

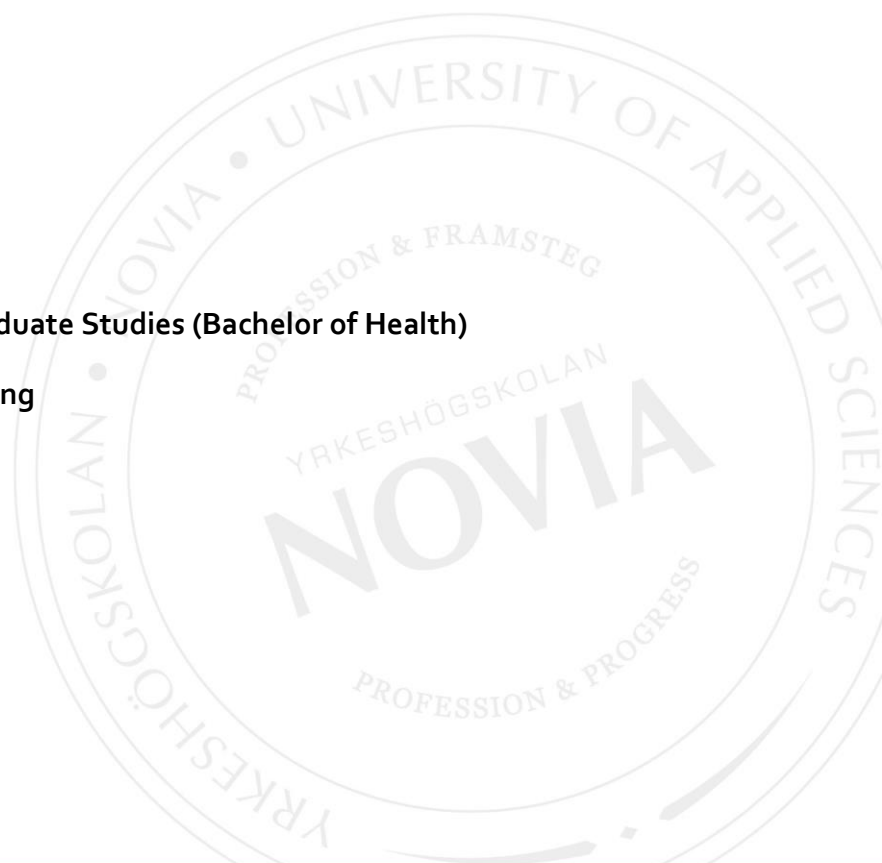
**THE EPIDEMIOLOGY OF EBOLA VIRUS DISEASE, ITS  
CONTROL AND PREVENTION IN SELECTED WEST  
AFRICAN COUNTRIES: THE NURSES' ROLE CONSIDERED  
A SYSTEMATIC LITERATURE REVIEW**

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**Degree Thesis for Undergraduate Studies (Bachelor of Health)**

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## **Bachelor's Thesis**

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### **Abstract**

Although Ebola Virus Disease's epidemic has not yet been recorded as a global canker like diseases such as HIV AIDS and cancer, it leaves a high level of threat and concern to the health of humanity in the global world because of its high fatality rate when one is infected with the Ebola Virus due to its nature and modes of epidemiology. This study explored the nature of the epidemiology of this Ebola Virus Disease and its available prevention and control measures in some chosen West African nations taking into consideration the various roles played by nurses in preventing and controlling the outbreak of the disease.

In this study, a systematic review of seven scientific articles was done using a qualitative content analysis method and a deductive content analysis approach. In this method, "Ebola Virus Disease Control and Prevention" and "Nurses role in Ebola Virus Disease Control and Prevention" were formed as main categories with five sub-categories explaining the concept of this study. Findings of this study show that Ebola Virus and its disease spreads through practices like touching infected people, and items that are contaminated with bodily fluids of those with the Ebola Virus Disease, eating infected animals, traditional funeral celebration and post-mortem contacts. Maintaining a hygienic environment, educating people on Ebola disease and its modes of epidemics, creation of Ebola Virus Disease isolation wards, provision of infection control resources, restrictions and travel ban on those infected, safe burials of those dead through Ebola Virus infection are among the various methods used to prevent and control the epidemics of the Ebola disease.

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**Language:** English **Key Words:** Ebola Disease, Epidemiology of Ebola Disease, Disease Control and Prevention, Mode of Transmission

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## 1. Introduction

Ebola is a disease caused by a virus called Ebola Virus, a disease-causing organism which causes a haemorrhagic fever. According to many studies, Ebola disease is very fatal in humans. It is thought that Ebola Virus Disease(EVD) has its natural host as bats in forest environments but there is no certainty about this, nor about the specific viral transmission mechanisms through which this virus spreads. According to the World Health Organisation (WHO), the Ebola virus causes an acute, and a serious illness which is very deadly if left untreated. Ebola virus disease from (WHO) record first appeared in 1976 in 2 simultaneous outbreaks, one in Nzara, South Sudan, and the other in Yambuku, Democratic Republic of Congo. The latter one occurred in a village near the Ebola River, from which the disease takes its name as Ebola (Hewlett and Hewlett, 2008.).

According to the WHO fact sheets on the outbreak of this disease on 12 February, 2018, the 2014–2016 outbreak in the West Africa was the largest and most complex Ebola outbreak since the virus was first discovered and noticed in 1976. In this period, there were more cases and deaths in this outbreak than all others when put together. It also spread between countries, beginning in Guinea then moved across land borders to Sierra Leone and Liberia. This outbreak of such a deadly disease across West African countries puts threat on other nations in Africa which have not yet recorded cases of this disease and so it stands as a potential global threat.

In this study, I consider the aetiology of Ebola Virus disease, the modes of transmission and its epidemiology and the various measures put in place by some selected West African nations and other organizations to control and prevent the disease in the affected and non-affected countries in West Africa. The study also considers the role of nurses in controlling and preventing the Ebola Virus Disease. Theorists and theories that explain the roles played by nurses in educating patients concerning the disease as well as epidemiology of diseases and possible control methods shall also be employed in this study to provide an overview of understanding to this study.

In this study and in this case, an African citizen as I am, a sound knowledge about this very fatal disease shall be obtained by the end of this study and this shall enable me to serve as a nurse educator to my colleague health workers and nurses in Africa, the general people in Africa and potential people deemed to have risk of infections of the disease.

## **2. The Aim of the Study and Problem Definitions**

This study aims to explain the concept of epidemiology of Ebola Virus Disease, its control and preventive measures in both affected and unaffected West African countries with the transmission of the disease in focus. The study throws light on the modes of transmission of the Ebola Virus Disease and how near-by countries close to the affected countries prepare themselves in preventing and controlling possible epidemic of the disease. The roles played by nurses in controlling and preventing the outbreak of the disease is also considered in this study.

The study seeks to answer the following questions:

- ❖ What are the control and preventive measures laid down in combatting the possible epidemiology of the disease in West Africa by the affected and un-affected near-by countries in West Africa?. What are the challenges faced during Ebola Control and prevention?.
- ❖ What are the roles played by nurses in controlling and preventing the Ebola Virus Disease?.

### 3. Background of The Study

The Ebola virus causes an acute and a serious illness called Ebola Virus Disease(EVD) which is often very deadly if left untreated. Ebola Virus Disease(EVD) as described in the introduction first appeared in 1976 in 2 simultaneous outbreaks according to World Health Organization (WHO, February 2018), one in Nzara, South Sudan and the other in Yambuku, Democratic Republic of Congo. The latter one occurred in a village near the Ebola River, from which the disease is named after.

The 2014–2016 outbreak in West Africa was recorded as the largest and most complex Ebola outbreak in terms of its fatality rate since the virus was first discovered in 1976. During this period, there were more cases of its pandemic and epidemiology and deaths in this outbreak than all others when put together. It also spread between nations, beginning in Guinea and then moved across land borders to Sierra Leone and Liberia (WHO, Ebola Situation Reports, 2016.).

The family of the virus from findings is that, it falls under Filoviridae which is a sort of zoonosis which transmits from wild animals to people. This Filoviridae includes three genera: Cuevavirus, Marburgvirus, and Ebolavirus. Within the genus of Ebolavirus, five different species have been identified which are: Zaire, Bundibugyo, Sudan, Reston and Tai Forest. The first three, Bundibugyo ebolavirus, Zaire ebolavirus, and Sudan ebolavirus have been identified and associated with large outbreaks in Africa. The type of Ebola virus which caused the 2014–2016 West African outbreak belongs to the Zaire ebolavirus species according to WHO, 12 February 2018 facts sheet.

It is found according to many studies that Ebola spreads through human-to-human transmission, through direct contact with infected people's skin, contact with the blood and through sexual intercourse, secretions, organs or other bodily fluids of infected people, sharing bed and clothes and drinking contaminated fluids and also burial or funeral ceremonies that does involve a direct contact with the body of the deceased person. The disease has gripped the people of Africa with intense fear as its epidemic puts people to death within few days to weeks of infection. This therefore has caused a global attention to tackle

and combat the pathogen that causes the disease(WHO (2016). The incubation period of Ebola virus according to a study made by T.Mangilal, AS. et al (2015) highlights that it is less than 3 weeks and that the virus' infection can cause a body's systemic inflammatory response and eventually suppress the human immune system which leads to multiple organ failure and distributive shock due to the damages made to the immune systems, the coagulation systems and the body's vascular systems caused by the Ebola virus(T.Mangilal, AS. et al (2015). According to several studies made on the treatment of the disease, there is no appropriate and specific antiviral vaccines or medications available to fight the infection in humans. Practices and measures such as high-fluid intake about 10 Litres per day in the first 72 hours of infection and ventilator support under broad-spectrum antibiotic medications have been proven to enhance recovery from the Ebola virus infection (T.Mangilal, AS. et al (2015).

Specific measures according to World Health Organization(WHO) and other health organizations have been put in place to prevent the outbreak of this disease and even control the infection on those that have already been infected by the disease. Among the various methods of prevention and control are: Reducing the risk of wildlife-to-human transmission, reducing the risk of human-to-human transmission, reducing the risk of possible sexual transmission, and many other outbreak containment measures. In health care settings, health-care workers taking care for patients with confirmed Ebola virus are to apply extra infection control measures to prevent the contact with the patient's blood and body fluids and contaminated materials such as clothing and bedding(WHO (2016).

Theories and theorists which do describe epidemiology of diseases and their control shall be employed in this study to provide a backbone and framework to this thesis.

### **3.1. Definition of Concepts**

In this sub-chapter and section, important key concepts concerned in this study are defined. As seen in the introductory section, the study focuses on epidemiology of Ebola Disease, the controlling and preventive measures laid down by concerned organizations and Nations especially those West African Nations that are susceptible to the outbreak of the disease. Concepts such as Epidemiology of Ebola disease, Disease Control and Prevention and Mode of transmission of the disease shall be explained under this section.

