SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCE

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PUBLIC HEALTH EMERGENCY PREPAREDNESS OF HOSPITALS FOR VIRAL HEMORRHAGIC FEVERS IN WESTERN REGION

BY

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DECLARATION

I **Agudey Daniel Tetteh** hereby declare that this research is my original work. Except for other peoples' work that have been duly acknowledged. This research has also not been presented elsewhere for the purpose of another degree.

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DEDICATION

I wish to dedicate this piece of work to my friend and soul mate Catherine Aggudey, and our three children Aaron, Daniella, Emmanuella and siblings who provided me the needed emotional support and encouragement during the period of my schooling and the field trips I had to make to get the necessary information to finish this project.

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LIST OF ABBREVIATIONS

BGH	Bibiani Government Hospital
CDC	Centers for Disease Control
CHPS	Community Based Health Planning Systems
DDPH	Deputy Director in Charge of Public Health
ED	Emergency Department
EGH	Enchi Government Hospital
ENRH	Effia Nkwanta Regional Hospital
EOC	Emergency Operations Centre
EP	Emergency Preparedness
EPC	Epidemic Preparedness Committee EVD Ebola Virus Disease
EPRP	Emergency Preparedness and Response Plan
ESGH	Essam Government Hospital
ETC	Ebola Treatment Centre
EVD	Ebola Virus Disease
GFELTP	Ghana Field Epidemiology and Laboratory Training Programme
GHS	Ghana Health Service
GLP	Good Laboratory Practice
GPs	General Practitioners
HAGH	Half Assini Government Hospital
HCW	Health Care Worker
HCWs	Health Care Workers

IDSR	Integrated Disease Surveillance and Response
IMS	Incident Management System
IOM	International Organization on Migration
IPC	Infection Prevention and Control
LF	Lassa Fever
MET	Medical Emergency Team
MCH	Maternal and Child Health
MH	Maternity Homes
MoH	Ministry of Health
NPC	National Population Commission
OPD	Outpatient department
ORS	Oral Rehydration Solution
PHE	Public health emergency
PHEMC	Public Health Emergency Committee
PHEP	Public Health Emergency Preparedness
PoC	Point of Care
PoE	Points of Entry
PPE	Personal Protective Equipment
RRT	Rapid Response Team
SARS	Severe Acute Respiratory Syndrome
SD	Standard deviation
SOP	Standard Operating Procedures
SPH	School of Public Health

TB	Tuberculosis
TBAs	Traditional Birth Attendants
TBP	Treatment Based Precaution
TCM	Traditional Chinese Medicine
TMH	Tarkwa Municipal Hospital
UG	University of Ghana
UNICEF	United Nations Children's Fund
USBP	Universal Standard Based Precaution
WRHD	Western Regional Health Directorate
CHPS	Community Based Health Planning System
VHF	Viral Hemorrhagic Fever
WHO	World Health Organization
WIFA	Women in Fertility Age
YF	Yellow Fever

ABSTRACT

Background: Viral Haemorrhagic fevers (VHF) are among the important public health emergencies of international concern as defined by the International Health Regulations (2005). They are associated with occurrence of major epidemics with high case-fatality rates. The emergence and re-emergence of VHF is a growing concern worldwide. The recent outbreak of Ebola Virus Disease (EVD) in the sub region exposed many weaknesses in the disease surveillance and response systems in Africa due to inadequate preparedness of the health care sector. Ghana is at high risk of importation of VHF such EVD cases. The objective of the study was to assess the current status of Emergency preparedness for Viral Hemorrhagic Fevers in district hospitals of Western Region.

Method: This cross- sectional descriptive study in selected health facilities conducted among 290 health care workers in six districts of the Western Region. A structured questionnaire was used for data collection. Quantitative data from the questionnaire was coded and then analyzed using descriptive statistics with Microsoft Excel and Epi Info version 7. Qualitative data from key informant interviews was translated into simple matrix checklist with the respective responses assembled for easy comparison.

Results: All facilities (6/6) had PHEMC in place. All facilities (6/6) had preparedness plans but does not include Viral Hemorrhagic Fevers. The proportion of facilities with above average functioning PHEMC 33.3% (2/6). As much as 89% (258/290) of the HCWs had not received simulation exercise to practice skill drill. Thirty-three percent (2/6) of the health facilities received funding support from WHO and IOM for emergency preparedness activities.

Conclusion: The emergency preparedness and capability of the six hospitals in the Western region to detect VHF is sub-optimal. Adequate training of staff, simulation and skill drill and funding remained the greatest challenge of the facilities to preparedness for VHFs.

CHAPTER ONE

INTRODUCTION

1.1 Background

The World Health Organization defines a public health emergency as: "an occurrence or imminent threat of an illness or health condition, caused by bioterrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human facilities or incidents or permanent or long-term disability (WHO, 2001)." Preparedness is generally described as set of activities intended at improving key response activities and coping capabilities (Moore M., 2012).

Viral hemorrhagic fever (VHF) is a universal term for a serious sickness or infections, now and again connected with bleeding, that might be brought about by various diseases. These include Ebola Virus Disease, Marburg, Lassa fever, Crimean-Congo haemorrhagic fever, Rift Valley Fever and Dengue. Ebola Virus Disease (EVD) and Lassa Fever (LF) are the VHFs of significant public health worry in Ghana resulting in the EVD flare-ups in the West African sub region in 2014 besides detailed LF endemicity in West Africa with 2 cases confirmed in Ghana in 2011. (GHS/MOH, 2016).

