CONTAGIOUS DISEASE AND THE AFRICAN VALUE OF CARE GIVING: EXAMINING THE RECONSTRUCTED REALITIES IN WEST AFRICA

BY

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CERTIFICATION

I certify that this research project was carried out by **AYANBISI OLUFEMI JOSHUA, MATRIC NO: SOC/12/0700** under my supervision in the Department of Sociology, Faculty of Social Sciences, Federal University Oye-Ekiti.

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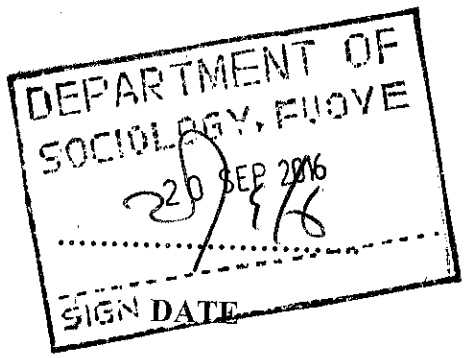

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DEDICATION

This research project is dedicated to God Almighty; my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding for his grace and mercy over my life since the beginning of my programme. Also to my loving and caring parents Mr. Elisha Ayanbisi and Mrs. Bolatito Ayanbisi for their parental care and support.

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ABSTRACT

The general aim of this study was to explore contagious disease and the African value of care giving. The study specifically examined the African conceptualization of care giving, discovered the reconstructed realities of African value of care giving orchestrated by Ebola virus disease. The study made use of a total of 8973 probable, confirmed, and suspected cases of Ebola virus disease and 4484 deaths as reported by the World Health Organization (WHO) in their 2014 Ebola response roadmap situation report. The Ebola virus disease had a widespread and intense transmission in countries like Guinea, Liberia, and Sierra Leone and countries like Nigeria, Senegal had case(s) imported from a country with widespread and intense transmission. In Guinea there were 1472 confirmed, probable, and suspected cases with 843 deaths, in Liberia there were 4249 confirmed, probable, and suspected cases with 2458 deaths, and in Sierra Leone there were 3252 confirmed, probable, and suspected cases with 1183 deaths. In Nigeria, there were 20 cases and eight (8) deaths while in Senegal, there was one case. The research findings revealed that the Ebola epidemic of 2014 has forced Africans to face numerous difficulties on daily basis regarding their traditional norms and practices of care giving by staying close to their sick family members to nurse them during illness. The study also revealed that Ebola virus disease has prohibited the Africans from properly honouring their loved ones who died from the deadly disease. Thus, the study recommends that Africans should endeavour to have a reconstructed mindset that Ebola patient like other hopeless diseases should be distanced from, not minding our long learned practice and shared culture, but survivors of Ebola virus disease should not be stigmatized and isolated after they have been declared free of the virus.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Contagious disease is one of the contemporary global health issues due to its high risk of contamination. Health constitutes precedence in the life of every individual. It determines to a great extent, the level at which man functions in the society. Hence health is that quality of life that enables an individual live most and serves his community best. It remains a fact that health is a major determinant of success in man's life. It guarantees hope and progress for individuals in any society (Dorman, 2002).

The World Health Organization (WHO) described health in 1948, in the preamble to its constitution, as "A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". To be healthy is to be free from both contagious and non-contagious diseases and also to be in a state of homeostasis (balance) with one's surroundings i.e. to maintain healthy habits such as taking regular exercises and adequate rest, adopting a high level of personal hygiene, eating a nutritionally balanced diet, abstaining from the abuse of drugs and alcohol, taking care of one's mental well-being and developing social skills to interact in a positive manner within society.

In the understanding of the human body, it is important to comprehend normal body structures and functions and how functional or physiologic changes affect the body which could lead to disease.

Disease can be defined as any deviation from or interruption of the normal structure or function of any part, organ, or system (or combination thereof) of the body that is manifested by a characteristic set of symptoms and signs (Phila and Saunders, 1994).Disease can also be

regarded as a term describing any deviation from the normal state of health or wellness. It includes physical, mental and social conditions. Disease leads to a disruption of homeostasis (balance) in the body.

Diseases can be classified as communicable (contagious) diseases and non-communicable (non-contagious) diseases. The term communicable disease is used to refer to infectious diseases that is transmitted to other person either by physical or casual contact with the victims' secretion or objects. Examples are malaria fever, Lyme disease, Lassa fever, Ebola etc. Non-communicable diseases are chronic medical conditions or diseases which are non-infectious. Examples are stroke, heart attacks, diabetes, cancer, asthma etc.

Management of contagious diseases are carried out by care givers which include health practitioners and family members. In Africa, wide family network provide support to individual or group of people suffering from diseases. Responsibilities around care giving are mostly shared among close relatives.

1.2 STATEMENT OF THE PROBLEM

The death incidences caused by contagious diseases especially that of Ebola virus disease has brought in so much fear among the Africans such that the social realities in terms of social relationships and values of care giving has been reconstructed. The once hospitable and friendly people are now battling with fear and stigma bringing about a drastic change in their social lives. For example, because there have been more Ebola cases and deaths in Liberia in the year 2014, people in other African nations do not want to have any relationship with them wherever they are found. A good example as reported by Punch Newspaper (2014) is that of a lady (a Liberian) named Kate, living in Ikotun, Lagos State, Nigeria, West Africa who committed suicide recently because she was neglected, avoided and isolated by

Nigerians for fear that she could be a carrier of the Ebola disease while she actually did not have the disease. She killed herself out of frustration of being rejected and alienated; this is because Africans value intimacy and thus desire to have social interaction with the people in their community.

So far, more than 1,552 people out of 3,069 known cases in four countries have died from Ebola (WHO, 2014), and public health officials have started to restrict movement of people and establish quarantine zones. These measures were taken because they could help stop the fatal virus from spreading. Flights were banned from going to Liberia from Nigeria since the first Ebola patient in Nigeria was a Liberian who flew in from Liberia. Due to the fear of being contracted with the deadly disease, the carriers of the disease and worse still the survivor's (that is, those who were infected and are now cured) are now struggling to be accepted by the people in their communities, they are being stigmatized and avoided even by members of their families (Caulderwood, 2014). Although, avoiding direct contact with people carrying the Ebola virus is one of the key measures used to reduce the spread of the disease, this also has a negative effect especially as people who suffer from other severe illnesses like malaria are sometimes admitted into isolation as a precaution. Fear and stigma are often common human reactions to a disease, in particular when it comes to Ebola, a highly infectious disease which can spread quickly and for which there is no known cure. It is noteworthy that the fear of being marginalized or isolated may also cause people to conceal their illness particularly when it is Ebola disease. In Guinea, a West African country, which is currently experiencing a rampant spread of Ebola cases, fear and stigma related to the disease are becoming increasingly visible. Many residents are limiting their movements, refusing to venture too far from their homes. Amanda McClelland, Emergency Health Officer with the International Federation of Red Cross and Red Crescent Societies (IFRC) said that this is a common reaction. She said that fear and stigma must be addressed immediately as she

recalled their experience in Uganda during an Ebola outbreak in 2012. According to her, they met people whose family and friends were scared of them because they were being monitored as possibly carrying the virus and so, no one touched them. They were avoided, even after they had recovered. It is this kind of fear and stigma which we must address immediately. (Diallo, 2014).

1.3 RESEARCH QUESTIONS

The following research questions are formulated based on the research topic:

1. What is the African conceptualization of care giving?
2. What are the reconstructed realities of African value of care giving?

1.4 AIM AND OBJECTIVES OF THE STUDY

The general aim of this study is to explore contagious diseases and the African value system of care giving. However, the specific objectives are as follows:

1. To evaluate the African conceptualization of care giving.
2. To examine the reconstructed realities of African value of care giving.

1.5 SCOPE OF THE STUDY

The scope of this study is to examine the reconstructed realities of African value of care giving alterated by contagious diseases and is limited to the people in Africa.

1.6 SIGNIFICANCE OF THE STUDY

This study offers insights on contagious diseases and the African value of care giving. The study may be significant to students, researchers, health workers and policy makers in the following ways:

i. To the students, the study may offers insights on concept of contagious diseases, the African value generally and may be a material for their academic consultation especially students of medical sociology, public health and other related discipline.

ii. It will give health workers insights on the African value of care giving i.e. the way the sick are been cared for among the Africans and also help them in employing empathy when treating an infected person.

iii. To the researchers and policy makers, the study may show the reconstructed realities of the African valve of care giving which was due to contagious diseases and information gathered may provide baseline data for further study and for policy makers, it will help them makes laws that will fight against the reconstructed realities which are fear and stigmatization of the infected or survivors of contagious diseases.

1.7 OPERATIONAL DEFINITION OF KEY CONCEPTS

In order to avoid misconception and ambiguity, some central concepts in the study are hereby defined. The purpose of these definitions is to make clear the scope covered by this study and bring the researchers notion of the concepts into proper perspective. The key words as would be used in this study are defined as follows:

1.7.1 Disease: This is defined as any deviation from or interruption of the normal structure or function of any part, organ, or system of the body that is manifested by a characteristic set of symptoms and signs. Disease leads to a disorder of balance in the body.

1.7.2 Contagious diseases: This is defined as a disease that can be transmitted from one person to another. This disease is easily catchable

1.7.3 Value: This is a coherent set of attitude, behaviour and action adopted by a person or a society as a standard to guide its behaviour and preferences in all situations.

1.7.4 Care-giving: This is defined as a duty of a healthy person to take care of the less fortunate; those incapacitated in one way or another.

1.7.5 Health: This means a state of optimal physical, mental, and social well-being, and not merely the absence of disease and infirmity.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION

This chapter contains a review of recent relevant literature to give support to the research specifically from former studies. The order of such review of literature is as follow:-

i. concept of contagious disease;

ii. the African value of care-giving and

iii. an examination of its reconstructed realities.

2.1.1 CONCEPT OF CONTAGIOUS DISEASE

Contagious disease can be regarded to as communicable or infectious disease. Anderson (1980) defined a communicable disease as a disease that can be transmitted from one person to another or from lower animal to higher animal (man). He attributed the cause of this disease to pathogenic microorganisms. These microorganisms are very difficult to see with mere naked eyes except with the use of highly powerful microscopic lens. Udoh, Fawole, Ajala, Okafo & Nwana (1987) confirmed that pathogens that harm the body are popularly known as germs.

The terms communicable disease, contagious disease and infectious illness are used interchangeably as they simply mean that the illness is "catchable." Brain (1977) noted that communicable diseases are infectious diseases that can be passed from person to another or from an animal to a person. World Health Organization (WHO) also defined communicable diseases as infectious diseases caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi; the diseases can be spread, directly or indirectly, from one person to another. Zoonotic diseases are infectious diseases of animals that can cause disease when transmitted to humans.

According to Janet M. Pollard & Carol A. Rice (2006) in an article 'Reducing Contagious Illness in the Child Care Setting' communicable disease can be defined as any bacterial, viral, or parasitic infection in the body that can be spread from one individual to another. They further stated that contagious, communicable or infectious diseases can vary from the common cold and flu to more uncommon diseases like meningitis and hepatitis.

Olaoye (1978) classified communicable diseases into four categories namely: water borne diseases, air borne diseases, insect borne and other diseases that are transmitted by contacts and arthropods. Communicable diseases are contacted through direct and indirect sources such as droplets from the mouth, nose or skin of the victims. They could also be contacted through open sores/cuts or wound and through insect bites, drinking impure water, eating contaminated foods, milk, fruits or wearing dirty clothes or caps/ head ties (Anderson, 1980).

Lucas and Gilles (1981) described the mode of transmission of communicable diseases as the way by which an infection is transferred from one person to the other or from reservoir to the host. This may occur in different ways which include contact, inhalation, infection, contamination of hands, food or water, penetration of skin directly by causative organisms and congenital transmission like syphilis, and toxoplasmosis.

The World Health Organization (W.H.O) Regional Office for Europe in conjunction with the Red Cross has categorized the common contagious diseases. Some of the common types of contagious diseases are listed below:

LIST OF SOME COMMON TYPES OF CONTAGIOUS DISEASES

1.Acquired immunodeficiency syndrome (AIDS)	20.Herpes
2.Anthrax	21.HIV (human immunodeficiency virus)
3.Aspergillosis	22.Influenza
4.Botulism	23.Lassa fever
5.Chicken pox	24.Leprosy
6.Cholera	25.Lice (pediculosis)
7.Pneumonia	26.Lyme disease
8.Conjunctivitis	27.Malaria
9.Coxsackievirus disease	28.Measles
10.Diarrhoea	29.Meningitis
11.Diphtheria	30.Rabies
12.Ebola viral haemorrhagic fever	31.Small pox
13.Echovrius	32.Syphilis
14.Gonorrhea	33.Tetanus infection
15.Guillain-Barre syndrome	34. Trichinosis Infection
16.Hand, foot, and mouth disease	35.Tuberculosis
17.Helicobacter pylori	36.Tularemia (Rabbit fever)
18.Hepatitis A	37.Yellow Fever
19.Hepatitis B	38.Zika (Zika Virus)

For the purpose of this research, I will be focusing on one contagious disease namely: Ebola virus disease.

