

Two examples of diseases that can be used to explain more on disease ecology are ...

[Environment](#), [Animals](#)



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## **Question I A**

The main argument of the One Health concept is that there is no real separation between human health, animal health and the environment. This statement sounds so ambiguous but explicit dissection of the statement reveals that it is not as complex as it sounds. First, One health refers to a collaborative effort of a variety of disciplines that work locally, nationally as well as internationally to achieve optimum health for three primary elements, people, animals and finally the environment. The one health campaign argues that the health of humans that of animals and that of the environment are all interrelated. When one of these elements is ailing, the other two elements are bound to ail too. Consequently, the One Health campaign was formed after recognition of the fact that there is a need to integrate human, animal and environmental matters. This is because the three are closely related. Evidence, suggests that most of the infectious diseases that affect human result from an infectious agent transmission from animals. Environmental health a factor in this equation as a degraded environment characterized by aspects such as chemical and microbial

pollution of water sources and land creates health risks for both animals and humans. This relationship can be explained better through the human ecology of disease. This is a triangle comprised of three major aspects. The first is habitat, which is the general environment that humans work and live in. Different settlement patterns, for instance, determines the spread and diffusing of diseases. Nucleated settlements, for example, faster fast diffusion of diseases.

The other element of this triangle is population, which comprise the human organisms that hold the potential for hosting diseases. The ability to determine DNA sequences has had a great impact in the ability to combat and contain certain diseases and isolate the individuals who are the least or most susceptible to certain diseases. Other factors that relate to the population aspect include age, physiological factors and immunological factors.

The final element of this triangle is behavior, which is the observable cultural aspect. Behavior comprises economic constraints, cultural precepts individual psychology, social norms, cultural practices, education, technological interventions and so on. This factor is considered to be the most enigmatic of the three. This is because humans have made a lot of alterations to the earth's surface. Man has made drastic changes to the earth's surface, and the impact of these changes to human health is conspicuous. These include but are not limited to changes in air quality, settlements construction amongst other factors that all impact on the cultural susceptibility to diseases. Others include nutritional practices and gender roles.

The human ecology concept is shown in Nathan Wolfe's book, *The viral storm: The Dawn of a New Pandemic Age* where explores how humans and disease causing organisms are related and how they have evolved. He shows how human habitats, population and human behavior have interacted to lead to the emergence and spread of diseases such as swine flu, HIV and bird flu.

Two examples of diseases that exhibit the relationship between animal health, human health and environmental health are the hemolytic uremic syndrome and the Lyme disease. Hemolytic uremic syndrome. The virus E. Coli causes this disease. This causative agent is also found in cattle as well as hogs running in irrigated fields. In a research done in California, the same agent was found in both surface water and ground water. Using a one-health construct, it emerges that a field can be contaminated by irrigation water containing the E. Coli hogs that are infected. Plants growing in this field containing the organism are infected with the same, and this can then be remitted to animals and humans.

Another sample disease is the Lyme disease. This disease is spread by a tick that to the most part bites human pets such as dogs and cats. This then spreads to humans. Ticks can also bite humans consequently transmitting the disease-causing organism to the humans. The tick transmits the causative organism that is known as *Borrelia burgdorferi*. This microbe is found in forest habitats and where tick population is high; the prevalence of the disease becomes very high. This further reinforces the one health concept.

## Question II A

Diseases are generally considered to be 'emerging' if their virulence or their incidence has of late increased or if they have begun infecting a novel population or host. A range of factors have been credited as leading to the "emergence of diseases". These factors are different for different diseases. An example of an emerging disease is HIV/AIDS. Scientists believe that HIV/AIDS most likely emerged about a century ago after multiple unrelated events whereby the causative virus moved from one primate host (chimpanzee) to another (man). Subsequently, due to a complicated array of demographic and social factors, it spread widely among the human populations. The disease did not however get any recognition as a distinct entity until the year 1981. The disease was first associated with certain high-risk groups such as gay men, blood products reception and drug users who used injections. However, it soon became clear that AIDS was not merely restricted to these groups. The disease has continued to spread rapidly with several factors or catalysts being charged with its emergence. These include human movement, especially on truck routes that is accompanied by large volumes of sex workers, poverty, and inadequate infrastructure when it comes to public health and social inequality. These are indeed the main factors or catalysts of the emergence of HIV/AIDS.