The main objective of the public health emergency preparedness and response is to provide a process to quickly, identify, notify, assemble and deploy public health personnel, partners from the private health sector and private hospitals, and appropriate medical equipment and supplies (Debra Revere, Kailey Nelson, et al. 2011). Emergency preparedness is done at all levels and should be systematically done. Successful preparedness requires detailed planning and

collaboration among all stakeholders. The potential for disasters to occur exists in all communities.

Emergency preparedness refers to four processes involved in ensuring an institution: (1) complying with the preventive measures; (2) having a state of preparedness to contain the effects of a forecasted disastrous event in order to minimize loss of life, injury, and damage to property; (3) providing rescue, relief, rehabilitation, and other services in the aftermath of the disaster; and (4) holding the capability and resources to continue to sustain its essential functions during a PHE. In light of the above, assessment of Emergency Preparedness of health facilities should include, an annual assessment of the emergency plan which is required in order to ensure that the emergency preparedness is up to date. Hospital emergency preparedness assessments also should include: elements of disaster planning, emergency coordination, communication, training, expansion of hospital surge capacity, personnel, availability of equipment, stockpiles of medical supplies and expansion of laboratory capacities.

The sub region and the continent has been challenged by a succession of public health emergencies including VHF and this has led to high morbidity and mortality of VHF. It is against this background that we assessed the current status of preparedness for Viral Hemorrhagic Fevers in six district hospitals of Western Region in Ghana.

1.2 Problem Statement

Viral hemorrhagic fevers (VHF) are severe and life-threatening viral diseases that are of particular public health importance because they can spread within a hospital setting, have a high case-fatality rate and are difficult to recognize and detect rapidly. A hemorrhagic fever outbreak requires a comprehensive and intensive public health response that would put even an ideal healthcare system to the test.

In 2014, the West African Sub Region was hit with the Ebola epidemic which claimed the life of over 2,296 people with a total 4,507 cases that were diagnosed from Guinea, Liberia, Nigeria, Senegal and Sierra Leone by 14th September 2014 (Team 2014). There were some few cases in the developed countries; Spain 1, United Kingdom 1 and United States 4 cases with one dead. (Control and Prevention 2014), the developed countries managed and contained the disease so well. Their surveillance system and preparedness towards disease outbreak was up to date such that these identified cases were those that entered the country. There was no further spread of this deadly disease in their countries. There are weaknesses and gaps in the public health emergency (PHE) preparedness and response in health facilities, particularly in frontline district hospitals. Factors contributing to the weaknesses in the system includes, non-existence of emergency preparedness and response plan, lack of training for staff on epidemic response, lack of simulation, non-availability of emergency stocks of drugs, supplies and materials for case management of outbreaks, non-availability of funds for emergency response to outbreaks and lack of laboratory support in the for confirmation of pathogens in epidemics. These factors have contributed very high morbidity and mortality VHFs during outbreaks. Hospital therefore preparedness is critical for the early detection and management of public health emergency

(PHE). Understanding the current status of PHE preparedness is the first step in planning to enhance hospitals' capacities for emergency response.

