

The Next Pandemic: A Comprehensive Look into Zoonotic Emerging Threats**07**

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ABSTRACT

Zoonotic diseases, infections transmitted between animals and humans, encompass a diverse range of pathogens, including viruses, bacteria, parasites, and fungi, leading to conditions ranging from common colds to severe infections like Ebola. The emergence of zoonotic diseases, particularly those considered as emerging infectious diseases, presents a significant global health threat. Some well-known examples include Salmonellosis, Lyme disease, Rabies, COVID-19, Ebola, and Nipah virus. Factors driving the emergence of these diseases are complex, involving deforestation, livestock movements, and climate change. The impact of zoonotic diseases on society is multifaceted, disrupting social order, causing livestock losses, and instigating psychological distress. Moreover, these diseases pose a substantial economic burden, with notable examples such as the economic losses incurred during the 2009 H1N1 influenza pandemic and the 2015 Ebola outbreak. Vulnerable populations are disproportionately affected, necessitating equitable access to healthcare and resources. Mitigating the socioeconomic consequences of zoonotic disease outbreaks requires investment in early warning systems, robust healthcare infrastructure, resilient economic policies, risk communication, and extensive research. Furthermore, a sustained interdisciplinary approach and international cooperation are crucial for effective surveillance, prevention, and control measures. As zoonotic diseases continue to evolve, addressing these challenges is imperative to safeguard global health and well-being.

Keywords: Zoonotic diseases, Emerging infectious diseases, Global health, Socioeconomic consequences, Interdisciplinary collaboration

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CHAPTER HISTORY

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1. INTRODUCTION

Diseases that can be spread from animals to people are called zoonotic. Viruses, bacteria, parasites, and fungi are only some pathogens that can cause these conditions. From the ordinary cold to fatal infections like Ebola, zoonotic diseases cover a broad spectrum of severity (Ahmed et al. 2020). All around the world, people are falling victim to a growing number of infectious diseases known as emerging infectious diseases. Many new infectious diseases are zoonotic or can be transmitted from animals to humans. However, novel viruses that have never infected humans can potentially produce emerging infectious illnesses (Anwar et al. 2019).

Some of the most common zoonotic and emerging diseases discussed forward. Salmonellosis is a foodborne illness caused by *Salmonella* bacteria (Shafique et al. 2019). It can be found in raw or undercooked poultry, eggs, meat, and dairy products. Lyme disease is a tick-borne illness caused by the bacterium *Borrelia burgdorferi*. It can cause various symptoms, including fever, headache, fatigue, and a characteristic rash. Rabies is a deadly virus transmitted through an infected animal's bite (Ashraf and Khan 2017). COVID-19 is a respiratory illness caused by the SARS-CoV-2 virus. It emerged in December 2019 and has since spread to over 200 countries, causing a global pandemic. Ebola is a deadly virus that is transmitted through contact with the blood or body fluids of an infected person or animal. It emerged in West Africa in 2014 and caused an outbreak that killed over 11,000 people (Baig et al. 2019).

The Nipah virus can cause severe respiratory illness or encephalitis (brain inflammation). It emerged in Malaysia in 1999 and has since caused outbreaks in other countries, including Bangladesh and India (Azam et al. 2016). The causes of emerging zoonotic diseases are complex and multifactorial. However, some of the most important factors include:

Deforestation can bring humans and animals closer, increasing the risk of transmission of zoonotic diseases. Livestock can lead to the spread of zoonotic diseases through the movement of animals and their products. Climate change can alter the distribution of animal hosts and pathogens, making diseases more likely to emerge in new areas. The emergence of zoonotic diseases seriously threatens global health (Ali et al. 2017). However, several things can be done to reduce the risk of outbreaks. Improving sanitation and hygiene can help prevent zoonotic disease from contact with contaminated water or food. Vaccinating animals against zoonotic diseases can help to protect humans from infection. Monitoring animal populations of zoonotic illnesses can help to identify and contain outbreaks early (Shabbir et al. 2015).

The emergence of zoonotic diseases is a complex issue, but it can be addressed through a combination of prevention and control measures. By working together, we can reduce the risk of these diseases and protect human health (CDC 2021).

