-Addressing Emerging Zoonotic Diseases through a One Health Approach: Challenges Opportunities

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ABSTRACT

One Health is a comprehensive approach that addresses the interconnected well-being of individuals, animals, and ecosystems, recognizing the interdependence of human, animal, and environmental health. Emerging zoonotic diseases, such as Anthrax, Rabies, Brucellosis, Q Fever, West Nile Virus, Lyme Disease, Leishmaniasis, and coronaviruses like MERS-CoV and COVID-19, underscore the critical importance of adopting the One Health paradigm. These diseases pose significant threats to global health, with origins often traced to complex interactions between environmental factors, climate change, and human-animal interfaces. Each disease presents unique challenges, demanding a multidisciplinary One Health approach for effective prevention and control. Collaboration among veterinarians, physicians, researchers, policymakers, and communities is crucial. Notable successes, such as the substantial reduction of human rabies deaths in Iran and the successful One Health strategy implemented in India for controlling leishmaniasis, demonstrate the effectiveness of such holistic approaches. However, challenges persist, including weak laboratory capacity, limited resources, and legislative gaps. Successful prevention entails rapid disease detection, efficient surveillance, and collaboration across various sectors. Multifaceted collaboration is essential for research, vaccine development, and international information exchange to effectively mitigate the spread of infectious diseases.

Keywords: One Health, Zoonotic Diseases, Emerging Infectious Diseases, Multidisciplinary Collaboration, Disease Prevention

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1. INTRODUCTION

One Health encompasses a comprehensive and cohesive strategy that seeks to effectively manage and sustainably enhance the well-being of individuals, animals, and ecosystems. There is a recognition of the interconnectedness and interdependence between the health of humans, domestic and wild animals, plants, and the environment as a whole, which encompasses ecosystems (Adisasmito et al. 2022). This initiative aims to respond to the requirement for uncontaminated water, energy, and air, together with secure and healthy food, while alleviating the consequences of climate change and fostering sustainable development (Erkyihun et al. 2022). Many diseases have emerged because of the convergence of human, animal, and environmental factors, leading to a significant loss of life among newborns and adults daily. Specifically, respiratory and diarrheal disorders pose a significant threat in impoverished countries (Mazet et al. 2009). Aggarwal and Ramachandran (2020) claim that the occurrence and resurgence of infectious and non-infectious diseases can be attributed to the swift alterations in climate and environment. In recent decades, the advent of epidemics and outbreaks of novel infectious illnesses in humans originating from animal reservoirs has brought to light the potential public health risks associated with zoonoses (Rabozzi et al. 2012). The rise of diseases in South Asia can be attributed to various factors, including unsanitary circumstances, human-animal contact, porous borders, climatic change, behavioral changes, and improper food preparation and consumption habits (Dahal et al. 2017).

The recurrence of novel infectious diseases emphasizes the need to consider human, animal, and environmental health in disease prevention and control (Kelly et al. 2020). The highly pathogenic avian influenza and severe acute respiratory syndrome viruses have shown that biological agents and animal breeding practices can threaten public health. Leptospirosis, brucellosis, Nipah virus, and rabies are all endemic; these infectious agents can cause epidemics (Rabozzi et al. 2012; Ahmad M et al, 2023). Emerging infectious diseases (EIDs) originate from wild animal reservoirs under considerable anthropogenic stresses. Thus, the One Health technique has gained popularity in managing EIDs (Kelly et al. 2020). Academic institutions, the human and animal health industries, and other stakeholders are working together to promote this strategy to prevent and control emerging issues. The goal is to enhance interdisciplinary collaborations and communication across various healthcare domains, focusing on individuals, animals, and the environment. So, it is imperative to establish a strong and cohesive partnership among veterinarians, occupational health physicians, and public health experts (Rabozzi et al. 2012). Avoiding emerging illnesses is of utmost importance, as is establishing a specialized early warning system to predict the likelihood of an epidemic or detect the signs of its onset.

This chapter will focus on the prominent emerging zoonotic diseases, their impact, and the preventive actions to be taken, particularly emphasizing the One Health approach.