1.3 Conceptual framework.

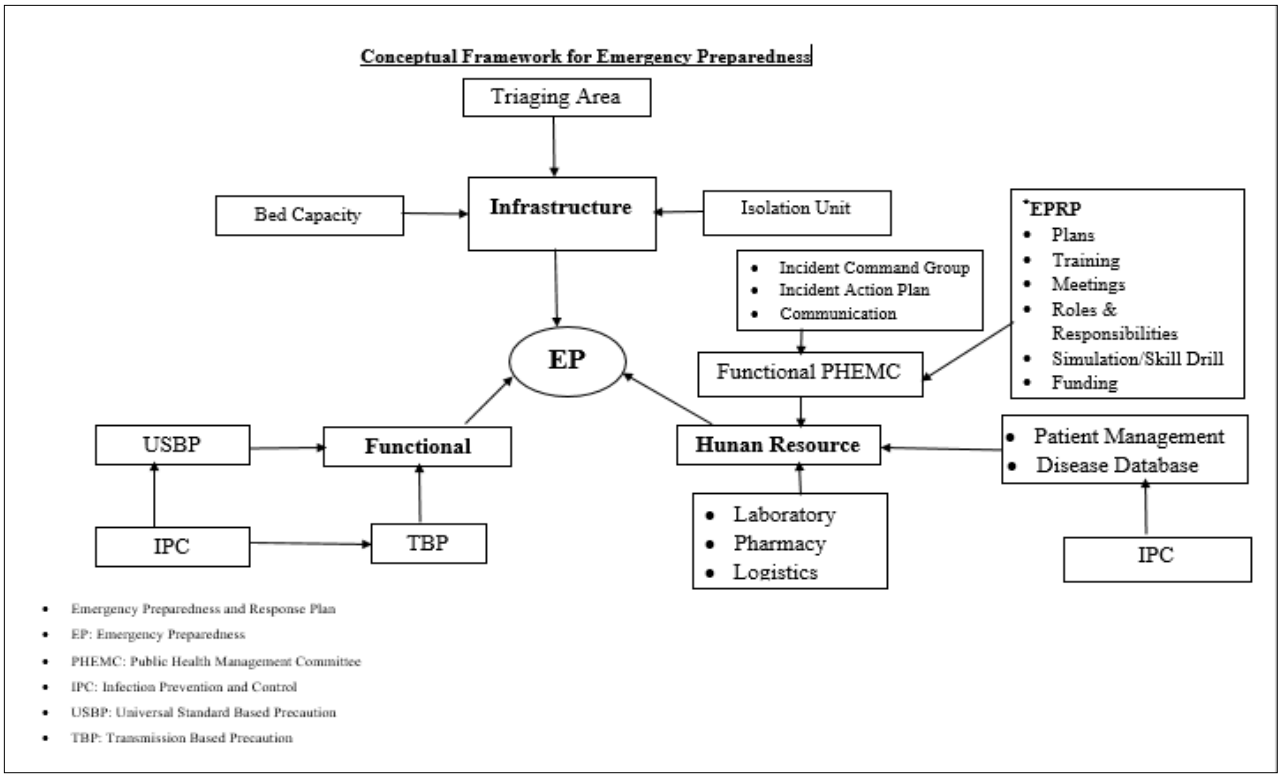

Figure 1: Conceptual Framework of Hospital Emergency Preparedness

Explanation of Conceptual Framework of Hospital Emergency Preparedness

Every facility must have a high level of preparedness prior to an infectious disease outbreak, for the most effective systems are those that were developed and tested prior to crisis situations. The three main drivers of emergency preparedness that can keep the impact of an epidemic in a health facility to an acceptable minimum include infrastructure, functional, and human resources assessment.

First of all infrastructure assessment which includes triaging areas or all incoming patients, specially designed infectious isolation unit and total bed capacity of the isolation unit. The second is functional assessment which is mainly Disease Prevention and Control limit of the health facility, this is made up Universal standard precautionary measures and transmission-based safety measures of the health facilities. The goal during outbreaks or emergencies is to decrease the risk of exposure and to protect ourselves, at all times by using barriers and appropriate procedures/measure each time we attend to or treat a client and protecting the community. The last driver for emergency readiness is Human Resources assessment. The assessment include functional Public Health Emergency Committee, Patient management, pharmacy, laboratory diagnosis and training and risk communication.

1.4 Justification

It has become extremely important for all to be ready to handle disease outbreaks as we are all under the pressure of emerging diseases that cause outbreaks and a lot of death. One of such disease that has caused panic and threatened the preparedness and response of the health sector in our continent especially the West Africa sub region is Ebola. The ability of a country to reduce the spread and death from such an outbreak depends on the preparedness and response of the country. The high case fatality of Ebola recorded in West Africa was probably indicative of our unpreparedness towards such emergencies and epidemics.

In the Western Region key cholera outbreaks has emanated from Ellubo border entry point. 2017 Meningitis outbreak reported in the region occurred in the border towns of Bia East and West districts. Each one of these events has challenged the public health system and impacted on the health of the affected people.

The study therefore sought to assess the current status of Hospital Emergency preparedness for Viral Hemorrhagic Fever in six districts including three border districts of Western Region in Ghana with the focus on the district public hospitals. This would assist health care managers to know the level of preparedness in terms of present infrastructure, functional, and human resources. The findings would also serves as a basis for capacity building including training of health staff, aid in policy development and guidelines, and informed distribution of logistics to key health facilities in the region.

1.5 Study Objectives

1.5.1 Main objective

The main objective is to assess the current status of six districts hospital public health emergency for Viral Hemorrhagic Fevers in the Western Region.

1.5.2 Specific objectives

The research specifically seeks to:

1. Assess infrastructural capacity of six hospitals to effectively manage Viral Hemorrhagic Fevers
2. Assess level of functionality of six district hospitals for Viral Hemorrhagic Fevers
3. Assess human resources structure for Viral Hemorrhagic Fevers readiness and response at the six district hospitals in the Western Region

CHAPTER TWO

LITERATURE REVIEW

The review is organized thematically under the following headings:

- Functionality-Management of viral hemorrhagic fevers in hospitals.
- Infrastructure-Knowledge of health workers on viral hemorrhagic fevers and emergency preparedness, triaging, Isolation and bed capacity of the facility
- Human Resource-Emergency readiness of the hospitals for communicable diseases.

2.2 Functionality-Management of Viral Hemorrhagic Fevers in Hospitals

Functionality is mainly assessed by Infection Prevention and Control (IPC). "The management of VHF cases has been mainly focused on the strict application of infection control measures to prevent transmission". (Fusco et al.2012). The main goals of IPC are to reduce healthcare associated infections and thereby to improve the safety of patrons who are present in a hospital, patients, healthcare workers and visitors; to develop the capacity of a hospital to respond to an outbreak and minimize the dissemination of infection in hospitals and other health care setting. In emergency readiness for viral hemorrhagic fevers, Universal Standard Precautions (USBP) and Transmission Based Precaution (TBP) are the two most component of IPC.

In another study by Ericsson CD. 2001. He stated that "strict barrier nursing and universal precautions with blood, body fluids, and potentially contaminated objects are highly effective. These measures must be activated as soon as a diagnosis of a VHF is suspected. The use of a facial shield or mask and goggles is useful in avoiding entry of virus-contaminated blood or secretions through conjunctivae, nose, or mouth when a patient suddenly vomits, coughs, or

sneezes. These measures should never be delayed until laboratory confirmation of a VHF is obtained, as secondary virus transmission is most likely to occur in the interim, when appropriate precautions are not practiced". (Ericsson CD. 2001)

Education on emergency readiness to public health workers is important in ensuring the safety of all citizen of a country. This provides the knowledge for infectious disease prevention, and it is also an important component of response to diseases outbreaks and other emergencies. Effective public health preparation requires workers with both information and abilities required for full commitment in arranging, reaction and assessment exercises for disaster; anyway most public health pioneers report that the public health workforce isn't completely arranged in such manner (Chandler, et al. 2008).