### 3.1.1. Epidemiology of Ebola Virus Disease

The word *Epidemiology* comes from the word “*Epidemic*”. An Epidemic is described as the “*rapid spread of infectious disease(s) to a large number of people in a given population within a short period of time, which is usually within weeks or less*” (Merriam-Webster's Collegiate Dictionary, 11th ed.). According to the World Health Organization(WHO), Epidemiology is the study of the distribution and determinants of health-related states or events that includes disease(s), and the application of this study to the control of diseases and other health related problems. From many studies, various methods can be used to carry out epidemiological investigations and among the commonest known methods are: surveillance and descriptive studies which can be used to study distribution of the case under study and also analytical studies are used to study determinants(WHO (2016)).

From the above explanation, Ebola epidemiology specifically in West Africa under this study shall then be explained as the study of the spread of the Ebola Virus disease from one region in Africa to another through surveillance and other methods and finding solutions to this situation(WHO (2016)).

### 3.1.2. Disease Control and Prevention

The term “*Disease Control*” as defined by Dowdle in 1998 according to the World Health Organization states that, “*disease control is a reduction in the incidence, prevalence, morbidity or mortality of an infectious disease to a locally acceptable level; where as elimination is explained as reduction to zero of the incidence of disease or infection in a defined geographical area; and eradication of a disease is permanent reduction to zero of the worldwide incidence of infection*”(Dowdle, WHO, 1998).

From this explanation given about disease control, any measures put in place during an outbreak of a disease to drastically reduce the spread or the speed at which the disease is contracted could be called *Disease Control*. In healthcare, there are many ways by which both an infectious and non-infectious disease could be controlled.

According to T. Mangilal, AS. et al (2015), Ebola disease could be controlled by isolation of infected patients and through quarantine, social distancing, travel restrictions on those



suspected of living in Ebola risk communities and having the tendency of spreading the Virus, practicing safe burial of those dead through the Ebola disease, practicing strict infection control methods in hospitals and a good use of personal protective equipment(T. Mangilal, AS. et al (2015).

Prevention of a disease refers to any action or step that is aimed at avoiding the manifestation of a disease(WHO, 2015).“Any actions having the tendency to improve health through changing the impact of social and economic factors on one’s health and making the provision of information on lifestyle and medical health risks and also providing consultation measures to decrease them at the personal and community level could be primarily useful measures in prevention of diseases(WHO, 2015).

### **3.1.3. Mode of Transmission of a Disease**

Transmission of a disease is explained as the passing of a pathogen or the disease causing organism from an infected host individual or group to a particular individual or group, without considering whether the other individual was previously infected or not(Merriam-Webster's Collegiate Dictionary, 11th ed.). The means by which the disease is transmitted from the affected host to an individual is termed as the mode of transmission. From this study’s perspective, according to the study made by T. Mangilal, AS. et al (2015), Ebola virus is transmitted due to close residence with the wild animals such as chimpanzees, baboons, African green monkeys, and fruit bats. When individuals get infected with this virus, a disease called Ebola Virus Disease is infested. This disease is highly contagious and has the tendency to break out to other individuals that come in contact with the affected patients T. Mangilal, AS. et al (2015).

Among the various modes of transmission of the Ebola disease are human-to-human transmission such as having a direct contact with infected people’s skin, contact with the blood and through sexual intercourse, secretions, organs or other bodily fluids of infected people, sharing bed and clothes and drinking contaminated fluids and also burial or funeral ceremonies that does involve a direct contact with the body of the deceased person(WHO, 2016).

## 4. Theoretical Framework

In this thesis, two theories from two different theorists shall be applied as the framework to provide a backbone to this study. The Self-Care Nursing Theory by Dorothy Orem is considered here and applied as a theoretical framework to this study in order to throw light on the roles played by nurses at the frontline of the Ebola Virus Disease control and prevention as they serve as educators to the patients, individuals and the general population as a whole who are deemed to be at risk of infection of the Ebola Virus Disease. This theory explains how the general population is educated in order to ensure their own self-care so as to avoid getting infected by the disease a possible outbreak of the disease. If a proper education concerning this outbreak of this deadly disease is not given to the entire population including even the healthcare professionals as a whole, arresting the situation is impossible. This theory is chosen because of its usability to the study.

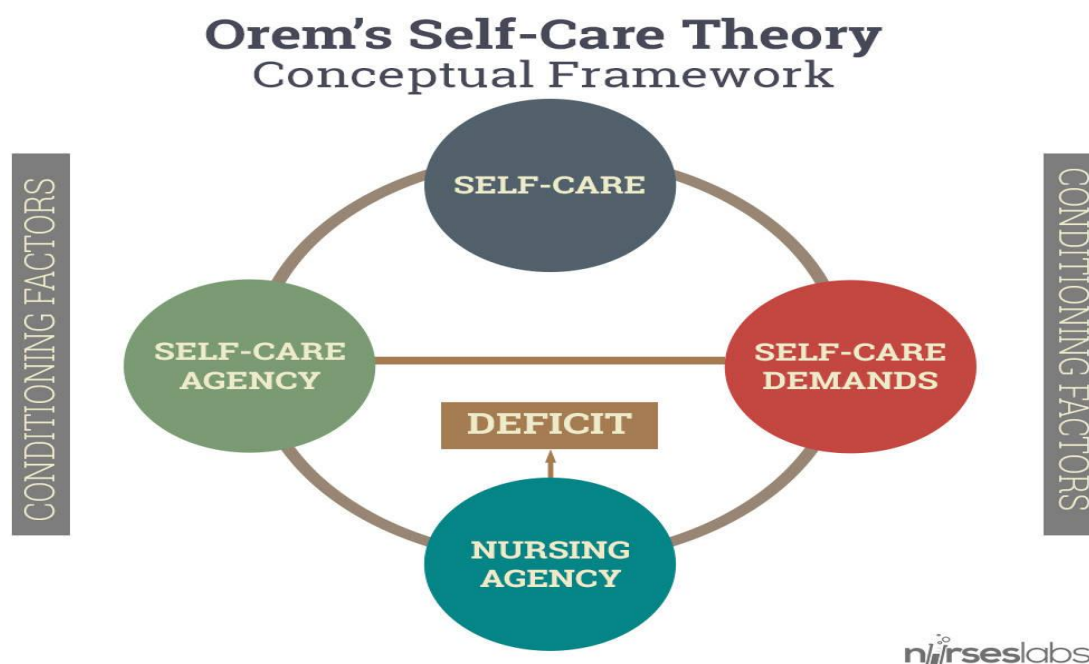
The Epidemiological Triad Theory by Theobald Smith in his 1934 book, explained infectious disease as “*an instance of parasitism, in which the infectious agent lives in or on the human host*”. He described disease as the result of all forces within a dynamic system that consist of the agent of infection, its host, and the environment(Theobald Smith (1934)). This theory employed here as a framework will provide an understanding about the Ebola Virus causing the Ebola Disease as an agent thriving on human host and if the environmental factors that assist the spread of the virus are not strictly contained, epidemic of the disease to a larger group of the population is possible.

### 4.1 The Self-Care Theory

The nursing profession from as early as 1950 sought for a means to provide a sound idea to provide an individualistic Self-Care. Within this period, Dorothy Orem began a study on the processes that could lead to this outstanding theory of Self-Care today. During this period, this renowned American theorist of nursing and educator conceived what is known today as the self-care nursing theory, which teaches and enables nurses to assist patients in improving their ability to perform acts of self-care. For the purpose of this study, this theory was defined as “the practice of activities that individuals perform to maintain their personal health and well-being”(Orem, D.E., 2001). From this explanation by Orem, nurses play role as educators

in drawing the attention to the patients and the general public the need to maintain hygienic environment, cleanliness, avoiding drinking contaminated water, staying away from people that have been affected by the Ebola disease.

Figure 1



Source: <https://nurseslabs.com/dorothea-orems-self-care-theory/>

Dorothy Orem focussed the Self-Care theory on trying to identify the universal or general basic self-care processes that most human individuals are usually capable and able to perform. Instances of these universal processes according to her are taking in clean and uncontaminated sufficient air, water, and nutrition, preventing getting exposed to hazards, and promoting development within social groups. As known generally, when humans develop illness, injury, or disease, this leads to situation-specific self-care processes like seeking medical attention ((Orem, D.E., 2001). This elaboration provides a sound knowledge to all individuals in an Ebola risk communities that as soon as an individual experiences a symptom that mimics a possible infection of Ebola, the individual should swiftly seek for a medical advice and attention.

### 4.1.1 The Self-Care Deficit Theory

The self-Care deficit Theory postulated by Dorothy Orem centralizes on the situations where a person has become unable to perform what is considered as “*continuous self-care*”(Orem, D.E., 2001). Orem placed these main methods of assisting patients who are unable to attend to their own self-care needs into the following categories:

- *“taking action for the sake of the patient*
- *providing patients with the needed guidance*
- *providing patients with support*
- *providing patients with an environment that promotes personal development*
- *teaching patients how to cope with obstacles they may potentially face in the future”*(Orem, D.E., 2001)

Considering the Self-Care Deficit Theory and the various methods coined by Orem in assisting patients unable to care for themselves as a result of instances of sicknesses such as the Ebola Virus Disease under this study, patients that are already affected by the Ebola diseases are cared for by nurses and other medical professionals sent into their communities and towns from many organizations and World Health Organization(WHO). Medical assistance needed by those affected in the outbreak of the disease according to the application of Orem’s Theory of Self-Care Deficit has to be provided to the patients in order to control the infection of the disease contracted as it is in the case of all other diseases(Orem, D.E., 2001).

As the environment becomes contaminated through the infection, those individuals who have not been infected by the disease according to the theory are to be moved to a cleaner and uncontaminated environment to avoid the risk of being infected. Individuals that have not contracted the disease are to be supported with the basic assistive needs and proper education that could enhance proper and healthier living in the new and healthier environment in order to prevent the disease’s infection(Orem, D.E., 2001).

The final concept under the Self-Care Deficit Theory focusses on teaching patients how to cope with obstacles and situations they may potentially face in the future. Here, the application of the concept under the theory explains that patients who have been treated out of

the Ebola Virus Disease and have been recovered and even those unaffected but have the risk of being infected are taught on how to cope with situations like that in future should in case a similar incidence breaks out(Orem, D.E., 2001).