2. ANTHRAX

Anthrax is a significant zoonotic disease caused by *Bacillus anthracis* (Ahmed et al. 2010). This bacterium has the ability to produce durable spores that can persist in the environment for extended durations (Brossier et al. 2002). Anthrax primarily impacts herbivorous animals, including cattle, sheep, and goats

(Ndiva Mongoh et al. 2008; Goel 2015). However, it is essential to note that humans can also contract infections by touching animals or their derivatives that have been contaminated, such as wool, hides, or meat (Doganay and Metan 2009). Anthrax has been historically linked to human civilization.
The 1979 witnessed a significant anthrax outbreak in Sverdlovsk, USSR, presently known as Ekaterinburg, Russia. That outbreak resulted from an inadvertent release of anthrax spores into the atmosphere by a microbiology facility. At least 66 individuals perished, while over 100 individuals were afflicted by inhaling spores. In 2001, the United States observed an incident when anthrax was employed as a bioterrorism instrument. Numerous media organizations and government establishments were targeted, as they received letters via postal services that contained anthrax spores. According to (Jernigan et al. 2002), the attack led to the unfortunate demise of five individuals, while an additional 17 individuals were afflicted with the infection. According to (Ezhova et al. 2021), an anthrax outbreak occurred in 2016 within nomadic populations in northern Siberia, Russia. According to Ezhova et al. (2021), a total of 2,300 reindeer in the Yamalo-Nenets Autonomous Okrug perished due to anthrax infections. Anthrax is classified as an emerging disease due to its capacity to induce epidemics in regions where it is not naturally prevalent, particularly in the setting of bioterrorism or alterations in the environment. Anthrax has been identified on five out of the seven continents.
Anthrax is a public health concern because of its high mortality rate, potential for intentional release as a bioweapon, and impact on animal health and food security. Anthrax outbreaks have occurred in various regions, especially Africa and Asia, where livestock vaccination and surveillance are inadequate. Anthrax threatens human health when people contact infected animals, their products, or where spores are in the environment. A study shows that anthrax was endemic in Odisha, India, for many years. In 2021, a protocol was published describing One Health's approach to the elimination of human anthrax in this district by strengthening the health care and surveillance system for early reporting of suspected cases of human and animal anthrax, vaccinating livestock, improving hygiene practices in livestock production, raising awareness among the local population. In the first year of the study, the number of human anthrax cases decreased by 50%. Therefore, anthrax requires coordinated efforts from multiple sectors and disciplines to prevent, detect, and control the disease using a One Health approach (Bhattacharya et al. 2021).

3. RABIES

Rabies is a disease that can be transmitted from animals to humans by the bite of a dog, and it is still a major public health concern around the world, causing about 590,000 deaths each year (Taylor and Nel 2015). Rabies virus is a negative-stranded RNA virus that belongs to the *Rhabdoviridae* family and genus *Lyssavirus* (Dietzschold et al. 2008). Rabies can infect any warm-blooded species, while young animals and bats are more vulnerable than adults (Brunker et al. 2018). The virus is disseminated through the bite or contact with infected animals' saliva, albeit the virus loses its infectiousness when it dries (Yousaf et al. 2012). Rabies can also be spread through touch with nerve tissue or aerosol inhalation in bat caves (Gibbons et al. 2002). Few animals have been discovered as asymptomatic carriers, and humans can also carry the virus without showing symptoms for a certain period (Wu et al. 2009). Dog bite causes more than 95% of the cases; most animal cases are also observed in dogs (Campo et al. 2022). The prevalence of rabies is highest in Africa and Asia, where 95% of dog-mediated rabies occur. This is due to several factors, including the higher populations of free-roaming dogs in these regions, the lack of access to vaccination programs, the lack of awareness, and the cultural acceptance of dog-human contact (Rupprecht et al. 2022).

Rabies is a fatal viral disease that can be prevented by post-exposure prophylaxis (PEP). PEP is highly effective if it is started before the onset of symptoms in humans (Hampson et al. 2008). However, once symptoms of rabies develop, the disease is always fatal. Only six people in history have survived rabies after symptoms developed and have been injected with antiviral drugs and sedatives for more extended periods. These survivors all suffered significant brain damage (De Souza and Madhusudana 2014; Mani et al. 2019).

Rabies is a major public health problem in Iran, with an estimated 2000 human deaths per year. During 1994-2004, Iran took the initiative to control rabies by launching a national rabies control program. As part of the program, they vaccinated dogs and cats against rabies, reduced the number of stray dogs, and increased education about rabies prevention. The result was dramatic, where deaths decreased to 100 in 2004. This represents a 90% reduction in human rabies death (Abedi et al. 2019). Rabies is a severe disease, but it is preventable. Implementing initiatives like Zero Death by 2030 can help protect ourselves and our families from this deadly disease (WHO 2018).