- EBOLA VIRUS DISEASE

According to the Centers for Disease Control and Prevention (C.D.C) fact sheet on Ebola Virus Diseases (2015), Ebola, also known as Ebola Hemorrhagic Fever, is a rare and deadly disease caused by infection with one of the Ebola virus species. Ebola can cause disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees). Ebola is caused by a virus of the family Filoviridae, genus Ebola virus. There are five identified Ebola virus species. Four of the five have caused disease in humans: Ebola virus (Zaire Ebola virus); Sudan virus (Sudan Ebola virus); Taï Forest virus (Taï Forest Ebola virus, formerly Côte d'Ivoire Ebola virus); and Bundibugyo virus (BundibugyoEbola virus). The fifth, Reston virus (Reston Ebola virus), has caused disease in nonhuman primates but not in humans.

Ebola Virus Disease (EVD) is a highly contagious disease caused by Ebola virus strains. In 1976, Ebola virus was first detected during two simultaneous outbreaks in Sudan and the Democratic Republic of the Congo (then Zaire). The village in which the second outbreak occurred is near the Ebola River, which gives its name to the virus (Mattar and González, 2014).

In a press briefing on World Health Organization's (WHO)'s strategy to combat Ebola, at the United Nations headquarters in Geneva August 28, 2014, WHO's Assistant Director General Bruce Aylward showed the number of cases of Ebola in West Africa in a chart. From the graphical illustration, he showed that the Ebola outbreak in West Africa had killed more than 1,552 people out of 3,069 known cases in four countries and that it "continues to accelerate" (Caulderwood, 2014). Ebola virus disease became an epidemic in West Africa from March, 2014.

The outbreak of Ebola Virus Disease (EVD) begins with the introduction of virus into human population from infected bats or non-human primates. Thereafter, the transmission from human to human occurs through close contact with patients of Ebola.

The first outbreak of Ebola Virus Disease (EVD) (i.e. the introduction of virus into human population from infected bats or non-human primates) occurred due to spill over of Zoonotic infection where the virus is acquired by close contact with bats or non-human primates through hunting, butchering, eating or handling organs or cells of these animals or through exposure to bat inhabited caves (Mishra, 2014).

The second outbreak of Ebola Virus Disease (EVD) (i.e. the human to human transmission) is responsible for spreading the outbreak. This occurs mainly through direct contact with patient's blood or various body fluids like urine, semen, genital secretion, sweat, bloody stool and vomitus and indirect contact with environment contaminated with infected body fluids. The virus has been found in semen for up to 7 weeks after recovery from the illness, which suggests the possibility of sexual mode of transmission. Burial ceremonies in which the members of the funeral procession have direct contact with the corpse can also result in transmission. No evidence suggests the role of insects in disease transmission (Mishra, 2014).

The symptoms of the Ebola Virus Disease (EVD) are similar to the ones of a common flu e.g. fever, weakness, loss of appetite, headache, and muscle pain, etc., which is followed by vomiting, diarrhea, bleeding, dehydration, shock, and death. The severity and speed of progression depend on the viral load, as well as on the nutritional status and also, the immune status of the patients. Maculopapular rash appears in 50% of the cases, being more intense on the chest and abdomen. The signs associated with the blood disorder appear by the end of the first week, including nausea and severe vomiting, hard-to-control epistaxis, hematemesis,

melena, hemoptysis, conjunctival, skin, mucosal and gingival bleeding, and lip ulcers. Once this point is reached, disseminated intravascular coagulation (DIC) develops fast, leading to shock, multiple organ dysfunction and death.

There is no known vaccine for treating Ebola virus disease. Most cases require treatment in an intensive care unit.

2.1.2 THE AFRICAN VALUE OF CARE-GIVING

Africa is one of the seven continents of the world. Ukanah (2011) asserted that Africa is the second largest of the world continents covering 23 percent of the world's total land mass and containing about 14 per cent of the world's population. The continents of the world are: Australia, North America, South America, Asia, Europe, Antarctica and Africa. Ogungbemi (2007) reports that Africa and its Islands, has a land area of twelve million square miles and that the land area could easily contain within it, and with room to spare the whole of India, Europe, Japan, the British Isles, Scandinavian and New Zealand. He adds that the United State of America could easily be fitted into the Sahara Desert. He also reported that in terms of natural resources, Africa is potentially the richest continent in the world. (Ogungbemi 2007:28).

Africa is divided into the following:

- North Africa region consists of Algeria, Egypt, Libya, Morocco, Sudan and Tunisia.
- Sub-Sahara Africa is generally divided into the regions of West Africa, East Africa, Central Africa, and Southern Africa.

- West Africa include such countries as Benin, Burkina Faso, Cameroun, Chad, Cote d'Ivoire, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, the Gambia and Togo.
- East African nations are Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Somalia, Tanzania and Uganda.
- The central Africa countries include Angola, Central African Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Republic of the Congo and Zambia.
- Southern Africa consist of Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe.
- Island nations on the coast of Africa are Cape Verde, Sao Tome and Precipe on the Atlantic Ocean and Comorros, Malagascar, Mauritius and Seychelles on the Indian Ocean (Ukanah 2011:3).

The African culture which consists of the norms, values, religious beliefs, languages and all other aspects of life is very unique. Tylor (1958) expounds culture as a complex whole which includes knowledge, belief, art, moral, law, custom, any other capabilities and habits acquired by man as a member of society. From the above definition, culture can be referred to as the totality of the way of life of people.

Falade et. al., (2009) in their own perspective expound the term value as a coherent set of attitude, behaviour and action adopted and, or evolved by a person, organization, or society as a standard to guide its behaviour and preferences in all situations (Falade, Akinde, &Adejubee., 2009: 482).

In Africa, care giving, communal living, hospitality, friendliness, respect for the authority and the elders, good human relations etc. are the ways of life and values. They

welcome strangers, respect them, and treat them well, because they believe that they may return the favour in the future. That is, "the good you do for someone else will eventually be paid back to you" (Vogl, 2014). Africans are extremely gracious and caring people, ready to go the extra mile to respect and service others.

Africans practice communal living and this can be explained through the use of a popular African proverb which says: "Go the way that many people go; if you go alone, you will have reason to lament". The philosophy behind the African communalism, therefore, guarantees individual responsibility within the communal ownership and relationship. 'The prosperity of a single person', says an African adage, 'does not make a town rich; but the prosperity of the town makes persons rich'.

Africans also accommodate everyone: they take care of the weak and the aged; the helpless, the sick are affectionately in the comforting family atmosphere. The comforting family atmosphere is provided by the extended family system. It is a system that is rested on the philosophy of "live-and-let live", otherwise known as "the eagle-and-kit" principle. According to Onwubiko "this principle defined rights and duties, responsibilities and obligations towards the less fortunate, those incapacitated in one way or another". For example, a man has the obligation to take care of the widows and orphans of his deceased relatives, the sick people in the family and the aged in his household. Failure to do this earns him strong public criticism. These values have brought about orderliness and development to the African society.

2.1.3 AN EXAMINATION OF THE RECONSTRUCTED REALITIES OF THE AFRICAN VALUES OF CARE-GIVING.

It is a known fact that communicable diseases are highly contagious and highly catchable. Medical practitioners and public health officials have developed diverse ways of

controlling and preventing the spread of communicable diseases within the society to obviate human extinction. These diverse means of controlling and preventing the spread of the diseases have resulted in a reconstruction of the African value of care-giving which was formerly centered on the extended family system.

Ganiyu (1980) observed that two important measures of controlling communicable diseases and improve the standard of hygiene are health education at community level and mass immunization. Lucas et al (1981) also confirmed that the purpose of health education is to raise the standard of hygiene. This should be regularly carried out through school health instruction; healthful school living; public health instruction, public health services and public healthful living. The use of mass media like television, radio, handbills, posters, and film strips to pass information on health education is also a major means of controlling communicable diseases.

Ganiyu (1982) and Godman (1960) agreed that some contagious diseases can be controlled by keeping the patients who are still with the diseases away from other people that are healthy. Anderson (1970) supported isolation and described it as the segregation of a patient from the community until all dangers of spreading infections are averted. This according to him blocks the route of transmission of diseases. Anderson (1970) identified quarantine as a means of controlling communicable diseases. He suggested that a susceptible person who has been exposed to infectious disease should be taken to an Infectious Disease Hospital (I.D.H.) so as to avoid the spread of communicable diseases.

The death incidences caused by the contagious diseases has brought in so much fear among Africans such that the social realities in terms of social relationships and values have been reconstructed. The once hospitable and friendly people are now battling with fear and stigma bringing about a drastic change in their social lives.

The above postulates from different authorities emphasize the use of health education, mass immunization, quarantine/isolation, stigmatization of infected individuals in the process of controlling and preventing the spread of communicable diseases which are quite unknown to the original African extended family system that is saddled with the responsibility of care-giving during illness of whatever nature.

2.2 THEORETICAL FRAMEWORK

Facts never interpret themselves. People interpret what they observed by placing their observation into a framework of some sort. That conceptual framework is called a theory. A theory can be conceived as body of ideas consisting of related concepts, variables and format, specifically designed in form of a statement to give explanation to events, situations or objects. It attempts to give satisfactory account of why events occur the way they do or why an event does or does not occur. Theory helps in the understanding of a phenomenon and summarizes knowledge through empirical generalization.

This study reviewed one theory which includes germs theory of disease. However, the study adopted the germs theory of disease as the theoretical framework for the study. This is because it provides detailed and related explanation on the factors that give rise to the reconstructed realities orchestrated by contagious diseases like Ebola in Africa.

2.2.1 GERMS THEORY OF DISEASE

The germ theory of disease states that some diseases are caused by microorganisms. These small organisms, too small to see without magnification, invade humans, animals, and other living hosts. Their growth and reproduction within their hosts can cause a disease. "Germ" may refer to not just a bacterium but to any type of microorganisms, especially one

which causes disease, such as protist, fungus, virus, prion, or viroid. Microorganisms that cause disease are called pathogens, and the diseases they cause are called infectious diseases.

The germ theory was proposed by Girolamo Fracastoro in 1546, when he propounded that epidemic diseases are caused by transferable seed-like entities that transmit infection by direct or indirect contact but scientific evidence in support of this accumulated slowly and Galen's miasma theory remained dominant among scientists and doctors. A transitional period began in the late 1850s as the work of Louis Pasteur and Robert Koch provided convincing evidence; by 1880, miasma theory was still competing with the germ theory of disease. Eventually, a "golden era" of bacteriology ensued, in which the theory quickly led to the identification of the actual organisms that cause many diseases. Viruses were discovered in the 1890s.

THE EMERGENCE OF GERM THEORY OF DISEASE

The influence of the work of Ehrlich, Koch and Pasteur originated a discourse on disease etiology in human societies. In the nineteenth century, the scholars found that the prevailing health problems were the product of living organisms that entered the body. This according to them was facilitated by bodily contact with contaminated food, air and water or bites from either insect or animals. Koch identified and showed that all the reported cases of tuberculoses were caused by the germ.

The germ theory of disease belongs to the bio-medical model of disease. The theory is construed in terms of biological discontinuities. Such discontinuities are linked to the malfunctioning of parts of human organism and are associated with certain levels of pain and discomfort. The state of pains and discomfort signifies ill health and the theory attributes to germ infection.

On the bases of the above, the basic tenets of germ theory are briefly put as follows:

i. Disease is caused by agents that are transmissible, called germs

ii. Specific agents caused specific diseases.

The germ diseases theory states that diseases are caused by germs or micro-organism which invades the body of human beings thereby causing a state of imbalance in the body of human beings. The theory is based on the scientific principle of cause and effect. It claims that fixed species of microbes from an external source invade the body and are the first cause of infectious diseases. Germs live around us, in our environment. We eat, drink and feel them; most of the diseases we suffer from are caused by organism or germs. Some of them are so minute that cannot be seen with the naked eyes, such are called micro-organism. They are seen only with the aid of microscope. Disease causing microorganisms are called pathogens and are found almost everywhere in the environment; in the water, food, soil and clothes among others. They are parasites body host them, survive and reproduce, in the process, give rise to disease conditions. The extent of attack of germs on human body depends on the type of germs, where it resides in the body and the strength of the immune system of the host. While they dwell and survive in the living tissue or cells, they launch attack to different parts of the body. Those who attack the reproductive health organs cause disease associated with reproductive behaviour and in most cases prevent or obstruct conception. The effect of the attack manifests in different subjective stage of illness behaviour such as, rise in body temperature, headache, shivering, and cold. For example tuberculosis is caused by germs called mycobacterium tuberculosis. The mycobacterium tuberculosis germ becomes active in the lungs and the individual experience symptoms, which include cough sputters and coughing of blood among others.

The theory laid foundation for modern medicine. The germ disease theory gave birth to the technique of vaccination that started in 1976. For example Jenner took pus from the running sores of sick cow and injected it into the blood of his patient. Thus was born a vile practice (immunization / vaccination) whose nature has changed little to this day, and whose understanding is still clouded by Pasteur's theory. The germ theory of disease also gave birth to the development of antibiotics which is a poisonous waste from one germ used to kill another, with the first been pen cilium.

APPLICABILTY OF GERM THEORY OF DISEASE TO THIS STUDY

Germ theory of disease is applicable to this study i.e. contagious disease and the African value of care giving in the sense that it has shown that due to how highly catchable infectious disease are, it has reconstructed the relationship that existed between the Africans for their drive for care giving i.e. assisting and rendering care services to their fellow brothers or sisters in time of sickness. This theory has also shown that due to how highly catchable infectious diseases which are gotten from germs are, it has limited that level of relationship between the African who once had a sense of communal belonging i.e. a sense of oneness. This theory explains that Africans will no longer see themselves as one because everyone has to protect him or herself from getting the disease because the germs that cause the disease live around us, in our environment.