#### **4.1.2. The Theory of Nursing Systems**

Orem stated under this theory that three systems are used to identify a person's need during nursing care. These systems are:

- ❖ *Wholly Compensatory Nursing Systems*
- ❖ *Partial Compensatory Nursing Systems*
- ❖ *Supportive-Educative Nursing Systems*

##### **4.1.2.1. Wholly Compensatory Nursing Systems:**

Here, she explains that these systems provide support to people who are solely unable to care for themselves, as a result of difficult circumstances and therefore, their well-being is wholly dependent on others (Orem 2001). From the perspective of this study, the individuals that have been infected by the Ebola Virus Disease and are seriously sick entirely depend on healthcare professionals and all healthcare team for assistance in terms of medical treatment and vaccinations. People in Ebola affected and epidemic communities but unaffected by the disease and unable to move and settle at new environments or communities as a result of poverty would depend on the assistance from the World Health Organization teams, governments, local organisations and other individuals who could assist them in kind in order to relocate to a more cleaner and unaffected communities and countries.

##### **4.1.2.2 Partial Compensatory Nursing Systems**

Under this system of the theory, it is emphasized that both the nurse and patient play some sort of role in performing personal care(Orem, D.E., 2001). From this study's perspective, if a patient in an Ebola Virus Disease infected region knows how to maintain a hygienic environment, stays away from circumstances and means by which transmission of the disease

could occur, there would be less risk of infection and hence, less labour on nurses and all healthcare professionals in treating, preventing and controlling the disease.

#### **4.1.2.3 Supportive-Educative Nursing Systems**

It is stated under this system that the patient is able to perform the necessary self-care activities and procedures, but needs an active guidance from a nursing care professional such as a nurse(Orem, D.E., 2001).

### **4.2 The Classic Epidemiologic Theory**

Theobald Smith, a renowned American microbiologist and bacteriologist born on 1859 and died on 1934 grasped a special opportunity of developing a science of microbiology of pathogens which has now been revolutionized into the study of medicine today (Theobald Smith 1859-1934 p.1-3). According to Mr Smith, discovery of an etiological agent of a given disease was only the introduction to the larger problems of the inter-relations of host of any pathogen and the parasite causing the disease. Smith published many subjects on micrologic studies and among the many subjects he published include : “ *the method of transmission of infectious agents from one individual host to another, as in the insect transmission of the parasite of Texas fever, the role of Heterakis in the production of enterohepatitis of turkeys; the differentiation of closely related organisms, as the varieties of tuberculosis bacilli, the Brucella, the paratyphoid bacilli, the streptococci and the anaerobes*”(Theobald Smith 1859-1934 p.1-3). Theobald Smith Continued his research and findings and postulated a classic theory which is now known as the Classic Epidemiologic Theory or Epidemiologic Triad Theory.

The Classic Epidemiologic Theory, otherwise called the Epidemiologic Triad Theory highlighted by Theobald Smith, states that “*disease is an instance of parasitism, in which the infectious agent lives in or on the human host*”(Theobald Smith 1859-1934). He saw disease as the result of forces within a dynamic system consisting of the agent of infection, the host, and the environment. This model has come to be known as the “Epidemiologic Triad Theory”. According to Smith, the direction of a movement of a disease depends on some

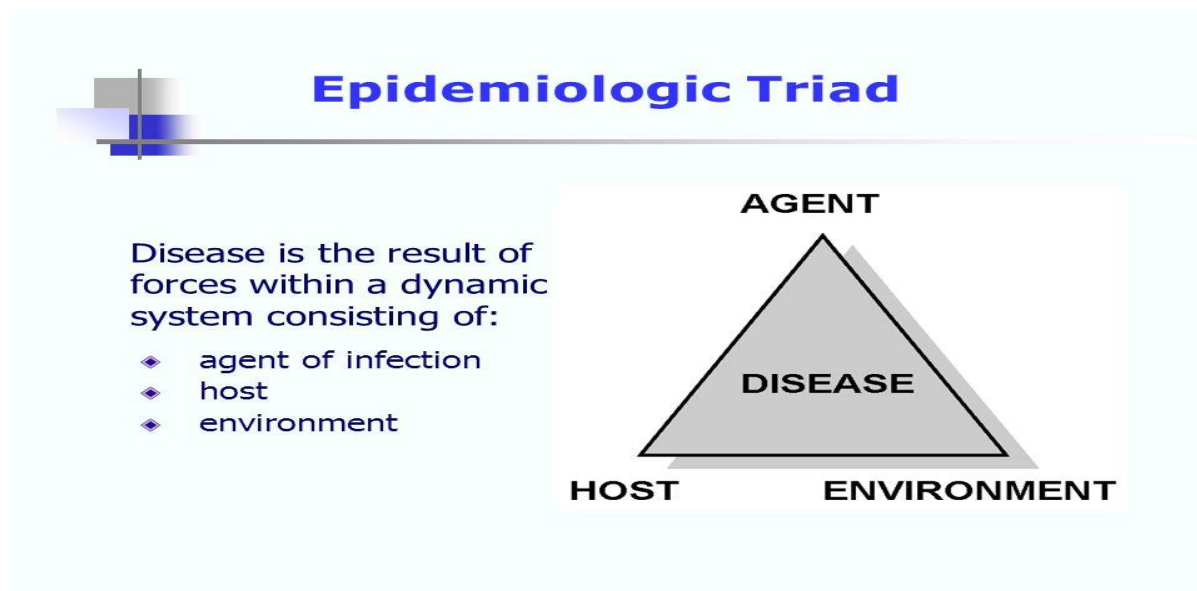
factors that determine the contact between an infectious agent and a host(Theobald Smith 1859-1934).

Smith explained that the route through which the causative agent of a disease is shed by a carrier host, the time span by which the pathogen is shed, the climatic conditions surrounding the host that carries the agent that causes the disease, and the presence of other non-human hosts that may serve as a “*continuing reservoir*” of the infection all play a role in trying to determine whether a host will be exposed to any infection(Theobald Smith 1859-1934).

#### 4.2.1. The Model of Transmission of An Infectious Disease

Smith’s Model of disease causation explains that infectious disease is as a result of all forces within a given system that do consist of concepts of an agent that causes the infection, the host of the agent (pathogen) and the environment within which the host lives. The Model is depicted in a form of a triangle as shown below and as such, it is commonly termed as the “Epidemiologic Triad Theory”(Theobald Smith 1859-1934, p 1-3).

Figure 2



Source: <https://www.cdc.gov/opphss/csels/dsepd/ss1978/lesson1/section8.html>

From the above figure showing the model of epidemiology according to Smith, The Triad Model consists of these three concepts known as *an agent*, *a host* and *an environment* in

which the host and the agent are brought together, making the disease to occur in the host(Theobald Smith 1859-1934).

#### **4.2.1.1 An Agent**

An agent could be described as ‘any organism, any force or a substance, whose presence or absence is very necessary for a particular disease process to occur. An agent could generally be explained as an infectious micro-organism or pathogen such as a virus, bacterium, parasite, or other microbe. It is generally known that for the disease to occur, there should be the presence of the agent. From the perspective of this study, the Ebola Virus Disease has its agent or pathogen as the Ebola Virus. It is however known that the absence of specific nutritive elements could cause a disease. Changes in body genetic systems could also cause a disease(Theobald Smith 1859-1934).

#### **4.4.1.2 A Host**

A host is simply the organism that is affected by the disease causing organism or the humans that can get the disease from the perspective of this study. Humans suffer from the Ebola Virus when infested because humans become a host when the Ebola Virus lives in the body and eventually suffers from a disease called Ebola Virus Disease(Theobald Smith 1859-1934).

From the Epidemiologic Triad Model above, a transmission of a disease could occur when the agent leaves its reservoir or host through a channel of exit that is in a way conveyed by an underlying mode of transmission to enter through an appropriate means of entry to infect another susceptible host. This transmission may be a direct type such as a host-to-host, a droplet spread from one host to another such as touching infected skin of Ebola Virus Disease patients, having sexual intercourse with an Ebola Virus Disease patient or even an HIV Disease patient or an indirect type such as the transfer of an infectious agent from a reservoir to a known susceptible host through contaminated air transfer by inhalation(Theobald Smith 1859-1934).



#### **4.4.1.3. Environment**

From the Model, *Environment* refers to the surrounding and all factors that affect the agent and the opportunity for its exposure to cause the disease and its transfer. The Environmental factors could include all physical factors such as the location or geology and climate, biological factors such as insects that do transmit the causative agent of the disease, and socioeconomic factors such as filth, crowding, availability of health services, and even sanitation(Theobald Smith 1859-1934).

## **5. Methodology**

Methodology is explained as the systematic, theoretical analysis of the literatures applied to a field of study, which does comprise the theoretical analysis of the body of methods and principles associated with a branch of knowledge. In order to obtain answers to the above aim and to find the ideas about the epidemiology of the disease and its control measures coupled with the roles played by nurses in fighting the disease in this study, the literatures and articles found were analysed using the content analysis method. This part of the study enables the readers to understand what method was used and how the data was gathered and analysed in the search for answering the aims of the study. A qualitative method of examining the content of the seven articles is used to obtain the answers to the questions in this study.

In this study, seven scientific articles written about the concept of the epidemiology of the Ebola Virus Disease and its available control measures in combatting it are qualitatively reviewed taking into consideration the roles of nurses in controlling and preventing the disease under this study.

### **5.1 Ethical Considerations**

Novia University of Applied sciences has a good framework and guidance for research work. This work has been done according to the framework of Novia's research guideline. Articles used in this study have been properly referenced to avoid plagiarism. Seven scientific articles were used in this work. The procedure for doing this study was made by submitting a proposal to the supervisor for approval before starting this work. This work has been done in line with the rules and regulations that governs research work at the Novia University of applied science. However, despite all of these guidelines, nursing research has been reported to put harm on the target group due to the fact that rules are not followed on writing a particular research study (Brown 2013).

Ethics is derived from the Greek word *ethos* and it simply means ones' character or moral right. Ethics in research refers to a branch of philosophy that is concerned with how people should behave, act and conduct themselves as they do research . It describes given judgement

about the actions for using ones work whether right or wrong and making rules to justify these actions (Kicthener, 2000).

## **5.2 Data Collection**

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research or study questions, test hypotheses, and evaluate outcomes, this section of the study considers the sources on which to base and confirm the research or the study and the findings(Elo, S.& Kyngäs, H. 2008).

To make sure that the answers to the study questions were obtained, the search strategies illustrated below in sub-chapter 5.3 were employed in choosing the articles for the study of interest. The articles used for this thesis work were seven in total. The preferred language used in the course of choosing the articles was in English.

