Forum: General Assembly 2

Issue: Measures to prevent the spread of mosquito-borne diseases

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Introduction

The issue of controlling the spread of mosquito-borne diseases is of paramount importance. These illnesses, such as malaria, Zika, and dengue, plague the whole world and are particularly severe in areas such as Latin America and South Africa due to their unsanitary conditions and warmer climate. Despite efforts from scientists and governments around the world, the effects of these diseases, such as illnesses and death, continue to cause large scale suffering. According to the American Mosquito Control Association (AMCA), over one million people die from mosquito borne diseases each year. Not only do such diseases impact humans, other animals such as dogs and cats (affected by dog heartworm disease) are also affected and can become carriers as well. This only highlights the importance of this issue and the need for the elimination of such diseases.

Mosquitoes are pests that are responsible for spreading large numbers of human diseases, and cause more suffering than any other insect. Their method of spreading disease involves ingesting disease-inducing micro-organisms through the blood off an infected host, and then injecting them into new host during their next meal.

But what is really concerning about mosquito borne diseases is how hard it is to predict and how long it takes for member states to act upon the diseases. Mosquitoes thrive in wetter and more humid climates, a trend which is becoming increasingly concerning in recent years with global warming on the rise. Studies have shown that, in hotter temperatures, the West Nile virus travels much faster in the blood, therefore increasing its deadliness. These conditions apply to many other diseases such as malaria.

Definition of Key Terms

Disease

A disease is defined as a condition of the living animal or plant body or of one of its parts that impairs normal functioning and is typically manifested by distinguishing signs and symptoms such as sickness.

Vector-Borne Diseases

Vector-borne diseases are illnesses caused by pathogens and parasites in human populations. Every year, all around the world, there are more than 1 billion cases and over 1 million deaths from vector-borne diseases such as malaria, dengue, schistosomiasis, human African trypanosomiasis, leishmaniosis, Chagas disease, yellow fever, Japanese encephalitis and onchocerciasis.

Mosquito Borne Diseases

Some mosquitoes are vectors for diseases. This means they can transmit diseases from one human or animal to another. Typically, the diseases are caused by viruses or tiny parasites. For example, a mosquito that bites an infected human or animal can pick up a virus along with the blood meal. The mosquito and virus do not harm one another but the virus reproduces inside the mosquito. Later, the mosquito can pass the viruses to other humans when biting them.

Endemic

When something is endemic that means that is regularly found in a certain place or among a certain group of people. This term is usually to describe illnesses and diseases.

General Overview

Information on Mosquitoes and Diseases

In the 1940s, insecticides and other indoor spraying agents were a huge scientific breakthrough and helped greatly reduce the risk of contracting mosquito borne diseases. But in recent years, many diseases have resurfaced due to climate change. The control of mosquito-borne diseases is a step forward towards the reduction of poverty. In regions ravaged by mosquito borne diseases, many people are disabled because of diseases and as a result cannot work or contribute to society. The government is also constantly spending money on healthcare as well as prevention methods. But if these diseases were to be eliminated, then more people will work, increasing productivity, and there will less financial stress on the government. This is of utmost importance for the regions of Africa and Latin America, where these diseases mainly affect those in

