# ONE HEALTH: Connecting the Dots between Emerging Infectious Diseases and the Environment

## Background

The world has been experiencing the impact of severe biosecurity threats in the last few decades. Early in the year 2020, Africa, along with the rest of the world was hit with a dreadful COVID-19 pandemic. This disease has a dramatic impact on individuals, communities, industries and economies. People have significantly changed how they live and work; many businesses have disappeared, shut down or changed their operating models; and national and global economic growth has experienced severe contraction. Shortly before this, there were a series of devastating infectious disease outbreaks reported in different parts of the world at different times. For instance, the SARS-associated corona virus (SARS-CoV) was reported in East Asia in 2002; the H1N1 influenza Pandemic in 2009; Middle East Respiratory Syndrome (MERS) in the Middle East- 2012; the Zika virus in North America- 2015 and Ebola virus disease in West Africa in 2014. It is quite interesting that these outbreaks are mostly zoonotic diseases of animal origin.

There are natural barriers that prevent pathogens from spreading from animal population to human population, more often than not, due to human activities these barriers are fast breaking down. The increase in human population, urbanization and industrialization is causing the deterioration of ecosystems and accelerating changes in the biosphere, causing significant damage to biodiversity. Indiscriminate migratory movement of both humans and animals is also a contributory factor. These rapid environmental changes are linked to an increase in the occurrence of infectious diseases in recent decades. In addition, changes to farming methods and intensive farming in some parts of the world and increased contact with wildlife, have considerably increased the risk of infectious pathogens from animals to humans. With the spread and the increasing emergence of zoonotic diseases and epidemics, the risk of pandemics is becoming more and more important.

In African countries which are mostly agrarian economies, people's lives are intimately related to the natural environment and the productivity of livestock. It has become an obvious reality that increased deforestation and indiscriminate 'game hunting' is increasing in low-income countries particular Africa

countries. The destruction of natural ecosystems is associated with an increase in infectious diseases, such as Cholera, Tuberculosis, HIV/AIDS, Polio, Malaria, Ebola and Lassa fever. Sadly, these diseases have claimed millions of lives as well as caused great suffering and economic hardship in African countries. In recent years, these zoonotic diseases have demonstrated the interdependence of human health, animal health, and ecosystem health. A better understanding of the causes and consequences of certain human activities, lifestyles, and behaviors in ecosystems is important for a rigorous interpretation of disease dynamics and to drive public health policies.

Climate change affects vector-borne diseases by directly affecting the transmission dynamics, geographic spread and re-emergence of vector-borne disease through multiple pathways including direct effects on pathogens, vectors, non-human hosts and humans. It is evident that many factors have changed interactions between humans, animals, and the environment. The increase in the human population has triggered more people to live in close contact with wild and domestic animals thereby increasing the chances of transmission of diseases from animals to humans. Illegal movement and sales of animals, and animal products across the globe also facilitate the spread of disease quickly across borders and regions of the world.

The realization of the relationship between emerging infectious diseases, and human, animal and ecosystem health explains why no single individual, discipline, sector or ministry can pre-empt and solve these complex emerging health challenges. It is therefore important to engage an integrative and holistic approach such as the One Health concept to address emerging health challenges. Understanding the dynamics of vectors requires the knowledge of pathogen biodiversity in the forest, human-wildlife interaction, changes in land use and climatic conditions, and also changes in society and human behaviour. One Health is an approach that recognizes that the health of people is closely connected to the health of animals and our shared environment.

One Health is a collaborative, trans-disciplinary, and multi-sectoral approach that can address urgent, ongoing or potential health threats at the human-animal-environment interface. The One Health concept is an emerging strategy for expanding trans-disciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. It involves designing and implementing programs, policies, legislation and research that encourage communication and collaborations among multiple sectors to achieve better public health outcomes. Human or livestock or wildlife health can't be discussed in isolation anymore. There is just one health and the solutions entail everyone working collectively on all the different levels. The One Health approach is particularly

relevant to zoonoses control, food safety, and combating antibiotic resistance.

Considering the relationships between human health and the environment, how to stop diseases driven by the degradation of the natural environment, are critical question for researchers, environmentalists, policymakers, and citizens alike. We need to develop new skills, capacities and strategies to prevent, protect and promote global health security through a robust One Health Approach. Global Emerging Pathogens Treatment Consortium (GET) in one of its monthly webinar series mobilized ONE HEALTH professionals to engage the public on "Connecting the dots between emerging infectious diseases and environment".