## **5.3 Search Strategies for The Articles**

The search strategy of this study was done using EBSCO, an academic search elite on [www.tritonia.fi](http://www.tritonia.fi). From Finna, the database EBSCO was browsed and the articles were obtained. These seven articles were obtained limiting the search within the literatures in five years to obtain a more current information about the concept under this study. The key word combinations used in the search for the articles were “Epidemiology of Ebola” and “ Ebola Control and Prevention”. Under this search, two(2) hits were obtained and one (1) is chosen for the study. Another search using “epidemiology of Ebola”, three(3) hits were found and only one(1) article was selected. A third search was made using the search word combination “ Ebola and its Control” and 8 hits were found. Four(4) articles out of these seven were chosen. A fourth search was made using the search word combination “Ebola Awareness and Education” on EBSCOhost. From this search, 3 hits were obtained and only 1 article was selected. This selection criteria is shown in Appendix 1 below.

## 5.4 Inclusion and Exclusion Criteria

The table below gives an explanation to the criteria by which the articles were selected.

INCLUSION CRITERIA	EXCLUSION CRITERIA
<ul style="list-style-type: none"> <li>➤ Articles published in English Language</li> <li>➤ Free articles</li> <li>➤ Scholarly written articles.</li> <li>➤ Articles with abstract.</li> <li>➤ Full pdf articles.</li> <li>➤ Related articles to the subject of study</li> </ul>	<ul style="list-style-type: none"> <li>➤ Articles published in other languages but not in English</li> <li>➤ Articles that cost</li> <li>➤ Non-scientific articles</li> <li>➤ Articles without abstract</li> <li>➤ Older articles for the limitation year 2013 and below.</li> <li>➤ Articles not related to the subject of study.</li> </ul>

## 5.5 Qualitative Content Analysis

According to Elo & Kyngäs(2008), content analysis is a method of analysis that could be used with either qualitative or quantitative data and in an inductive or deductive way of study. From qualitative content analysis of a study, it is usually often and commonly used in nursing studies but not so much has been actually published on the analysis process and many books on research only give a short description of this method. Polit and Beck explain content analysis as “*the process of organizing and integrating material from documents, often narrative information from a qualitative study, according to key concepts and themes.*” (Polit and Beck 2012, 723).

Deductive content analysis in a study is often used when the structure or nature of the analysis is *operationalized* on the basis of previous work done and knowledge whilst an Inductive method of content analysis of a research study is used in cases where there are no previous studies that deal with the process. The inductive method is also known as a method of analysing literatures according to Elo & Kyngäs,2008. Content analysis permits a researcher

to test theoretical issues which assists in understanding of the data being reviewed and studied. (Elo, S. & Kyngäs, H. 2008).

This study is based on the previous work done by researchers and I systematically review literatures written concerning the Epidemiology of Ebola and its possible control taking into consideration the roles played by nurses in combatting the disease. For the purpose of this study, a deductive method of analysis is used to obtain the answers to the study questions I have in this thesis.

Fereday & Muir-Cochrane(2006) States six different stages for conducting a deductive approach in data analysis as:

- *“developing the code manual that includes the code label or name, the definition of what the theme concerns, and a description of how to know when the theme occurs;*
- *testing the reliability of the code by determining the applicability of the code to the raw information;*
- *summarizing the data and identifying the initial themes, applying template of codes and additional coding;*
- *connecting the codes and identifying themes; and then ;*
- *corroborating and legitimating coded themes’’(Fereday & Muir-Cochrane(2006)*

In this study, I categorize the articles reviewed into main categories and sub-categories where their meanings are also provided.

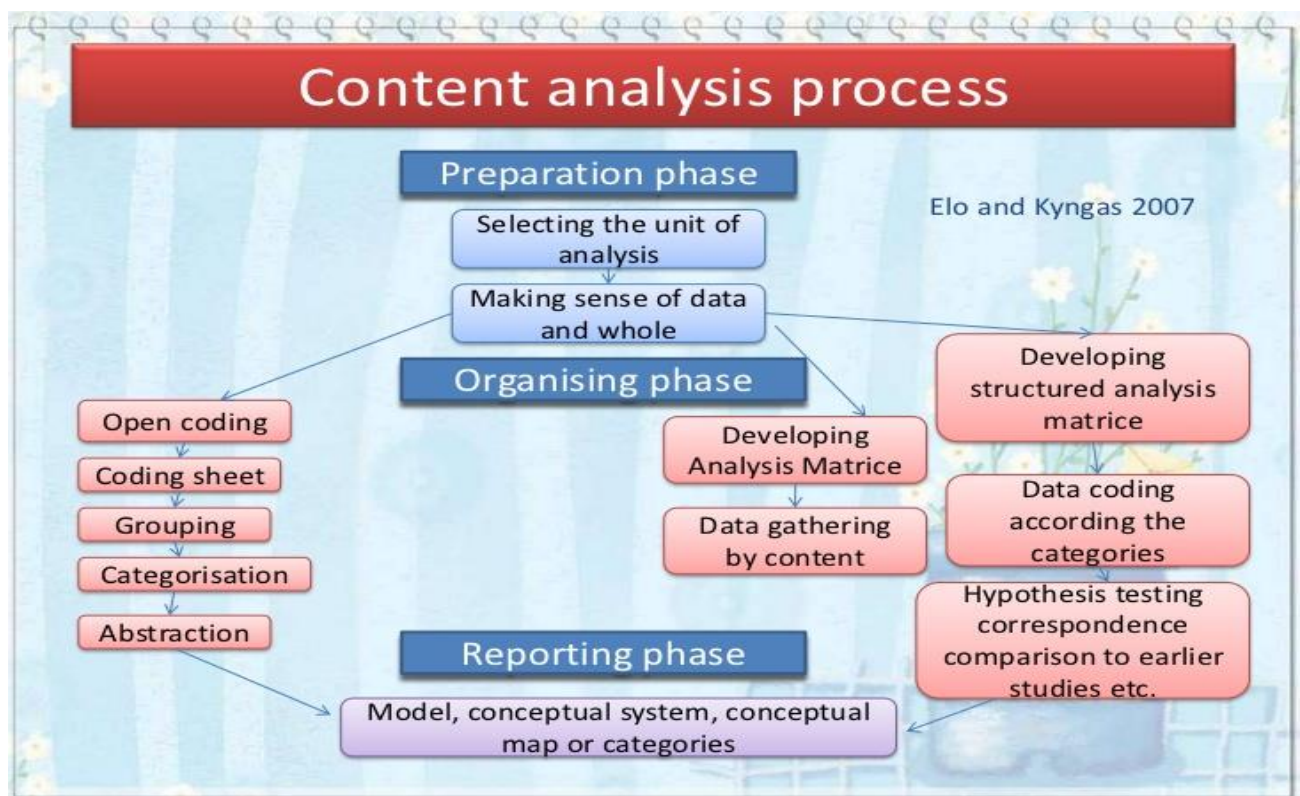
## 6. Data Analysis

The articles selected as seen in appendix 2, were analyzed using the deductive approach described by Elo & Kyngäs content analysis process. A category matrix was made in order to organize the themes that had emerged from the theoretical background material. To obtain a clear understanding of the themes described in the article, Units of the texts illustrating the themes were broken out of the studies and placed in the matrix tables seen below in appendix 2.

A Qualitative data analysis can be used in an inductive or a deductive way of a study. According to Elo & Kyngäs, (2007), both inductive and deductive content analysis processes are placed into three main phases: *preparation*, *organization*, and *reporting of results*. The preparation phase consists of gathering suitable data for content analysis, making sense of the data, and selecting the unit of analysis. In an inductive approach of a study, the organizing phase includes open coding, creating categories, and abstraction (Elo & Kyngäs, 2007).

**Figure 3:**

The Preparation phase, Organizing phase and Reporting phase of a content Analysis process of a Data according to Elo & Kyngäs, 2007.



## 7. Results

As stated in the previous chapter, qualitative content analysis was employed to analyze the final articles chosen. In total, seven articles were selected for this study. The articles were read through thoroughly and similarities in all the articles in relation to the aim and study questions were pointed out. Categories were formed through the analysis of the articles. The main categories for this study were:

- *Ebola Virus Disease Control and Prevention*
- *Nurses Role in Ebola Virus Disease Control and Prevention*

Under the Main Category 1 as illustrated in Figure 4, the following sub-categories were formed:

- ❖ *Public Education and Awareness of Ebola Virus Disease*
- ❖ *Preparedness and Response to Ebola Virus Disease Outbreak*
- ❖ *Measures and Interventions Put in Place to Treat Ebola Virus Disease's Epidemics*

Under the Main Category 2 as illustrated in Figure 4, the following sub-categories were formed:

- ❖ *Public Education and Awareness of Ebola Disease Epidemiology*
- ❖ *Treating Patients Infected with Ebola Virus Disease*

### 7.1 Ebola Virus Disease Control and Prevention

Reviewing all the articles collected systematically, the Ebola Virus Disease(EVD) according to the articles could be controlled by many ways. From the article labelled 6 in the matrix table 2 by Cooper, C., et al(2016), the authors discuss how the Health Care Workers in Liberia penetrated the hard point of the Ebola Virus Disease patients and offered the control measures and interventions to them. The article has its background from a study of the Infection Prevention and Control activities instituted into the Liberian Ministry of Health Care during the Ebola Disease outbreak by a certain group of Task-Force, that do include representatives of the World Health Organization (WHO) and also the United States' Centres for Disease Control and Prevention (CDC).

In the article, the authors describe that before the health care workers began the control measures, a programme called “*The Keep Safe, Keep Serving (KSKS)*” was implemented.

Here, the HCW(Health Care Workers) trained adequately before embarking on the control of the disease were strictly recommended to wear their personal protective equipment (PPE) (Cooper, C., et al(2016)).

The authors describe that, to enhance a proper protection against the EVD during the outbreak, confidence in Liberian Health Care Workers(HCW) was instilled in them and a rapid uptake of new guidance of how to wear the personal protective equipment(PPE) was taught around the country, and a “*simple two-tier and risk-based PPE*” protocol was issued to them. In this, all the HCWs were recommended to wear “basic PPE” consisting of face shield, gown and gloves for all low-risk clinical activities they were to perform(Cooper, C., et al(2016)). The article continued to state that, enhanced “PPE”(Personal Protective Equipment), that is basic PPE together with apron, mask, head cover or hood and a second pair of gloves were also recommended for all the nurses that provided care to the suspected or confirmed Ebola Virus Disease patients and all the other high-risk activities(Cooper, C., et al(2016)).

### ***The Ebola Disease Prevention and Control Measures***

The article above also describes an approach called “*Sector Approach*” in dealing with the outbreak. The *sector approach* was introduced to intensify the response efforts in certain areas with continued active transmission in a Montserrado County area. This approach according to the author focused primarily on health care facility’s readiness, with a general emphasis on triage. The approach helped the Liberian Government with its goal of getting to zero case of infection after identifying 22 cases of the EVD in a city called St Paul Bridge in Monrovia in February 2015(Cooper, C., et al(2016)). The article states that, early in the outbreak of the disease, the absence of the infection prevention and control team resulted into the transmission of the Ebola Virus.