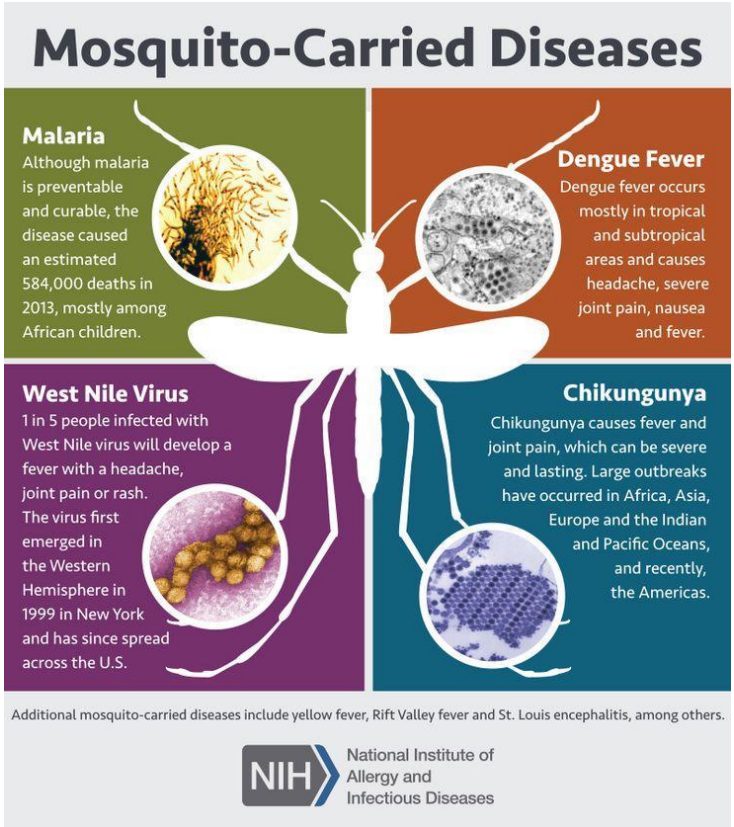

Figure 1: Infographic by the NIH, informing people on the symptoms and dangers of mosquito borne diseases

lower socioeconomic classes due to their poor living conditions and lack of access to clean facilities and healthcare. Mosquito-borne diseases are mostly diseases related with poverty and are responsible for major economic burdens through disability and missed educational opportunities for children and adolescents. Thus, it is no coincidence that many countries affected by these diseases are amongst the Less Economically Developed Countries (LEDCs).

Below is a chart showing which mosquito types cause which diseases.

Mosquito type	**Disease**
Aedes aegypti	Dengue, yellow fever, chikungunya, Zika virus
Aedes albopictus	Chikungunya, dengue, West Nile virus
Anopheles (more than 60 known species can transmit diseases)	Malaria
Haemagogus	Yellow fever

Malaria

Malaria originated in Africa and is an ancient disease. *Plasmodium* is the Malaria parasite transmitted by female anopheles (a genus of mosquitoes which can sometimes serve as vectors of some diseases) mosquitoes.

Some of the symptoms of the disease include fever, chills and flu-like illness. In 2015, an estimated 214 million cases of malaria occurred worldwide and 438,000 people died, mostly children in the African Region.

Antimalarial drugs have been available for more than 50 years and recently scientists in Britain and the United States have identified of the malaria parasite genome, a step that may help boost the campaign against the disease. This means the elimination of the malaria parasite and, thus, easier and more effective controlling of the disease.

Dengue

Dengue is a mosquito-borne viral infection, which has rapidly spread in all regions in recent years. It is transmitted by female mosquitoes mainly of the species of *Aedes aegypti* and, to a lesser extent, *Aedes albopictus*. The infection is responsible for flu-like illness and, if severe, it can be life-threatening.

Yellow Fever

Yellow fever is a viral hemorrhagic (includes bleeding disorders) disease transmitted by infected mosquitoes. This disease, at present, occurs only in tropical areas of Africa and America, such as Angola, Nigeria and Argentina.

Symptoms of yellow fever include fever, headache, jaundice (yellowish pigmentation of the skin), muscle pain, nausea, vomiting and fatigue. However, it can be prevented by an extremely effective vaccine (Yf-Vax), which has been tested and proved to be safe. Yf-vax provides a long-lasting protection or even immunity for most healthy individuals, but not all.

West Nile Virus

West Nile Virus (WNV) can lead to a fatal neurological disease in humans, transmitted by the bite of mosquitoes. WNV can be detected in Africa, Europe, the Middle East, North America and West Asia. Birds are the natural hosts of the virus.

Infection with WNV is either asymptomatic (no symptoms) in around 80% of infected people, or can lead to West Nile fever (headache, tiredness, and body aches, nausea, vomiting) or severe West Nile disease (headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis.)

No current vaccine is available for humans. Treatment is supportive for infected patients, including hospitalization, respiratory support and prevention of other infections.

Zika Virus

Zika virus disease is caused by a virus transmitted primarily by Aedes Mosquitoes. The symptoms of this disease are similar to other infections, such as dengue, and consist of fever, skin rashes, conjunctivitis, muscle and joint pain, malaise and headache. This disease was identified in Uganda and the United Republic of Tanzania. Outbreaks of Zika virus have been recorded in Africa and America as well. Nowadays, Brazil is a country that is threatened by the virus on a large scale.

Since sexual transmission of Zika virus has been documented in several countries, the risk of a potential pregnancy with severe complications is getting higher and higher. Zika virus can be passed won from mother to fetus, resulting in many brain defects such as microcephaly, an abnormal smallness of the head.

