# Review on global warming and disease dynamics

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*Full Length Research Paper*

# Review on global warming and disease dynamics

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**The aim of this paper are to elaborate the concept of global warming and to high light the impact of global warming on animal and human vector borne disease.Global Warming is defined as the increase of the average temperature on Earth.Global warming is a gradual process that threatens to have serious consequence over time, including elevated sea level, crop failure, famine, change in global rain fall pattern, changes to animals and plant populations and serious health effect.The diseases are global entities that depend dynamically on interaction between the host populations and the existing regional climate and thus global warming result in considerable shift of the spectrum of the diseases. Global warming accelerate the spread of disease primarily because warmer global temperature enlarge the geographic range in which disease carrying animals, insect and microorganism and germs and viruses they carry can survive. Global warming can influence the emergence and reemergence of vector borne disease such as malaria, trypanosomiasis, leishmaniasis and viral disease like West Nile fever. Generally, climate plays an important role in the seasonal pattern or temporal distribution of diseases that are carried and transmitted through vectors because the vector animals often thrive in particular climate conditions.Therefore, factor that results in global warming should be reduced.**

**Key words:** Global Warming, disease dynamics, vectors, disease, transmission.

## INTRODUCTION

Global Warming is a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants. As the Earth is getting hotter, disasters like hurricanes, droughts and floods are getting more frequent (Titus, 1990). Global warming is a gradual process that threatens to have serious consequence over time, including elevated sea level, crop failure, and famine, change in global rain fall pattern, changes to animals and plant populations, and serious health effect (Khasnis and Nettleman, 2005).

Global warming has serious implication for all aspect of Human and Animal life. It is the ever-increasing Human-induced progression of changes in our global environment, including global warming, loss of Biodiversity and increases in the incidence of natural disasters.

It will inevitably affect the global patterns of vector borne diseases, if greenhouse gas emissions are not reduced. As well as increasing the burden of infectious disease it can possibly lead to epidemics (Zavaleta *et al*., 2003).

The diseases are global entities that depend dynamically on interaction between the host populations and the existing regional climate and thus global warming may result in considerable shift of the spectrum of the diseases. It can affect both the distribution of the vector and the effectiveness of pathogen transmission through the vector. In more detail temperature change can affect the survival of the vector, the rate of vector population growth, feeding behavior, susceptibility of vector to pathogen, incubation period of the pathogen, seasonality of vector activity, and seasonality of pathogen transmission (Hunter, 2003).

Global warming accelerate the spread of disease primarily because warmer global temperature enlarge the geographic range in which disease carrying animals, insect and microorganism as well as the germs and viruses they carry can survive. Higher temperature will cause several pathogens (parasite, bacteria, and viruses) to extend their distribution and change their prevalence and abundance. The change of distribution of pathogen may have several consequences for wild and domesticated animal as well as human being (Khasnis and Nettleman, 2005).

It is necessary to have information on Global warming and its effect on the spread of disease in order to take measurement and to develop technology that reduceGreenhouse gases which in turn reduce health risk. There is little information on the effect of global warming on disease dynamics, so this review aims to elaborate the concept of global warming and to high light the impact of global warming on animal and human vector borne disease.

## The Concept of Global Warming

The concept of global warming requires a basic understanding of the greenhouse effect. Solar radiation passes through the atmosphere and is absorbed at the earth's surface. This heat is lost from the earth's surface as infrared radiation. The infrared radiation can't escape the atmosphere as easily as the solar radiation inters. Some of it is trapped by a number of gasses which act similar to the glass in the greenhouse-heat can enter but cannot exit that result in greenhouse effect. In nature the greenhouse effect is responsible for elevating the earth's temperature, making it possible for life to thrive (Zavaleta *et al*., 2003).

Greenhouse gases which include carbon dioxide, methane, and nitrous oxide are naturally occurring; whereas hydrocarbon (perfluorocarbon (PFC), hydro fluorocarbon (HFC) andsulfur hexafluoride ($SF_6$) and their derivatives are generated artificially. HFCs and PFCs are the most heat absorbent. Methane and nitrous oxide absorb more heat per molecule than $CO_2$ (Zavaleta *et al*., 2003).

The global warming potential (GWP), or power of each of these gases differs. $CO_2$ has been assigned a value of one GWP and the warming potentials of other gases are expressed relative to its power on a $CO_2$ -equivalent basis.

For example, one tone of methane has the warming effect of around twenty three tons of $CO_2$, while one tonne of nitrous oxide has the warming effect of around two hundred ninety six tonnes of $CO_2$ (table 1.), (Steinfeld *et al.,* 2006).