The article concludes that no single organization was able to contain this epidemics. The enhanced efforts put in place to combat the epidemics was as a results of a combined efforts put in place by the logistics teams and security, health education, psychosocial support, and other key functions. The WHO Global Outbreak Alert and Response Network (GOARN) deployed into West Africa to assist the control of the Ebola Virus helped(Cooper, C., et al(2016)).



Specific challenges according to the article were faced in arresting the epidemics of the virus and hence the disease and its prevention. Poor equipment and communications, inadequate cleaning supplies such as aprons, gloves, masks, lack of running water and reliable power supply and even lack of pay to Health Care Workers were all challenges(Cooper, C., et al(2016)).

### ***7.1.1 Public Education and Awareness of Ebola Virus Disease***

The article describes the early intervention and engagement of the Infection Prevention and Control(IPC) team when the outbreak initial broke out by making the HCWs primarily focussing on dispelling any sort of myths behind the origins of the Ebola disease. The Nurses together with the entire Health Care team made it known to the general public that, Ebola was real, and that it was an infectious disease and lives of man could be saved with supportive care given. The nurses needed the reassurance from the Health Ministry that they could safely provide care with the right personal protective equipment (PPE) and training and this was givenThe Task Force also provided advice on enhancing prevention measures in the community, such as improving hygiene and infection prevention measures(Cooper, C., et al(2016))..

The infection Prevention and Control Task Force succeeded in the containment of the epidemic in the initial stages by providing advice and education on enhancing prevention measures in the communities, such as improving Personal hygiene and cleanliness(Cooper, C., et al(2016)). The IPC Task Force according to the article stated that, the nurses and the other health care workers were assured a safe working environment and that their work was designed to facilitate the rapid and quicker identification, isolation and care of patients with the Ebola Virus Disease until they could be transferred to an Ebola Treatment Units (Cooper, C., et al(2016)).

### ***7.1.2 Preparedness and Response to Ebola Virus Disease's Outbreak***

A systematic analysis and review of the article titled “*Preparation and Response to the 2014 Ebola Virus Disease Epidemic in Nigeria*” by Ogoina D, Oyeyemi AS et al (2016) as seen in

appendix 2, a mixed cross-sectional and qualitative study was conducted in a hospital in Nigeria to ascertain the Ebola Virus Disease(EVD) related fear, myths and their misconceptions among healthcare workers (HCWs), and also evaluate the necessary plans, measures and activities with challenges faced by the hospital during the outbreak in the country. In this study, the article states that in two weeks after the Ebola Virus disease was reported in a city called Lagos in Nigeria, the authors assessed Ebola-related fear, myths and other sort of misconceptions among Health Care Workers using a cross sectional study design (Ogoina D, Oyeyemi AS et al (2016)). The authors of the article moved on eventually in October, 2014 to review the documented plans, actions and activities of the hospital, taking into consideration the challenges faced by the nurses and the entire health care workers during the outbreak and after the establishment of the Ebola Virus Disease treatment centre in the hospital. Here, the study was conducted in a hospital called “*the Niger Delta University Teaching Hospital(NDUTH)*”, with a 200 bed hospital situated in certain state called “Bayelsa state” which happened to be one of the two states that recorded the Ebola Virus Diseases (Ogoina D, Oyeyemi AS et al (2016)).

In this study, the authors in August 2014, organised Ebola Virus Disease-sensitization programme and workshop and therefore enrolled a certain number of consecutive staffs of the hospital who gave their consent to be part of the study. The hospital according to the article had about 500 staff including doctors being (n=98), nurses(n=102) and other medical and non-medical health workers and teams(n=300). All study respondents completed a self-administered and structured questionnaire to provide their views about Ebola Virus Disease-related myths and misconceptions and to assess their fear of the disease. Later in October, 2014, after the successful control and treatment of those infected with the Ebola Disease, the respondents and the hospital were asked to provide the information about the plans, measures, actions and activities that were laid down in the control of the disease(Ogoina D, Oyeyemi AS et al (2016)).

All the data gathered by the authors of this article were statistically analysed and significant results were obtained. In this, the plans, actions, measures and activities of the hospital in response to the Ebola Virus Disease outbreak in the hospital reported that the management of the hospital together with the IPAC(Infection Prevention and Control) committee immediately put together the needed plans and measures to prevent and control the disease in the hospital(Ogoina D, Oyeyemi AS et al (2016)). According to the article, the training

programme was organised on some days to inform, prepare and educate the staff about the disease. Nurses and doctors were highly trained on various sections of standard precautions of infection control, health care and waste management and also clinical management of the disease from the World Health Organizations' guidelines on infection control. A practical demonstration of keeping hand hygiene and wearing personal protection equipment were shown. Temperature measurement using infrared rays in all clinics around the state were practically taken and demonstrated when screening patients for the Ebola disease. All the healthcare workers were advised to report suspected cases of infection once identified to the Ebola response team(Ogoina D, Oyeyemi AS et al (2016).

A final review of the article showed that, before the hospital successfully controlled and treated the patients in this epidemics, the following measures were put in place:

- *Creation of Ebola Virus Disease Isolation Ward*
- *Provision of Infection Control Resources:* Here, the hospital provided full body Personal Protection Equipment that include gowns, aprons, face mask and shields, hand gloves , antiseptics, goggles and also boots.
- *Public Education on the Disease and its modes of Epidemics of the disease*(Ogoina D, Oyeyemi AS et al (2016).

Considering the Ebola Virus Disease's related fear, myths and misconceptions in this study, where 189 participants including 70 doctors, 61 nurses and 58 other medical and non-medical hospital staff that took part in the study, 92% of the participants were uncertain about the role of bathing and or drinking salted water in preventing the Ebola disease whereas 75.3% were uncertain about the role of the local Kola nut consumption that is mythically known in Nigeria to prevent the infection(Ogoina D, Oyeyemi AS et al (2016).

### ***Challenges Faced During the Response and Intervention in the Nigerian Epidemic***

Focussing on the challenges faced by the response team from the healthcare workers' (nurses) point of view, during the combat of the Ebola Disease, it was observed and recorded that some Health Care Workers were feeling reluctant to be part of the hospital's Ebola response team and so some nurses before getting involved requested for life insurance and other monetary insurances in order to participate in the Ebola Disease response(Ogoina D, Oyeyemi AS et al (2016). The article highlighted that the response team after few weeks of the notice

of the Ebola case received information and reports about some Health Care Workers that avoided seeing patients with fever and so wanted to wear hand gloves and many personal protective equipment to examine all patients irrespective of the kind of illness and disease they had and so washed their hands frequently more than necessary even without patient contact. It explains that, due to excessive demand on the equipment in that season things like hand gloves, sanitizers and disinfectants, and hand washing soaps quickly ran out of stock in the hospital(Ogoina D, Oyeyemi AS et al (2016).

Considering the article titled “*Surveillance Training for Ebola Preparedness in Côte d’Ivoire, Guinea-Bissau, Senegal, and Mali*” by Cáceres, V. M., Sidibe, S et al (2017) under appendix 2 and found in the matrix table of the articles numbered 5, a Surveillance Training for Ebola Preparedness was built up along the borders of the countries that were deemed to be at-risk of having the outbreak of the Ebola Virus Disease to them. These countries were Côte d’Ivoire, Guinea-Bissau, Mali, and Senegal. The target audience according to the study was district surveillance officers. This STEP (Surveillance Training for Ebola Preparedness) was conducted on 185 participants/respondents from 72 health facility units from districts and regions(Cáceres, V. M., Sidibe, S et al (2017).

In this, trained health professionals demonstrated competence-based training to the chosen participants and taught them how to deliver essential and needed public health services to their people in cases of possible epidemics in their countries. Focussing on the Partner Collaboration, In-Country Training and the Country Engagement as the methods employed to embark on this study, the result of the study showed that the participants recruited for the study were prepared to fight the disease because they had been well taught on how to wear all protective gowns like PPE(Personal Protective Equipment), have understood the different modes by which the Ebola Virus spreads, other means of preventing infection such as Isolation of those infected with the disease and enhancing proper public education concerning the need to report possible suspected infection on any individual in the country, city, town and or any community in order to have the disease treated and controlled(Cáceres, V. M., Sidibe, S et al (2017).

### ***7.1.3. Measures and Interventions Put in Place to Treat Ebola Virus Disease's Epidemics***

The article titled “*When Ebola enters a home, a family, a community*” from a population’s perspectives on Ebola control measures in certain rural and urban areas of Sierra Leone by Gray, N., Stringer et al (2018), illustrated under appendix 2 and numbered 2 in the matrix table, the study was organised by recruiting purposefully participants which do include 25 survivors from a previous Ebola Virus Disease’s infection, 24 members of the community, and 16 health workers. These participants were recruited in the study in two districts of Sierra Leone to obtain an understanding of the Ebola Disease’s survivor, community, and health worker perspectives on Ebola Disease control measures. In this study, a participatory method was used to gather the data through field notes and in-depth interviews. The data collected were thematically analysed using the grounded theory principle(Gray, N., Stringer et al (2018).

The data analysis coded led to two themes termed as: “*when Ebola is real*” and “*collective controls*”. Under each theme emerged three categories. From the theme, “When Ebola is real”, *Denial, knowledge, and acceptance* were formed. The study highlighted that the ‘*denial*’ term was used by respondents to assess a range of attitudes and perceptions about the disease, from the people who actively got themselves in rejecting Ebola and also didn’t believe that it was real and so it can not pose any immediate risk to them. According to the article, in all these cases, the study highlighted that denial of the Ebola Virus Disease was attributed to the lack of knowledge, direct experience of the disease, and or exposure to the Ebola Disease. It was said that until the disease was experienced and realised within a given family or close community, it was outrightly denied(Gray, N., Stringer et al (2018). An instance was given in the article where a healthcare worker voiced out and it is quoted as:

*“They said it’s the politics, the government has signed a paper, that’s why the disease has been here, because they need money and soon...Like in Kailahun they were saying because the census is coming and they[the government] want Kailahun not to have a higher number. ..in the north, that’s why he[the President] allowed it...”Health worker (HW) 02(Gray, N.,*

*Stringer et al (2018)*

The author mentioned some list of control measures that were identified through reviews and the interviews from the participants. The measures were categorised under two main groups namely:

***Biomedical control measures:***

Under this, Ebola patients are identified through laboratory diagnosis and screening. Those identified by the community are brought in to the treatment centres. *Isolation of patients* suspected and diagnosed with the disease at the holding centres was the next step to control the disease. *Care and management of recorded positive cases* medically by the health Care team in Ebola Medical Centres and Community Care Centres (CCCs). *Infection Control* measures such as screening, Triage, wearing Personal Protective Equipment(PPE) when approaching Ebola risk areas were put in place. Hand washing on individual together with adherence to a policy called “no touch” enforcement contributed to the control and prevention of the disease(Gray, N., Stringer et al (2018).