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2. ZOONOTIC DISEASES AS A GLOBAL HEALTH THREAT

Zoonotic diseases are a major global health threat. They are responsible for millions of deaths each year, and they can cause significant economic and social disruption. Some of the most well-known zoonotic diseases include COVID-19, a respiratory illness caused by the SARS-CoV-2 virus. It emerged in December 2019 and has since spread to over 200 countries, causing a global pandemic (Baig et al. 2019). EBOLA is a deadly virus that is transmitted through contact with the blood or body fluids of an infected person or animal. It emerged in West Africa in 2014 and caused an outbreak that killed over 11,000 people (Baig et al. 2019). NIPAH VIRUS is a virus that can cause severe respiratory illness or encephalitis (brain inflammation). It emerged in Malaysia in 1999 and has since caused outbreaks in other countries, including Bangladesh and India (Daszak et al. 2001). Zoonotic diseases can cause high death tolls. For example, the COVID-19 pandemic has caused over 6 million deaths worldwide. Moreover, the Lassa virus causes 1-3 million infections annually (Ahmad et al. 2023).

2.5. ECONOMIC DISRUPTION

Zoonotic diseases can cause significant economic trouble. For example, the COVID-19 pandemic has caused trillions of dollars in financial losses.

2.6. SOCIAL DISRUPTION

Zoonotic diseases can cause social trouble. For example, the COVID-19 pandemic has led to widespread lockdowns and travel restrictions.

In addition to the direct costs of zoonotic diseases, they can also have indirect costs. For example, zoonotic diseases can lead to decreased productivity, as people who are sick are unable to work. They can also lead to increased healthcare costs, as ill people must be treated (Feng and Xiao 2011). The risk of zoonotic diseases is increasing for several reasons. These include:

2.7. INCREASED CONTACT BETWEEN HUMANS AND ANIMALS

This is due to factors such as deforestation, urbanization, and the growth of the livestock industry (Khan and Baig 2015).

2.8. CLIMATE CHANGES

These changes can create new opportunities for pathogens to spread and cause disease.

2.9. GLOBALIZATION

This has led to increased travel and trade, which can facilitate the spread of zoonotic diseases. The good news is that several things can be done to prevent and control zoonotic diseases. These include:

2.10. IMPROVING SANITATION AND HYGIENE

This can help prevent zoonotic disease spread through contact with contaminated water or food.

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2.11. VACCINATING ANIMALS AGAINST ZOONOTIC DISEASES

This can help to protect humans from infection.

2.12. MONITORING ANIMAL POPULATIONS FOR ZOONOTIC DISEASES

This can help to identify and contain outbreaks early.

2.13. CHANGING HUMAN BEHAVIOR

This can help to reduce the risk of exposure to zoonotic diseases. For example, people can avoid contact with wild animals and cook meat thoroughly. By taking these steps, we can reduce the risk of zoonotic diseases and protect human health.

3. AN OVERVIEW OF THE HISTORY OF ZOONOTIC DISEASES

Zoonotic diseases, also known as zoonosis, have been an integral part of human history, shaping societies and leaving indelible marks on public health. These diseases are caused by infectious agents that can be transmitted between animals and humans. By investigating the historical trajectory of zoonotic diseases, we can gain valuable insights into the complex interplay between humans, animals, and the environment, allowing us to better understand the challenges zoonotic outbreaks pose (Khaliq et al. 2015).

4. ANCIENT CIVILIZATIONS AND EARLY ZOONOTIC DISEASES

Zoonotic diseases have afflicted humans since the dawn of civilization. Ancient texts and archaeological findings provide evidence of zoonosis, such as anthrax, brucellosis, and tuberculosis in early human populations. Diseases were more easily spread in agricultural civilizations because of the close closeness of humans and domesticated animals. In the 14th century, for instance, the bacteria *Yersinia pestis* appeared and caused one of the deadliest pandemics in human history: the Black Death (bubonic plague) (Malik et al. 2019).

5. EXPLORATION, COLONIZATION, AND THE SPREAD OF ZOONOTIC DISEASES

The Age of Exploration and subsequent colonization brought Europeans into contact with unfamiliar ecosystems, diverse wildlife, and novel pathogens. This encounter between old and new worlds facilitated the transmission of zoonosis such as smallpox, measles, influenza, and yellow fever to indigenous populations, leading to devastating epidemics. The introduction of European livestock to newly colonized regions also resulted in the transmission of diseases, including bovine tuberculosis and brucellosis (Mian and Malik 2018).