CHAPTER THREE

RESEARH DESIGN METHODOLOGY

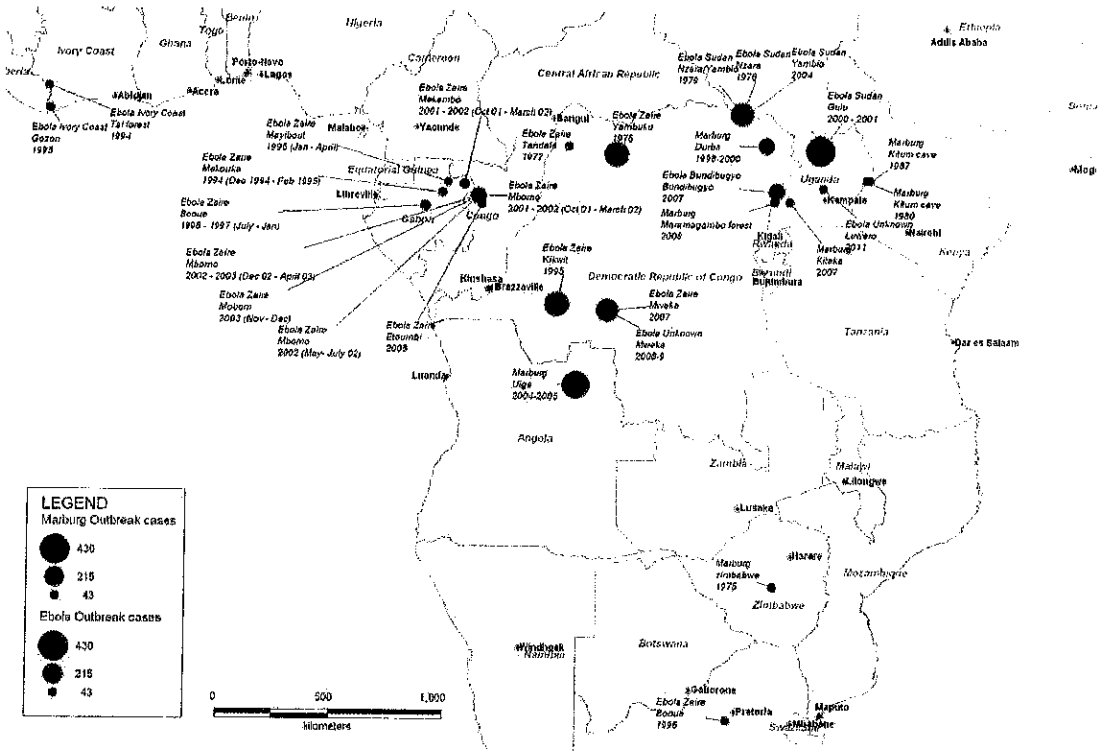
3.0 INTRODUCTION

This chapter of the study employed the use of a secondary data and all of the information provided in this chapter was based on the review of literature on Ebola virus disease. This chapter provides relevant information on the following: Disease Background Information, Ebola virus disease outbreaks and Marburg haemorrhagic fever outbreaks in Africa, 1976–2011, Levels of risk of transmission of Ebola virus according to type of contact with an infected patient etc. about Ebola disease.

3.1 DISEASE BACKGROUND INFORMATION

Infections with Ebola viruses originating from Africa cause a severe disease in humans, Ebola virus disease (EVD). Since the first documented EVD outbreak in Zaire (now: the Democratic Republic of Congo) in 1976, five species of the genus Ebola virus (Filoviridae family) have been identified from samples collected from humans and non-human primates during outbreaks of the disease: Zaire Ebola virus (EBOV), Sudan Ebola virus, Reston Ebola virus, Taï Forest Ebola virus and Bundibugyo Ebola virus [. Li and Chen, 2013; Emond, Evans, Bowen and Lloyd, 1977]. Ebola viruses and Marburg virus, another member of the Filoviridae family, are classified as biosafety level 4 pathogens (BSL-4; risk group 4) and require special containment measures and barrier protection, in particular for healthcare workers. The map below presents the geographical distribution of Ebola outbreaks from 1976 to 2011 in Africa.

Figure 1: Distribution of Ebola virus disease outbreaks and Marburg haemorrhagic fever outbreaks in Africa, 1976–2011



Source: Public Health England. Available from: http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Ebola/Maps/

The onset of EVD is sudden and early symptoms include flu-like illness, fever, muscle pain (myalgia), fatigue (weakness), headache and sore throat. The next stage of the disease is characterized by symptoms and clinical manifestations from several organ systems. Symptoms can be gastrointestinal (vomiting, diarrhoea, anorexia and abdominal pain), neurological (headaches, confusion), vascular (conjunctival/pharyngeal injections), cutaneous (maculopapular rash), and respiratory (cough, chest pain, shortness of breath), and can include complete exhaustion (prostration). During the first week, patients often deteriorate suddenly, while diarrhoea and vomiting are getting worse. All of these symptoms correspond to the prodromal phase of EVD. After one week, haemorrhagic manifestations can appear in more than half of the patients (bloody diarrhoea, nosebleeds, haematemesis, petechiae, ecchymosis and puncture bleedings). Some patients develop profuse internal and external haemorrhages and disseminated intravascular coagulation [Roddy, Howard, Van Kerkhove,

Lutwama, Wamala, Yoti, et al; ECDC, 2014]. Patients in the final stage of disease die in the clinical picture of tachypnoea, anuria, hypovolemic shock and multi-organ failure. The incubation period is usually four to ten days but can vary from two to 21 days. The case-fatality ratio for Zaïre ebolavirus (EBOV) infections is estimated to be between 50% and 90% [Bannister, 2010].

Ebola viruses are highly transmissible by direct contact with infected blood, secretions, tissues, organs or other bodily fluids of dead or living infected persons. Airborne transmission has not been documented and person-to-person transmission is considered the principal mode of transmission for human outbreaks regardless of how the index case was infected. Burial ceremonies are known to play a role in transmission [World Health Organization, 2014]. Transmission through sexual contact may occur up to seven weeks after clinical recovery, as observed for Marburg filovirus, and it is supposed to be possible for Ebola viruses [Martini and Schmidt, 1968].Transmission to humans can also occur by contact with dead or living infected animals, e.g. primates (such as monkeys and chimpanzees), forest antelopes, duikers, porcupines and bats [ECDC, 2014]. Hunting and butchering of wildlife (great apes and fruit bats) has been identified in previous outbreaks as a potential source of infection [Tamfum, Mulang, Masumu, Kayembe, Kemp, Paweska, 2012]. Bats remain the most likely, but still unconfirmed, reservoir host for Ebola viruses [Wood, Leach, Waldman, Macgregor, Fooks, Jones KE, 2012; Hayman, Yu, Crameri, Wang, Suu-Ire, Wood, 2012 and Pourrut, Delicat, Rollin, Ksiazek, Gonzalez, Leroy, 2007]. To date, the reservoir of virus in West Africa is unknown.

EBOV can survive in liquid or dried material for a number of days [Piercy, Smither, Steward, Eastaugh, Lever, 2010]. However, EBOV can be inactivated by UV radiation, gamma irradiation, heating for 60 minutes at 60 °C or boiling for five minutes. The virus is susceptible to sodium hypochlorite and disinfectants [Public Health Agency of Canada,

2010]. Freezing or refrigeration will not inactivate Ebola virus [European Centre for Disease Prevention and Control, 2010]. The risk of getting infected with Ebola virus according to type of contact with a human case is summarized in Table 1 below.

Table 1: Levels of risk of transmission of Ebola virus according to type of contact with an infected patient

Risk level	Type of contact
Very low or no recognized risk	Casual contact with a feverish, ambulant, self-caring patient. Examples: sharing a sitting area or public transportation; receptionist tasks.
Low risk	Close face-to-face contact with a feverish and ambulant patient. Example: physical examination, measuring temperature and blood pressures.
Moderate risk	Close face-to-face contact without appropriate personal protective equipment (including eye protection) with a patient who is coughing or vomiting, has nosebleeds or who has diarrhea
High risk	Needle stick or mucosal exposure to virus-contaminated blood, bodily fluids, tissues or laboratory specimens in severely ill or known positive patients

A review of the literature indicates a low risk of transmission in the early phase of symptomatic patients (prodromal phase around seven days) [Bannister, 2010]. Risk of transmission may increase with transition to later stages of the disease with increasing viral titres [Colebunders and Borchert, 2000]. During an outbreak of Sudan ebolavirus in 2000 in Uganda, the most important risk factor was direct repeated contact with a sick person's bodily fluids during the provision of care. The risk was higher when exposure took place during the late stages of the disease. Simple physical contact with a sick person appeared not to be sufficient for contracting Ebola infection. Transmission through fomites heavily contaminated with bodily fluids is possible [Colebunders and Borchert, 2000].

For Ebola infections, notably with EBOV, the goal of outbreak control is to interrupt direct human-to-human transmission through the early identification and systematic isolation of cases, timely contact-tracing, proper personal protection, safely conducted burials, and improved community awareness about risk factors of Ebola infection and individual protective measures [World Health Organization , 2012; Dowell, Mukunu, Ksiazek, Khan,

Rollin, Peters, 1999]. Quarantine of infected patients has been shown to effectively stop the spread of the disease in previous outbreaks.

Healthcare workers have frequently been infected while treating patients with suspected or confirmed EVD. This occurred through close contact with patients when infection control precautions were not strictly practiced. Healthcare workers can become infected through close contact with infected patients or contaminated hospital materials and medical waste. The risk for infection can be significantly reduced through the appropriate use of infection control precautions and adequate and strict barrier nursing procedures [European Centre for Disease Prevention and Control, 2014; Francesconi, Yoti, Declich, Onek, Fabiani, Olango, et al, 2003].

Surveillance of viral haemorrhagic fevers has been enhanced in several African countries [Li, Chen, 2013; Emond, Evans, Bowen, Lloyd, 1977]. In 2013, there were no reports of outbreaks of Ebola or Marburg viral infections in Africa. The present outbreak is the first documented human outbreak of EVD in West Africa, save one exception: a single non-fatal human case reported from Côte d'Ivoire in a person who had performed a necropsy on a wild chimpanzee in the Taï forest, in November 1994 [Formenty, Hatz, Le Guenno, Stoll, Rogenmoser, Widmer, 1999]. The animal was part of a group of chimpanzees affected by EVD, and this remains the only isolation of Taï Forest ebolavirus. Guinea is at the western end of the rain forest belt, and some limited serological evidence of ebolavirus infections in humans has been documented in Guinea, although no human cases were reported [Ftika and Maltezou, 2013].

There are no specific prophylactics (licensed vaccine) or therapeutic (antiviral therapy) options available to treat human infections, despite recent advances in research [World Health Organization, 2014]. Severely ill patients require intensive supportive care. Patients

are frequently dehydrated and require oral rehydration with solutions containing electrolytes or intravenous fluids.

i. Agent

Ebolavirus belongs to the *Filoviridae* family (filovirus). Ebolavirus comprises 5 distinct species:

1. Bundibugyo ebolavirus (BDBV)
2. Zaire ebolavirus (EBOV)
3. Sudan ebolavirus (SUDV)
4. Reston ebolavirus (RESTV)
5. Taï Forest (formerly Côte d'Ivoire ebolavirus)ebolavirus (TAFV)

Four of the five subtypes occur in an animal host native to Africa. BDBV, EBOV, and SUDV have been associated with large EVD outbreaks in Africa, whereas RESTV and TAFV have not. Pathogenicity varies among Ebola viruses, from EBOV, which is highly lethal in humans, to RESTV, which causes disease in pigs and macaques but asymptomatically infects humans.

ii. Prevention

There is no approved vaccine available for Ebola. Healthcare workers who may be exposed to people with Ebola should follow these steps:

i. Wear appropriate personal protective equipment (PPE).

ii. Practice proper infection control and sterilization measures.

iii. Isolate patients with Ebola from other patients.

iv. Avoid direct contact with the bodies of people who have died from Ebola.

v. Notify health officials if you have had direct contact with the blood or body fluids of a person sick with Ebola.

3.2 POSSIBLE SCENARIOS FOR THE EU/EEA

Scenario 1: Suspicion of exposure to Ebola virus

An individual travelling to or residing in an affected country who suspects having been exposed to Ebola virus should be evaluated and assigned a 'level of risk of transmission'.

If the risk of transmission is considered low or moderate, the person should be reassured and asked to monitor his/her temperature for 21 days. If the risk of transmission is deemed high, e.g. a healthcare worker having experienced a needle stick injury, active monitoring of health status should be implemented immediately and a medical evacuation should be considered at an early stage by specialized air providers under high containment provisions.

Scenario 2: Person presenting with symptoms compatible with EVD

Symptoms compatible with EVD include flu-like symptoms with fever, muscle aches, myalgia, weakness, headache and sore throat at the prodromal phase which may develop into various clinical manifestations with gastrointestinal symptoms (vomiting, diarrhoea, anorexia and/or abdominal pain), neurological symptoms (headaches, confusion, prostration), vascular symptoms (conjunctival/pharyngeal injections), cutaneous symptoms (rash) and respiratory symptoms (cough, chest pain, shortness of breath). An individual residing or visiting an affected area who develops such symptoms with EVD should be assessed for possible exposure:

- If the person did not experience an exposure or experienced an exposure at low risk, other pathologies such as malaria should be investigated.
- If the person experienced an exposure of moderate or high risk level, a medical evacuation should be considered at an early stage, carried out by specialized air providers under high containment provisions; investigations for other possible causes of disease should be initiated immediately.