The article continued to describe some other important measures of the disease control in terms of “*Safe patient and body care*” and “*Safe and dignified burials*” and “*Safe access to healthcare for non-Ebola patients*” like pregnant women that needed care(Gray, N.,Stringer et al (2018). Under the Safe Patient and Body Care, the people were educated on the risk and dangers involved in taking care of own family members alone in the hide-outs of their homes when they are deemed to be infected with the disease. Washing or showering them in the house and touching them is highly risky. The author continued to state that those that die out of the Ebola disease are not to be touched nor washed by the people but should be wholly handled by the Ebola Response team. Burials of any dead body should be handled by the trained personals to avoid any infection. These measures ensured the arrest of the epidemic and its prevention according to the article(Gray, N.,Stringer et al (2018).

***Legal or State Measures:***

The article states that National by-laws that forbid people concealing the sick, washing those dead out of the Ebola disease, hunting for bush animals were instituted(Gray, N.,Stringer et al (2018). It also talks about Quarantining infected individuals, households, communities that

have been actually exposed to Ebola Virus Disease for a certain period of 21 days. Other measures such as temperature taking at some check-points and restriction on travel were put on suspected ones(Gray, N.,Stringer et al (2018).

The final findings of the study show the importance of providing needed services and control measures with affection and empathy, and being compassionate. The Biomedical or the social controls measures implemented in the fight against the disease were more likely to be positively taken by the community according to the article(Gray, N.,Stringer et al (2018).

## **7.2 Nurses Role in Ebola Virus Disease Control and Prevention**

Coming to the systematic review of the article titled “*Beyond Knowledge and Awareness: Addressing Misconceptions in Ghana’s Preparation towards an Outbreak of Ebola Virus Disease*” by Adongo, P. B., Tabong, P. T.-N., et al (2016) as seen under appendix 2 and numbered 7 in the matrix table 2, the authors of this article conducted a study to address the misconceptions in the mind of people concerning the Ebola Disease in Ghana, one of the West African Nations that has not yet recorded any case of the Ebola epidemic. The study was also conducted to raise an awareness and also educate the general people of the country the need to keep a hygienic environment in order to avoid the epidemic of the Ebola disease. It was also to explore the community knowledge about the Ebola disease with the main aim of trying to identify the bridge and gaps and to develop needed strategies that could be used to address these lack of knowledge in case of possible future epidemics(Adongo, P. B., Tabong, P. T.-N., et al (2016).

In this article, the authors organised the study in five(5) out of the ten regions in Ghana where Twenty-five focus group discussions comprising a total number of participants (N=235) and with 40 in-depth interviews were conducted across the five chosen regions with members from the communities, opinion leaders and stakeholders together with clinical professional nurses. The data collection method chosen in the Focussed Group Discussions and in the In-Depth Interviews were such that, each group was made up of community members and opinion leaders and nurses and each group was between 8–10 individuals with a total of 235 respondents in all. The In-Depth Interviews were carried out with eight in each of the five

regions. The article stated that both female and male professional nurses at the frontline of healthcare and staff members in hospitals were purposely selected for the focussed group discussion to ascertain their level of knowledge about the disease in each of the regions with their ages ranging between 20 and 86 .The data collected was recorded, transcribed and coded. A final analysis was made and a finding on the knowledge of on modes of transmission of the Ebola Virus Disease was obtained(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.7.

The study's final results showed that some of the participants had a general knowledge of the Ebola disease but had many misconceptions which had to be addressed through education. Nurses had to play a role in educating the public about this issues. It was also clarified that possibility of lack of knowledge about the disease among villagers in rural areas and illiterates may exist and so intense public education about the Ebola Virus Disease and its modes of epidemics should be made known by the nurses(Adongo, P. B., Tabong, P. T.-N., et al (2016).

Considering the article titled “*We and the nurses are now working with one voice*”: *How community leaders and health committee members describe their role in Sierra Leone's Ebola response*” by McMahon, S. A., Ho, L.S et al (2017) under appendix 2 found and labelled 3 in the matrix table below, the article describes the roles played by the nurses and the Community leaders in Sierra Leone in controlling and preventing the Ebola outbreak that took place in the Country. The article also focussed on providing health services such as referrals and health education to the general public through the roles played by the nurses during the outbreak. In the study conducted by the authors of this article, thirteen focus group discussions (FGD) were organised with community members which did involve members of Health Management Committees (HMC)) with nurses near during the Ebola outbreak in Sierra Leone .All the data gathered during the focussed group discussion were audio recorded and transcribed according to the article and finally translated into English by the data collection team. The analysis of the data were made and results were obtained(McMahon, S. A., Ho, L.S et al (2017).

The final results and findings obtained from the study according to the article explained that a direct link to the health workers(nurses) roles existed between the members of the community and the health administration. It highlighted that duties were played by the nurses and members of the community by embarking on outreach which did include maintaining health records, undertaking home visits to find ill and sick community members, notifying burial



response teams of deaths, and even conducting screenings outside health facilities. They also assisted in record keeping which involved having the members of the community working hand-in-hand with nurses to record details of non-Ebola deaths during the Ebola disease outbreak, taking into consideration the kind of treatment the deceased had received and what illnesses they might have been involved (McMahon, S. A., Ho, L.S et al (2017)). The article proceeded to state that, the health education regarding how Ebola spreads and how it can be prevented and treated were given to the people of the community by the nurses built on the people's confidence obtained in the medical system's response team. It continued to state that the nurses embarked on encouraging the people on going for healthcare in health facilities, explaining to the people medical responses to the Ebola disease, and even addressing the public's fears of health workers (McMahon, S. A., Ho, L.S et al (2017) p.5. The conclusion to the final discussion of the study in the article emphasizes the great duties and roles played by the nurses in the combat of the Ebola Virus disease in the country. Public Health education, treating the sick with the evidenced-based medication, isolation of the sick, screening to diagnose those with fever and many more were recorded as part of the roles played by the nurses in the fight against the Ebola Disease (McMahon, S. A., Ho, L.S et al (2017) p.5.

### ***7.2.1 Public Education and Awareness of Ebola Disease's Epidemiology.***

A systematic study and review of the article titled "*Transmission Dynamics and Final Epidemic Size of Ebola Virus Disease Outbreaks with Varying Interventions*" by Barbarossa, M. V., Dénes, A et al (2015), as found under appendix 2 and labelled 4 in the matrix table 2, the authors of the article proposed what is called a compartmental model for studying Ebola Virus Disease's rate of dynamics or epidemics, which did include the virus' mode of transmission in communities, at hospitals, and at funeral grounds in the affected nations (Barbarossa, M. V., Dénes, A et al (2015).

In this study, the author focussing on the hospital as a compartmental setting, it was revealed that the transmission of Ebola virus is not only due to coming in contact with those infected with the Ebola virus in the community, but also with individual hospitalized patients and dead Ebola patients. It stated clearly indeed that ,a large part of infections actually occurred at hospitals and funerals grounds and even with post-mortem contacts. The article finally

concluded in its findings of the study that the most important factor contributing to the spread of the Ebola virus was during the local traditional burial practices. The article then stressed on the need for the general public to be educated on these settings also where there is a high risk of infection of the Ebola virus. (Barbarossa, M. V., Dénes, A et al (2015) p.4.

***Coming to the Knowledge on modes of transmission of the Ebola Virus Disease based on the study in the article***

The study seen in the article “*We and the nurses are now working with one voice*”: *How community leaders and health committee members describe their role in Sierra Leone’s Ebola response*” by McMahon, S. A., Ho, L.S et al (2017) revealed a high level of awareness and knowledge of the Ebola Virus Disease among the participants especially the disease’s modes of transmission to humans among the nurses. The article highlighted that the respondents in the study were very able to identify the main major forms of the transmission of the Ebola Disease, mentioning examples of animal-to-human and also human-to-human modes of transmission of the disease. From the examples given, with the human-to-human modes of transmission, the participants had a knowledge about both direct and indirect transmission. They mentioned that coming into contact with the bodily fluids of any infected persons is known as a direct mode of transmitting the disease. They further moved on to say that also transmission could occur when someone eats an infected animal as meat, and even washes and touches a dead body of a known relative infected with the Ebola Virus disease (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.7. As evidently presented by the quotes in the article from the respondents below, knowledge of the disease was identified as below:

*“If an animal or human being dies from Ebola and you touch the animal or human being without protection, you can get the condition”* (FGD, Females, Ashanti Region) (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.7.

*“Ebola is present in body fluids like the blood, saliva and water from the body, if you touch water from the infected person you will get it”* (FGD, Male, Urban, Ashanti Region) (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.7.

*“They have made us understand that if someone has Ebola and the person’s sweat touches you or you shake the person you will get the disease so it is not just through eating meat that you can get the disease”* (FGD, Female, Greater Accra Region) (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.7

### ***Coming to the Knowledge on the incubation period, and the known signs and symptoms of the Ebola Disease according to the Study***

The results gathered from the study in the article showed that the respondents averagely and generally knew the time frame for an infected persons to begin manifesting the signs and symptoms of the Disease. The participants of the study in the article highlighted that the incubation period of the Ebola virus in the affected host could depend on the immune system of the affected person. They said that it could even range from a period of 2 to 21 days(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.9. From some of the focussed group discussions, respondents said and it is quoted that:

*“It takes between 2 to 21 days from the point of infection to start showing signs and symptoms”* (Female, Western Region) (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.9

*“If I remember correctly, it is about 21 days and within the 21days depending on your body immunity level, it may take some few days before it shows”* (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.9 (In-Depth Interview, Paramount Chief, Northern Region).

The study explored the respondents knowledge about the non-specific signs and symptoms of the disease and their findings showed that their knowledge on symptoms and signs such as chills, fever and headache was also high. A respondent stated that:

*“We have not had a case in this community but we have heard some of the symptoms include vomiting, diarrhoea, cold, and headache. However, malaria has similar symptoms so we can only confirm it is Ebola if the person is taken to the hospital”* (Group Discussion, Male, NR).

### ***Coming To Identify Some Misconceptions About The Ebola Virus Disease According To The Study in the article***

The study highlighted that despite the high knowledge demonstrated by the respondents, some community members still showed misconception about the disease. Some attributed the Ebola Disease in the known African Countries affected by some punishment from God against their sins they have committed against God. They went on to state that Liberia and Sierra Leone have been hit with the disease because of the Atrocities they committed during the civil war and further moved on to say that some people even went on to eat human bodies during the intensive famine that occurred in these countries according to the article (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.10 . Examples of these statements were quoted in the article as shown below:

*“Yeeh I heard...a friend told me that because in Liberia people ate dead bodies of their colleagues because of the war, so that is why they are getting Ebola”* (FGD, Nurses, GAR).