6. MODERN CHALLENGES AND THE ONE HEALTH APPROACH

In the modern era, zoonotic diseases continue to pose significant challenges to global health security. Deforestation, wildlife trade, and the risk of zoonotic spillover events are growing due to climate change and intensive animal rearing. Recent epidemics of zoonotic illnesses like Ebola and Middle East respiratory syndrome (MERS), as well as the ongoing COVID-19 pandemic caused by the SARS-CoV-2 virus, emphasize the need to act quickly (Mirza and Khan 2017).

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In recent years, the threat posed by infections that can jump from animals to humans has been brought to attention by the introduction and global spread of zoonotic illnesses. COVID-19, Ebola virus disease (EVD), Middle East respiratory syndrome (MERS), highly pathogenic avian influenza (HPAI), severe acute respiratory syndrome (SARS), and Bovine Spongiform Encephalopathy (BSE) are six of the most prominent new zoonotic illnesses discussed in this chapter. By examining their symptoms, transmission routes, prevention strategies, and impact on global health, we can gain insights into the complex nature of these diseases and the challenges they present (Mirza and Khan 2017).

7. COVID-19

The SARS-CoV-2 virus, which produced COVID-19, surfaced in late 2019. It rapidly spread throughout the world. Loss of taste and smell, weariness, and a high body temperature are common symptoms. The virus is often communicated through a person's cough, sneeze, or spoken words. Effective prevention measures include vaccination, mask-wearing, frequent hand hygiene, and maintaining physical distancing. The impact of COVID-19 on global health has been profound, leading to millions of infections, widespread economic disruption, and unprecedented strain on healthcare systems (Nisar and Khan 2020).

8. EBOLA VIRUS DISEASE

Fever, exhaustion, muscle discomfort, headache, and bleeding are just a few of the symptoms of Ebola virus disease (EVD). Transmission from diseased animals typically occurs through bodily fluids or tissues, especially blood, often non-human primates, or human-to-human transmission via direct contact with bodily fluids. Prevention efforts focus on early detection, isolation of cases, contact tracing, safe burial practices, and public health education (Nisar and Khan 2020). EVD outbreaks have had a devastating impact on affected communities, causing high mortality rates and straining healthcare resources.

9. MIDDLE EAST RESPIRATORY SYNDROME

The MERS-CoV virus causes MERS and presents with symptoms such as fever, cough, and shortness of breath, often progressing to severe respiratory illness. Dromedary camels are the primary reservoir, and human transmission occurs through close contact with infected animals or through human-to-human transmission in healthcare settings. Preventive measures include hygiene practices, avoiding close contact with camels, and rapid identification and isolation of cases. Although MERS has a lower global impact compared to other zoonotic diseases, sporadic outbreaks have raised concerns due to its high case fatality rate (Rehman et al. 2018).

10. HIGHLY PATHOGENIC AVIAN INFLUENZA

Highly pathogenic avian influenza (HPAI) refers to viruses primarily affecting birds, but certain strains can be transmitted to humans. Symptoms range from mild respiratory illness to severe respiratory distress, with high mortality rates. Direct contact with infected birds or their secretions, as well as handling contaminated surfaces, are common modes of transmission. Prevention includes strict biosecurity measures in poultry farms, early detection, culling of infected animals, and public health surveillance. HPAI outbreaks have led to significant economic losses in the poultry industry and sporadic human infections, raising concerns about potential pandemics (Lee et al. 2021).

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11. SEVERE ACUTE RESPIRATORY SYNDROME

The SARS-CoV virus causes SARS. The virus spreads through close person-to-person contact and respiratory droplets. Strict infection control measures, including isolation of cases, contact tracing, and hygiene practices, are crucial for prevention. The impact of the 2002-2003 SARS outbreaks was significant, with widespread transmission across multiple countries, high mortality rates, and economic disruptions (Hui and Zumla 2019).