Another cross sectional study on information, practices, attitudes and familiarity of nurses regarding emergency and disaster readiness in Saudi –Arabia, students found out that the learning level in regards to disaster status among two third of the investigation test was low, there was huge contrast found for demeanors and work on seeing debacle availability just as recognition concerned emergency preparation , dependent on the examination lacking of information and disposition and practices with adequate degree of frame of mind in regards to calamity preparation and unbiased commonality with emergency status were closed. (Fatma, et al. 2014).

Erin Smith also in a study titled the readiness of emergency healthcare workers to work during major emergency and disasters in Australia stated that emergency readiness plans necessitate emergency health care workers to participate fully in responding to and managing major emergencies and disaster. It concluded that disaster health care services should not only depend

on workers working at emergency centres as some healthcare workers are not willing to work during such crises for the fear of the threat of the infection and illness (Smith 2007).

Ogedegbe, et al. 2012 also conducted another study on health care workers and disaster availability: boundaries to and facilitators of readiness to react to diseases disaster uncovered that practically all the investigation members comprehended their obligations and were happy to answer to work in a catastrophe circumstance, the lion's share voiced critical obstructions to such exercises, they distinguished hindrances to their eagerness to work during a disaster.

Clinical and non-clinical staff differ in the types of barriers to willingness to report (WTR) endorsed, as well as their confidence in the hospital's ability to provide them with personal protective equipment (PPE) and guarantee their safety.(Ogedegbe, et al. 2012)

Another study on emergency preparedness competencies assessing nurses' educational needs indicated that despite the critical role nurses play in emergencies, there seemed to be no typical training in the undergraduate nursing education. The nurses' position on emergency readiness and strategies within and across varied response team was low (Wisniewski, et al. 2004).

2.4 Human Resources-Emergency Preparedness of Health Facilities

Human capacity in emergency preparedness requires that there is a functional Public Health, staff are adequately trained to effectively manage cases, collect samples and has an effective incident command system. According to Connolly, et al. (2004), hospital disaster management enables health facility to design, prepare and provide a rational response to cases of disaster. During diseases outbreaks and disasters, there can be perplexity and wastefulness in the medical clinics; and can overpower the emergency clinic assets, staffs space and supplies. When there is no plan to fall on during these times can lead to circumstances where there may be too numerous

leaders and commands and no clear direction to solve the problem. It is therefore essential that all hospitals have a hospital emergency/Disaster plan which defines the command structure, clear cut job definitions once a disaster occurs. Rivera-Gutiérrez, et al. (2013) also said, to determine preparedness levels of health care facilities in disaster management, the following key areas should be looked at critically, chain of command during emergency.

Butler, et al. 1998, indicated that emergency readiness for communicable disease should be targeted at strategies to rejuvenate the capability to shield the public from developing irresistible diseases by improving four noteworthy public health exercises: reconnaissance and reaction, connected research, foundation and preparing, and aversion and control

Hersche 2003 was of the view that therefore the key for any effective acing of an emergency is to be decidedly ready. Every single potential issue must be carefully examined and particular safeguards must be taken. Real mishaps and catastrophes must be aced and constrained by clever arranging.

Studies have showed that many conditions outcome has a connection between the portion of treatment given and the reaction of such treatment. Different investigations around the globe have exhibited that patients admitted to emergency clinics endure genuine antagonistic occasion at a pace of somewhere in the range of 2.9% and 17% of cases. Such occasions may not be straightforwardly identified with the patient's unique conclusion or fundamental ailment. Of more prominent concern, these occasions may bring about delayed length of medical clinic remain, lasting handicap, and even passing in up to 10% of cases. Medicinal Emergency Team (MET) varies from other Rapid Response group in that the group head is a doctor, commonly with escalated care ability.

CHAPTER THREE

METHODS

3.2 Study Design

We conducted a cross sectional study among 290 health staff in six district hospitals in the Western region to assess the current status of Emergency preparedness for Viral Hemorrhagic Fevers using quantitative and qualitative approaches. In the quantitative approach, a questionnaire adapted from WHO Field manual for capacity assessment of health facilities, CDC detailed emergency medical service checklist and WHO EVD consolidated preparedness checklist. Qualitative approach was a key Informant Interview amongst management of the hospitals using a semi-structured questionnaire WHO Ebola virus disease: consolidated preparedness checklist. 2015and assessed preparedness for Viral Hemorrhagic Fevers in terms of infrastructure, functionality and human resource capacity from April to June, 2019. Data was analyzed using descriptive statistics with Microsoft Excel and Epi Info version 7. Qualitative data was translated into simple matrix checklist with the respective responses assembled for easy comparison.

3.2 Study Area

The study area is made up of six district hospitals in the Western Region. The facilities includes in three border districts and three non-border district. Essam Government Hospital (ESGH), Enchi Government Hospital (EGH), Half Assini Government Hospital (HAGH), Bibiani Government Hospital (BGH), Tarkwa Government Hospital (TGH) and Effia Nkwanta Regional Hospital (ENRH). The clinical health workers and administrative staff in these facilities will be used for the study. The total population of this category of health workers is estimated 1900.

