One World, One Health

Introduction

One of the first conditions of happiness is that the link between man and nature shall not be broken.

Leo Tolstoy

Health of the humans relies on well-functioning ecosystems, which provide clean air, fresh water, medicines, and food security, as well as limit disease and stabilize the climate. Biodiversity in the ecosystem that refers to biological variety in all its forms is thus important for human health, productive livelihood, and even for pharmacological sciences. Climate change, in the form of extremes of weather, drought and flooding, and ocean acidification, has resulted in the loss of biodiversity which is impacting human health worldwide.[1]

The new concept, "One World, One Health," is based on the understanding that humans, animals, and the environment are inextricably linked, indicating that the world has suddenly realized the interrelation between ecology, animal diseases, and public health, striving to restore and maintain harmony and synergy.

Background

The commitment to preserve a positive link between all components of the ecosystem dates back to the year 2004 when a meeting was held in Manhattan (New York, United States of America), where experts in various disciplines from around the world participated to discuss problems arising from the circulation of diseases between humans, domestic animals, and wildlife.[2]

Subsequently in 2008, four international organizations, United Nations Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE), the World Health Organization (WHO), and United Nations Children's Fund, along with the World Bank and United Nations System Influenza Coordinator, joined together to produce a strategic document titled "Contributing to One World, One Health: a strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface."[2]

Challenges in Public Health

Humankind is currently facing several challenges compromising health through loss of biodiversity and resultant imbalance in the ecosystem, which can only be overcome through coordinated global efforts. One of these challenges of utmost importance is the spread of infectious diseases that emerge or re-emerge at the interfaces between animals, humans, and the ecosystems in which they live. Data reveal that 60% of known human infectious diseases have their source in domestic or wild animals. About 70% of all emerging and re-emerging pathogens are zoonotic which jump from animals to humans, emerging as a health threat in the form of a new disease. Majority of the pathogens that can potentially be used in bioterrorism are also of animal origin.[3,4]

Several factors are responsible for this situation, primarily the exponential growth in human population and closer interaction between livestock and wildlife. Human–animal contact has increased in many ways, mainly in way of food that affects both food producers and food consumers. Other than food, animals are also important for livelihood, travel, sport, education, or companionship. Migration and international travel and trade including globalization of trade in animals and animal products have enhanced the opportunity of pathogens transcending national and international borders, leading to extensive spread of diseases around the globe. Human activities have resulted in rapid and uncontrolled urbanization, deforestation and forest encroachment, and changing farming systems including change in land use and water management through dam construction and irrigation. Combined effect of all factors has led to climate variability and change in ecosystems, which has contributed to increased vector population and their survival in environment, thus affecting infectious disease reservoirs and facilitating transmissibility of many diseases.[1-5] All these factors have led to the spread of existing endemic diseases, as well as cause new or re-emerging zoonotic diseases, which include rabies, Salmonella infection, West Nile virus infection, Q fever, anthrax, brucellosis, Lyme disease, ringworm, and Ebola.[5,6]

Environmental impacts and declines in biodiversity have also been hypothesized to be related to increase in chronic diseases as explained by the "hygiene hypothesis" which states that environments with high microbial biodiversity are less likely to have a high prevalence of allergic and autoimmune diseases. Ecosystems research has also revealed that high biodiversity is associated with tolerance and resilience, lack of which has been shown to lead to inflammatory and autoimmune diseases.[7] Hence, with ongoing loss of biodiversity, there may be a rapid increase in inflammatory and autoimmune disease.

Biodiversity also plays a crucial role in human nutrition by ensuring conducive conditions of the soil and oceans to maintain crops, livestock, and marine species harvested for food. Attempt to enhance plant food production through irrigation, use of fertilizers and pesticides, and introduction of new crop varieties and cropping patterns affect biodiversity and thus impact world food production, with resultant influence on nutritional status and human health. Animals are sources of food for humans, providing protein and fat through milk, eggs, or meat. It has been reported that world production of food animals is reduced by more than 20% due to disease, thus

leading to shortage of animal food and consequent deficiency of nutrients, which can also be a public health problem.[1,3,5]

Biodiversity is important for health research and traditional medicine too. Although synthetic medicines are available for many purposes, use of natural products still persists and biomedical research also relies on plants, animals, and microbes to understand human physiology and to understand and treat human diseases. Traditional medicines are mainly obtained from medicinal plants supplied through collection from wild populations and cultivation. They are estimated to be used by 60% of the world's population, thereby playing an essential role in primary health care. With loss in biodiversity, this aspect is also heavily compromised.[1]

The only way to combat these alarming problems is to implement harmonized and coordinated strategies through effective health governance, at international, regional, and national levels. With increasing socioeconomic interdependence and increased mobility between and within countries, health security has become vulnerable to being compromised, with a resultant impact on global health. Global public health security has been defined by the WHO as "the activities required, both proactive and reactive, to minimize the danger and impact of acute public health events that endanger people's health across geographical regions and international boundaries."[8] Efforts have been initiated to unite the entire world through launching various international initiatives for committed and consorted action. Two such initiatives at the forefront are global health security agenda (GHSA)[9] and One World One Health approach.[2]

