**Final Term Abstract**

**By - Annie Renita (**a2@stevens.edu**) and Gauri Mahajan (**gmahaja2@stevens.edu**)**

**Title : Ebola transmission and spread in a small town**

Ebola Virus Disease (EVD) is Ebola Haemorrhagic fever, is a severe, often fatal illness affecting humans and other primates. The problem is to avoid disease spread in the future, it is necessary to have a risk management strategy ready, in-order to contain any disease. To create a risk management strategy and prevention & control of any disease it is necessary to have a dynamic model system to help analyze data of transmission and spread of the disease within the communities. We have chosen transmission and spread of Ebola Virus disease as it is one the deadliest diseases. The average EVD case fatality rate is around 50% but the case fatality rates have varied from 25% to 90% in the past outbreaks. This will help in stocking vaccines in places prone to the outbreak, so that it can be contained in time to reduce the transmission and spread of EVD. The most recent outbreak was in 2018-2021. The World Health Organization has acknowledged and Ministry of Health of Democratic Republic of Congo has confirmed cases of Ebola virus disease (EVD) had been detected in Butsii Health Area, Benii Health Zone in North Kivu Province. So this means that EVD has not been completely eradicated so there’s a chance of EVD to cross borders and create an outbreak. Analyzing and studying the dynamic factors leading to the transmission and spread, would help in disease management which is very interesting.

The Ebola virus causes an acute, serious illness which is often fatal if untreated. EVD first appeared in 1976 in 2 simultaneous outbreaks, one in what is now Nzara, South Sudan, and the other in Yambuku, DRC. The latter occurred in a village near the Ebola river, from which the disease takes it’s name. The 2014-2016 outbreak in West Africa was the largest Ebola outbreak since the virus was first discovered in 1976. The outbreak started in Guinea and the moved across land borders to Sierra Leone and Liberia. The virus family Filoviridae includes three genera: Cuevavirus, Marburgvirus and Ebolavirus. Within the genus Ebolavirus, six species have been identified: Zaire, Bundibugyo, Sudan, Tai Forest, Reston and Bombali.Fruit bats of the Pteropodidae family are suspected to be natural Ebola virus hosts. Ebola is spread to humans by direct contact with the blood, secretions, organs, or other body fluids of infected animals such as fruit bats, chimps, gorillas, monkeys, forest antelope, or porcupines that have been found sick or dead in the jungle. Ebola transmits from person to person by direct contact (through damaged skin or mucous membranes) with: Blood or bodily fluids of an Ebola patient or a person who has died from Ebola. Objects contaminated with bodily fluids (such as blood, feces, or vomit) from an Ebola patient or the body of an Ebola patient who died.The incubation period, or the time between viral infection and start of symptoms, ranges from 2 to 21 days. A person who has been infected with Ebola cannot spread the illness until symptoms appear. EVD symptoms can appear suddenly and include: Fever, Fatigue, Muscle ache, Headache, Throat irritation. The following comes after that: Vomiting, Diarrhoea and Rash, Symptoms of Kidney and Liver Insufficiency. Both internal and exterior bleeding can occur in some circumstances (for example, oozing from the gums, or blood in the stools). Low white blood cell and platelet counts, as well as increased liver enzymes, were discovered in the lab.Survival is improved with supportive care, such as rehydration with oral or intravenous fluids, and treatment of particular symptoms. A variety of possible treatments are now being explored, including blood products, immunological therapy, and pharmacological therapies.

The first-ever multi-drug randomized control trial was conducted in the Democratic Republic of the Congo during the 2018-2020 Ebola outbreak to evaluate the effectiveness and safety of drugs used in the treatment of Ebola patients under an ethical framework developed in consultation with experts in the field and the DRC during the 2018-2020 Ebola outbreak. In late 2020, the US Food and Drug Administration authorized two monoclonal antibodies (Inmazeb and Ebanga) for the treatment of Zaire ebolavirus (Ebolavirus) infection in adults and children.The Ervebo vaccine has been demonstrated to protect humans against the Zaire ebolavirus species, and the Strategic Advisory Group of Experts on Immunization recommends it as part of a larger set of Ebola epidemic response techniques. The vaccine was authorized by the US Food and Drug Administration in December 2020, and WHO prequalified it for use in anyone aged 18 and above (excluding pregnant and nursing women) for protection against Ebola virus illness caused by the Zare Ebola virus. Under the "compassionate use" strategy, the vaccine was given to around 350 000 patients in Guinea and the Democratic Republic of the Congo during the 2018-2020 Ebola virus disease epidemics. The vaccine has been proven to be safe and effective against the Zaire ebolavirus species. Beginning in January 2021, a global stockpile of the Ervebo vaccine will be accessible. In May 2020, the European Medicines Agency suggested that a 2-component vaccination named Zabdeno-and-Mvabea be approved for anyone aged 1 year and up.