4. BRUCELLOSIS

Brucellosis, a zoonotic bacterial disease, has been neglected in scientific and public health initiatives. An etiology of this condition can be attributed to a distinct strain of bacteria characterized by gram-negative properties, facultative intracellular behavior, absence of spore formation, lack of motility, and absence of a capsule (Ameen et al. 2023; Deb Nath et al. 2023). Various species of Brucella can cause brucellosis; *Brucella abortus* is the predominant cause of infection in animals; *B. melitensis* is the most frequently observed pathogen in humans; *B. melitensis*, *B. abortus, B. suis, and B. canis* are also known to cause infections in humans (Bardenstein et al. 2023). The Brucella genus presents a notable public health hazard and incurs considerable economic losses within the livestock sector (Ameen et al. 2023). The incidence of brucellosis exhibited variation contingent upon the occupational activities of individuals and the specific species of animals involved. According to Nasinyama et al. (2014), veterinarians, farmers, and laborers risk contracting brucellosis, an occupational hazard.

There is a dearth of comprehensive data regarding the prevalence and impact of brucellosis in South Asian nations. According to a study by Islam et al. (2013), the prevalence of brucellosis in livestock such as cattle, buffalo, goats, and sheep in Bangladesh varied between 3.6% and 7.3%. According to Suresh et al. (2022), the aggregate pooled prevalence of brucellosis throughout Asian and African nations was almost 8%. Additionally, the prevalence rate of brucellosis, specifically within India's cattle population, was 12%. Human brucellosis transmission is influenced by various risk factors, such as consuming unpasteurized dairy products or raw meat, unsafe hunting practices, occupational exposure, inadequate hygiene practices, environmental conditions, and demographic characteristics (Devi et al. 2021). Several factors contribute to the risk of animal brucellosis, including the acquisition of infected animals as replacements, the specific type of animal production, demographic variables such as age, sex, breed, herd size, and herd management practices, as well as regulatory considerations, climate conditions, and contact with wildlife (Khurana et al. 2021). The mortality rate associated with brucellosis is modest. The disease can have substantial economic implications, leading to reduced cattle productivity and trade limitations.

Adopting a One Health approach to effectively tackling the issues presented by brucellosis is essential. This method entails cooperation and coordination among the human, animal, and environmental health sectors to proactively address, identify, and effectively manage zoonotic illnesses like brucellosis. Implementing the One Health strategy represents a noteworthy progression in working brucellosis control in Sierra Leone (Suluku et al. 2019). This highlights the significance of actively participating in problemsolving methodologies. The potential for the One Health approach to facilitate identifying and reducing risk factors linked with the transmission of brucellosis is evident.

5. Q FEVER

Q fever was first discovered in 1935 in Queensland, Australia, during an outbreak of a febrile illness of unknown origin (Query fever) among abattoir workers (Hirschmann 2019). Q fever, a zoonotic disease, has become a significant public health concern in countries associated with the South Asian Association for Regional Cooperation SAARC (Siengsanan-Lamont and Blacksell 2021). One of the concerning aspects of this bacterium is its ability to survive in the environment for extended periods, which makes it highly resistant and a significant public health concern (Hadush et al. 2016). It is vital to address the presence of *Coxiella burnetii* to prevent the spread of Q fever and Coxiellosis. Q fever is primarily transmitted to humans through inhalation of aerosols from contaminated soil or animal waste (Anderson et al. 2013).
In SAARC-associated countries, where agriculture and livestock farming are prevalent, the risk of Q fever transmission from animals to humans is exceptionally high (Porter et al. 2011). The zoonotic impact of Q fever is significant. Infected animals shed *C. burnetii* in their birth products, urine, feces, and milk, and people can get infected by breathing in dust that these materials have contaminated (Berri et al. 2001).
The occurrence of Q fever is comparable among SAARC nations. The frequency of Q fever ranges from 0.1 to 0.5 cases per 100,000 individuals, and the prevalence varies from 0.005 to 0.02%. Living close to livestock can increase the risk of Q fever as it increases the likelihood of contact with the bacteria that causes the disease (Smit et al. 2012). A country's livestock prevalence is also a significant risk factor for Q fever, and a study in northeastern Thailand found that rice farmers with farm animals such as chickens and cattle had a higher prevalence of acute Q fever (Burns et al. 2023). Environmental factors also affect humans' risk of Q fever infection (Dorko et al. 2012). Warm weather with dry soils and a particular wind direction can increase the risk of exposure to the bacteria (Porter et al. 2011). Wind can carry dust particles in the air that bacteria can attach to, which can be inhaled by humans and animals nearby (Van Leuken et al. 2016) Found that soil texture, roughness elements, and vegetation density were essential predictors of Q fever incidence rate. Certain occupations, such as farmers, veterinarians, and abattoir workers, are at an increased risk of Q fever due to their close contact with livestock (Eastwood et al. 2018). People who process milk, such as dairy farmers and cheesemakers, are also at an increased risk of exposure to Q fever (Esmaeili et al. 2016). People who work in construction and disturb soil or rocks could be exposed to Q fever if the soil or rock contains bacteria. Through contact with infected animal feces, milk, urine, and birth products, Q fever-causing bacteria can be transmitted directly from animals to humans (Esmaeili et al. 2016). Older individuals, particularly men, are more frequently reported for Q fever cases (Maurin et al. 1999).
Limited information is available on whether any countries within SAARC tackle Q fever with an integrated movement. Instead, there are examples of countries in the Asia-Pacific region that have implemented community engagement with a multidisciplinary group of people to fight against Q fever. For instance, in Thailand, Malaysia, Singapore, and Japan, vaccine development was stimulated by the extent and impact of seasonal outbreaks of enteroviruses, including Q fever. Government prioritization and support in some countries facilitated vaccine development. Advocates, funders, technical supporters, and trainers work hard in South Asia to promote One Health research, training, and government support (Cleaveland et al. 2017).