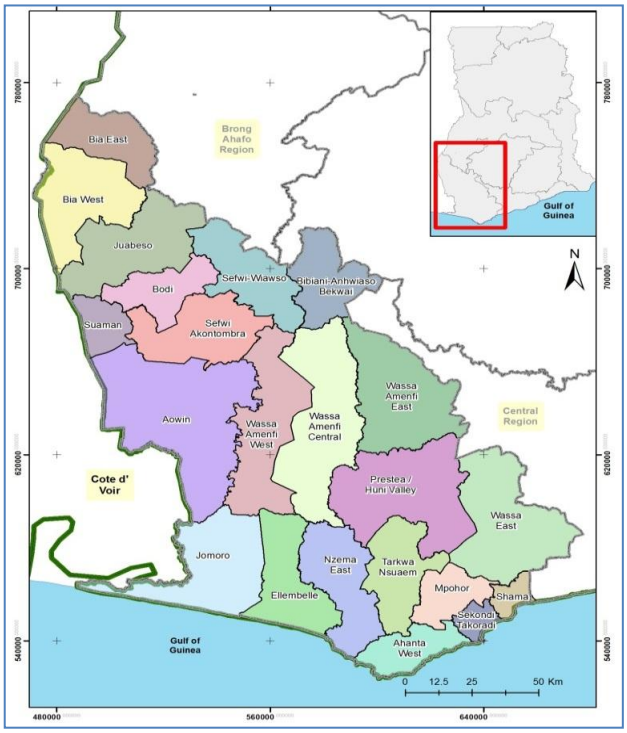

Figure 2: Map of Western Region Showing District

Western Region of Ghana is situated in the south-western part of Ghana. It is bordered on the east by Central Region, to the west by the Ivory Coast, to the north by Ashanti and Brong Ahafo Regions and to the south by the Gulf of Guinea. The population as of 2018 was 2,975,788. Women in Fertility Age (WIFA) is 641,189 (24% of total population, region specific), Expected Pregnancies –107,032 (4% of total population) and Children Under 1yr – 107,032 (4% of total population). The Total Fertility Rate (TFR) of the region is slightly lower (4.2) when contrasted with the national TFR of 4.0, demonstrating that on the average women in the Western Region bring forth four youngsters as do all women in Ghana. What's more, there are four births for each every 100 young people in the area, which is among the most noteworthy contrasted with different areas. Concerning

Contraceptive Prevalence Rate (CPR), the utilization of present day contraceptives among right now hitched ladies (Contraceptive Prevalence Rate) was 23.3% in 2014. In 2013, the HIV pervasiveness rate in the area was 2.4%, has compared to the national HIV prevalence of 1.3%. 50% of the populaces are guys and females. The size of land region is 23,760 sq. km, which makes it the fourth biggest amongst the locales regarding area size. It has a populace thickness of 99.3 individuals per sq. km. The area is 42.4% urban with a yearly urban development pace of 3.5%. There is a total of 492 health facilities made up of 37 Hospitals, 62 Health Centres (HC), 29 maternity homes (MH) 126 Clinics and 520 functional CHPS compounds. Together with other partners including Marie Stopes (family planning in some districts), JHPIGO (with sponsorship from Tullow Oil for strengthening CHPS operation in six coastal districts) and ENI Ghana (support for CHPS and MCH activities (WRHD, 2018)

3.3 Variables

Table 1: Description of Variables

Variables	Operational definition	Type of variable
Age	Refers to age at which participant	Quantitative continuous
Sex	Sex of participant	Categorical (dichotomous)
Educational Qualification	Refers to the highest level of education attained	Categorical
Category of Staff	Refers to the division of occupation in the hospital within which participants belongs to	Categorical
Availability of triaging area	Presence of system in health facility to screen all patients VHF	Categorical
Availability of isolation unit	Presence of a separate ward used to isolate patients suffering from infectious diseases.	Categorical
Bed capacity of isolation unit	Refers to beds set up and staffed for use in the health facility	Categorical
Practice of Universal Standard based precaution	Presence of a system to reduce the risk of transmission of blood-borne pathogens, and body substance isolation	Categorical
Practice of Transmission based precaution	Presence of a system of additional infection-control precautions in health care, and routine infection prevention and control practices applied for patients who are known or suspected	Categorical

Variables	Operational definition	Type of variable
Existence of hospital PHEMC	Establishment of Public Health Emergency Management Committee in the hospital	Categorical
Regularity of meetings of the hospital PHEMC	Refers to the frequency of scheduled meetings of the hospital PHEMC	Categorical
Functionality of the committee		Categorical
Existence of emergency preparedness and response plan	Refers to the presence of prepared document on key activities and roles of stakeholders in responding to public health emergencies	Categorical
Training on epidemic response & IDSR	Refers to capacity building of staff on epidemic response and IDSR	Categorical
Availability of emergency stocks	Refers to presence of drugs, supplies and materials for case management of outbreaks	Categorical
Availability of funds	Perception about adequacy of funds for emergency response to outbreaks	Categorical

3.3 Study Population

The study population was staff of the six district public hospitals which included the Physician Assistants, Pharmacists, Pharmacy Technicians ,Medical Officers, all categories of Nurses, Biomedical Scientists, Laboratory Technologists and Laboratory Assistants, Disease Control Officers, Field Technicians, members of the emergency preparedness team and management team members who were present at the time of the assessment.

3.3.1 Inclusion Criteria

All HCW in the six hospitals which included all clinical staff, Disease Control Officers, members of the emergency preparedness team and management team members and have worked for more than three months

3.3.2 Exclusion Criteria

HCW and management team members who decline to be included in the study, staff that had worked for less than three months during the time of data collection

3.3.3 Sample Size

The sample size was calculated using the Cochran formula and adjusting for finite population

The Cochran formula is:

$$n_o = \frac{Z^2 * pq}{e^2}$$

Final sample size after adjusting for finite population.

$$n = \frac{n_o N}{n_o + (N - 1)}$$

Where:

Z = initial critical value on standard normal distribution that gives the desired confidence level.

value at confidence level of 95% (from standard normal table) = 1.96

P=expected level of readiness or proportion of facilities that are ready or using an assumption that 70% of these HCWs would come into contact with a VHFs (Annan et al 2017)

q = 1-p,

e=margin of error around p

Where n_o is the initial sample size

N=population size =1,900 (staff population of six facilities)