*“Recently, a woman told me that, it is because of the way people were killed in Liberia, Sierra Leone that is there reason why God is angry with them and has cursed them. So, we should be prayerful in Ghana for God to forgive us. She continued that wars are not good, so we should pray against it otherwise Ghana may also be cursed”*(Health Worker, In-depth Interview, Northern Region) (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.10.

### ***Knowledge About The Signs And Symptoms, Causes And Prevention Of Ebola Virus Disease From The Study.***

The study according to the article revealed that the participants generally demonstrated knowledge about the Ebola Disease, its signs, symptoms , causes, some preventative measures and modes of transmission. However, it explained that the vast misconceptions in the mind of the people about the disease would have to be addressed and eradicated (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.10. The authors of the article continued to state that the participants actually showed knowledge about the disease but the behavioural practices that could cause the outbreak of the disease such as touching of infected people, touching of items that are contaminated with bodily fluids, and eating or consumption of infected animals likely to cause the epidemic should be stopped and a general public education on the Ebola Virus Disease should be made in order to prevent the disease and to arrest the disease should in case

a possible outbreak is recorded in the country(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.10.

### ***Addressing Misconceptions Towards Ebola Virus Disease Preparedness And Containment***

According to the study in the article, although the knowledge about the Ebola Disease was generally high across the country, there was vast misconceptions of the disease among the participants. These misconceptions were categorized into two forms:

- *misconceptions regarding the modes of transmission of the disease and*
  - *misconceptions concerning the handling and management of the Ebola Virus Disease.*
- (Adongo, P. B., Tabong, P. T.-N., et al (2016) p.15.

The article highlighted that the belief that the disease was spiritual, and that it is caused by witchcraft or other supernatural conditions has instances of influence and implications on the prevention and control of the Ebola Virus Disease. This belief in supernatural causes has the tendency of leading people to look for spiritual remedies in either churches or other spiritual outlets without actually going to the hospital for treatment. The article continued to say that, this conception and perception has the potential to shift the direction and focus of a possible future individual that has been infected with the virus and its disease from seeking health care from a healthcare facility to a traditional place where it may be a potential ground to the spread of the disease. People should be therefore educated that the disease is real and that it is not as a result of any sort of punishment and a spiritual one(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.15.

### ***7.2.2 Treating Patients Infected with Ebola Virus Disease***

As viewed from the numerous roles played by healthcare members specifically nurses in sub-chapter 7.2 about in controlling Ebola virus and from the article written by Gray, N.,Stringer et al (2018), and the other articles systematically reviewed in this thesis, all individuals infected by the Ebola Virus Disease in the countries hit by the pandemic were taken to Ebola Treatment Centres set by the Governments and Organizations like World Health Organization. Medications, vaccinations and drugs tested and evidenced-based were provided

to the infected individuals with the help of the nurse, doctors and all the Ebola Response teams in the affected location. It is said that though there isn't specific known drug or medicine that could immediately treat the disease, it was told in the various articles reviewed that the combinations of the approved drugs and medications could effectively and efficiently treat many cases of infection of the virus (Gray, N.,Stringer et al (2018).. Most Countries in Africa and specifically Western part of Africa that haven't yet been hit with the disease have set up emergency Ebola Treatment centres to combat the disease according to the articles reviewed in this study (Ogoina D, Oyeyemi AS et al (2016).

## **8. Discussion of The Results**

Considering the title and the focus of this thesis, with the aim of this study material in mind, epidemiology of Ebola Virus Disease recorded in West Africa in the time period 2014-2016 was the greatest with varying interventions. As elaborated systematically reviewed under the ‘ ‘Results’’ chapter above, the findings of the study reveal how Ebola Virus Disease took the lives of thousands of people in West Africa as a results of its epidemic. The articles described the various means and modes by which the Ebola Viruses broke out of one border to the other through various routes(modes). Various measures, methods, interventions and other control and preventive measures were put in place to arrest the epidemic of the Ebola Virus Disease in West Africa during the heights of the outbreak until now.

The articles described the various modes by which the disease spreads and get people infected citing examples that behavioral practices such as touching infected people, touching of items that are contaminated with bodily fluids of those with the Ebola Virus Disease, and eating or consumption of infected animals. The findings obtained in the articles show that majority of the people that were affected with the disease had a large part of infections actually occurring at hospitals and funerals grounds and even with post-mortem contacts. The articles explained that the most important factor that contributed to the spread of the Ebola virus was during the local traditional burial practices(Barbarossa, M. V., Dénes, A et al (2015) p.4).

The study explained how the Ebola Disease was controlled and prevented during its peak of infection through measures such as : Creation of Ebola Virus Disease Isolation Ward,

Provision of Infection Control Resources which include Personal Protection Equipment such as gowns, aprons, face mask and shields ,hand gloves , antiseptics, goggles and also boots. Public Education on the Disease and its modes of Epidemics of the disease(Ogoina D, Oyeyemi AS et al (2016). Restrictions and travel ban on individuals deemed to have the infection, safe burials of those dead through the infection by trained personals, medical treatment of those infected with the disease at the Ebola Treatment Centres were among the various ways used to prevent and control the infection according to the reviews of the articles.

The results obtained in this thesis also highlighted on some key roles played by nurses in the Ebola Virus Disease's control and prevention in West Africa where they showed up as frontiers. Among these were embarking on public health education concerning the Ebola disease, treating the sick with the evidenced-based medication, isolation of the sick, screening to diagnose those with fever and many more were recorded as part of the roles played by the nurses in the fight against the Ebola Disease(McMahon, S. A., Ho, L.S et al (2017) p.5.

Challenges existed in the fight against the Ebola Virus disease from the articles reviewed. Among these were shortages and inadequate supply and availability of Personal Protective Equipment(PPE) in the countries that were hit by the virus, Poor infection prevention and control capacity in some nations was also a primary driver of Ebola Virus Disease transmission within the health facilities, systems and misconceptions about the Ebola Disease in the minds of the people that have not yet been hit by the disease. Less knowledge about the disease and its epidemiologic modes existed also.

## **8.1 Discussion of Methodology**

According to Holloway, I. et al. (2017, p.309-310), a sound knowledge obtained from a qualitative research can be developed through these five criteria : *dependability, credibility, transferability, confirmability, and also authenticity.*

According to Holloway, I. et al. (2017), dependability is described as methodologically conducting a study in a consistent and accurate way by using a sort of audit trail. In this thesis, the student used Microsoft Office Word to tabulate all the seven (7) articles reviewed in a form of a matrix and to show the development of the analysis that was thoroughly made.

Holloway, I. et al. (2017) describe “Credibility” of a research study as the “*compatibility of the perceptions of the participants of the study with the interpretation of the researcher*” . This study was centralized on seven(7) important articles that highlighted on the aim of the study in order to obtain the right amount of information that had to be analyzed and could answer the study questions. In a qualitative way, the content of the data gathered was analyzed systematically with the guidance of the supervisor of the student.

Transferability which means that the gathered knowledge from one study or previous study can be applied in different settings was applied here. The selection of the articles collected and gathered from the EBSCOhost was such that the articles had to be in a way similar and relevant to each other focusing on the topic of the this study. These articles employed in the study provided a sufficient amount of information and data that was needed to provide understanding to the study and to answer the study questions.

Confirmability as it is explained as the interpretation of the results obtained which does not involve the presumptions and bias of the researcher is also seen in this study. The student followed a systematic approach and method of analyzing the contents of the articles chosen and the ethical standards in using articles for a study. Categories were formed taking into consideration the authenticity of the study which involves “*fairness and faithfulness of the study to the true testification of the participants*” . Answers to the study questions were obtained and documented under the results and its discussion.



## 9. Conclusion

The results obtained from this study provided a broad understanding on the epidemiology of Ebola virus disease, the modes of transmission of the disease and the various measures available for preventing and controlling it. The various roles played by trained nurses in preventing and controlling the disease were also identified. Findings of this study indicate that the modes by which the disease spreads and get people infected are through behavioral practices such as touching infected people, touching of items that are contaminated with bodily fluids of those with the Ebola Virus Disease, and eating and consuming infected animals. The findings showed that majority of the people with the infections actually occurred at hospitals and funerals grounds and from post-mortem contacts.

It was identified that measures like Creation of Ebola Virus Disease Isolation Ward, Provision of Infection Control Resources which include Personal Protection Equipment(PPE) such as gowns, aprons, face mask and shields ,hand gloves , antiseptics, goggles and also boots. Public Education on the Disease and its modes of Epidemics of the disease. Restrictions and travel ban on individuals deemed to have the infection, safe burials of those dead through the infection by trained personals, medical treatment of those infected at the Ebola Treatment Centres were means of arresting the disease.

The roles played by nurses as frontiers in health care when it comes to Ebola Prevention and Control cannot be neglected. Public education on Ebola disease and how to maintain a hygienic environment to avoid the infection, treating the sick together with doctors with the evidenced-based medication, isolation of the sick, screening to diagnose those with Ebola disease's fever are among the numerous tasks handled by nurses in contributing to the prevention and control of the disease.

A highlight on the need for the general public to be educated on the Ebola disease was made citing that Ebola Virus Disease is a killer and so hygienic environment has to be maintained to avoid the Ebola epidemic both in Africa and the whole world. Behavioural practices that might lead to the outbreak of the disease has to be avoided.