6. WEST NILE VIRUS

The West Nile virus is a flavivirus transmitted to humans through mosquito bites, which can cause various illnesses ranging from mild to severe (Sampathkumar 2003). It belongs to the *Flaviviridae* family, including other viruses such as dengue, yellow fever, and Zika (Sips et al. 2012). The West Nile virus was initially identified in 1937 after being isolated by a woman residing in the West Nile district of Uganda. However, it wasn't until 1999 that the virus was first detected in New York City, signifying its appearance in the Western Hemisphere (Islam et al. 2020). Since then, WNV has spread to every state in the United States and numerous other countries worldwide, including Canada, Mexico, and SAARC-associated nations, except for Bhutan (David and Abraham 2016).

These mosquitoes become infected by feeding on the blood of birds carrying the virus and then transferring it to uninfected birds during their feedings (Sbrana et al. 2005). Although dogs, cats, and bats can contract the virus, they are not significant carriers of the disease, and researchers consider them incidental hosts (Reed et al. 2003). A person can acquire the West Nile virus without exhibiting any symptoms. Some individuals may experience mild symptoms such as fever, headache, body aches, nausea, vomiting, and occasionally a skin rash on their torso (Sampathkumar 2003). Unfortunately, in rare instances, West Nile virus can lead to severe neurological diseases like encephalitis or meningitis, which can cause paralysis, a coma, and even death (Sips et al. 2012).

The Centers for Disease Control and Prevention in the United States has implemented integrated mosquito control programs to reduce the risk of West Nile virus. The programs use Integrated Pest Management strategies, including surveillance, source reduction, larval control, and adult mosquito control (Cleaveland et al. 2017). Thailand, Bhutan, India, Pakistan, and Sri Lanka have all implemented several measures to prevent this disease, including raising awareness of the disease through public education campaigns, conducting surveillance for West Nile virus cases, implementing vector control measures, such as mosquito spraying, and vaccinating livestock against this virus (Tshokey et al. 2017; Ullah et al. 2022).

7. LYME DISEASE

Lyme disease is a significant emerging infectious disease most frequently found in North America and Europe (Steere et al. 2016), but is also present in some regions of Asia (Mead 2015). Although the disease has primarily been recorded in temperate areas, the incidence has increased globally due to increased travel and shifting vector habitats (Sharma et al. 2017).

Lyme disease is the most prevalent vector-borne disease in the temperate areas of the northern hemisphere. Europe reports about 85000 instances a year, according to estimates based on national statistics. However, this number needs to be more accurately stated because case reporting is so uneven in Europe, and so many Lyme infections go undetected. Between 15000 and 20,000 cases are reported annually in the United States, and the disease is endemic in 15 states (Lindgren et al. 2006).