Z = 1.96,

P = 0.70,

Q = 0.30

$$n_o = \frac{(1.96)^2 * (0.70) * (0.30)}{(0.05)^2}$$

n_o = 322

Final sample size after adjusting for finite population.

$$n = \frac{n_o N}{n_o + (N-1)}$$

$$n = \frac{322(1900)}{322 + (1900-1)}$$

n = 276

Non-response rate of 5% =5/100* (276) =13.8

Total sample size = 276+14=290

Hence sample allocated to facility:

$$\text{Sample Allocated to facility} = \frac{\text{Staff population x Total Sample calculated}}{\text{Total population of the six facilties}}$$

Name of Facility	Staff Population of Facility	Sample Allocated
Essam Govt. Hospital	283	43
Enchi Govt. Hospital	284	43
Half Assini Hospital	311	47
Bibiani Govt. Hospital	303	46
Tarkwa Municipal Hospital	298	45
Effia Nkwanta Hospital	421	64
Total	**1900**	**290**

3.3.4 Sampling Method

- At the regional level, purposive sampling (based on outpatient patient attendance and or being a border district) was used to select six districts out of 22 districts and their district hospitals were used for the study.
- The sample size was proportionally allocated to each of the six health facilities based on number of staff in each of the facilities
- A simple random sampling was done to select participants from the facilities after list of staff members were obtained for each facility. All sampled members who did not avail themselves for the interview were replaced with new sample.

3.4 Data Collection Techniques and Tools

Quantitative and qualitative data was collected, using structured questionnaires adapted from the World Health Organization's Field Manual for Capacity Assessment of Health Facilities in Responding to Emergencies of 2007 (WHO, 2017), CDC Detailed Emergency Medical Services (EMS) agenda for Ebola preparation (CDC, 2015), WHO Ebola virus disease: combined status agenda (WHO, 2015), was adapted, modified and administered to the participating hospitals staff. In the health facilities, interviews were conducted with key medical officers and, or other identified key informants. Participants were taken through the questionnaires and any unclear question was explained.

3.5 Quality Control

The research assistants involved in the data collection had previous experience in data collection approaches; a field test was done and relevant changes made to the questionnaire before data collection. The Principal Investigator (PI) and supervisors supervised the field work, undertook spot checks and conducted field editing of the data.

3.5.1 Training of interviewers and supervisors

Interviewers and supervisors with surveillance background were trained as data collectors. They were trained to understand the purpose of the study and appropriate data collection technique.

3.5.2 Pretesting

A pre-test of the study was used to test the validity and reliability of the sampling method and instrument. The sampling method and the questionnaire was tested by administering it to health workers of Dixcove Hospital which had similar characteristics as the hospitals selected for the study. The questionnaire was modified to improve the meaning of some of the questions in the questionnaires. This helped check for mistakes and completeness of the questionnaire. Also, it also helped eliminate or modify questions with unclear responses.

3.6 Data Processing and Analysis

3.6.1 Data Handling

Information collected was checked for completeness and correctness, and double-entered into data sheets on a computer on a daily basis by two data clerks using Epi Info software programme. Data cleaning and verification was done on daily basis and back-up copies kept by the Principal Investigator and a copy kept on an external hard disk drive and virtual drive drop-box and in my email draft folder.

3.6.2 Data Analysis

Information gathered from the questionnaire was analyzed using descriptive statistics with Microsoft Excel and Epi Info version 7. Qualitative data from key informant interviews was translated into simple matrix checklist with the respective responses assembled for easy comparison. A 5-point Likert scale starting from 1-25% (not prepared at all), 2-below 50% but greater than 25 (averagely preparedness), 3 (above 50% above averagely), 4 (>75% prepared) to 5 (>90% highly prepared) was developed to assess the participating facilities.

3.7 Ethical Consideration

Ethical clearance to conduct the research was obtained from the Ghana Health Service Ethical Review Committee (GHSERC)-GHS-042/02/19, Western Regional Health Directorate (WRHD) and District Health Directorate (DHD) involved in the study.

3.7.1 Contenting Process

Approval to conduct the study in the region was obtained from the Regional Director of Health Service (RDHS) through the School of Public Health (SPH). This was be followed by a request to the RDHS for a letter to the selected districts seeking to for permission to enter their districts. Letter. At the district level, letters were circulated to the medical superintendents through their DDHS about the study and their participation.

3.7.2 Possible Risks and Discomfort

There were no known risks or discomfort associated with this study. Participants had the right not to answer any questions.

3.7.3 Possible Benefits

Participants were informed that their participation is voluntary with no inducement, they may not benefit directly from the study but the findings will benefit DHD and Western Regional Health Directorate as a whole.

3.7.4 Confidentiality

The questionnaires were self-administered, and to ensure privacy, no name or any identity was used to trace back the filled questionnaire to any participant. Numbers linked to particular names were kept confidential.

CHAPTER FOUR

RESULTS

Table 2: Demographic Characteristics of the Study Participants in Six District Hospitals of Western Region

Variable	Frequency(N=290)	Percent (%)
Sex		
Male	118	40.7
Female	172	59.3
Category of staff		
Medical Doctor	19	6.6
Disease Control	29	10.0
Laboratory Personnel	33	11.4
Nurse	169	58.3
Physician Assistants	27	9.3
Others	13	4.5
Working Years In Facility		
1 - 5	162	55.9
6 - 10	81	27.9
11 – 15	8	2.8
16 – 20	6	2.1
21 – 25	29	10
26 – 30	4	1.3

Median 4years and Interquartile Range (IQR1=3, IQR3=8)

4.2 Demographic Characteristics of Study Participants in Six Districts of Western Region

Overall 290 respondents were interviewed of which 40.7% (118/290) were males. The category of occupation of participants included nurses 58.3% (169/290), Laboratory personnel 11.3% (33/290), Physician Assistants (PA) 9.3% (27/290), Disease Control 10.0% (29/290), Medical Doctors 6.6% (11/290) and others 4.5% (13/290), More than fifty percent 55.9% (169/290) had worked less than five years in their respective health facilities, The median age of working in the facilities is 4years (minimum of 2years and maximum of 27years).