Scenario 3: Passenger with symptoms compatible with EVD on board of an airplane

Cabin crew identifying a sick passenger with suspicion of infectious disease on board, as well as ground staff receiving the passenger at the destination, should strictly follow the IATA guidelines for suspected communicable diseases. These guidelines provide information on how to handle a sick passenger during the flight, how to reduce the risk of transmission on board the aircraft, how to communicate the event to the destination airport, and how to record contact details on passenger locator cards for the passengers in the two rows around the case. Public health authorities and emergency medical services at the airport of destination should be informed in advance of arrival. On arrival, the sick passenger should be put in a separate room awaiting medical assessment. The assessment of possible exposure to ebolavirus and of the compatibility of the symptoms with Ebola virus disease is out of the scope of the airline crew's actions and should be performed by medically trained ground staff.

The population incidence of Ebola virus infection is low, even during an outbreak, and it is considered highly unlikely that a passenger infected with Ebola virus boards an airplane. In addition, the prodromal presentation of the disease is not characteristic enough to distinguish an Ebola virus infection from many other viral diseases. The public health response to a sick passenger on an aircraft should be based on a thorough assessment of the patient's possible exposure to ebolavirus rather than on the clinical presentation. The evaluation of the exposure should check if, within the past three weeks, the passenger has:

i. visited a country where ebolavirus disease has been confirmed (for the current outbreak: Guinea and Liberia); and

ii. been in contact with a sick or dead wild animal (particularly bats) while there; OR

iii. cared for and touched a severely ill or dead person

Scenario 4: Patients and healthcare workers having been exposed to an unrecognized Ebola patient

Unrecognized Ebola virus fever has a high potential for spreading within a healthcare setting. This is caused by close person-to-person contacts and possible exposure to bodily fluids as occurring during nursing, diagnostic and treatment procedures, including the manipulation of biological samples. The risk for other patients and/or healthcare workers may rise to 'moderate' or 'high', depending on the conditions of an undiagnosed patient. The minimization of time lag in suspecting and subsequently diagnosing EVD in a symptomatic patient is essential for containing outbreaks in a healthcare setting.

Once a case of EVD is suspected, the procedures in the healthcare facility are carried out as if the EVD was already confirmed. The responses include:

i. Contact tracing among staff and patients who have been in contact with the suspected patient

ii. Medical monitoring of identified contacts (fever and prodromal symptoms)

iii. Immediate notification of the competent public health authorities

iv. Improvised barrier management in all areas where the suspected patient has been treated (contaminated zone, transition or sluicing zone, 'clean' zone)

v. Patient handling under droplet hygiene precautions; in case of invasive, potentially aerosol-generating procedures: airborne transmission precautions

vi. Retaining waste and any type of bodily fluids from the patient in the contaminated zone until appropriate decontamination and disposal provisions are in place

vii. Handling and shipment of patient samples according to the international procedures for 'transport of category A infectious substances assigned to UN 2814 or UN 2900' [WHO, 2014]

Hospital preparedness measures promoting early detection and safe handling of viral haemorrhagic fever cases:

i. Sensitization of staff working in 'ports of entry' in a healthcare setting (emergency departments, ambulance services, GP offices) for early and advanced symptoms of viral haemorrhagic fever

ii. Focusing on systematic recording of travel history and vaccinations received

iii. Establishing a standard diagnostic procedure for ruling out common differential diagnoses at an early stage (e.g. malaria, yellow fever, dengue, Lassa fever, rickettsia and leptospirosis)

iv. Establishing a protocol for notification of the competent public health authorities at an early stage if suspecting an EVD case

v. Knowing of, and establishing contact to, reference laboratories able to perform viral haemorrhagic fever diagnostics

vi. Knowing of, and establishing contact to, specialized treatment centers with high containment facilities

vii. Delivering basic training to healthcare workers on principles of provisional barrier nursing and use of personal protective equipment for droplet transmission precaution

3.3 Documented human and non-human primate outbreaks in Africa

Ebola viruses constitute a serious threat to both human and wildlife health in the Congo and Nile basins. The first documented outbreaks were generally regarded as causing a mysterious disease, so dramatic in its effect that it inspired novelists and film producers. In most of the cases, the disease has appeared suddenly out of the elusive natural environment and dissipated slowly during the outbreak. The first outbreaks of EHF occurred almost simultaneously in 1976 in southern Sudan (June) and northwestern Zaire (now Democratic

Republic of the Congo, DRC) (September). Initially it was thought that the DRC outbreak was due to dissemination of the Sudan outbreak but, in fact, the outbreaks were caused by two antigenically and biologically distinct species named SEBOV and ZEBOV. The index case in Sudan was a worker in a cotton factory in Nzara who subsequently was the source of nosocomial transmission in Maridi hospital. The mortality rate amongst the 284 notified cases was 53% (WHO 1978a). The index case in the Zaire or DRC outbreak was a 44 year-old male instructor at the Yambuku catholic mission school who fell ill after extensive travels in northern Equateur Province. He bought fresh and smoked antelope and monkey meat on his way back to Yambuku. He was treated for presumptive malaria at the Yambuku hospital, where the outbreak emerged subsequently. In total 318 cases were recorded, with a case fatality rate of 88%. Close contact with an acute Ebola case and receiving an injection with a reused, unsterilized syringe at the hospital were the major risk factors for virus transmission in humans (WHO 1978b).

In 1979, Nzara and Maridi in Sudan were again hit by a small outbreak, with 34 cases and 22 deaths (Baron, McCormick & Zubeir 1983), whereas a single case was described in a child at Tandala hospital in DRC (Heymann *et al.* 1980). Apparently, none of the cases had contact with wild animals. After an absence from 1980 to 1993, several independent foci of Ebola virus transmission were recorded. Most of them were caused by ZEBOV and SEBOV but some were caused by the newly discovered species, namely CIEBOV and BEBOV:

a. **Ebola haemorrhagic fever in Côte d'Ivoire (1994):** A large Ebola virus outbreak occurred amongst chimpanzees living in the Taï National Park in Côte d'Ivoire. An ethologist was infected whilst performing an autopsy on a dead chimpanzee. The patient was treated as a presumptive malaria case in Abidjan hospital, without success. There were no secondary cases. This was the first documented outbreak of Ebola virus amongst NHP in nature and the

first in West Africa. The outbreak led to the discovery of a new species of Ebola virus, namely CIEBOV (Le Guenno *et al.* 1995).

b. **Ebola haemorrhagic fever in Gabon (1994, 1996, 1997 and 2001–2002):** Several viral haemorrhagic fever outbreaks, caused by ZEBOV, were associated with the hunting of NHP. The 1994 outbreak involved gold-diggers in the Minkebé Forest who had killed a sick gorilla for food; the illness was initially confused with yellow fever (Amblard *et al.* 1997; Georges-Courbot *et al.* 1997a, 1997b; Leroy *et al.* 2002).

c. **Ebola haemorrhagic fever in the Republic of the Congo (2001–2002, 2003 and 2005):** The first recorded outbreak of Ebola occurred in 2001–2002. In 2003, ZEBOV re-emerged, affecting 143 individuals in Mbomo (17 cases) and Kellé (126 cases), and 128 deaths were recorded (Formenty *et al.* 2006). Three independent index cases were identified in relation to hunting episodes and contact with gorillas. During this outbreak, intra-familial transmission was more important than nosocomial transmission. However, three health care workers were infected. In the same year, another small Ebola outbreak, involving 35 cases and 29 deaths, had occurred. The last documented Ebola outbreak in the country was reported in 2005, with 11 cases and nine deaths (Nkoghe *et al.* 2011).

d. **Ebola haemorrhagic fever in the DRC (1995):** ZEBOV reemerged in 1995 in the city of Kikwit, with 400 000 inhabitants, 1000 km south of the location of the 1976 outbreak. In total, 315 cases and 250 deaths were recorded. A 31-year-old female Ebola patient traveled during the early stage of her disease to Kinshasa, where she was isolated in a private clinic. No secondary transmission occurred (Khan *et al.* 1999). The main occupation of the index case was farming and preparing charcoal in one of the remnant forest areas near Kikwit but the exact cause of infection or exposure is not known. There were no great apes but a lot of bats and rodents were present in the region. The risk factors for secondary human-to-human

infection were mainly working in Kikwit general hospital or preparing corpses for burial. Almost 20% of the 250 victims were health care workers (Guimard *et al.* 1999).

e. **Ebola haemorrhagic fever in the DRC (2007–2008, 2008– 2009):** A further outbreak occurred in 2007, in the Mweka health zone, West Kasai Province, involving 264 cases and 187 deaths with a case fatality rate (CFR) of 71%. Kampungu city was the epicenter of the outbreak with 47% of cases, followed by the city of Kaluamba (42% of cases). The index case was the chief of the village and a hunter. The outbreak was apparently associated with a massive fruit bat migration through this region (Leroy *et al.* 2007). During this outbreak, the fatalities amongst health care workers were fewer. However, several human-to-human transmissions had occurred in churches where patients had been taken for prayers and nursing (Doctors without Borders, unpublished data).

f. **In the 2008 Ebola outbreak, Kaluamba was affected again, with 32 cases and 14 deaths (CFR of 43.8%).** The index case was believed to be an 18 year old girl who had died from a post-abortion haemorrhage. However, the source of her exposure remains unknown. This outbreak was reported to the national and provincial health authorities 21 days after the disease onset, compared to a period of four months in the 2007 epidemic. The observed low CFR in Kaluamba outbreak is considered to be due to the early recognition of the disease and the prompt response of the national team.

g. **Ebola haemorrhagic fever in Uganda (2000, 2007, 2011):** An outbreak of SEBOV occurred in Gulu in 2000 and spread to the cities of Mbarara and Masindi, with a total of 425 cases and 224 deaths (CFR of 52%) (Lamunu *et al.* 2004). This was the largest epidemic caused by SEBOV. The outbreak was recognized from a cluster of human cases and was amplified by nosocomial transmission. Uganda was again affected in 2007 when a new Ebola species, BEBOV, killed 30 people out of 116 cases (CFR of 26%) (Towner *et al.* 2008). An isolated case of EHF caused by SEBOV was reported from Uganda in 2011 (WHO 2011).

h. **Ebola haemorrhagic fever in Sudan 2004**: The epicenter of this small outbreak of 17 cases and seven deaths (CFR of 41.2%) was the town of Yambio, near to the two previous Ebola sites (Nzara and Maridi) (Onyango *et al.* 2007). The outbreak started with the admission of a 27-year-old man to Yambio hospital with fever and haemorrhagic manifestations. The onset of symptoms started on 15 April 2004. The outbreak was contained rapidly with the establishment of infection control measures, thanks to the early recognition and confirmation of the outbreak by the Kenya Medical Research Institute (KEMRI).

Table 1: Distribution of Ebola cases in the affected villages in Democratic Republic of the Congo.

Number of cases	Number of affected villages			
	Yambuku (1976)		Kikwit (1995)	
	Number	%	Number	%
1	17	30.9	15	60
2–5	18	32.7	10	40
10–4	4	7.3	0	–
15–19	1	1.8	0	–
20–29	1	1.8	0	–
30 +	2	3.7	0	–
Total	55	–	25	–

Antibodies are known to cross-react amongst Ebola species (MacNeil, Reed & Rollin 2011), this high sero prevalence may be the outcome of exposure to yet unknown, less pathogenic or non-pathogenic variants of Ebola virus. Sexual transmission has been suggested in humans since filoviruses can be found in semen (Bausch *et al.* 2007). Aerosol infection is questioned since people sharing the same space with infected persons do not contract the infection even though aerosol infection of NHP has been demonstrated in the laboratory (Leffel & Reed 2004).

3.4 Clinical features

The onset of the disease is abrupt after an incubation period of two to 21 days. The clinical features can be divided into four main phases as follows, (1) Phase A. Influenza–like syndrome: The onset is abrupt with non-specific symptoms or signs such as high fever,

headache, arthralgia, myalgia, sore throat, and malaise with nausea. (2) Phase B. Acute (day1–6): Persistent fever not responding to anti-malaria drugs or to antibiotics, headache, intense fatigue, followed by diarrhea and abdominal pain, anorexia and vomiting. (3) Phase C. Pseudo-remission (day 7–8): During this phase the patient feels better and seeks food. The health situation presents with some improvement. Some patients may recover during this phase and survive from the disease and (4) Phase D. Aggravation (day 9): In many if not most cases, the health status gets worse. The following symptoms may be observed:

i. respiratory disorders: dyspnea, throat and chest pain, cough, hiccups
ii. Symptoms of haemorrhagic diathesis: bloody diarrhoea, haematemesis, conjunctival injection, gingival bleeding, nosebleeds and bleeding at the site of injection consistent with disseminated intravascular coagulation
iii. Skin manifestations: petaechiae (not so obvious on black skin), purpura (morbiliform skin rash)
iv. neuro-psychiatric manifestations: prostration, delirium, confusion, coma
v. Cardio-vascular distress and hypovolaemic shock (death).