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### Appendix 1. Matrix of the Data Collection

Date	Database	Search Words	Hits Found	Number Used
30.10.2018	EBSCOhost	Epidemiology of Ebola and Ebola Control and Prevention	2	1
30.10.2018	EBSCOhost	Epidemiology of Ebola	3	1
30.10.2018	EBSCOhost	Ebola Control and Prevention	47	4
30.10.2018	EBSCOhost	Ebola Awareness and Education	3	1

### Appendix 2. Matrix of the Articles Employed in the Study

Author(s)	Article's Name	Year	Aim	Method	Results
1). Ogoina D, Oyeyemi AS, Ayah O, Onabor A A, Midia A, Olomo WT, et al.	Preparation and Response to the 2014 Ebola Virus Disease Epidemic in Nigeria. The Experience of a Tertiary Hospital in Nigeria.	2016	To describe the experience of a tertiary teaching hospital in preparation and responds to the 2014 EVD outbreak occurred in Nigeria	Qualitative study	<i>More than 75% of the respondents interviewed reported uncertainty about the myth that EVD can be prevented by drinking salt water or eating Garcinia kola, while 82% of respondents</i>

					<i>believed that EVD can be prevented by avoiding crowded places.</i>
2) Gray, N., Stringer, B., Bark, G., Heller Perache, A., Jephcott, F., Broeder, R., ... Samba, T. T.	‘When Ebola enters a home, a family, a community’: A qualitative study of population perspectives on Ebola control measures in rural and urban areas of Sierra Leone’	2018	“‘To obtain an understanding and idea of community interactions with the Ebola response to inform future intervention strategies’”.	A qualitative Study	<i>“‘Successful control and prevention approaches need strong community leadership, with the aim of achieving collective understanding between communities and health workers. Health promotion for communities at risk is best conducted through people who have had close interaction with or who have survived Ebola as opposed to reliance on broad mass</i>

					<i>communication strategies''</i>
3) McMahon, S. A., Ho, L. S., Scott, K., Brown, H., Miller, L., Ratnayake, R., & Ansumana, R.	“We and the nurses are now working with one voice”: How community leaders and health committee members describe their role in Sierra Leone’s Ebola response”	2017	To describe how community leaders and health care members describe their role in Sierra Leone’s Ebola response	Focussed group discussion	<i>“Respondents described building community trust and support for Ebola prevention and treatment, while also enabling formal health workers to better understand and address people’s fears and needs”</i>
4). Barbarossa, M. V., Dénes, A., Kiss, G., Nakata, Y., Röst, G., & Vizi, Z.	Transmission Dynamics and Final Epidemic Size of Ebola Virus Disease Outbreaks with Varying Interventions	2015	To determine the transmission dynamics and the final Epidemic Size of Ebola Virus Disease Outbreaks taking into consideration the varying interventions employed.	Compartmental Population Model	<i>“The model predictions show that as long as cases are reported in any country, intervention strategies cannot be dismissed. Since the main driver in the current slowdown of the epidemic is not the depletion of</i>

					<i>susceptible, future waves of infection might be possible ,if control measures or population behaviour are relaxed''.</i>
5). Cáceres, V. M., Sidibe, S., Andre, M., Traicoff, D., Lambert, S., King, M. E., Quick, L.	Surveillance Training for Ebola Preparedness in Côte d'Ivoire, Guinea-Bissau, Senegal, and Mali.	2017	<i>To survey the preparedness of the Ebola Disease Control and Prevention using the training received in the countries involved in the study.</i>	Partner Collaboration ,Country Engagement, Curriculum and In-Country Training.	<i>“The result confirmed that the appropriate participants had been recruited, with 155 (84%) of the 184 participants responding that they performed surveillance activities as part of their routine work when they began the training”</i>
6) Cooper, C., Fisher, D., Gupta, N., MaCauley, R., & Pessoa-Silva, C. L.	“Infection prevention and control of the Ebola outbreak in Liberia, 2014-2015: key challenges and successes”	2016	“To find out the key challenges and successes obtained during the infection control and	Qualitative Study	<i>“No single organization could respond as comprehensively as it was required during the 2014–2015</i>

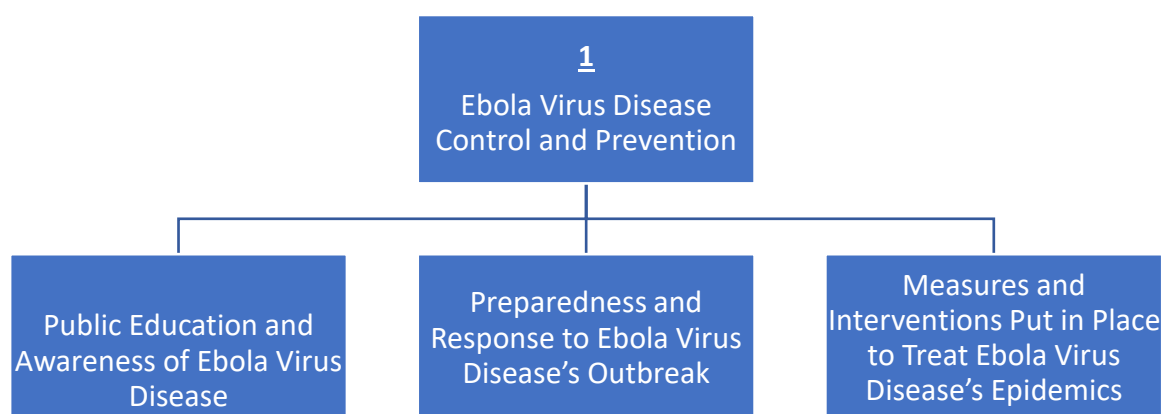


			prevention of the Ebola Outbreak in Liberia 2014-2015''		<i>Ebola outbreak. In Liberia, Healthcare workers need to receive continuous education on risk-based practices for high priority diseases in the Country''</i>
7) Adongo, P. B., Tabong, P. T.-N., Asampong, E., Ansong, J., Robalo, M., & Adanu, R. M.	“Beyond Knowledge and Awareness: Addressing Misconceptions in Ghana’s Preparation towards an Outbreak of Ebola Virus Disease”	2016	“to explore and identify a community knowledge and attitudes about Ebola and its transmission”.	Qualitative Study	<i>The results showed a high level of awareness and knowledge about Ebola, however, it was believed by the respondent that it was a spiritual disease and could be transmitted by Mosquitoes, sexual intercourse and many more.</i>

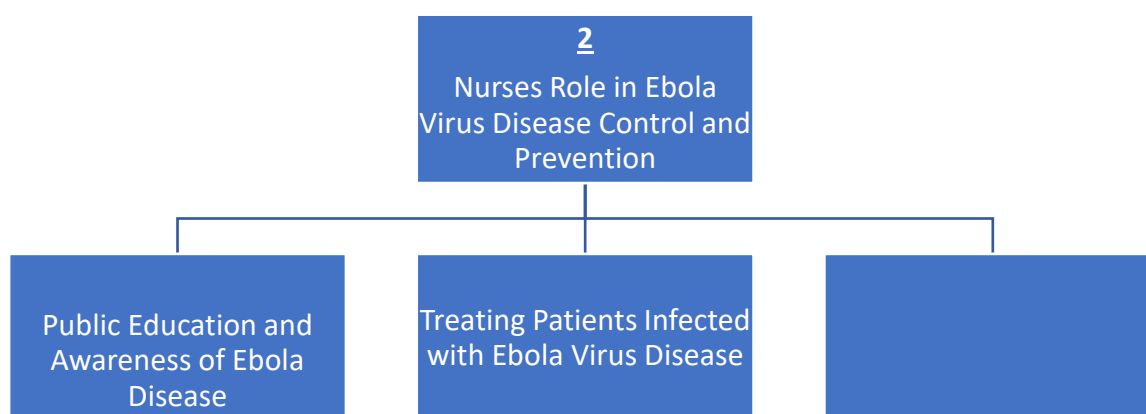
### Figures of Categorization of the Articles

The figures below show the main categories and Sub-categories. Their meanings are illustrated in the matrix table of the categorization.

**Figure 4**



**Figure 4**



Appendix 3. Table of Categorization of the articles

Main Categories	Sub-Categories	Meaning
<b>Ebola Virus Disease Control and Prevention</b>	Public Education and Awareness of Ebola Virus Disease	“ The study seen in the article revealed a high level of awareness and knowledge of the Ebola Virus Disease among the participants especially the disease’s modes of transmission to humans among the nurses. The article highlighted that the respondents in the study were very able to identify the main major forms of the transmission of the Ebola Disease. More education needed to alleviate the misconception of the Ebola Disease’s epidemic in Countries that haven’t yet been infected with the Ebola Disease’’(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.15.
	Preparedness and Response to Ebola Virus Disease Outbreak	A final review of the articles showed that, before the hospitals successfully controlled and treated the patients in this epidemics,

		<p>the following measures were put in place:</p> <ul style="list-style-type: none"> <li>➤ <i>Creation of Ebola Virus Disease Isolation Ward</i></li> <li>➤ <i>Provision of Infection Control Resources:</i> Here, the hospital provided full body Personal Protection Equipment that include gowns, aprons, face mask and shields ,hand gloves , antiseptics, goggles and also boots.</li> <li>➤ <i>Public Education on the Disease and its modes of Epidemics of the disease(Ogoina D, Oyeyemi AS et al (2016).</i></li> </ul>
	<p>Measures and Interventions Put in Place to Treat Ebola Virus Disease's Epidemics</p>	<p><b><i>Biomedical control measures:</i></b> Comprising <i>Isolation of patients</i> suspected and diagnosed with the disease at the holding centres was the next step to control the disease. <i>Care and management of recorded positive cases</i> medically by the health Care</p>

		<p>team in Ebola Medical Centres and Community Care Centres (CCCs).</p> <p><i>Infection Control</i> measures such as screening, Triage, wearing Personal Protective Equipment(PPE) when approaching Ebola risk areas where put in place.</p> <p><b><i>Legal or State Measures:</i></b></p> <p>This talks about Quarantining infected individuals, households, communities that have been actually exposed to Ebola Virus Disease for a certain period of 21 days. Other measures such as temperature taking at some check-points and restriction on travel were put on suspected ones(Gray, N.,Stringer et al (2018).</p>
		<p>The conception and perception that Ebola is a spiritual disease spreading as a result of punishment from God has the potential to shift the direction and focus of a possible future individual</p>

<p><b>Nurses Role in Ebola Virus Disease Control</b></p>	<p>Public Education and Awareness of Ebola Disease's Epidemiology</p>	<p>that has been infected with the virus and its disease from seeking health care from a healthcare facility to a traditional place where it may be a potential ground to the spread of the disease. People should be therefore educated that the disease is real and that it is not as a result of any sort of punishment and a spiritual one(Adongo, P. B., Tabong, P. T.-N., et al (2016) p.15.</p>
<p><b>and Prevention</b></p>	<p>Treating Patients Infected with Ebola Virus Disease</p>	<p>There is no appropriate and specific antiviral vaccines or medications available to fight the infection in humans. Practices and measures such as high-fluid intake of about 10 Litres per day in the first 72 hours of infection and , ventilator support under broad-spectrum antibiotic medications have been proven to enhance recovery from the Ebola virus infection (T.Mangilal, AS. et al (2015). Any individuals infected by the Ebola Virus Disease in</p>

		<p>the countries hit by the pandemic were taken to Ebola Treatment Centres set by the Governments and Organizations like World Health Organization. Medications, vaccinations and drugs tested and evidenced-based were provided to the infected individuals with the help of the nurse, doctors and all the Ebola Response teams in the affected location. It is said that though there isn't specific known drug or medicine that could immediately treat the disease, it was told in the various articles reviewed that the combinations of the approved drugs and medications coupled with hydration treat many cases of infection of the disease(Gray, N.,Stringer et al (2018)</p>
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