The sole pathogen that causes Lyme disease in the United States is the spirochete *Borrelia burgdorferi*. However, besides B *burgdorferi*, other closely related species, such as *Borrelia afzelii* and *Borrelia garinii,* cause Lyme disease in Europe and Asia. These bacteria are spread throughout the United States by hard-bodied ticks, such as *Ixodes pacificus* on the Pacific Coast and *Ixodes scapularis* in the East and Midwest. *Ixodes ricinus* and *Ixodes persulcatus* are vectors in Europe and Asia (Shapiro 2009).

Ticks have become more common and expanded to higher latitudes and elevations over the past few decades. It has been demonstrated that changes in tick density and dispersion are related to climatic changes. Lyme disease cases and other tick-borne illnesses have also grown during the same period. This might result from improved reporting over time in some regions (Lindgren et al. 2006).

To control the disease, The World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), and the World Organization for Animal Health have joined forces to assist surveillance for tick-borne diseases by adopting the "One Health" concept (Johnson et al. 2022). In the

UK, the Human-Animal-Infections and Risk-Surveillance (HAIRS) group and the Veterinary Risk Group play a role in determining research ideas, suggesting interventions, and determining disease risk to control the disease (Yamada et al. 2014). According to a One Health approach, national coordination and reporting of tick-borne diseases produces national-level indicators to support an evidence base for policy and influencing international organizations. This data should be included in federal and local multisectoral coordination of tick-borne disease control since it is pertinent to community needs, priorities, and capabilities.

8. LEISHMANIASIS

An intercellular parasite, *Leishmania,* causes leishmaniasis. The *Leishmania* parasite is primarily transmitted by sandflies and is considered a tropical and subtropical disease (Torres-Guerrero and Arenas, 2018). Leishmaniasis is one of the seven most significant tropical diseases, according to the WHO, and it poses a severe threat to global health due to its wide range of potential clinical symptoms (Torres-Guerrero et al. 2017).

Leishmaniasis affects 89 countries worldwide, and Asia, Africa, the Americas, and the Mediterranean are endemic regions (Crecelius et al. 2021). Almost 350 million people globally are susceptible to getting the disease. An estimated 1.5 to 2 million new cases are reported yearly, resulting in 70,000 mortalities (Kashif et al. 2017).

Two types of Leishmaniasis are observed: cutaneous leishmaniasis and visceral leishmaniasis. The estimated annual incidence of cutaneous leishmaniasis ranged from 700,000 to 1.2 million or more, and visceral leishmaniasis has dropped to 100,000 from earlier estimates of 400,000 or more cases (CDC 2020).

Leishmania transmission occurs at the point where the parasite, vector, and host intersect, and it depends on a dynamic multifactorial process that is influenced by each of these three (Dostálová and Volf 2012).

Leishmania parasites, from amastigotes to infectious metacyclic promastigotes, grow inside the digestive tract of the sandfly. The sandfly is contagious and can spread parasites as it tries to consume more blood (Abdeladhim et al. 2014). These parasites are laid in groups as well. Several groups have shown vector-derived components with sandfly and Leishmania origins throughout the past few decades (Rohoušová and Volf 2006).

Geographically, leishmaniasis affects 88 nations, with 60% of illness foci in specific regions of Bangladesh, India, and Nepal. In 2001 and 2002, respectively, it was anticipated that there would be 15,000 and 11,000 new leishmaniasis cases in India annually. There are 30,000 cases annually in Bangladesh and 1850 in Nepal (Mannan et al. 2021). An initiative aimed at eliminating leishmaniasis was started by the governments of India, Bangladesh, and Nepal to bring the annual incidence down to less than 1/10,000 of the population. In India, to prevent leishmaniasis, they followed a strategy: Development of sensitive tools for early diagnosis and monitoring infections, improving treatment strategy to prevent drug resistance, Strengthening the VL surveillance program, development of transmission dynamic modeling and spatial risk map, improvement of integrated vector management, Community engagement, and participation (Sundar et al. 2018). The proactive case detection, efficient management, and vector control strategies used in controlling and eliminating leishmaniasis aim to reduce morbidity, mortality, and disease transmission (Palatnik-De-Sousa and Day 2011).

Interdisciplinary teams comprising microbiologists, parasitologists, entomologists, ecologists, epidemiologists, immunologists, veterinarians, public health officials, and human physicians will primarily be required to control leishmaniasis effectively. More importantly, the One Health strategy satisfies infection control and surveillance needs.

9. MERS-COV AND COVID-19

Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and Coronavirus Disease 2019 (COVID-19)) are two significant zoonotic diseases caused by coronaviruses (Haider et al. 2020; WHO 2022). Both diseases have gained global attention due to their potential to cause severe respiratory illnesses in humans.

