



# A STUDY ON POSSIBLE EBOLA VIRUS DISEASE SPREAD

## KEYWORDS

health security, infectious disease, Ebola virus disease

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## ABSTRACT

The greatest contemporary threats of health security are global spreading of infectious diseases, increasing concentration of chemical, biological and radiological substances in products and environment and bioterrorism. Numerous examples of fast spread of infectious diseases in the past highlight the fact that it is essential to be vigilant towards prospective epidemics. One of the greatest epidemics in the last decade is Ebola virus disease outbreak in West Africa. The main aim of this paper is to analyze further possible spread of Ebola virus disease in West Africa and worldwide.

## INTRODUCTION

Ebola virus disease, previously known as Ebola hemorrhagic fever, is rare and deadly disease caused by infection with one of the Ebola virus strains. Ebola viruses were found in several African countries. Ebola was first discovered in 1976 with simultaneous appearances in Nzara, Sudan and in Yambuku, Democratic Republic of the Congo. [2] Disease got its name based on place of occurrence in village near river Ebola. Ebola virus disease case fatality rate is around 50%. Case fatality rates have varied from 25% to 100% in past outbreaks.

The 2014 Ebola outbreak is the most severe outbreak of Ebola virus disease in history since the discovery of ebolaviruses in 1976, affecting multiple countries in the world, especially countries of West Africa.

Epidemiologically, the Global Public Health risk is a function including the probability of a worldwide spread and the vulnerability to controlled Ebola [9] transmission within affected country.

## CASE STUDY

In the present study, of possible Ebola virus disease spread, were investigated cases incidents and deaths resulting from EVD containing incidents in West Africa but as well imported cases to other countries of the world.

## METHODS

This study analyzes spread of Ebola virus disease in the period of time from 1 September 2014 to 21 January 2015 in countries of West Africa but also other countries of the world. Source of information about cases incidents and deaths resulting from Ebola virus disease were situation reports of WHO on Ebola virus disease.

## RESULTS

On the 21st January 2015, there have been 21 724 reported cases Ebola virus disease, with 8641 reported deaths. Disease was spread over 3 continents with massive spread in West Africa, cases on other continents were imported. Affected countries to the 21 January 2015 were Guinea, Liberia, Sierra Leone and the United Kingdom. Previously affected counties were Mali, Nigeria, Senegal, Spain and the United States of America. These cases highlight the

fact that in case of immediate emergency and isolation of sick people and possibly sick people, epidemics can be stop very early. Second finding is that health care systems of developed countries are able to cope with Ebola virus disease more effectively than in countries of West Africa.

Spread of disease is to the 21 January 2015 still not under control in the following countries of West Africa: Guinea, Sierra Leone and Liberia. The graphs below picture cumulative Ebola cases and deaths from end of august to the end of the 21 January 2015 in each week.

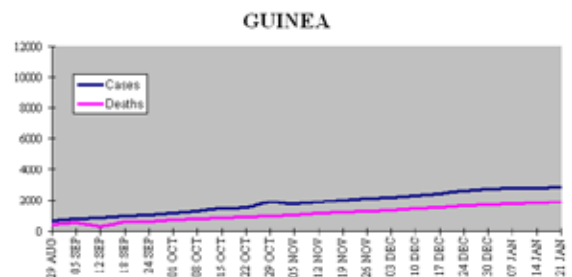
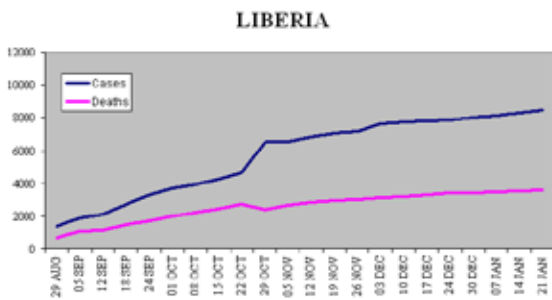


Figure 1: cumulative Ebola cases and Deaths in Guinea  
Sources: authors.



Figure 2: cumulative Ebola cases and Deaths in Sierra Leone  
Sources: authors.



**Figure 2: cumulative Ebola cases and Deaths in Liberia**  
Sources: authors.

Looking at the shape of the graphs and not at the absolute case counts it seems to be obvious that we face a different outbreak dynamics in Guinea, Liberia and Sierra Leone. The Guinea graph shows a near linear pattern indicating that there is kind of equilibrium between new cases on the one hand and deaths on the other. This also underscores that fighting the outbreak is far from being impossible provided that the necessary means are onsite and operational.

A stratified analysis of cumulative confirmed and probable cases indicates that the number of cases in males and females is about the same. There have been 74 reported cases per 100 000 population in males, compared with 76 per 100 000 population in females.

Compared with children, people aged 15 to 44 are three times more likely to be affected (33 reported cases per 100 000 population, compared with 96 per 100 000 population). People aged 45 and over (122 reported cases per 100 000 population) are almost four times more likely to be affected as children. [5]

## DISUSSION

The current Ebola virus disease outbreak in Western Africa highlights how an epidemic can proliferate rapidly and pose huge problems in the absence of a strong health system capable of a rapid and integral response. Global awareness of the Ebola outbreak has not translated into

action and international community was caught off guard by Ebola virus disease, response was for a long time inadequate to address realities on the ground. [7]

At the time the outbreak began, the capacity of the health systems in Guinea, Liberia and Sierra Leone was limited. Several health-system functions that are generally considered essential were not performing well and this hampered the development of a suitable and timely response to the outbreak. There were inadequate numbers of qualified health workers.

Infrastructure, logistics, health information, surveillance, governance and drug supply systems were weak. The organization and management of health services was sub-optimal. Government health expenditure was low whereas private expenditure – mostly in the form of direct out-of-pocket payments for health services – was relatively high. [8]

The study proved that dynamics of Ebola virus disease spread in most affected countries are different. Basically the most important factor in fight against Ebola virus disease is how is health care system developed and prepared for outbreaks of virus diseases.

## CONCLUSIONS

In general we can conclude that Ebola virus disease epidemics in West Africa are more social and economic problem, as well as problem of weak health care systems of affected countries. It is highly likely than outbreak of Ebola virus disease in one of developed countries would not be so serious and would not affect so huge number of people.

Furthermore we can conclude that spread of Ebola virus disease worldwide is highly unlikely. The only filed cases outside of West Africa were imported cases.

Nevertheless, internationally we have to be vigilant to prospective threats of Ebola virus disease spread and as well other threats to international health security.

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