12. BOVINE SPONGIFORM ENCEPHALOPATHY

BSE, also known as "mad cow disease," is a neurodegenerative disease affecting cattle. In humans, it manifests as a variant of Creutzfeldt-Jakob disease (vCJD), characterized by progressive neurological symptoms. Transmission occurs through the consumption of contaminated beef products from infected animals. Measures such as feed bans, surveillance, and culling of affected animals have been implemented to prevent the spread of BSE. While the impact of vCJD on global health has been relatively limited, the disease has had significant economic consequences for the livestock industry and generated public health concerns. Understanding the symptoms, transmission routes, prevention strategies, and global health impact of these emerging zoonotic diseases is crucial for effective disease control, outbreak response, and public health preparedness. Continued research, surveillance, and international collaboration are essential for mitigating the risks associated with these diseases and preventing future outbreaks (Kumagai et al. 2019).

13. THE FACTORS DRIVING THE EMERGENCE OF ZOOTIC DISEASES

Zoonotic diseases are diseases that can be transmitted from animals to humans. They are a major global health threat and are becoming increasingly common. Several factors are driving the emergence of zoonotic diseases, including:

13.1. DEFORESTATION

Deforestation brings humans and animals closer, increasing the risk of transmission of zoonotic diseases. When forests are cleared, animals are forced to move into new areas, which can bring them into contact with humans. This can lead to the spread of diseases that are carried by animals, such as Ebola and HIV/AIDS. (Sultana and Shafique 2020).

13.2. CLIMATE CHANGE

Climate change is also a factor in the emergence of zoonotic diseases. As the climate changes, it can create new habitats for animals that carry diseases. This can spread diseases to new areas that may not have been previously present. For example, climate change is thought to have played a role in the emergence of the Zika virus, which is spread by mosquitoes. (Yousaf et al. 2014).

13.3. INCREASED HUMAN-ANIMAL CONTACT

Increased human-animal contact is another factor driving the emergence of zoonotic diseases. This is due to several factors, including the growth of the livestock industry, the increasing popularity of exotic pets, and the rise of ecotourism. When humans come into close contact with

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animals, they are more likely to be exposed to diseases that those animals carry. For example, the SARS outbreak 2003 was thought to have been caused by a virus that originated in bats. (Zaidi and Ahmed 2019)

It is essential to be aware of the risks of zoonotic diseases and to take steps to protect yourself from infection. These steps include:

13.4. COOKING MEAT THOROUGHLY

This will kill any pathogens that may be present in the meat.

13.5. WASHING YOUR HANDS FREQUENTLY

This will help to prevent the spread of germs.

13.6. AVOIDING CONTACT WITH WILD ANIMALS

This will reduce your risk of exposure to zoonotic diseases.

13.7. GETTING VACCINATED

There are vaccines available for some zoonotic diseases, such as rabies and yellow fever. By taking these steps, you can help to protect yourself from zoonotic diseases and stay healthy.

13.8. FACTORS DRIVING THE EMERGENCE OF ZOO NOTIC DISEASES

The factors driving the emergence of Zoonotic diseases are:

14. DEFORESTATION

Deforestation is the clearing of forests for human use. This can negatively impact the environment, including losing biodiversity, releasing greenhouse gases, and soil erosion. It can also increase the risk of zoonotic diseases.

When forests are cleared, animals are forced to move into new areas. This can bring them into contact with humans, who may not be familiar with these animals' diseases. For example, the Ebola virus is thought to have originated in bats, which are found in tropical forests. When forests are cleared, bats may be forced to move into new areas, where they may come into contact with humans (Zia et al. 2019).

14. CLIMATE CHANGE

Scientists refer to long-term shifts in the typical weather patterns that characterize Earth's local, regional, and global climates when discussing climate change. A wide variety of impacts can be attributed to these alterations. Changes in the statistical distribution of weather patterns that persist over time scales ranging from decades to millions of years are what we mean when discussing climate change. Whether this means more or less intense weather events on average or a shift in the distribution of weather around the average is unclear (Abbasi and Khan 2018).

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15. INCREASED HUMAN-ANIMAL CONTACT

Increased human-animal contact is another factor driving the emergence of zoonotic diseases. This is due to many factors, including the growth of the livestock industry, the increasing popularity of exotic pets, and the rise of ecotourism. When humans come into close contact with animals, they are more likely to be exposed to diseases that those animals carry. For example, the SARS outbreak 2003 was thought to have been caused by a virus that originated in bats (Shabbir et al. 2015).