The MERS-CoV was identified for the first time in Saudi Arabia in June of 2012 and is classified as a beta coronavirus (Killerby et al. 2020). Several SAARC countries have reported cases of MERS-CoV, with Saudi Arabia being the most affected. Other countries reporting cases include the United Arab Emirates, Qatar, Oman, Jordan, and Yemen (WHO 2022).

The COVID-19 pandemic emerged in Wuhan, China, in late 2019. It rapidly became a global pandemic, causing millions of infections worldwide. On January 30, 2020, WHO designated it a Public Health Emergency of International Concern, and on March 11, 2020, it was classified as a pandemic.

COVID-19 has had a significant impact worldwide, including in SAARC countries. As of May 10, 2021, the SAARC region was responsible for 25.26 million (15.83%) COVID-19 cases and 0.29 million (8.69%) COVID-19 deaths globally (Salman et al. 2022). Until October 24, 2020, Nepal had the highest prevalence of COVID-19 among SAARC member states, followed by the Maldives, Sri Lanka, India, Bangladesh, Pakistan, and Afghanistan (Saha et al. 2021). India, Pakistan, and Bangladesh have had the highest burden of reported COVID-19 infections in South Asia (Khan et al. 2021). Bangladesh had the highest daily case fatality rate among SAARC member states until October 24, 2020, followed by Afghanistan, India, Sri Lanka, Pakistan, Nepal, and the Maldives, where India has the highest mortality rate per million people (Saha et al. 2021).

The emergence of the COVID-19 pandemic has prompted the establishment of novel One Health coordination initiatives within the United States government. Notably, the One Health Federal Interagency Coordination Committee has been formed to facilitate the convergence of public health, animal health, and environmental authorities from over 20 federal agencies (CDC 2023).

Prevalence, risk factors, and epidemiological data are essential for developing successful preventative and control strategies. It is crucial to embrace the "One World, One Health" ideology at both global and local scales to mitigate the potential occurrence of pandemics like MERS-CoV and COVID-19, given the exponential growth of the worldwide population and urbanization trends (Jorwal et al. 2020).

10. Challenges and Collaboration areas Of Multidisciplinary Sectors In The Prevention And Control Of Eids

The significant challenges of the One Health approach include weak laboratory capacity, human resources limitations, weak surveillance mechanisms, legislation deficiencies, and conflict in prioritizing emerging zoonotic diseases due to lack of data hindering One Health's sustainability. Therefore, the lack of a single entity, budget authorization, and reliable data on disease burden and risk factors hinder collaboration between animal and human health (WHO 2020). Thus, South Asian countries must demonstrate leadership, network, political backing, and need-based funding to institutionalize One Health. Taking a multidisciplinary approach, including various sectors and organizations, is essential to handle the complexity of preventing and managing emerging infectious diseases. The first and most key step in controlling outbreaks is quickly discovering and identifying novel conditions. The development of efficient surveillance systems and diagnostic tools necessitates collaboration among medical specialists, epidemiologists, and data scientists.

Furthermore, the successful implementation of efficient preventative measures and public health initiatives requires collaboration among healthcare professionals, policymakers, and communication specialists to distribute precise information and encourage general compliance effectively. Furthermore, research institutions, pharmaceutical companies, and regulatory agencies must collaborate to enhance the efficiency of vaccination and treatment development processes. Moreover, the interdependence of worldwide travel and trade necessitates international collaboration and the exchange of information across many nations and organizations to effectively mitigate the transmission of contagious illnesses across national boundaries.

Lastly, NGOs, governments, and humanitarian organizations must collaborate to develop a vital healthcare infrastructure in low-resource areas. Engaging in multidisciplinary collaboration can enhance our collective ability to address the problems, strengthening our capability to combat emerging infectious diseases and protect world health.

11. CONCLUSION

In the fight against emerging infectious diseases, the 'One Health' strategy emphasizes the interconnection of human, animal, and environmental health. The highlighted diseases illustrate the significance of interdisciplinary collaboration among specialists, including medical professionals, researchers, veterinarians, policymakers, and others. The benefits of collective action are enormous despite obstacles like a lack of resources and data. Collaborative efforts can make early identification, significant research, public awareness campaigns, worldwide coordination, and improved healthcare infrastructure possible. In a world continuously transforming, the One Health concept has become more crucial in mitigating the risks associated with emerging infectious diseases and safeguarding the well-being and security of communities.

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