The population size and global warming are related, because human activities increase production of greenhouse gases, which culminates it. The observed rise in global temperature over the 20$^{th}$ century is 0.3$^{o}$c to 0.6$^{o}$c and this rise predicted to accelerate (Houghton, 1995).

Rising temperature are likely to continue. It is predicted that the average global surface temperature could raise 0.6$^{o}$c-2.5$^{o}$c in the next 50 years, and 1.4$^{o}$c-5.8$^{o}$c by the year 2100.

Evaporation will likely increase, resulting in increased average global precipitation. However, the distribution of rain fall may become more erratic, leading to focal area of flood and drought (Zavaleta *et al*., 2003).

## The Impact of Global Warming on Vector Borne Disease

Vector borne diseases are those diseases that are spread by Arthropod vector, such as Mosquitoes, Ticks, Triatomine bugs, Sand flies, Black flies and non-arthropod vectors like rodents such as Rats, certain Bats, a species of aquatic Snail, and several species of wild birds. Different vectors carry different diseases such as Malaria, Dengue, Encephalitis, African sleeping sickness and Yellow fever and other (Confalonieri *et al*., 2007).

Global warming affects the spread of vector borne diseases both directly and indirectly. It would directly affect the transmission of the disease by shifting the vectors geographic range and increase reproductive and biting rates by shortening the pathogen incubation period. Rainfall leads to stagnant water pools in which mosquitoes breed. Global warming leads to increased global temperatures allowing mosquitoes to survive winters where they would otherwise have perished. Subsequently, more mosquitoes are alive to breed and transmit disease during the summer season. In addition, mosquito larvae develop much faster at higher temperatures and after ingestion of the virus become more infectious at higher temperatures. Indirectly, other factors such as deforestation and natural disasters, decreased hygiene and stagnant water beds, increase the proliferation and survival of vectors and hence the incidence of vector-borne diseases. An important factor to consider is increase in travel worldwide particularly to and from vector borne disease-endemic areas (Patz *et al.*, 2000).

Weather influences survival and reproduction rates of vectors, in turn influencing habitat suitability, distribution and abundance, intensity and temporal pattern of vector activity (particularly biting rates) throughout the year; and rates of development, survival and reproduction of pathogens within vectors (Rogers and Randolph, 2006).

The most common vectors, arthropod, are cold blooded, (exothermic) meaning that their internal temperature is greatly affected by the temperature of their environment. The incidence of arthropod borne disease will depend on both vector and host factor (Gubler, 1998).

Global warming can influence the emergence and reemergence of vector borne disease which for example malaria, dengue fever, yellow fever, plaque, flariasis, louse borne typhus, Lyme disease, Trypanosomiasis, Leishmaniasis and Viral disease like West Nile fever which is just the latest example of invasion by exotic virus (Morsess, 1995).

The role of tick vectors in diseases like babesiosis in animals and Lyme disease in Humans, and of mosquitoes in the transmission of viruses (Rift Valley Fever, Dengue fever, African horse sickness, Bluetongue) and parasites (Malaria) are all well-known but the geographical distribution of these diseases is expanding as changes in climate continue. The dreadful

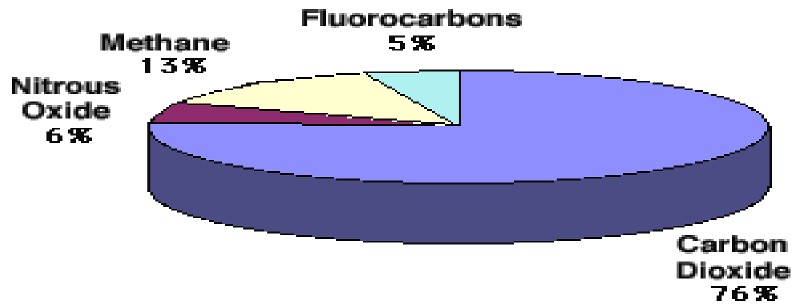


**Figure 1.**

**Table1**. Global Warming Potential of different gasses.

| Gas | Global Warming Potential |
|---|---|
| Carbon dioxide ($CO_2$) | 1 |
| Methane ($CH_4$) | 23 times than $CO_2$ |
| Nitrous oxide ($N_2O$) | 296 times than $CO_2$ |

**Source**: Steinfeld *et al*., 2006

impact of these diseases on health and the economy affects entire animal and human populations but the poorest communities are the most disadvantaged. The increased incidence in deadly infectious diseases in wildlife, livestock, and people may be one of the most important immediate consequences of global warming (Reeves *et al.,* 1994).