From these clinical manifestations it is obvious that EHF may mimic many other tropical diseases like malaria, typhoid fever or yellow fever at the start of the disease. In most outbreaks, recognition of the disease is delayed because physicians are not accustomed to this new illness and the symptoms are generally non-specific. Outside the epidemic context, it appears quite impossible to recognize the first Ebola case in an outbreak on clinical grounds only. Suspicion of EHF is only possible later during the aggravation phase.

Source: Photograph provided by author

FIGURE 1: Dissection of wild-caught bats. Field laboratory deployed during Ebola ecology study in Luebo, Democratic Republic of the Congo, May 2011.

Source: Photograph provided by author

FIGURE 2: Processing and testing of blood and tissues from bats collected during the 2011 Ebola ecology expedition to Luebo, Democratic Republic of the Congo in biosafety level four facility in Sandringham-Johannesburg, South Africa.

3.4.1 Diagnosis

Early laboratory confirmation of suspected clinical haemorrhagic fever cases is essential to implement appropriate control measures. Definitive diagnosis of suspected cases of EHF is usually made by PCR detection and virus isolation on Vero cells. As a class-4 pathogen, Ebola virus culture requires a maximum containment facility. Additional laboratory diagnostic tests include ELISAs for the detection of Ebola IgG- and IgM-specific antibodies and virus antigens; more specialized molecular testing is also available but is not readily available in the usual clinical setting.

In Africa, laboratory confirmation of Ebola cases has been challenging and early recognition of the first outbreaks were severely hampered as a result. Because the disease was poorly known or rare, laboratory investigations were oriented towards the more common, endemic pathogens in the area.

Initially, *Salmonella typhi* and yellow fever virus were suspected to be responsible for the 1976 Yambuku outbreak. Blood samples collected for cultures (that remained negative), Widal tests and liver specimens presented for pathological examination showed inconsistent results: some specimens gave evidence of yellow fever whilst others were compatible with liver congestion. The Yambuku outbreak was finally confirmed by viral culture at the Institute of Tropical Medicine in Antwerp thanks to blood samples collected from a Belgian nun who fell ill in Yambuku and was transferred to Ngaliema hospital in Kinshasa.

Since 1994, the incidence of Ebola outbreaks increased and, as a consequence, the awareness of the disease has improved and facilities capable of diagnosing EHV were established in Africa. National Public Health laboratories in endemic countries like Uganda (UVRI), Kenya (KEMRI) and Gabon (CIRMF) have already developed capacities to diagnose EHF by ELISA and RT-PCR. South Africa is the only African country with a maximum containment, enclosed suit laboratory where all class-4 viral pathogens can be handled safely.

After the last Ebola outbreak in Kaluamba, DRC (2008–2009), the Ebola diagnostic technologies of ELISAs for the detection of antigens and IgM antibody, and RT-PCR have been transferred to the INRB in Kinshasa.

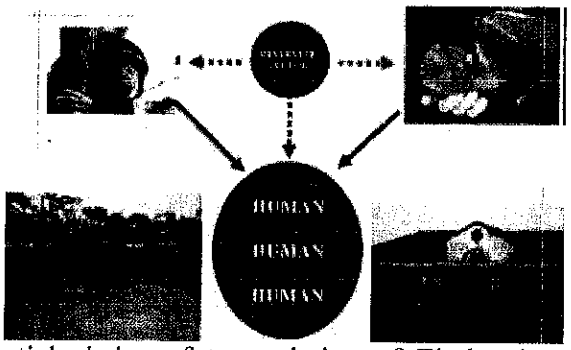


FIGURE 3: The potential chains of transmission of Ebola virus may be described as involving 3 stages, from primates or bats to humans (especially hunters) in the wild (index case), from index case to secondary cases (introduction into the domestic environment) and from patient to healthcare personnel in the clinical setting. Whilst primates and fruit bats are known to be sources of Ebola virus in nature, the reservoir has not yet been identified with any certainty.

Source: Photograph provided by author

FIGURE 5: Ebola patient with haemorrhagic diathesis at transfusion and injection sites.

3.4.2 Treatment

Managing Ebola patients in the African setting was a major challenge because there was no effective antiviral drug and no specific vaccine available. Only supportive care could be

administered, to sustain cardiac and renal functions with prudent use of perfusion. Oral rehydration was recommended but sometimes not realistic because of throat pain, vomiting and intense fatigue. The main objective was to provide optimal care to the patient with maximum protection of the medical and nursing staff. For that purpose, medical and nursing staff had been trained in donning and removing personal protective equipment (PPE) and applying barrier–nursing procedures. Since Ebola virus is generally considered as a potential biological weapon, it is urgent to develop effective antiviral drugs and vaccines. The ideal is to develop a candidate vaccine able to confer interspecies cross-protection against ZEBOV, SEBOV, BEBOV and unknown Ebola virus species.

3.4.3 Control measures

The corner-stone for controlling an outbreak of EHF is to interrupt the viral transmission chain. In order to reduce transmission, several strict public health measures need to be implemented as quickly as possible, including isolation of patients, barrier precautions and identification and tracking of all contacts.

3.5 Advice to National Authorities Globally

The Pan American Health Organization / World Health Organization (PAHO/WHO) advises its Member States to consider implementing the following measures:

Surveillance

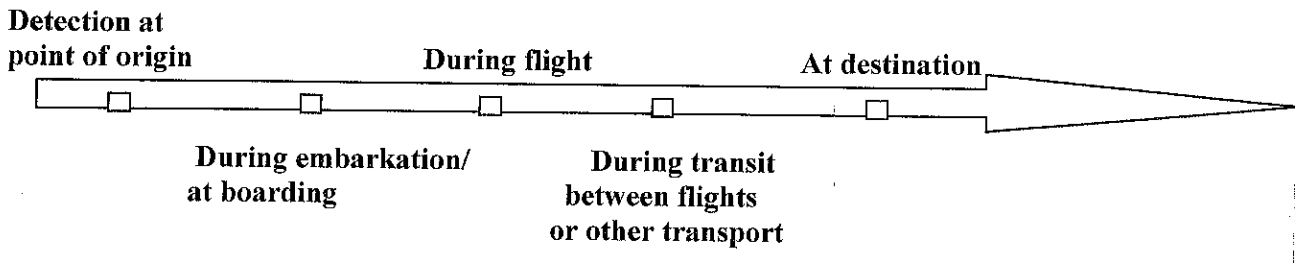
1. Detection of case with symptoms compatible with EVD

Any case compatible with Ebola virus infection or an unusual event associated with an Ebola virus infection should be reported through the channels established under the International Health Regulations (IHR). Likewise, any confirmed Ebola case must be reported internationally as established in the IHR. The identification of an Ebola virus case must take

into account both the clinical manifestations as well as the travel history and exposure history reported by the patient.

The detection of these unusual health events potentially associated with the introduction of the Ebola virus can occur at different points as described in the below figure. Therefore it is important that the personnel operating at the points described in the figure are properly trained. They need to be kept updated on the status of EVD, and be trained to recognize the symptoms of EVD, in order to ask about travel history, and understand the protocols to inform the proper corresponding authorities.

Figure 5. Different points of detection of possible EDV cases.



The health facilities staff should be alerted to the possible introduction of EVD and should be alerted to the need to properly follow protective measures.

3.5.1 Contact tracing

When an individuals with clinical and epidemiology history compatible with EVD is identified or if there are unexplained deaths of travelers, with clinical and epidemiological history compatible with EVD, (even though laboratory diagnosis is pending), identification of contacts and monitoring for 21 days (after the last known exposure to EVD) should be initiated.

When any international traveler in transit is among the identified contacts, the national authorities should determine whether or not the traveler should stay in the country for follow up– based on the legal framework existing in the country – or if the contact may continue to

travel. If the latter is decided, the country's authorities must inform the recipient country of the arrival of these travelers that will have to be monitored.

Contact person is defined as any person having had contact with an Ebola in the 21 days preceding the onset of symptoms in at least one of the following ways:

i. Having slept in the same household with a case

ii. Has had direct physical contact with the case (dead or alive) during the illness

iii. Has had direct physical contact with the (dead) case at the funeral,

iv. Has touched his/her blood or body fluids during the illness

v. Has touched his/her clothes or linens

vi. Has been breastfed by the patient (baby)

If the patient with illness compatible to EVD develops symptoms while on an airplane, contact tracing must be made according to the Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA) protocol, which indicates contact tracing of all those passengers seated in an adjacent seat to the patient in all directions -on the side, in front or behind, including across an aisle- , as well as the crew on board. If the cleaning of the aircraft is performed by unprotected personnel, they should be considered as contacts.

3.5.2 Laboratory diagnostic

Once an individual with illness compatible with EVD is identified, a sample must be taken (whole blood and / or serum) for the diagnosis. The sample should be taken by trained health personnel with extreme biosecurity measures and additional protective equipment (non-sterile gloves, masks, goggles - preferably with an anti-fog visor, apron or waterproof apron and, if possible, the disposable kind). This sample should ideally be taken at the hospital designated to handle cases compatible with EVD and sent to the National Reference Laboratory.

Of note, is that the confirmation of Ebola virus infection can only be performed in patients who have already developed symptoms. The confirmation is not possible during the incubation period.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.0 INTRODUCTION

Ebola virus disease (EVD), also known as Ebola haemorrhagic fever, is a severe, often fatal illness, with a case fatality rate of up to 90%. There are no licensed specific treatments or vaccine available for use in people or animals. Genus Ebola virus is 1 of 3 members of the Filoviridae family (filovirus), along with genus Marburg virus and genus Cuevavirus. Genus Ebola virus comprises 5 distinct species: Bundibugyo Ebola virus (BDBV), Zaire Ebola virus (EBOV), Reston Ebola virus (RESTV), Sudan Ebola virus (SUDV) and Taï Forest Ebola virus (TAFV).

The incubation period of Ebola virus disease (EVD) varies from 2 to 21 days, with an observed average of 8 to 10 days. Following the introduction of Ebola virus in the human population through animal-to-human transmission, person-to-person transmission by direct contact body fluids/secretions of infected persons is considered the principal mode of transmission. Indirect contact with environment and fomites soiled with contaminated bodily fluids (e.g. needles) may also occur. Airborne transmission has not been documented during previous EVD outbreaks. There is no risk of transmission during the incubation period.

The most common symptoms experienced by persons infected with the virus are the sudden onset of fever, intense weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash, impaired kidney and liver function, and at advanced stage, both internal and external bleeding. Laboratory findings include low white blood cells and platelet counts and elevated liver enzymes.

4.1 Some Countries in Africa with Widespread and Intense Ebola Transmission

The upward epidemic of Ebola, trend in Africa especially in countries like Guinea, Liberia, and Sierra Leone. A total of 8973 probable, confirmed, and suspected cases of EVD and 4484 deaths have been reported up to the end of 12 October 2014 by the Ministries of Health of Guinea and Sierra Leone, and up to the end of 11 October by the Ministry of Health of Liberia (table 1).

Table 1: Probable, confirmed, and suspected cases in Guinea, Liberia, and Sierra Leone

Country	Case definition	Cases	Cases in past 21 days	Cases in past 21 days/total cases (%)	Deaths
Guinea	Confirmed	1184	289	24%	653
	Probable	190	19	10%	190
	Suspected	98	89	91%	0
	All	**1472**	**397**	**27%**	**843**
Liberia	Confirmed	950	66	7%	*
	Probable	1923	468	24%	*
	Suspected	1376	555	40%	*
	All	**4249**	**1089**	**26%**	**2458**
Sierra Leone	Confirmed	2849	1110	39%	926
	Probable	37**	0	0%	157**
	Suspected	366	220	60%	100
	All	**3252**	**1330**	**41%**	**1183**
Total		**8973**	**2816**	**31%**	**4484**

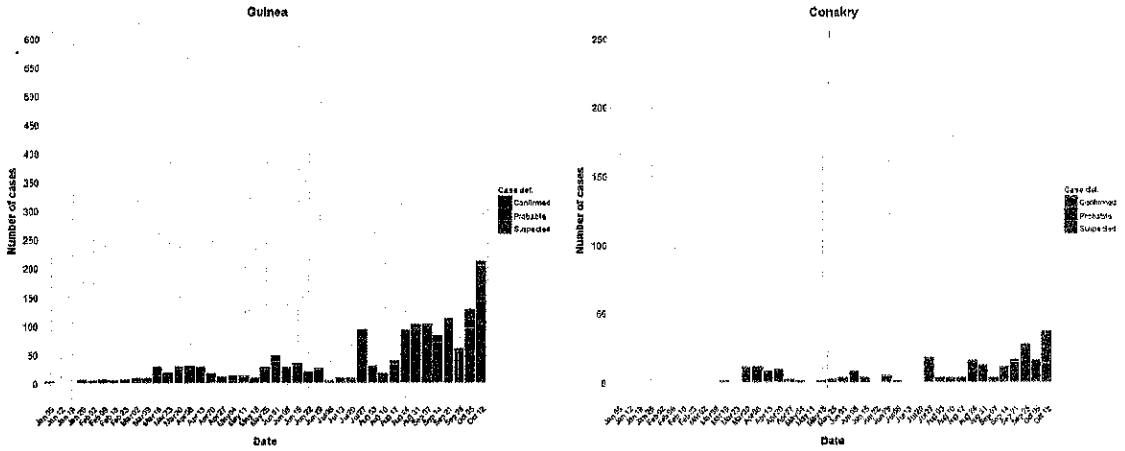
**No available data. **For Sierra Leone, 120 more probable deaths have been reported than have probable cases. Data are based on official information reported by Ministries of Health. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results.*

4.1.1 Ebola spread in Guinea

There is evidence of an increase in the intensity of transmission in Guinea. Compared with the previous week, a very slight drop in the number of new confirmed cases reported from the capital Conakry (figure 1) has been more than offset by a sharp rise in the number of new cases in the neighbouring district of Coyah, with 25 cases reported between 6 and 12 October. Because laboratory data is currently well integrated with clinical surveillance in

Guinea, many of the newly reported suspected cases are likely to be reclassified or discarded in the coming weeks. N'Zerekore (29 cases) and Kerouane (14 cases) have also shown a marked increase in new cases in recent weeks. Transmission remains intense in Macenta, which reported 51 new cases between 6 and 12 October. Gueckedou, where the outbreak originated, reported one suspected case during the same period. In the east of the country, on the border with Côte d'Ivoire, the districts of Beyla and Lola both reported new cases (table 2), emphasizing the need for active surveillance at local border crossings. To the North, the district of Boke, on the border with Guinea-Bissau has reported active transmission for the first time in more than 21 days. The central district of Mamou has reported a confirmed case for the first time.