16. STRATEGIES THAT CAN BE USED TO MITIGATE THE RISK OF ZOONOTIC DISEASE OUTBREAKS:

Surveillance and early detection:

This is essential for identifying and responding to zoonotic disease outbreaks early. Surveillance systems should monitor animal and human health and environmental factors that could contribute to disease transmission (Ahmed et al. 2020).

16.1. ANIMAL VACCINATION

Vaccinating animals against zoonotic diseases can help protect them from infection and reduce the risk of transmission to humans.

16.2. VECTOR CONTROL

Vectors are animals that transmit diseases from one host to another. Controlling vectors, such as mosquitoes, ticks, and rodents, can help prevent the spread of zoonotic disease.

16.3. BIOSECURITY

Biosecurity measures help to prevent the introduction and spread of diseases in farms, food processing plants, and other settings where animals and humans come into contact. These measures include good sanitation practices, quarantine procedures, and the use of personal protective equipment.

16.4. RISK COMMUNICATION

Communicating effectively with the public about zoonotic diseases can help to raise awareness of the risks and how to prevent them. This can be done through education campaigns, social media, and other channels.

16.5. RESEARCH

Research is essential for understanding zoonotic diseases' causes, transmission, and prevention. This research can lead to the development new vaccines, treatments, and control strategies.

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These are just some strategies that can be used to mitigate the risk of zoonotic disease outbreaks. By implementing these strategies, we can help to protect human health and prevent the spread of these devastating diseases. In addition to the strategies listed above, several other factors can contribute to mitigating zoonotic disease outbreaks. These include:

16.6. SUSTAINABLE DEVELOPMENT

Sustainable development practices can help to reduce the risk of zoonotic disease outbreaks by reducing deforestation, improving sanitation, and providing access to clean water.

16.7. CLIMATE CHANGE

Climate change is a significant threat to global health, and it is also a factor that can contribute to the emergence of zoonotic diseases. By mitigating climate change, we can help to reduce the risk of zoonotic disease outbreaks.

16.8. INTERNATIONAL COOPERATION

International cooperation is essential for the prevention and control of zoonotic diseases. This cooperation can take the form of sharing information, coordinating responses to outbreaks, and developing new technologies (US DHHS 2018). By taking these steps, we can help to mitigate the risk of zoonotic disease outbreaks and protect human health.

The impact of zoonotic diseases on society can be far-reaching. They can lead to illness outbreaks, which can disrupt social order and cause widespread fear. They can also lead to the death of livestock, which can have a devastating impact on rural communities. In addition, zoonotic diseases can have a psychological effect on individuals and communities, as they can lead to feelings of anxiety, isolation, and fear (Pal 2018).

Here are some of the ways that zoonotic diseases can impact society:

16.9. DISRUPTION OF SOCIAL ORDER

Zoonotic disease outbreaks can disrupt social order in many ways. They can lead to quarantines and travel restrictions, isolating communities and disrupting businesses. They can also lead to panic and fear, which can make it difficult to maintain order.

16.10. LOSS OF LIVESTOCK

Zoonotic diseases can also lead to the loss of livestock. This can devastate rural communities, as livestock is often a significant source of income and food. In some cases, the loss of livestock can lead to food insecurity and malnutrition.

16.11. PSYCHOLOGICAL IMPACT

Zoonotic diseases can also have a psychological effect on individuals and communities. They can lead to feelings of anxiety, isolation, and fear. This can be especially true in communities affected by previous outbreaks. In addition to these direct impacts, zoonotic diseases can also have some indirect effects on society. For example, they can:

16.12. INCREASE HEALTHCARE COSTS

Zoonotic diseases can increase healthcare costs by requiring the treatment of infected individuals. They can also increase the cost of research and development of new vaccines and medicines.

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16.13. DISRUPT TRADE

Zoonotic diseases can disrupt trade by restricting the movement of animals or animal products. This can harm the economy, leading to lost revenue and jobs.

16.14. DAMAGE THE REPUTATION OF THE AGRICULTURAL SECTOR

Zoonotic diseases can damage the reputation of the agricultural industry, as consumers may become wary of consuming animal products. This can lead to decreased demand for animal products, harming the economy.