In general, climate plays an important role in the seasonal pattern or temporal distribution of diseases that are carried and transmitted through vectors because the vector animals often thrive in particular climate conditions. For example, warm and wet environments are excellent places for Mosquitoes to breed. There is evidence that the geographic range of ticks and Mosquitoes that carry disease has changed in response to climate change (Morsess, 1995).

## Some Important Vector Borne Disease Affected by Global Warming

**Malaria:** Malaria is caused by one of four species of the *Plasmodium* parasite transmitted by female *Anopheles* spp Mosquitoes (Kuhn *et al.,* 2002).The potential for malaria transmission is highly connected to meteorological conditions such as temperature and precipitation (Guerra *et al.,* 2008).

The effect of global warming on malaria has been actively debated. In modern time we think Malaria as a tropical disease. However, Malaria has existed in many temperate area of the world (Reiter, 2000). Malaria cases have been on the rise due to increase in global warming (Nchinda, 1998).

The climate factor that increase the incubation rate of *plasmodium* parasite, as well as the breeding activity of anopheles mosquitoes, are considered the most important cause of epidemic out breaks of Malaria in non-endemic area (Hunter, 2003).

Malaria transmission is influenced by climate. Clearly transmission does not occur in climates where Mosquitoes cannot survive. Warm, moisture climate are most conducive to mosquito propagation and survival (El-Akad, 1991).

Malaria cannot occur below $16^{o}$c or above $33^{o}$c as sporogony cannot occur. The ideal condition for transmission is high humidity and environmental temperature between $29^{o}$c and $30^{o}$c. Rate of transmission also depends on the number of times the infected mosquito bites the host and the duration of the mosquito life span, both of which are influenced by temperature (White, 1996).

**Dengue fever:** It is important Mosquito borne arboviral disease affecting Human and is transmitted by *Aedes aegypti,* which is adapted to urban environments. However, over the last 15 years another competent vector *Aedes albopictus* (Asian tiger mosquito) has been introduced into Europe and expanded into several countries due to global warming and raising the possibility of dengue transmission (Paz, 2000).

*Aedes* mosquito thrives in warmer environment but not in dry environment. Thus, the effect of global warming on disease like dengue depends on both precipitation and temperature.

*Aedes* decline in laying egg, when monthly mean temperature decline to $16.5^{o}$c and no eggs were found below $14.8^{o}$c. The climate appears to be onlyonefactor in transmission of the disease (Khasnis and Nettleman, 2005).

The effects of future climate change on the rates of Dengue transmission are complex. On the one hand, areas with higher rainfall and higher temperatures can expect higher rates of dengue transmission because the Mosquitoes thrive in warm, moist environments. However, while it seems somewhat counterintuitive, rates of Dengue transmission may actually increase in regions that are projected to become more prone to drought. This is because the *Aedes* Mosquitoes which carry Dengue breed in containers used for household water storage, and because the need for such water storage containers will increase in areas projected to be more prone to drought as climate continues to change. Thus there may likely be more habitats for dengue vectors in areas projected to become drier. Epidemiological studies have shown that temperature is a factor in dengue transmission in urban areas (McMichael *et al.,* 1996).

**Chikungunya fever:** Chikungunya fever is caused by a virus of the genus *Alpha virus*, in the family *Togaviridae*, which is transmitted to human beings by the bite of infected Mosquitoes such as *Aedes aegypti* and *Aedes albopictus* (Beltrame *et al.,* 2007).A confirmed outbreak of Chikungunya fever was reported in August 2007 in north-eastern Italy, the first chikungunya outbreak on the European continent (Rezza *et al.,* 2007).

**West Nile fever:** West Nile fever is caused by the West Nile virus, a virus of the family *Flaviviridae* which is part of the Japanese encephalitis antigenic group. West Nile fever mainly infects birds and infrequently Human beings through the bite of an infected *Culex* Mosquito. It is emerging viral infectious disease and is transmitted by *culex* mosquito sps. Although the life span of the mosquito diminishes with excessive temperature, it has been suggested that as a result of global warming, there could be a north ward shift in western Equine and St.louis encephalitis, with disappearance of the former in southern endemic region (Reeves *et al.,* 1994).