Global Health Security Agenda

In keeping with the commitments under the international health regulations (IHR), the GHSA is a worldwide effort to strengthen the capacity of countries to prevent, detect, and respond to infectious disease threats. The Center for Disease Control and Prevention is partnering with 31 countries around the world to realize the goals of GHSA.[9]

GHSA commitment development meeting in 2011 identified 11 discrete GHSA action packages to combat public health threats, which were discussed further at the global infectious diseases meeting in 2014 in Jakarta. These 11 action packages are drafted based on current and future health threats: zoonotic disease action package, biosafety and biosecurity action package, antimicrobial resistance, immunization action package, emergency operation center action package, linking public health with law and multisectoral rapid response action package, medical countermeasures and personnel deployment action package, national laboratory system action package, real-time surveillance action package, and reporting action package.[10]

One Health Approach

"One Health" has been defined by the WHO as "an approach to designing and implementing programs, policies, legislation, and research in which multiple sectors communicate and work together to achieve better public health outcomes." It is a collaborative, multisectoral, transdisciplinary approach, which works at the local, regional, national, and global levels. The goal of One Health is achieving optimal health outcomes while recognizing the interconnection between people, animals, plants, and their shared environment.[5,6]

One Health is concerned with multiple issues which include zoonotic diseases, antimicrobial resistance, food safety and food security, environmental contamination, vector-borne diseases, and other health threats shared by people, animals, and the environment. Several other fields are indirectly affected and would also benefit from One Health approach such as injury, occupational health, and noncommunicable diseases.[5,6]

One Health and Pandemics

At the 27th Tripartite Annual Executive Committee Meeting of World Organization for Animal Health (OIE), the WHO Director-General emphasized that future pandemics can be prevented only with an integrated One Health approach to public health, animal health, and the environment we share. This should be done by taking global partnerships to a new level. He also specified that One Health is more than zoonosis. Human health cannot be protected without reducing the impact of human activities that disrupt ecosystems, encroach on habitats, and influence climate change. These activities include pollution, large-scale deforestation, intensified livestock production, and the misuse of antibiotics, along with production, consumption, and trade of food.[4]

Disease dynamics involve two aspects – the human–animal interface and the human–environment interface. Various pathogens continue to circulate in mild forms in animals living in their natural habitats. However, for various reasons such as deforestation, climate change, and destruction of their natural habitat, they move out and come in contact with human population. In the process, they jump the interspecies barrier by undergoing mutations to infect humans and other species. Recent coronavirus transmission is a classic example of such animal-to-human transmission and mutation to newer variants. Coupled with this, extensive globalization and intercontinental movement have facilitated the spread of COVID-19 leading to a most serious pandemic, affecting all countries around the world. Hence, to address the present and future pandemics, the global initiative of One Health needs to be implemented effectively for protection of both human and animal health, by managing chemical and biowastes, monitoring biodiversity, and maintaining balance in the ecosystem. All countries should also prepare and implement strategies for reducing their carbon footprint.[11]

COVID-19 has identified the need for consideration of the One Health approach in some major areas. Enhanced and integrated surveillance infrastructure and monitoring mechanisms should be implemented to detect new microorganisms sharing

similar genotypes across species that have the potential to infect humans. Stringent regulation of hotspots, such as live animal markets, should be continued to prevent transmission of infectious agents among animals and humans. Policies and programs should address the high risk of disease transmission among the vulnerable and marginalized populations, and health-care workers. Strengthened coordination and collaboration between all stakeholders is essential for effective implementation of the Oone Health principle and policies.[12]

Prevention of Public Health Problems Through One Health Approach

The FAO/WHO/OIE document has outlined key elements of effective prevention programs in both animal and public health, which include the following:[2]

- Adequate infrastructure and expertise at national and local levels, and at entry points.
- Timely and responsive disease surveillance systems for animal and human populations with a communication protocol between both.
- Up-to-date emergency preparedness and response plans.
- Capacity for communication of level of risk.
- Capacity to apply international agreements and standards.
- Continuous evaluation and improvement of biosecurity.
- Governance and legislation in line with international standards.
- Adequate sustainable laboratory capacity supported by external quality assurance systems.
- Established monitoring and evaluation systems for veterinary and public health services.
- A legal framework with incentives through cooperation with the private sector.

Conclusion

The environment along with human and animal population of the world is inextricably linked and all three are currently endangered due to various factors. The only way to combat the alarming problem is through consorted global efforts implementing IHR, GHSA, and the One Health Approach, the last one being a comprehensive approach targeted toward the entire ecosystem. Coordination needs to be established between all stakeholders that include public health and veterinary personnel and agencies, environment protection agencies, industries, research institutions, traders and handlers of livestock, and the community in general. Time has come for the entire world to come together, putting in the best efforts for fighting to preserve the ecosystem of the home that we all share.

The Earth is a fine place and worth fighting for."

Ernest Hemingway

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Conflicts of interest

There are no conflicts of interest.

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