Another example of an emergent disease is the West Nile disease. The main factor or catalyst of emergence of this disease is microbial adaptation and change. West Nile was first discovered in Uganda in 1937. In recent years; the disease has emerged as it has spread way beyond its traditionally known boundaries. It has caused illness in humans, horses, birds both in Europe and

in the US. In the United States particularly, it was particularly first discovered in 1999 in New York. From that time, the disease has emerged and has, as a result, been detected in animals, mosquitoes and humans in almost every state. The West Nile virus has been found to be unlike other arboviruses that are completely or partly host restricted, this virus has actually become adapted to multiple avian and mosquito species. This is indeed a great factor in terms of increasing the virus' opportunity to attack human beings. Lack of extra or additional hosts has been undoubtedly driven the main vectors of the virus that is mosquitoes, to favor adapting to the human beings, their environments and their behaviors. There is a huge association between the virus and the Aeneas mosquito, which lives around human settlements and habitations. This means that overcrowding, poverty and poor sanitation provide perfect environments for the virus transmissions human.

As observed, there are several diseases that can be considered to be emerging. The factors of emergence may vary from one disease to another but as observed from the two diseases discussed above, some can overlap.

### **Question IIB**

Disease ecology refers to the interaction ecology and behavior of hosts with the pathogen's biology as it relates to diseases impact on populations. The focus of disease ecology is to understand how diseases are spread through and how they impact host populations. It also looks at how pathogens, hosts and their environments evolve and react in response to each other.

Disease ecology in real sense merges principal ideas from medicine, ecology, genetics, epidemiology and immunology. This comprises studies pathogens

and hosts interactions in communities, populations as well as entire ecosystems. The field of disease ecology is rapidly growing. The discipline hugely draws on the strengths of researchers in the fields of agriculture, biomedicine, veterinary and even environmental sciences. One particular area of growth has particularly been in regards to infectious diseases, which explores the interactions and relationships between bacterial, parasitic and viral infectious diseases, their animal and human hosts, as well as the environment. Some of the most common areas of study include factors for emergence, emergence of diseases in human and animal populations, environmental disturbance impact amongst others.

The role of ecology in disease is very conspicuous. This is because ecological factors have the ability to allow disease vectors become abundant or alternatively suppress them and consequently influence the dynamics of disease. Ecology is also important when the role of the host is considered. A host simply refers to an organism that is capable of being infected with a certain disease. The host of certain diseases can however belong to different species.

Toxoplasmosis is caused by a brain parasite. This disease is mainly passed among cats, rats as well as humans. It comes from the oocysts located on infected animals flesh or faeces. In cats, where geological social and climatological conditions are favorable to the maturation and survival of oocysts, the disease is very common where it is caused predominantly by the mentioned oocysts. However, where cat contact is minimal, tissue cysts predominantly cause the infection.

Tuberculosis is also another disease that can be used to portray the ecology concept. It is also a social disease mainly caused by a pathogen that is airborne. The disease transmission to a huge part is dependent on the interaction of humans within communities. Consequently, there are some community environments that inadvertently prove to better in terms of tuberculosis transmission. In fact, surveillance has documented various disparities in the rates of tuberculosis transmissions in different neighborhoods. The observed differences emerge from various factors at the community level. They are also due to ecological risk factors facilitating transmission overcrowding, poverty together with other deprivation markers that all lead to increased rates of tuberculosis transmissions.

As observed, the ecological context of this disease is, therefore, very important. In regards to structuring an effective public health response and retaliation to this dangerous disease, it is important to consider both information from the community level as well as the ecological risk factors that are responsible for the contraction of the disease. It is also clear that disease ecology is a very important discipline that when fully explored provides a wide array of information about various diseases and their association with the ecology.

## **Works Cited**

Wolfe, N. *The viral storm: The dawn of a new pandemic age*. New York: Times Books, 2011. Print.