Past entomologic data have been linked to meteorological data in order to model a West Nile fever outbreak in 2000; the aggressiveness of the vector (*Culex modestus*) was positively correlated with temperature and humidity, and linked to rainfall and sunshine, which were particularly high during the epidemic period (Ludwig *et al*., 2005).

**Filariases:** These are insect-borne infections caused by Filarial worms. The classic example is elephantiasis caused by *Wuchereia bancrofti*. Larvae of *W. bancrofti* develop in the mosquito and, as in malaria, human infection results from the bite of the insect. When bitten, the larvae (as male and female forms) pass through the lymphatics and mature to thread-like adults, 4-8 cm long, in the lymphatic glands. After mating the females develop eggs and larvae that are released as microfilariae into the peripheral circulation. The localization of the adult filariae in the lymph glands causes obstructions in the lymphatic drainage. This then results in the grossly disfiguring condition of Elephantiasis that typically involves massive swelling of the legs, scrotum and other extremities (Knight, 1982).

**Leishmaniasis:** Leishmaniasis is a protozoan parasitic infection caused by *Leishmaniainfantum* that is transmitted to human beings through the bite of an infected female sandfly. Temperature influences the biting activity rates of the vector, diapause, and maturation of the protozoan parasite in the vector (Bates, 2008).

Sand-fly distribution in Europe is south of latitude $45^oN$ and less than 800 m above sea level, although it has recently expanded as high as $49^oN$. Historically, sand-fly vectors from the Mediterranean have dispersed northwards in the postglacial period based on morphological samples from France and northeast Spain and sandflies have been reported today also from northern Germany.

The biting activity of sandflies is strongly seasonal, and in most areas is restricted to summer months. Currently, sand-fly vectors have a substantially wider range than that of *L. infantum*, and imported cases of infected dogs are common in central and Northern Europe. Once conditions make transmission suitable in northern latitudes, these imported cases could act as plentiful source of infections, permitting the development of new endemic foci.

Conversely, if climatic conditions become too hot and dry for vector survival, the disease may disappear in southern latitudes.

Thus, complex climatic and environmental changes (such as land use) will continue to shift the dispersal of leishmaniasis (Rioux and Lanotte, 1990).

**Tick-borne encephalitis (TBE):**Tick-borne encephalitis (TBE) is caused by an Arbovirus of the family *Flaviviridae* and is transmitted by ticks (predominantly *Ixodes ricinus*) that act both as vectors and as reservoirs (Lindquist and Vapalahti, 2008).

Similar to other vector-borne diseases, temperature accelerates the ticks' developmental cycle, egg production, population density, and distribution. It is likely that climate change has already led to changes in the distribution of *Ixodes ricinus* populations in Europe. *Ixodes ricinus* has expanded into higher altitudes in the Czech Republic over the last two decades, which has been related to increases in average temperatures (Gray, 2008).

**Anaplasmosis:** Human Anaplasmosis is caused by *Anaplasma phagocytophilum*, a bacterium usually transmitted to human beings by *Ixodes ricinus* tick. In Europe, this disease was known to cause fever in goats, sheep, and cattle until it emerged as a disease in human beings in 1996.

It has now shifted to new geographical habitats throughout Europe, and migrating birds have been implicated in its expansion (Petrovec *et al.,* 1997).

## The Impact of Climate Change on Epidemiology of Vector Borne Disease

**The effect of temperature on vector borne disease:** Warmer temperatures are already enabling insects and microorganisms to invade and reproduce in areas where once they could not due to severely low temperatures and seasonal chills. A small rise in temperatures can produce a 10-fold increase in a mosquito population causing an increase of malaria cases hence, malaria is now occurring in several Eastern European countries as well as in the highland areas of countries like Kenya where historically cooler climatic conditions had prevented the breeding of populations of disease-carrying mosquitoes. Freshwater snails, intermediate hosts for Fasciolosis, a disease that affects millions of herbivorous animals and can also affect humans can now be observed in areas above 4200 meters in the highlands of Peru and Bolivia as milder temperatures and altered environment conditions are more favorable to their survival (Gubler *et al.,* 2001).

Temperature can affect both the distribution of the vector and the effectiveness of the pathogen transmission through the vector. The range of possible mechanism whereby changes in temperature impact on the risk of transmission of vector borne disease are Increase or decrease in survival of vector, Change in rate of vector population growth, Change in feeding behavior, Change in susceptibility of vector to pathogen, Change in incubation period of pathogen, Change in seasonality of vector activity, Change in seasonality of pathogen transmission (Gubler *et al,* 2001).