Figure 1: Ebola virus disease cases reported each week from Guinea and Conakry



Data are based on official information reported by Ministries of Health up to the end of 12 October for Guinea and Sierra Leone, and 11 October for Liberia. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results.

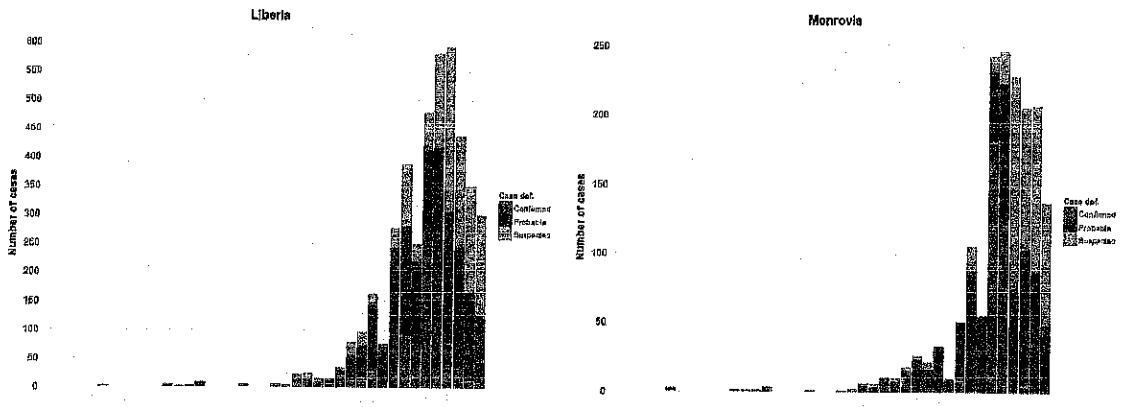
4.1.2 Ebola spread in Liberia

Data acquisition continues to be a challenge in Liberia. Evidence obtained from responders and laboratory staff in the country suggests that the situation in Liberia is getting worse, and that transmission remains intense in the capital, Monrovia. As has been the case over the past four weeks, very few confirmed cases were reported from Monrovia between 6

and 11 October (figure 2), reflecting ongoing delays in matching laboratory result

with clinical surveillance data. By contrast, 138 suspected and probable cases were reported from Monrovia during the same period, many of which are likely to be genuine cases of EVD. Outside Monrovia, most newly reported cases have come from the districts of Bong (75 cases) and Margibi (28 cases). The recent fall in the number of new cases reported from Lofa, which borders Gueckedou in Guinea, appears to have continued, with reports from observers in the area suggesting that there is evidence of a genuine decline. It should be noted, however, that the 13 new cases that were reported in Lofa between 6 and 11 October represents a high number in the context of an EVD outbreak, and a concerted effort will be required to halt all transmission in the area.

Figure 2: Ebola virus disease cases reported each week from Liberia and Monrovia



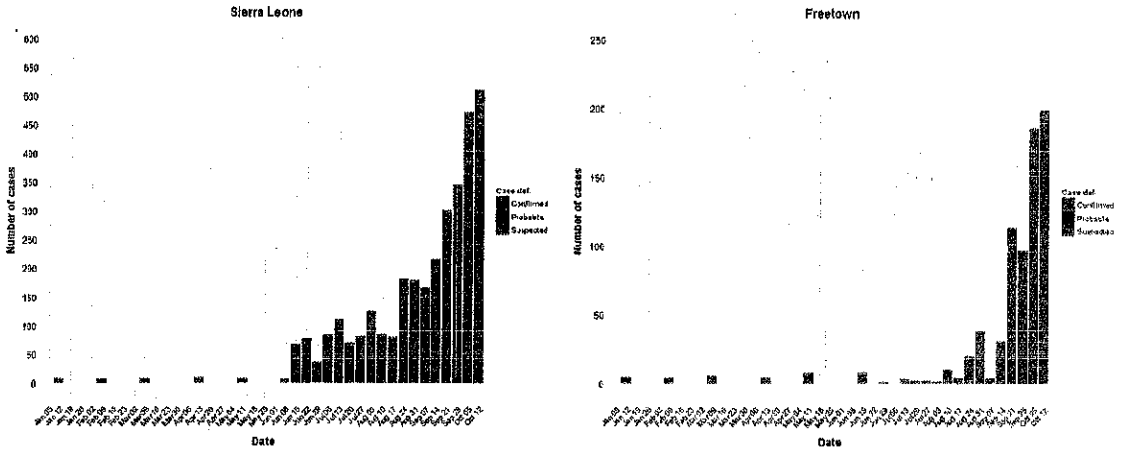
Data are based on official information reported by Ministries of Health up to the end of 12 October for Guinea and Sierra Leone, and 11 October Liberia. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results

4.1.3 Ebola spread in Sierra Leone

EVD transmission is rampant in Sierra Leone, with 425 new confirmed cases reported between 6 and 12 October (figure 3). The areas hardest hit are the capital, Freetown, with 172 new cases, along with the neighbouring western districts of Bombali (94 cases) and Port

Loko (67 cases). The central districts of Bo (22 new cases), and Tonkolili (27 new cases) are also areas of intense transmission. Transmission appeared to have been slowing in recent weeks in Kailahun and Kenema. However, this week has seen an increase in new cases, with eight new cases in Kailahun and 16 in Kenema.

Figure 3: Ebola virus disease cases reported each week from Sierra Leone and Freetown



Data are based on official information reported by Ministries of Health up to the end of 12 October for Guinea and Sierra Leone, and 11 October for Liberia. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results.

4.2 Health-Care Workers

In Africa, a total of 427 health-care workers (HCWs) are known to have been infected with EVD up to the end of 12 October. 236 HCWs have died (table 2). WHO is undertaking extensive investigations to determine the cause of infection in each case. Early indications are that a substantial proportion of infections occurred outside the context of Ebola treatment and care. Infection prevention and control quality assurance checks are now underway at every Ebola treatment unit in the three intense-transmission countries. At the same time, exhaustive efforts are ongoing to ensure an ample supply of optimal personal protective equipment to all Ebola treatment facilities, along with the provision of training and relevant guidelines to ensure that all HCWs are exposed to the minimum possible level of risk.

Table 2: Ebola virus disease infections in health-care workers

Country	Case definition	Cases	Deaths
Guinea*	Confirmed	68	32
	Probable	8	8
	Suspected	0	0
	All	**76**	**40**
Liberia*	Confirmed	78	64
	Probable	96	27
	Suspected	35	5
	All	**209**	**96**
Nigeria	Confirmed	11	5
	Probable	0	0
	Suspected	0	0
	All	**11**	**5**
Sierra Leone*	Confirmed	125	91
	Probable	2	2
	Suspected	2	2
	All	**129**	**95**
Spain	Confirmed	1	0
	Probable	**	**
	Suspected	**	**
	All	1	0
United States of America	Confirmed	1	0
	Probable	**	**
	Suspected	**	**
	All	1	0
Total		**427**	**236**

**Countries with widespread and intense transmission. **No available data. Data are based on official information reported by Ministries of Health up to the end of 12 October for Guinea and Sierra Leone, and 11 October for Liberia. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results.*

4.2.1 Ebola case confirmation in Africa

The total number of operational laboratories in the three intense-transmission countries will increase to 13 in the coming weeks, as a Russian Mobile Laboratory becomes operational in Macenta, Guinea, and a Public Health England laboratory begins to provide

diagnostic testing in the Western Rural area of Sierra Leone. At present, overall testing capacity stands at 200 samples per day in Guinea, 470 in Liberia, and 300 in Sierra Leone. As ECUs/CCCs are introduced more widely, it is anticipated that demand for diagnostic capacity will increase. Currently, specimens from districts without a laboratory are sent to the nearest laboratory in a neighbouring district.

4.2.2 Ebola Surveillance in Africa

In Guinea, contact-tracing teams in all districts except Dalaba and Faranah were able to trace 90% of registered contacts each day during the past week. In Liberia, fewer than 90% of registered contacts were traced in the districts of Bomi, Gbarpolu, Grand Bassa, Grand Cape Mount, Grand Gedeh, Grand Kru, Maryland, Margibi, Nimba, Rivercess, River Gee, and Sinoe. In Sierra Leone, teams were able to trace 82% of registered contacts in Monrovia on a daily basis. Teams in the districts of Bo, Bonthe, Kenema, Kono, Moyemba, Port loko, Pujehun, and Tonkolili were able to trace more than 90% of registered contacts daily.

Contact-tracing teams in areas of intense transmission are often overwhelmed by the high volumes of daily contacts to be traced. Logistical difficulties, community denial of the existence of EVD, and community resistance can also hamper the ability of teams to trace contacts effectively.

4.2.3 Safe and dignified burials of Ebola patients

Ebola task forces established in all three intense-transmission countries continue to deploy teams trained in the safe management of dead bodies in response to deaths in treatment facilities and in communities. All districts in countries with widespread and intense transmission are equipped with trained dead-body-management teams.

4.2.4 Social mobilization

On 8 October, the Ebola Communication Network (ECN) was launched. ECN is an online collection of Ebola resources for Ebola communication developed by the Health

Communication Capacity Collaborative with inputs from UNICEF, the US Centers for Disease Control and Prevention, USAID, IFRC, and WHO to strengthen the capacity of countries to implement state-of-the-art health communication programs. A working group of representatives of faith-based organizations was established to collaborate with WHO, UNICEF and IFRC to ensure that religious and cultural practices are included as part of the technical guidelines on safe and dignified burials. A protocol on community engagement developed by WHO and UNICEF for the planning and roll-out of ECUs/CCCs, has now been finalized. The protocol will ensure that affected communities are listened to, consulted, and that they will drive the local-level response to reduce EVD transmission.

4.3 Countries with an Initial Case or Cases, or with Localized Transmission

Four countries, Nigeria, Senegal, Spain, and the United States of America have now reported a case or cases imported from a country with widespread and intense transmission. In Nigeria, there have been 20 cases and eight deaths (table 4). In Senegal, there has been one case, but as yet there have been no deaths or further suspected cases attributable to EVD. In the United States of America there have been two cases and one death. In Spain there has been one case.

In Nigeria, all 891 contacts have now completed 21-day follow-up (362 contacts in Lagos, 529 contacts in Port Harcourt). A second EVD-negative sample was obtained from the last confirmed case on 8 September (37 days ago). In Senegal, all contacts have now completed 21-day follow-up, with no further cases of EVD reported. A second EVD-negative sample was obtained from the single confirmed case in Senegal on 5 September (40 days ago). Within a country, an outbreak of EVD is considered to be over when 42 days (double the 21-day incubation period of the Ebola virus) has elapsed since the last patient in isolation

became laboratory negative for EVD. In Spain, 72 people, including 13 high-risk contacts, are being monitored. In the United States of America, 125 contacts are being monitored.

Table 4: Ebola virus disease cases and deaths in Nigeria, Senegal, and the United States of America

Country	Case definition	Cases	Deaths
Nigeria	Confirmed	19	7
	Probable	1	1
	Suspected	0	0
	All	**20**	**8**
Senegal	Confirmed	1	0
	Probable	0	0
	Suspected	0	0
	All	**1**	**0**
Spain	Confirmed	**1**	**0**
	Probable	*	*
	Suspected	*	*
	All	**1**	**0**
United States of America	Confirmed	2	1
	Probable	*	*
	Suspected	*	*
	All	**2**	**1**
	Total	**24**	**9**

**No available data. Data are based on official information reported by Ministries of Health. These numbers are subject to change due to ongoing reclassification, retrospective investigation and availability of laboratory results.*

4.4 Preparedness of Countries to Rapidly Detect and Respond to an Ebola Exposure

In accordance with the UN Mission for Ebola Emergency Response (UNMEER) 90-day plan, strengthening the preparedness of all countries to respond to an initial exposure to

EVD is a mission-critical priority. Accordingly, all countries should have a protocol for suspect cases, an equipped isolation unit, a minimum stock of personal protective equipment, a case-management team trained in infection prevention and control, and a public communications strategy.

