Emerging zoonotic infectious diseases: a folly of human development

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Abstract

The accelerated pace at which human development has been set into has resulted into fast-tracking the emergence of novel diseases that affect both humans and animals. One of these is the emergence of infectious zoonotic diseases that have threatened human health since time immemorial. The emergence of Highly Pathogenic Avian Influenza (HPAI) H5:N1 from poultry in 2002, Severe acute respiratory syndrome coronavirus (SARS-CoV) from civets and bats in 2003, Middle East Respiratory Syndrome coronaviruses (MERS-CoV) from camelids in 2014, and most recently in SARS-CoV 2 or COVID-19, which reportedly came from bats, should serve as lessons that should be taken seriously. Factors that have resulted in the emergence of these illnesses include, but are not limited to, environmental destruction, illegal wildlife trade, and increasingly intensive livestock and poultry production. It is high time that humans look into efforts that prevent the emergence of these illnesses, rather than simply managing their effects. Addressing the problem through the lens of One Health is the way to go.

Keywords: COVID-19; Emerging Infectious Diseases; MERS-CoV; Zoonotic Diseases

Introduction

The accelerated pace at which human development has been set into has resulted into fast-tracking the emergence of novel diseases that affect both humans and animals (Goenka & Liu, 2020). Hence, it is not a surprise that every decade since the turn of the millennium has been marked by devastating infectious illnesses that had roots in the abuse of the environment, wildlife, and food animals: Highly Pathogenic Avian Influenza (HPAI) H5:N1 in 2004, Severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003, H1:N1 Swine Flu in 2009;Middle East Respiratory Syndrome coronaviruses (MERS-CoV) in 2014, and most recently SARS-CoV 2 or COVID-19 (Bonilla-Aldana et al., 2020; Oboho et al., 2015; Spencer et al., 2021). This paper will succinctly discuss emerging zoonotic infectious diseases, factors that may have influenced their emergence as illnesses, and the importance of viewing these health issues thru the lens of One Health.

Emerging Zoonotic Infectious Diseases

Infectious diseases are illnesses that are caused by agents that are transmissible from an infected person, animal or through fomites to a susceptible host. Infectious agents that cause these illnesses include viruses, bacteria, fungi, and parasites (i.e., protozoans and helminths) (Oeschger et al., 2021; Tenorio and Molina, 2021a&b). However, there are also unconventional etiologic agents like prions (i.e., infectious proteins) that causes spongiform encephalopathy (Levkovich et al., 2021). These diseases may be transmitted through the air, via aerosols, through direct contact, fomites, vehicled by food, through blood transfusion or via arthropod vectors (Tenorio and Flores, 2021; Greenhalgh et al., 2021; Athni et al., 2021). A subcategory of infectious diseases is emerging infectious diseases (EIDs). EIDs are newly discovered transmissible maladies or are infectious illnesses that have been previously reported but have since re-emerged with increasing incidence within a population in a geographical area (Frutos et al., 2021; Van Oosterhout, 2021). It has been estimated that about 75% of emerging infectious disease are zoonotic in nature – transmitted from animals to humans and vice versa (Taylor et a., 2001). Therefore, an important touchpoint in this discussion are emerging zoonoses. The five infectious diseases mentioned in the introduction that have grappled humanity are emerging zoonoses: H5:N1 HPAI from poultry, SARS-CoV from "civets and bats", H1:N1 Swine Flu from pigs, MERS-CoV from camelids, and SARS-CoV-2 allegedly from "civets and bats" (Bonilla-Aldana et al., 2020; Spencer et al., 2021; Platto et al., 2021). It has been posited that about one billion people worldwide succumb and die due to zoonotic diseases (Espinosa et al., 2020).

Some factors affecting the emerging zoonotic infectious diseases

A number of factors may have contributed to the emergence of zoonotic infectious diseases. Increased human encroachment in environments that were supposed to be wildlife habitats has led to the former being exposed to pathogens that originate from the latter animals (Barbier, 2021; Bezerra-Santos et al., 2021). Similarly, destruction of the environment and disruption of ecosystems to give way for infrastructure and economic gain has resulted to wildlife movements towards human settlements further increasing exposure risks. Illegal wildlife trade should also be noted in this discussion. These phenomena result to zoonotic spillover events (Williams et al., 2021). The previously mentioned zoonotic infectious diseases caused by Alpha coronaviruses and the extent of the devastation they have caused are testaments to the catastrophic results of wildlife zoonotic spill overs. Another perspective worthy of examination in the emergence of zoonotic diseases is the intensive production methods for food animals that have been put into place to feed the earth's growing human population (Ferreira et al., 2021; Gong et al., 2021). Intensive rearing of livestock that involve increasing densities of animals raised in confined spaces enable the spread of animal diseases at a faster pace. The high probabilities of rapid disease transmission in these animals become a grave concern when zoonotic infectious diseases are the ones wreaking havoc. The H5:N1 avian influenza outbreak in Asian countries in the early 2000s nearly crippled their growing agricultural economies (Chowdhury et al., 2020; Spencer et al., 2021). Hence, zoonotic infectious diseases like H5:N1 HPAI have disastrous effects on the animal production perhaps due to the control and elimination efforts that are enacted to control it (e.g., strict quarantine measures, stamping out programs, zoning, and trade restrictions). Risky agricultural practices, including increasingly intensive livestock and poultry production, account for more than 50% of the zoonotic infectious diseases that have decimated the human populace (Rohr et al., 2019). Therefore, the deleterious effects of zoonotic infectious diseases of livestock origin should be considered both as a human health hazard and as an agricultural production problem when crafting regional and national development policies.

Figure 1. The three pillars of One Health and important global health outcomes within them.

Conclusions

The emergence of zoonotic infectious diseases is everyone's concern. The fate of humanitylies on how well we address the continuing emergence of pathogens that threaten our lives, health, and livelihood. The COVID-19 pandemic nearly crippled our world and our very existence. We were put in the very uncomfortable situation of looking at the effects of human environmental destruction and its dire effect on health without rose-colored glasses. Therefore, it is high time that humans look into efforts that prevent the emergence of these illnesses, rather than simply managing their effects. Addressing the problem through the lens of One Health is the way to go (Figure 1). The interconnections between human, animal, and environmental health should never be neglected and must be put into prime consideration in regional, national and international human development policies and thrusts. Through One Health, addressing issues that provide the catalysis for the emergence of zoonic infectious diseases in the human – animal - environment interfacewill have lasting benefitsin promoting global health in the long run.

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Conflict of Interest

No conflict of interest to declare.

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