**The effect of rainfall on vector borne disease:** Rainfall can affect vector borne disease and its transmission in many ways. The range of possible mechanism whereby rainfall can impact on risk of transmission of vector borne disease are Increased surface water can provide breeding sites for vector, Low rainfall can also increase breeding site by slowing river flow, Increased rain can increase vegetation and allow expansion in population of vertebrate host, Flooding may eliminate habitat for both vectors and vertebrate host and Flooding may force vertebrate host into closer contact with human and animal (Gubler *et al,* 2001).

## Impact of Global Warming On Animal and Human Diseases

According to the World Health Organization, zoonoses are diseases naturally transmitted to people from non-human vertebrates (Greifenhagen and Noland, 2003). Some zoonoses are transmitted directly through contact with animals or animal products. Other zoonoses are transmitted from their animal sources to humans by certain species of insects. The pathogens, their animal hosts and the insects that transmit them are directly affected by temperature, humidity, and other environmental factors. Many factors combined determine whether or not individual organisms or communities will be affected by disease. Climate change may affect one or more of these factors in a variety of ways, making it difficult to predict actual outcomes (Kay, 2004).

Zoonotic diseases are transmitted from animals to people in a number of ways. Some diseases, such as rabies, brucellosis and tuberculosis, are acquired by people through direct contact with infected animals or animal products and wastes. Other zoonoses are transmitted by vectors or through contaminated food or water. It is clear that many wild and domestic animal diseases occur seasonally. Climate variability affects the population dynamics of wild animals (and to a much lesser extent, domestic animals), and these dynamics affect the transmission of diseases within the animal populations as well as the transmission to other animal populations or people. Climate can affect the reproductive success and population densities of some species, and hence can increase the probability that a zoonotic disease will spread--the greater the number of the affected animal, the greater the chances of contact and transmission both within and between species (Ireland *et al.,* 2004).

Many diseases are transmitted by ticks and insects in the tropics, and to a somewhat lesser extent in temperate latitudes. Diseases like Lyme disease and West Nile virus are the best known of the few vector-borne zoonoses occurring in Canada. Temperature and humidity levels directly affect the feeding activities of these insects, as well as their reproductive success, survival rates and ability to transmit disease. Low winter temperatures kill many exposed ticks and insects and the diseases they carry, so that cycles of disease transmission are interrupted and need to be restarted in spring (Barker and Lindsay, 2004).

Globalization and climate change have had an unprecedented worldwide impact on emerging and re-emerging animal diseases and zoonoses. Climate change is disrupting natural ecosystems by providing more suitable environments for infectious diseases allowing disease-causing bacteria, viruses, and fungi to move into new areas where they may harm wild life and domestic species, as well as humans. Diseases that were previously limited only to tropical areas are now spreading to other previously cooler areas e.g. malaria. Pathogens that were restricted by seasonal weather patterns can invade new areas and find new susceptible species as the climate warms and/or the winters get milder. There is evidence that the increasing occurrence of tropical infectious diseases in the mid latitudes is linked to global warming. Insect-borne diseases are now present in temperate areas where the vector insects were nonexistent in the past e.g. trypanosomosis, anaplasmosis. Humans are also at an increased risk from insect-borne diseases such as malaria, dengue, and yellow fever (Ireland *et al.,* 2004).

For effective establishment and spread of zoonotic diseases, conditions must favour increased human-vector contact, increased survival and density of hosts or animal sources. Climate may affect the vectors, the disease organisms, the hosts, the pathways by which the disease is transmitted or more likely, and some combination of these. In Canada east of the Rockies, a possible northward movement of Lyme disease (which can cause chronic arthritis and nerve and heart dysfunction if left untreated) could be influenced by temperature effects on the ticks that transmit it, and by increased human population pressure on wilderness areas (Ogden, 2005).

Important zoonotic diseases such as avian influenza, Lyme disease and Rift Valley Fever are also likely to spread due to global warming. Avian influenza viruses occur naturally in wild birds, though often with no dire consequences, however, a highly pathogenic strain of the disease-H5N1-is currently a major concern because it can affect humans. This is mainly because severe winter conditions and droughts, occasioned by climate change can disrupt the normal migration pathways of wild birds and thereby bring both wild and domestic bird populations into greater contact at remaining water sources (Ireland *et al.,* 2004).