The webinar discussed how human and animal health are interdependent on the environment and proposed a holistic approach that would strengthen a multisectoral collaboration to enhance health security, especially in Africa.

## Challenges for One Health Implementation

While there has been a wide range of commitments to the One Health approach, its operationalisation and implementation can be challenging. In a world where professions are more inclined to specialization and expertise within their realm, understanding the interdisciplinary and transdisciplinary approach adopted in One Health might be challenging. One Health demands that human, animal and environmental health experts cross professional, disciplinary and institutional boundaries, and work in a more integrated fashion. Some of the challenges that affect the implementation of One Health include:

**Leadership** – Leadership is a crucial issue in the development of the One Health approach. It is essential for building relationships and trust.

**Building Strong Relationship** – There is a need to build a strong transdisciplinary relationship for the One Health approach to be successful

**Lack of Funding** – Adequate multisectoral funding is needed for a successful One Health approach implementation.

**Existing Institutional Environment** – Ministries, sectors and professionals need to break existing institutional and sectoral boundaries to implement the One Health approach.

**Limited understanding of the One Health concept** – Stakeholders should have a clear understanding of the transdisciplinary approach to effectively function and implement a One Health concept.

**Infrastructure** – Adequate infrastructure for transdisciplinary surveillance, laboratory systems and

effective communication and information channels are needed for implementing a successful One Health approach.

## Recommendations:

In compliance with the World Health Organization (WHO) and the World Organization for Animal Health (OIE), Nigeria has recently launched its ONE HEALTH strategic plan. This plan clearly outlines the country's strategy to strengthen the prevention, detection and response to infectious diseases that affect humans, animals, and the environment. Furthermore, the African countries' inter-ministerial conference on Health and Environment endorsed a 10-year Strategic Action Plan to scale up health and environment interventions in Africa from 2019 to 2029 at the third Inter-Ministerial Conference on Health and Environment in Gabon in 2018. In a similar vein, African-led multidisciplinary research was promoted to address the challenges of One Health operation on the continent. The recommendations below are important to strengthen the One Health approach in Africa

1. There is a need to establish a framework for trans-disciplinary collaboration among relevant government ministries and stakeholders to coordinate disease surveillance and epidemic preparedness. The ministries can establish designated One Health desk officers that will meet regularly to discuss and review epidemic preparedness at all levels.
2. There is a need to review the curriculum in health and other related courses in the Universities to include emerging transdisciplinary challenges such as climate change and environmental degradation and their impact on human health.
3. Strengthening of border health initiatives through training and the deployment of interdisciplinary personnel
4. Investment in multisectoral funding of One Health projects and programmes. There is a need to promote investment in projects that can demonstrate value for money in tackling health and environmental issues such as waste recycling and the production of biobased products.

## Conclusion

Available evidence has demonstrated that there is a significant influence of the environment on the emergence of infectious diseases. One Health concept, a transdisciplinary and collaborative approach, offers a potent panacea to mitigating these global health challenges. Effective implementation of this concept requires strong leadership, adequate infrastructure, an improved understanding of the One Health concept and adequate funding.

## *About GET*

***Global Emerging Pathogens Treatment Consortium (GET)*** *was established in 2014 as a direct response to the 2014-16 Ebola virus disease outbreak in West Africa and ongoing outbreaks of Lassa Fever, Meningitis, Multidrug resistance (MDR) enteric fevers and COVID-19 across the sub-region. There was clearly a need to create an African-led multidisciplinary forum of experts capable of working together with international partners to strengthen Africa's preparedness and resilience in tackling such infectious disease outbreaks caused by emerging pathogens, public health emergencies and pandemics.*

*GET found the understanding of biosecurity to be a very underdeveloped area on the continent with clear opportunities for using biosecurity to dramatically improve capacity for prevention and medical countermeasures during public health crises. GET now operates firmly in the African Biosecurity and pandemic preparedness space, and functions as a think tank, providing high-level advocacy and the operational and necessary expertise to support Countries and communities achieve improved resources to combat outbreaks and other public health emergencies that can threaten stability, peace and security thereby undermining economic growth and well being. The consortium is working with international collaborators with the goal of providing strategic recommendations and establishing infrastructure and research capacity to respond to highly infectious emerging Pathogens such as Ebola and the ongoing COVID-19 Pandemic. The Consortium creates a rapid informed response strategy and provides advice and guidance to African countries, and a point of reference for international funding and aid agencies*