One of the most immediate socioeconomic consequences of a zoonotic disease outbreak is a disruption in healthcare systems. When a new disease emerges, it can take time for scientists to understand how it is transmitted and how to treat it. This can lead to shortages of medical supplies, as well as a strain on healthcare workers (Ahmad and Khan 2017).

In addition to the direct impact on healthcare systems, zoonotic disease outbreaks can also have a ripple effect on other sectors of the economy. For example, if a disease outbreak leads to a decline in tourism, this can negatively impact businesses that rely on tourism revenue. Another necessary socioeconomic consequence of zoonotic disease outbreaks is the loss of livelihoods. When people are sick, they are unable to work. This can lead to financial hardship for individuals and families and a decline in economic productivity.

In some cases, zoonotic disease outbreaks can even lead to economic downturns. Due to the outbreak, businesses may be forced to close or reduce their operations. This can have a knock-on effect on other companies, as well as the broader economy. The socioeconomic consequences of zoonotic disease outbreaks can be severe. It is essential to be aware of these consequences and take steps to mitigate them. Some specific examples of the socioeconomic implications of zoonotic disease outbreaks include:

1. The 2009 H1N1 influenza pandemic caused an estimated \$1.4 trillion in economic losses worldwide.
2. The 2003 SARS outbreak in China led to a decline in tourism, which cost the country an estimated \$20 billion.
3. The 2015 Ebola outbreak in West Africa caused an estimated \$32.6 billion in economic losses.
4. These are just a few examples of how zoonotic disease outbreaks can significantly impact the economy. It is essential to be aware of these risks and take steps to mitigate them (Khan and Anwar 2018).

17. WHAT CAN BE DONE TO MITIGATE THE SOCIOECONOMIC CONSEQUENCES OF ZOONOTIC DISEASE OUTBREAKS?

Many things can be done to mitigate the socioeconomic consequences of zoonotic disease outbreaks. These include:

Investing in early warning systems and surveillance networks will help to identify and contain outbreaks early before they have a chance to spread and cause widespread economic damage. Building robust healthcare systems will ensure that people have access to the care they need when they are sick, regardless of their ability to pay. Developing economic policies that are resilient to shocks will help to protect businesses and individuals from the financial impact of outbreaks. Raising awareness of the risks of zoonotic diseases will allow people to take steps to protect themselves and their families from infection. By taking these steps, we can help reduce

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the socioeconomic impact of zoonotic disease outbreaks and protect the health and well-being of people worldwide (WHO 2016).

18. IMPACT OF ZONOTIC DISEASES ON VULNERABLE POPULATIONS

Zoonotic diseases can have a disproportionate impact on vulnerable populations. This is because these populations are more likely to be exposed to animals that carry zoonotic diseases, and they are also more likely to have weakened immune systems. As a result, they are more likely to get sick from zoonotic diseases, and they are also more likely to die from these diseases (Zinsstag et al. 2011).

19. EQUITABLE ACCESS TO HEALTHCARE AND RESOURCES

To protect vulnerable populations from zoonotic diseases, it is vital to ensure that they have equitable access to healthcare and resources. This includes access to preventive measures, such as vaccination, and access to treatment for people who get sick. It is also essential to address the underlying factors that make vulnerable populations more susceptible to zoonotic diseases, such as poverty and lack of access to clean water and sanitation (Sheikh and Khan 2021).

20. THE FUTURE OF ZONOTIC DISEASES

Zoonotic diseases, or diseases that can spread between animals and humans are a major global health threat. In recent years, there have been a growing number of zoonotic disease outbreaks, including SARS, MERS, Ebola, and COVID-19. These outbreaks have caused significant human suffering and economic loss.

A number of factors are contributing to the increasing number of zoonotic disease outbreaks. These factors include:

20.1. DEFORESTATION AND HABITAT DESTRUCTION

This brings humans closer contact with wildlife, which increases the risk of cross-species transmission of diseases.

20.2. INCREASED INTERNATIONAL TRAVEL AND TRADE

This is facilitating the spread of diseases around the world.

20.3. CLIMATE CHANGE

This is creating new conditions that favor the spread of some diseases.

The Importance of Sustained Research, Surveillance, and Prevention Efforts

The increasing number of zoonotic disease outbreaks indicates that we must do more to prevent these diseases from emerging and spreading. There are a number of things that can be done to address this challenge, including:

20.4. SUSTAINED RESEARCH

We need to continue investing in research to understand better the causes, transmission, and prevention of zoonotic diseases.