Treatment includes rest, drinking enough fluids and treatment of pain and fever via the usual medicines. If

the situation gets worse, then the patient should seek medical care. There is currently no vaccine available.

Chikungunya

Chikungunya virus is a pathogen transmitted by mosquitoes. It was first found in the Caribbean and, now, it is detected in 35 states, Puerto Rico and the U.S. Virgin Islands. Local transmission of chikungunya is now being reported in other countries in the South America.

The symptoms are fever, joint and muscle pain, headache, lethargy and rash. The disease is rarely fatal. There is currently no vaccine and the treatment is limited to pain medication.

Major Parties and Organizations Involved

Africa

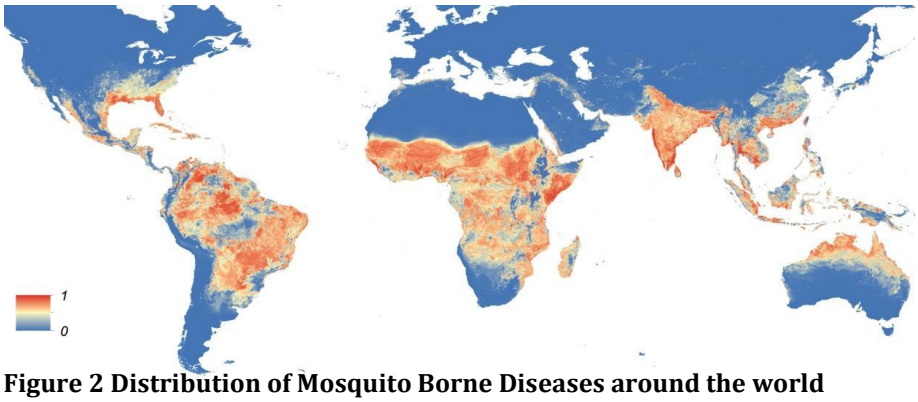

Figure 2 Distribution of Mosquito Borne Diseases around the world

Around the world, malaria transmission occurs in 97 countries, putting about 3.4 billion people at risk. The disease burden is heavily concentrated in sub-Saharan Africa, where an estimated 90% of malaria deaths occur. Four out of ten malaria related deaths occur in the two highest burden countries: The Democratic Republic of the Congo and Nigeria.

Nigeria suffers from malaria, which causes about 600,000 deaths per year. The government of the country strives to promote preventive measures, such as indoor and outdoor spraying, to protect their citizens.

Dengue is now endemic in more than 100 countries in Africa (e.g Kenya and Angola), while there have been several outbreaks of chikungunya in the continent. At the same time, yellow fever has occurred in recent years in seasonal workers and nomadic and displaced people in several African countries.

Latin America

As of May 25, 2016, the following South American countries had reported cases of chikungunya: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela.

In addition, in Argentina, there have been several outbreaks of Zika virus, as well as yellow fever and malaria. The Zika virus causes much concern to health officials in Latin America, and pregnant women are warned from travelling to the area, since thousands of babies are being born with brain defects on the continent, particularly in Brazil.

World Health Organization

The UN-affiliated World Health Organization has a global health agenda that gives high priority to the controlling of mosquito-borne diseases by planning and implementing a wide range of interventions and projects. For instance, it has carried out many indoor spraying projects in African countries and has launched campaigns all over the word to raise awareness on the issue. In addition, the World Health Day is a day devoted on diseases and ways to combat them, including mosquito-borne diseases.

American Mosquito Control Association

The mission of this organization is to provide information and education leading to the enhancement of health and quality of life through the suppression of mosquitoes and the controlling of mosquito-borne diseases. It is world-wide in scope with members in over 50 countries.

Malaria No More

Malaria No More (MNM) is a worldwide organization committed to eliminating mosquito-transmitted malaria deaths in children. MNM has been able to provide approximately 5.4 million mosquito nets that have resulted in a 58 percent decline in child malaria deaths in many parts of Africa since 2000.

Nothing but Nets

Nothing but Nets is an organization that partners with the World Health Organization (WHO), the United Nations International Children's Emergency Fund (UNICEF) and the UN Refugee Agency to create awareness and raise funds to fight malaria in Africa.

The parties listed above are only a few of the many organizations that help find solutions to the said issue. Organizations such as the Bill and Melinda Gates foundation, United Nations International Children's Emergency Fund (UNICEF), and the African Union have all contributed greatly to the resolution of the issue.