All countries bordering affected areas should have active surveillance in, and weekly reporting from, areas assessed as at the highest risk of an initial exposure. Countries will be supported with appropriate technical guidance, simulation and protocol testing, and, in case of the importation of an EVD case, a rapid response capacity. On 10 October, a meeting between WHO and partner organizations in Brazzaville agreed on a range of tools to support countries unaffected by Ebola in strengthening their preparedness in the event of an outbreak. One of these tools is a comprehensive checklist of core principles, standards, capacities and practices, which all countries should have or meet. On 13 October, WHO Director General Margaret Chan urged East Asian and Pacific countries to strengthen defenses against EVD. Preparations are ongoing for the third meeting of the IHR emergency committee, which will have a special focus on entry and exit screening.

4.4.1 Categories used to Classify Ebola Cases

Ebola cases are classified as suspected, probable, or confirmed depending on whether they meet certain criteria (table 5).

Table 5: Ebola case-classification criteria

Classification	Criteria
Suspected	Any person, alive or dead, who has (or had) sudden onset of high fever and had contact with a suspected, probable or confirmed Ebola case, or a dead or sick animal OR any person with sudden onset of high fever and at least three of the following symptoms: headache, vomiting, anorexia/ loss of appetite, diarrhoea, lethargy, stomach pain, aching muscles or joints, difficulty swallowing, breathing difficulties, or hiccup; or any person with unexplained bleeding OR any sudden, unexplained death.
Probable	Any suspected case evaluated by a clinician OR any person who died from 'suspected' Ebola and had an epidemiological link to a confirmed case but was not tested and did not have laboratory confirmation of the disease.
Confirmed	A probable or suspected case is classified as confirmed when a sample from that person tests positive for Ebola virus in the laboratory.

As at 9 October 2014, and following a retrospective laboratory review of cases, there have been 68 cases (38 confirmed, 28 probable, 2 suspected) of Ebola virus disease (EVD) reported in the Democratic Republic of the Congo, including eight among health-care workers (HCWs). In total, 49 deaths have been reported, including eight among HCWs. 852 contacts have now completed 21-day follow-up. Of 269 contacts currently being monitored, all (100%) were seen on 9 October, the last date for which data has been reported. This outbreak is unrelated to that affecting Guinea, Liberia, Nigeria, Senegal and Sierra Leone.

4.5 Ebola Case Management in Africa

Meetings were held this week and last in Geneva to further refine WHO's existing guidance on personal protective equipment in EVD outbreaks with a formal WHO Guidelines Development Group, including experts from a wide range of partners. A final document is expected within the week. A standing Training Coordination Partners Group met for its third

and fourth calls on 8 and 15 October. Efforts to scale-up the number of available EVD-specific beds have been intensified in countries with widespread and persistent transmission. Finding donors to fund the construction of new treatment facilities, and foreign medical teams to staff them, remains an ongoing challenge. Two of four planned ETUs are now fully operational in Guinea (table 3). In Liberia, however, only six of a planned 28 ETUs are currently operational, providing 620 (21%) of 2930 planned beds. Health-care partners able to staff and manage ETUs are yet to be found for 16 of 28 planned facilities in the country, contributing to a current shortfall of 2310 beds. In Sierra Leone, almost half of the 18 planned ETUs are now operational. Three facilities accounting for 250 beds require further support before being brought into use.

Table 3: Available and planned EVD bed capacity

	Existing ETU beds	Planned ETU beds	Existing ETU beds/planned ETU beds (%)
Liberia	620	2930	21%
Guinea	160	260	50%
Sierra Leone	346	1198	29%

In all three intense-transmission countries, a lack of available beds in ETUs forces many families to care for patients at home. In the home setting, carers are unable to adequately protect themselves from EVD exposure, and thus the risk of transmission within the family and throughout the community is greatly increased. As a remedial measure, Ebola Community Care Units (ECUs)/Community Care Centres (CCCs) are now being introduced into communities. These facilities will enable newly detected cases to be isolated, and thus reduce household transmission. ECUs/CCCs are controlled environments within communities where patients with EVD can receive supportive and palliative care in close proximity to their families. Liberia and Sierra Leone are the first countries to implement ECUs/CCCs. Liberia

have opened two CCCs in Bong and Montserrado. In Sierra Leone, a total of 149 CCCs are planned within the next 10 weeks.

4.5.1 Ebola Cases and Management at different Channels

A. In health care services

Recognizing that patients with symptoms compatible EVD can be detected at different levels of the health care system or entry points, which must be handled using standard infection control precautions:

The patient should be transferred and managed in a designated health facility which must comply with the following characteristics:

i. Contact isolation conditions,

ii. Appropriate provisions of personal protective equipment, and

iii. Health services personnel trained in infection prevention and control.

Ideally, patients should be kept in individual rooms. If this is not possible, patients should be placed in cohort, isolating separately those who have been EVD confirmed by laboratory and those still under investigation for EVD.

The country should consider having a number of designated facilities compatible with their geographical and administrative management.

If the country does not currently have designated hospitals for isolating patients with symptoms consistent with EVD, using those services that have already been identified for isolation of patients during the influenza pandemic and/or those used for isolation of patients with multidrug-resistant tuberculosis should be considered.

When the detection is realized in an airplane or at airport facilities, the patient should be directed to the areas designated as the facilities for isolation and evaluation by health personnel according to the airport contingency plan and prior to transfer to the designated hospital.

B. Patient transfer

Patient transfer should be performed by trained health care professionals in an appropriate vehicle for the transfer of patients. The vehicle must only transport essential personnel for patient care.

Personal protective equipment for the transfer:

a. The direct care personnel of the patient must wear gloves, impermeable gowns, surgical masks, goggles (preferably with anti-fog visor), and closed shoes.

b. The driver does not need to use personal protective equipment unless possible direct contact with the patient is anticipated.

Vehicle cleaning: After a vehicle has been used for patient transfer, it must be cleaned and disinfected with hypochlorite solution 0.05%. The professionals who perform cleaning should use personal protective equipment (gloves, waterproof gowns, surgical masks, goggles (preferably with anti-fog visor), and closed shoes).

4.5.3 Cleaning in the hospital and of households of patients symptomatic of EVD

At home: If a patient develops symptoms at home before being isolated, the home should be disinfected, and the clothing and the patient's bedding and clothing should be incinerated.

Disinfection of the environment:

i. Clean surfaces with blood or other body fluids with water and detergent prior to disinfection.

ii. Disinfection should be done with hypochlorite solution 0.05%.

iii. Use gloves, gowns and closed shoes for cleaning and disinfecting surfaces with blood and / or body fluids.

In the hospital: Both the bedding and clothing of the patient should be placed in a bag before washing and routed separately to the hospital laundry facilities where staff is to be adequately protected. Hand washing these items is not recommended.

4.5.4.1 Safe disposal of dead bodies

The dead body must be kept whole and its handling should be limited. Regardless of the funerary practice of family or friends of the patient, the body must not be embalmed. It should be disinfected with hypochlorite solution 0.05%, placed in resistant fluid extravasation body bags, which must be properly closed and placed in a closed casket before burial.

The staff for the management of dead bodies should be designated, equipped, trained and supervised by the national public health authorities to carry out the management of dead bodies under biosafety conditions. Personnel should use PPE at all times when handling a dead body, which includes aprons, overalls, waterproof gowns, surgical masks, eye protection (preferably with an anti-fog visor) and closed shoes.

4.5.4.2 Clinical Management

General medical support is critical. Severely ill patients require intensive supportive care. Such care must be administered with strict attention to barrier isolation. Patients are frequently dehydrated and require oral rehydration with solutions containing electrolytes or intravenous fluids. Currently, no specific licensed therapy has demonstrated efficacy in the treatment of EVD. Invasive procedures should be limited for EVD confirmed cases as well as for EVD suspected patients.

4.5.4.3 General Population

It is recommended to implement the existing communication plan to ensure transparency on preparedness activities undertaken by the government as well as the detection of EVD compatible cases and/or confirmed cases. Communication with the public must be established

to facilitate communication on the eventual implementation of public health measures that could impact society at large as well as individuals.

National health authorities are encouraged to identify cultural and religious practices and beliefs that may have the potential to prevent the acceptance of public health measures to control EVD by the community, should there be one or more suspected and/or confirmed case of EVD.

a. **Informing travelers:** Given the evolution of the outbreak and considering the international recommendations published, national authorities should inform and advise travelers who want to travel to countries with documented transmission of EVD, at the time of their trip the characteristics of the disease and transmission and inform them about personal protection measures. Channels to disseminate this information: This information should be disseminated through medical care centers or travel agencies and/or web pages dedicated to this purpose.

b. **Informing expat communities:** (from countries where EVD transmission has been documented). Engage appropriate national authorities to reach out to expat community leaders to ensure open dialogue with the communities, to facilitate the health monitoring operations, and provide access to the health care services.

c. **Media:** National health authorities are invited to engage with the media to inform them about the modes of transmission and clinical presentation of EVD; about efforts made by national authorities to prepare for the introduction of EVD; and to seek in advance their collaboration and cooperation for the delivery and dissemination of health messages to the population, especially in case of suspicion or confirmation of EVD in the countries.

4.6 Discussion on the Africa value of Care giving and examining the Reconstructed Realities of Ebola in Africa

4.6.1 West African cultural traditions and norms

The Ebola epidemic of 2014 has forced West Africans to face numerous difficulties on daily basis regarding their traditional norms and practices. In essence, their traditions have been severely disrupted due to the Ebola virus. For instance, Africans have had the tendency to remain close to their sick family members to nurse them during illness for centuries. Unfortunately for the African community, many have been encouraged to keep their distance from their infected family members as potential contact could be fatal. In addition, it is part of their culture to touch the deceased at funerals and for the sister of the deceased's father to bathe, clean, and dress the corpse in a favorite outfit. When there is not an aunt to perform this task, a female elder in their community is then held responsible. Not only is it customary to wash and touch the deceased, but also to kiss those that have passed.

Specifically, funerals are considered to be major cultural events for families and friends to gather around to celebrate the deceased. The funeral performances, which involve wailing and dancing, is done out of care and respect for the dead. Funerals in Africa often last for several days, depending on the status of the person who died. In other words, the more important the person who died was while they were alive, the longer the mourning will last. More importantly, there is a common bowl used for ritual hand-washing towards the end of the ceremony, including a final kiss or touch on the face, which is to be bestowed on the dead. This is commonly referred to as a "love touch." The Wesley Medical Center has confirmed that prohibiting African families from performing such rites is a disgrace as it insults the deceased, putting the remaining family in danger. Specifically, it is believed that the dead person's spirit, also known as "tibo," will cause harm and bring illness to the family as a result of an improper burial.

4.6.2 Resistance to Western medicine

Resistance to Western medicine is considered to be a significant barrier to battling the Ebola virus. The Wesley Medical Center claims that the interference with African burial rituals caused by Western medical practices has prohibited them from properly honoring their loved ones. They believe that this may have been a reason for heightened distrust in medical professionals, and that the mistrust enhances each time family members of infected persons are prohibited from participating in the funeral or seeing the dead body in person. Due to the mistrust Ebola-stricken communities in Liberia reportedly hid family members with Ebola from health care providers and held secret burials. In Sierra Leone health workers made more progress because health measures were implemented according to WHO guidance, which advises health workers to heed the traditions of the threatened communities when attending to the dead. Therefore, funerals were held in agreement with the wishes of the families, but also gave health workers an opportunity to disinfect the bodies. In many of the Ebola infected areas in Africa, Western medicine is also believed either to be ineffective or to be the actual origin of the virus. In other words, there is a belief among the African community that Western doctors are intentionally killing their patients with their treatments. A conspiracy theory also says that the medical professionals are planning to harvest the organs of those dying from Ebola.

Resistance to Western medicine exists also because of the look of the hazmat suits, which are worn by healthcare workers to protect themselves from becoming infected with the Ebola virus. The protective equipment is said to frighten many West Africans and also believed to be hostile and intimidating to the African families. Lastly, the interference in the family's care for the patient diminishes the honor of the patient as well as hindering the family's duty to provide comfort and care. Regardless of the existing resistance towards Western medicine, handling the bodies of the deceased poses a high risk of contagion as

Ebola is contracted through physical contact with an infected person's bodily fluids. This is mainly because preparation for burial includes touching, washing, and kissing as is mentioned above. Those that are preparing for the funeral can become easily infected as they can easily become exposed to the infected person's blood, vomit, diarrhea, and other bodily fluids as these are the main symptoms of the virus.