Most food- and water-borne diseases are zoonotic. The pathogens reside in livestock and wildlife, and are passed into the environment in the animals' feces or urine, which then contaminate food and water destined for human consumption. Climate change may alter the ecology of many food-borne and water-borne diseases, as well as food and water consumption and preparation patterns. Warmer summer temperatures and humid conditions enhance the survival of microbes in the environment, leading to increased contamination of food and water, and increased risk of infection. Some seasonal behavior exacerbates the risk of food- or water-borne disease transmission (outdoor grilling, al fresco meals, consumption of untreated water while camping (Todd,2000).

## Some Important Zoonotic Diseases Spread due to Global Warming

**Babesiosis:** This disease is tick-borne, affecting both wildlife and human populations. The disease, not fatal in itself, causes greater susceptibility to other infections. For example, after dry conditions spawned a heavy infestation of ticks in East Africa, large numbers of lions died from Canine distemper after first being weakened by Babesiosis. The disease is becoming more common in Europe and North America, also in relation with shifting tick distributions(Jeremy, 2008).

**Bird flu:**Changes in climate may disrupt natural movements and migrations of wild birds, possibly bringing them into contact with greater numbers of domestic birds, thereby further spreading bird flu. A particular pathogenic strain of bird flu, labeled H5N1, can be contracted by humans. This strain has caused grave concern among medical experts who worry it will evolve to become contagious from human to human (Ireland *et al.,* 2004).

**Bovine tuberculosis:**As Cattle move globally, so does Bovine tuberculosis. As climate change affects water availability worldwide, it is reasonable to assume that cattle distribution will change, bringing bovine tuberculosis to new regions. The disease can spread from cattle to wildlife and humans, greatly affecting natural environments and human settlements (Jeremy, 2008).

**Cholera:** This is a deadly water-borne disease that currently affects a large number of people in the developing world. Rising global temperatures will likely spread the disease, since it has been shown that higher water temperatures cause greater occurrence of the bacteria which leads to cholera (Todd, 2000).

**Ebola:** A deadly virus, that targets people, Gorillas, and Chimpanzees, there is no known cure. The virus appears to be linked to variations in precipitation, leading experts to believe that changing climate will allow outbreaks in new locations (Jeremy, 2008).

**Parasites:** Widespread, parasites are expected to shift ranges with temperature and precipitation changes. Some parasites affect many species, including humans. Others, like the *Baylisascaris schroederi*, are fatal only to one species, in this case the giant panda. A study showed that 50 percent of panda mortalities in the past five years were due to the parasite (Jeremy, 2008).

**Rift Valley Fever:** This fever is having great impact in the Middle East and Africa on both livestock and people. Infected livestock have high abortion and death rates. In addition, the disease is often fatal to humans. Mosquitoes transmit the disease and as water increases in some areas and lessens in others, there is little question that the range of the disease will change (Ireland *et al.,* 2004)**.**

**Sleeping sickness:** Transmitted by the tsetse fly, this disease affects both humans and animals. Sleeping sickness is known in 36 countries in Sub-Saharan Africa and leads to 40,000 Human deaths every year. The Tsetse fly's habitat may shift, like mosquitoes' and ticks', due to climate change (Jeremy, 2008).

**Yellow Fever:** Like Rift Valley Fever, Yellow Fever depends on mosquitoes for transportation. As Mosquitoes shift due to changes in water availability, it is likely that Yellow Fever will appear in new places. The fever affects primates as well as Humans. Recently, Brazil and Argentina have seen sudden drops in primate populations due to Yellow Fever (Jeremy, 2008).

## CONCLUSION AND RECOMMENDATIONS

In the coming decades, people and animals will likely experience different health issues than before, and some of these will be affected by climate variability and change. Because the role of climate in health outcomes is complex, and because interactions among Human health, animal health, and the environment are complex, it is impossible to predict exactly the effects of climate change on health. However, it is clear that a number of diseases are vulnerable to the effects of climate variability and change. Like all diseases, those that may be affected by climate change are embedded in particular Ecosystem dynamics. The most straightforward way to prevent some of these diseases would appear to involve direct intervention in the ecosystem.

Higher temperature will cause several pathogens (parasite, bacteria, and viruses) to extend their distribution and change their prevalence and abundance. The change of distribution of pathogen may have several consequences for wild and domesticated animal as well as human being.Based on the above the following recommendations are forwarded:Nations and international community's particularly, Industrialized countries should take all round protecting and commitment mechanism to minimize evacuation of excessive Carbon emission to atmosphere from the industries, which play a vital role in global warming,Planting trees and improving management to reduce emission of gasses,There should be Medical interventions to develop new and more effective vaccines and drugs against newly emerging diseases.

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