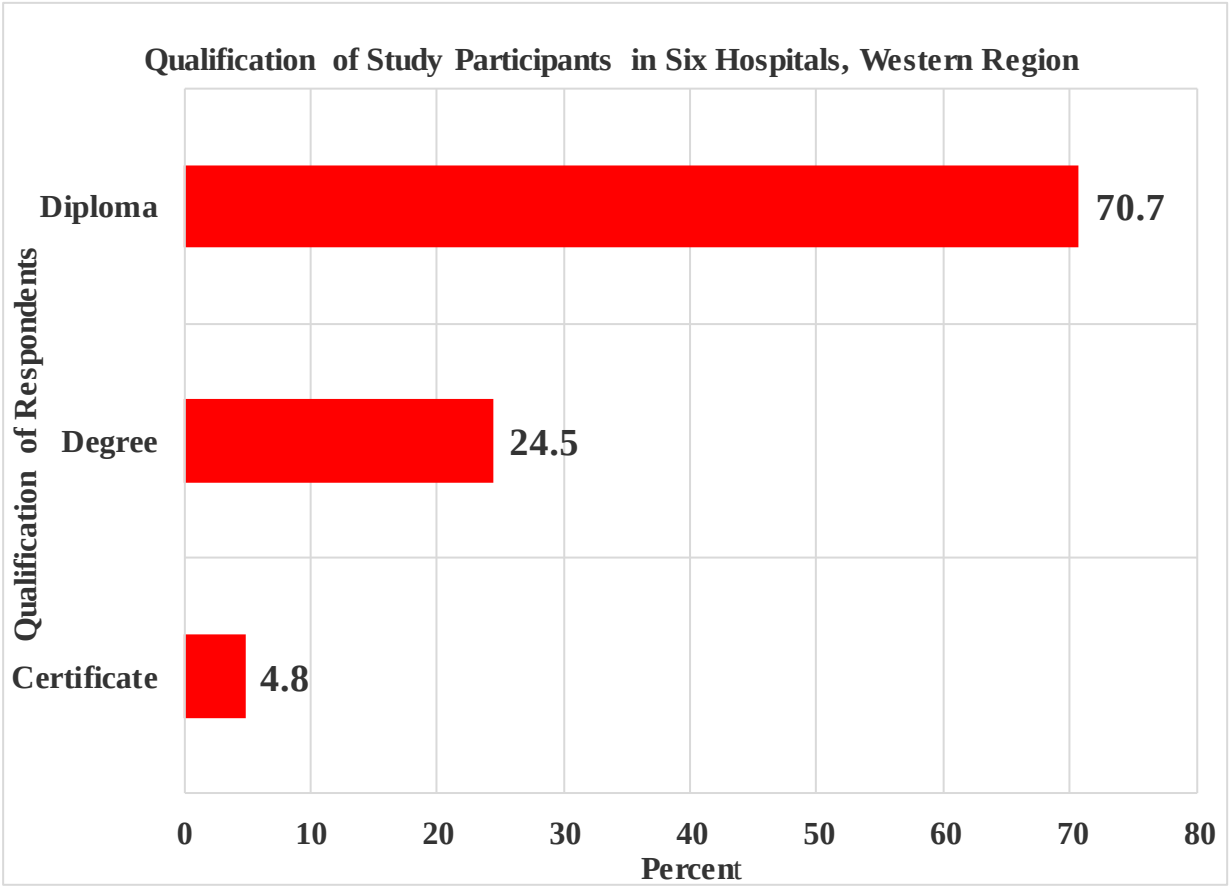

Figure 3: Qualification of Respondents in Six Hospitals of Western Region

Most of the participants 70.7 % (205/290) were diploma holders, this was followed by degree holders with 24.5% (71/290) and certificate 4.8 %(14/290).

4.3 Infrastructural capacity

There are three main components for assessing infrastructural capacity of health facility. These includes triaging system, isolation facility and bed capacity in the isolation area. When the participants were asked whether all the facilities has designated a room for holding of suspected cases VHFs. 80.7% (234/290) said that had isolation unit and 75.5% (291/290) responded that they had adequate beds in the isolation rooms in their facility. In all 93.1% (270/290) of

participants indicated they had triaging area in their facility for screening Tuberculosis cases (TB task shifting officers) and other communicable diseases including VHFs.