4.6.3 Traditional medical practices

Apart from the fact that traditional African healers have been using ritual and herbal remedies for many centuries, the African people also trust these treatments and find the costs more affordable. Traditional procedures include the following: magic, biomedical methods, fasting, dieting, herbal therapies, bathing, massage, as well as surgery. Surgical procedures often involve cutting a patient's skin with unsterilized knives. Sometimes, traditional healers apply blood to the skin to rid them of their sickness. Despite the severe distrust of Africans in modern medicine, the Ebola virus has been said to spread rampantly across West Africa due to a shortage of healthcare workers and limited medical resources and facilities. The unsanitary conditions in the overall African region have also made it easier for Ebola to spread

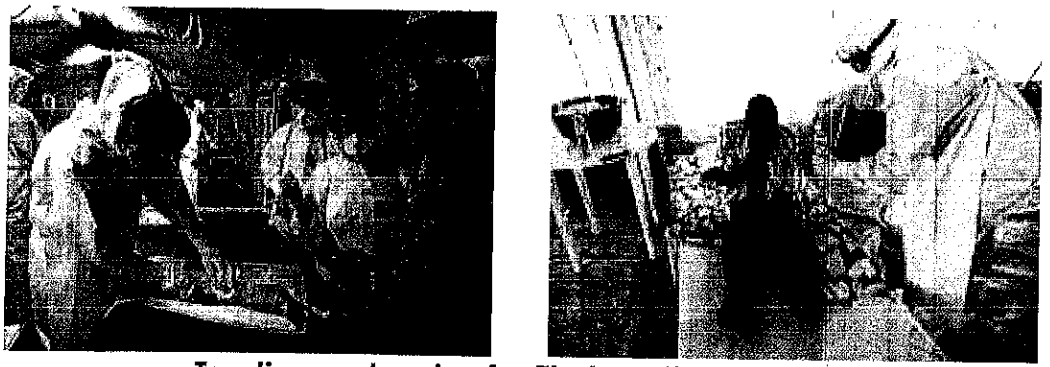
The Ebola virus epidemic in West Africa has had a large effect on the culture of most of the West African countries. In most instances, the effect is a rather negative one as it has disrupted many Africans' traditional norms and practices. For instance, many West African communities rely on traditional healers and witch doctors, who use herbal remedies, massage, chant, and witchcraft to cure just about any ailment. Therefore, it is difficult for West Africans to adapt to foreign medical practices. Specifically, West African resistance to Western medicine is prominent in the region, which calls for severe distrust of Western and modern medical personnel and practices.

Similarly, some African cultures have a traditional solidarity of standing by the sick, which is contrary to the safe care of an Ebola patient. This tradition is known as "standing by the ill" in order to show one's respect and honor to the patient. According to the Wesley Medical Center, these sorts of traditional norms can be dangerous to those not infected with the virus as it increases their chances of coming in contract with their family member's bodily fluids. In Liberia, Ebola has wiped out entire families, leaving perhaps one survivor to recount stories of how they simply could not be hands off while their loved ones were sick in bed, because of their culture of touch, hold, hug and kiss.

Some communities traditionally use folklore and mythical literature, which is often passed on verbally from one generation to the next to explain the interrelationships of all things that exist. However the folklore and songs are not only of traditional or ancient historical origins, but are often about current events that have affected the community. Additionally, folklore and music will often take opposing sides of any story. Thus early in the Ebola epidemic, the song "White Ebola" was released by a diaspora based group and centers on the general distrust of "outsiders" who may be intentionally infecting people (Boima, 2015).

This initial misinformation increased the general distrust in foreigners, and the idea that Ebola was not in Africa before their arrival led to attacks on many health workers as well as blockages of aid convoys blocked from checking remote areas. A burial team, which was sent in to collect the bodies of suspected Ebola victims from West Point in Liberia, was blocked by several hundred residents chanting: "No Ebola in West Point." Health ministries and workers started an aggressive Ebola information campaign on all media formats to properly inform the residents and allow aid workers safe access to the high risk areas, (CBS News, 2015). In Guinea, riots broke out after medics disinfected a market in Nzerekore.

Locals rumored that the medics were actually spreading the disease. In nearby Womey, 8 people distributing information about Ebola were killed by the villagers (BBC News, 2014).



Treating and caring for Ebola patient in the Hospital

The images displayed above shows how and manner Ebola patients are treated and cared for in the scientific medical way. The nature of the deadly disease explain or determined how everybody or groups or units involved in the treatment to protect themselves very well so that they do not contact the disease in the course of treating Ebola patient since any form of contact or direct in hailing of Ebola patient carbon dioxide could lead to easy contact of the disease. The care for Ebola patients unlike other disease totally differ Africa's cultural bond that exist among Africans, its indeed a strong pity.

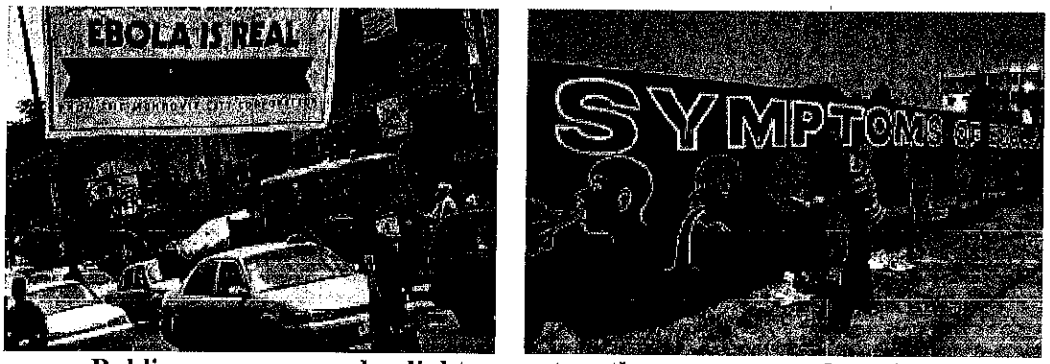
Community's displaying a distanced solidarity for Ebola patient

The image above shows two pathetic scenes of how Ebola disease has exchanged the cultural solidarity that Africans shared and practiced into a state of reconstructed reality of individualistic. That is, Ebola patients at any stage of contracting the disease are on their own, in order not to spread the disease to other people. The first image above showed an Ebola patient lying dead helplessly on the floor why fellow community people could not move near to help or assist in any way in order to prevent unnecessary spread of the disease. The second image displayed a more painful scene of beloved brothers and sisters in Africa who were denied the opportunity to move near Ebola patient to demonstrate care and love usually shared among Africans in order to curb excessive spread of Ebola among the people in their various communities.

Sorrowful and mourning mood of Africans losing their loved ones to Ebola

The pictures above displayed two scenarios on sad and mourning mood because of losing their beloved relatives to untimely death through Ebola. This is enough to let people know African's value of care giving to African people whenever the need arises not minding the type of sickness or the condition or situation surrounding their people. But it is very unfortunate that the nature of Ebola has did not allow Africans to display their usual care giving they are known for. This is because Ebola is not compared to other contagious or hopeless diseases such AIDS or cancer or any other

disease. From the pictures, the people above could not in any way help their relations who were victims of Ebola contagious disease.



Public awareness and enlightenment on the symptons and reality of Ebola

The issue of awareness and enlightenment of Ebola disease became an urgent and a necessity in all communities globally. This is because of the nature of the disease right from the first stage of contacting it by anybody to whatever stage before such a person is quaratine in order to stop the fast spread. For hopeless and deadly disease like Ebola, the images above showed the extent some communities went in Africa to sensitized their people on this deadly disease. The drawing on the way it is contacted, the symptons and signs were demonstrated on this long wall. This is because of the cultural bond that exist among Africans anywhere they are. This simply explain for the fast spread of Ebola and the number of people that actually died in each nation in Africa and the continent at large.

Dead bodies of Ebola patients well packed to avoid contact

The images above shows non-cultural and painful way and manner Ebola dead bodies are packed prepared to be buried without any social usual ceremony for dead people. They were packed and taking just like animal, not that the people want it that way but because of the deadly nature of the disease which has not respect for culture, social class or position. All the groups or crews involved in one way or the other in the case of Ebola needed to play very safe in order not be victims of circumstance. It was recorded that some medical people also contacted in the course of taking care of Ebola patients and they died too. Nigeria recorded up to ten (10) cases of Nurses and medical Doctors that contacted from patients and died.

The reconstructed realities by Africans in respect to Ebola patients and treatment cum African culture is simply for Africans to do all things necessary to prevent Ebola spread in the continent. In doing this, or to achieve this, all hands must be on deck. Everybody must be involved in terms of proper education and enlightenment about Ebola looking at its meaning, causes, and areas of the body affected, signs and symptoms, method or mechanism of its spread or contact or transmission and how it can be managed if there is and how it can be prevented. With this reconstructed realities about Ebola, the spread of Ebola carelessly will drastically reduce in Africa.

4.6.4 Personal account of a West African student

Alakey Osei, a student and bank-teller from Freetown, Sierra Leone, described the Sierra Leonean capital as a ghost-town, as a result of the increasing death toll in the West African region caused by the Ebola epidemic. Osei states that "everyone is scared to be out of their houses. No one is going to church or mosque, no one is going to work, the kids are not going to school and people are not even going to the market place." The fact that the city of Freetown has been completely abandoned is strange to the student, because the nation is and has always been heavily dependent on physical contact and very close interaction. Osei has

indicated that following the no touching rule that the medical personnel have been promoting is extremely difficult for her. Osei continues by saying that she does not even know how her people are surviving.

In her interview, Osei provides some insight about her childhood. She moved to USA in 2008 when she was thirteen years old. She experienced extensive bullying for her unawareness to American culture and simply for being the "uncivilized" African. For example, others had asked her if she was getting accustomed to wearing shoes since people do not wear shoes in Africa. She was also called names, such as monkey and pre-historic. As a result of this cruelty, she began to believe that American culture was very cold. She also noticed that Americans were "protective of their property," space, and time. She concluded that American society is "extremely individualistic." This truly made her miss living in Africa, "[...] where every woman is your mother and every man is your father, [...] where you are never alone, because everyone is family and family is all around you."

As of October 2014, the Ebola virus had not reached her home-town back in Sierra Leone; however, she said that her family still living in the country claimed that Freetown did not "feel like the same place" anymore. Her aunt had told her that people were not sharing food anymore nor spending time at each other's houses as they used to because of the fear of becoming infected. Osei finds it heart-breaking that people in Sierra Leone have turned to isolation as a way to stay Ebola-free. Osei now says that "Freetown has become Fear-town," and that "Ebola has turned us into prisoners in our own country." *(Rosemond, 2014).*

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

This is the last chapter of this project. The chapter is divided into three major parts. That is, the summary of the whole study which run through all the chapters, the conclusion base on the content of this study and finally, the recommendations of this study which is basically based on the context of this study.

5.1 SUMMARY

This study focus mainly on the contagious disease and the African value of care giving, examining the reconstructed realities of Ebola in West Africa. To this end, the chapter one of this study focus on the introductory part of the study which include background to the study, statement of the study, significance of the study, research questions and objectives of the study. Chapter two was on the reviewed of relevant literature on some basic issues on Ebola like the concept of contagious diseases, the African value of care-giving and an examination of the reconstructed realities of Ebola in West Africa. Chapter three of this study also looked at issues such as the background information of Ebola, the possible scenarios for the EU and EEA, Ebola transmission in Africa and advice to National Authorities Globally. In chapter four, some of areas current literatures appraised were on some countries in Africa with widespread and Intense Ebola Transmission such as Guinea, Liberia and Sierra Leone, Health-care workers, Ebola case management in Africa, Ebola case confirmation in Africa, Ebola surveillance in Africa, safe and dignified burials of Ebola patients, countries with an initial case or with localized transmission, preparedness of countries to rapidly detect and respond to an Ebola exposure, Ebola cases and management at different channels, infection prevention and control, cleaning in the hospital and of households of patients symptomatic of EVD, waste management in the hospital settings, clinical management. General population and discussion

on the Africa value of care giving examining the reconstructed realities of Ebola in West Africa. And finally, chapter five was on the summary of the entire work, conclusion of the study based on other scholars work on the subject matter and recommendations based on the scope of the study.

5.2 CONCLUSION

Ebola haemorrhagic fever epidemic constitute a significant public health concern in Africa and an effective vaccine is needed urgently. Such a vaccine would primarily benefit doctors, nurses and field epidemiologists working in endemic countries. The second target group would be the scientists working with Ebola virus as well as veterinarians and those involved in wildlife conservation in endemic areas. Since its discovery in 1976, much is known about Ebola virology, physiopathology, clinical features and epidemiology, but the missing link certainly remains the virus reservoir in nature. For instance, Ebola has high case of fatality rates (up to 90%), the deadly Ebola haemorrhagic fever outbreaks are becoming more and more frequent in Africa, mostly in relation to increasing contact with infected wildlife. Previous epidemics were detected after a long delay, especially because of the remoteness of the epidemic focus, the lack of laboratory facilities and the poor knowledge of the disease by doctors and nurses, who confused Ebola disease with malaria or typhoid fever. The more recent epidemic in Yambio (2004) and Kaluamba (2008) resulted in low CFRs of 41.2% and 43.8%, respectively. This is mainly related to the early detection of the outbreaks followed by a prompt and vigorous response from public health authorities and their partners.

5.3 RECOMMENDATIONS

Based on the findings the following recommendations are made:

i. Africans should endeavour to have a reconstructed mindset that Ebola patient like other hopeless diseases should be distanced from not minding our long learned, practice and shared

culture. However, survivors of Ebola virus should not be stigmatized and isolated after they have been declared free of the virus.

ii. The act of hand washing and general hygiene should be maintained if it is a must to be close to Ebola patient in Africa.

iii. Emphasis should be placed not just on the personal hygiene of the families and relations of Ebola patient but also on the entire environment of people close to the patient.

iv. Much publicity and better means of prompt information dissemination should be advocated for the rural areas in Africa most especially in Nigeria.

v. Each household should be provided with adequate fund to maintain the tempo of hygiene as a result of EVD.

vi. Africans should reduce to the barest minimum our usual contact with wild life such as bat, monkeys, grass cutter, antelopes etc.

vii. Medical practitioners in Africa especially Nigeria should be well knowledgeable about all disease in order to know how to react/attend to patients when they are brought to them.

viii. This research is recommended for further studies to help gather more information on contagious diseases like Ebola and its effect on African value system so as to add to the body of knowledge.

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