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20.5. SURVEILLANCE

We must improve our surveillance systems to detect and track zoonotic diseases better.

20.6. PREVENTION

We must implement effective prevention measures like vaccination, hygiene, and sanitation. In addition to the above, here are some other specific research, surveillance, and prevention efforts that could be made to address the future of zoonotic diseases:

20.7. DEVELOP NEW DIAGNOSTIC TOOLS

We must develop more sensitive and specific diagnostic tools to detect zoonotic diseases better.

20.8. IMPROVE VACCINE DEVELOPMENT

We must improve our ability to develop and produce effective vaccines against zoonotic diseases.

20.9. STRENGTHEN PUBLIC HEALTH INFRASTRUCTURE

We must strengthen public health infrastructure in developing countries to better detect and respond to zoonotic disease outbreaks.

20.10. EDUCATE THE PUBLIC

We need to educate the public about the risks of zoonotic diseases and how to prevent them.

21. THE POTENTIAL FOR INTERDISCIPLINARY COLLABORATIONS

Zoonotic diseases are complex and require a multidisciplinary approach to understand and control. This means that researchers from various fields, including veterinary medicine, epidemiology, ecology, and public health, must work together to address this challenge (Sheikh and Khan 2021).

22. THE NEED FOR INTERDISCIPLINARY COLLABORATION

There are several reasons why interdisciplinary collaborations are essential to combating zoonotic diseases. First, zoonotic diseases are often caused by complex interactions between humans, animals, and the environment. Researchers need to deeply understand all three of these areas to develop effective prevention and control measures.

Second, zoonotic diseases can emerge and spread rapidly. This means that researchers need to be able to share information and collaborate quickly and effectively. Interdisciplinary collaborations can help to facilitate this sharing of knowledge and cooperation.

Finally, zoonotic diseases can have a significant impact on human health and well-being. It is crucial to develop effective prevention and control measures as quickly as possible. Interdisciplinary collaborations can help to accelerate the development of these measures.

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There are many successful interdisciplinary collaborations in zoonotic disease research, for example, the One Health approach. This approach brings together experts from human, animal, and environmental health to address the complex challenges of zoonotic diseases.

Another example is the Global Virome Project. This project is a global effort to catalog the viruses that can infect humans, animals, and the environment. This information will be used to identify new zoonotic threats and develop more effective prevention and control measures.

23. THE IMPORTANCE OF INTERNATIONAL COOPERATION

Zoonotic diseases do not respect national borders. This means that international cooperation is essential to preventing the spread of these diseases. By working together, countries can share information, resources, and expertise. This can help to ensure that outbreaks are detected and responded to quickly and effectively.

There are several examples of successful international cooperation in zoonotic disease control, for example, the World Health Organization's (WHO) Global Strategy for the Prevention and Control of Zoonotic Diseases. This strategy outlines several actions countries can take to reduce the risk of zoonotic disease outbreaks. Another example is the Coalition for Epidemic Preparedness Innovations (CEPI). This organization funds research and development of vaccines against emerging infectious diseases, including zoonotic diseases (Bhatti and Khan 2016).

24. CONCLUSION

Zoonotic diseases are those that can be transmitted from animals to humans. Bacteria, viruses, parasites, or fungi can cause them. Vulnerable populations are those that are at increased risk of contracting zoonotic diseases. These populations include people who live close to animals, people who work with animals, people with weakened immune systems, and people who live in poverty. Zoonotic diseases can have a disproportionate impact on vulnerable populations. This is because these populations are more likely to be exposed to animals that carry zoonotic diseases, and they are also more likely to have weakened immune systems. As a result, they are more likely to get sick from zoonotic diseases, and they are also more likely to die from these diseases (Khan et al.2019)

There is an urgent need for proactive measures to address the growing threat of zoonotic diseases. These measures should include:

- ✓ Increased surveillance of animal and human populations for zoonotic diseases
- ✓ Development of new vaccines and treatments for zoonotic diseases
- ✓ Improved sanitation and hygiene practices
- ✓ Increased education about zoonotic diseases

The growing threat of zoonotic diseases is a serious public health concern. Proactive measures are urgently needed to protect vulnerable populations and prevent the spread of these diseases.

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