UN Involvement, Relevant Resolutions, Treaties and Events

The United Nations have passed multiple resolutions to help solve this issue including but not limited to:

- **A/RES/67/299**-Consolidating gains and accelerating efforts to control and eliminate malaria in developing countries, particularly in Africa, by 2015, 1 October 2013

- **A/RES/68/301** -New Partnership for Africa's Development: progress in implementation and international support, 28 July 2014

- **A/RES/68/308**-Consolidating gains and accelerating efforts to control and eliminate malaria in developing countries, particularly in Africa, by 2015, 19 September 2014

- **A/RES/69/325**-Consolidating gains and accelerating efforts to control and eliminate malaria in developing countries, particularly in Africa, by 2015 and beyond, 6 October 2015

- **A/RES/70/183**-Global health and foreign policy: strengthening the management of international health crises, 18 February 2016

The UN also established the World Health Organization which had its own program that advertised and raised awareness on the issue through the use of TV and other media.

The UN, through the UNTV and their official site, have been posting videos and information in order to raise awareness on preventive measures.

Between 2004 and 2013, international donors funded over 700 million bed-nets to protect families against malaria in sub-Saharan Africa.

Currently, biotechnology companies (e. g OXITEC) are working on genetically engineered measures to combat the *Aedes Aegypti* mosquito population. A lot of research has gone into a Zika virus vaccine and other techniques they are using are the Radiation-based Sterile Insect Technique (SIT), and RNA interference.

Timeline of Events

Date	Description of event
1647 - 1650	Yellow fever is brought from Africa to Barbados on the slave ships. Wealthy white settlers on the island have no immunity to the disease. Six thousand of the settlers die during an outbreak lasting several years.
1742	When the British send an army to take Cartagena, Colombia more than half of them die of mosquito-borne disease.
1800s	Local populations in Africa and Asia have immunity to yellow fever and malaria but the European colonizers do not and as a result many of them die.
1904	The USA, under President Theodore Roosevelt, takes over work on the Panama Canal. William Crawford Gorgas is a hero for eliminating yellow fever in Cuba, largely by

	breaking the chain of infection and reducing mosquito breeding grounds. He is hired to eliminate yellow fever and malaria from the canal zone.
1930	In Brazil, entomologist Raymond C. Shannon finds a mosquito - *Anopheles gambiae* - a malaria vector. It probably arrived from West Africa on a destroyer ship used to deliver mail. World travel has opened up possibilities for vectors to move across countries and continents.
1947	The Zika Virus is first identified in Uganda in monkeys.
7 April 1948	Founding of the World Health Organization (WHO)
1952	The Zika Virus is identified among humans
1962	US scientist, Rachel Carson publishes Silent Spring; a book arguing that DDT is not safe. The reaction is immediate in several US states: DDT is banned. A nation-wide ban follows ten years later.
2007	The first large outbreak of disease caused by Zika infection is reported from the Island of Yap, located in the Caroline Islands of the Western Pacific Ocean.
2015	7000 cases of illness related to the Zika Virus emerged in Brazil
2016	WHO declares that Zika virus infections constitute a major Public Health Emergency of International Concern.

Possible Solutions

Raising awareness on the importance of the issue, as well as on preventive measures, with the main actors being school officials, governments, Non-Governmental Organizations (NGOs) etc. is a major part of the solution, since people potentially affected by the diseases need to be aware of how to protect themselves. These groups could then present plans involving better hygiene and sanitation standards of living (e.g piping water to households) as these aspects can contribute to the elimination of insect habitats.

However, such measures would be redundant without financial support, so looking into ways of garnering funding for scientific research regarding vaccines and medical treatment would also be effective. For example, the International Monetary Fund (IMF) can fund the research being carried for the Zika virus vaccine. Additionally, governments could also support financially the current progress made by biotechnology companies, in order to tackle the issue through genetic engineering and vaccines.

Programs related to the training of anyone who could help in this battle against the mosquito-borne diseases are of vital importance (e.g. local authorities, doctors). As doctors cannot be in all placed at once, it is important for different regions to have their own doctors and training camps can be established to help do so. This can be funded with the solution presented in the paragraph above.

There are also many other prevention methods including but not limited to:

- Promoting the use of certain sprays
- Buying long lasting nets for homes in poor areas
- Modifications to water sources could all reduce the impact of mosquito borne diseases,
- Introducing natural predators of mosquitoes into the area
- Changes in housing, such as moving houses away from known mosquito habitats or installing screens on all doors

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