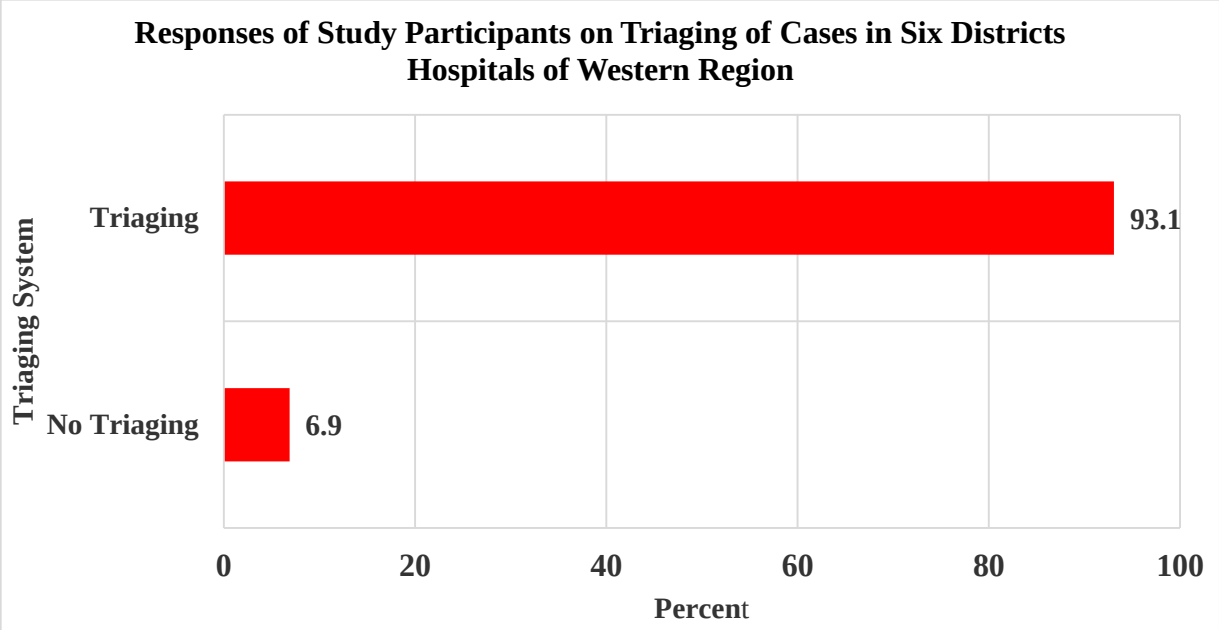

Figure 4: Responses of Study Participants on Triaging of Cases in Six Districts Hospitals of Western Region

When the participants were asked whether all the facilities has designated a room for holding of suspected cases of VHFs. The remaining could not indicate availability of isolation unit for holding suspected cases.

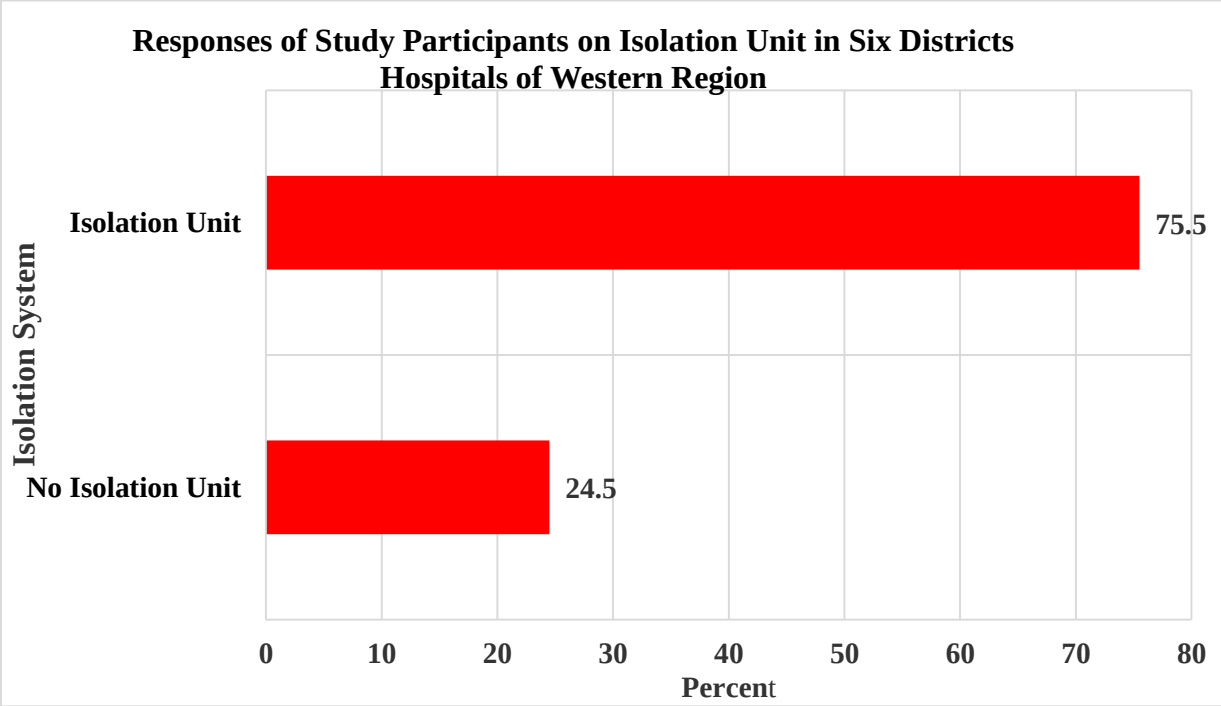

Figure 5: Participants responses on Isolation of Study Participants in Six Districts Hospitals of Western Region

4.4 Functionality

Overall 45.7% (132/290) of the participants responded in the affirmative at the point when were inquired as to whether they considered their offices adequately prepared to deal with and oversee VHFs patients based on USBP and TBP. Only 37.6% (109/209) were able to mention bleach with appropriate concentration as disinfectant to use after attending to VHFs.

4.5 Human Resource Capacity

4.5.1 Knowledge on VHFs

Of the 290 participants, 71.2% (208/290) knew the cause of VHFs, 28.3% (82/290) did not know the cause and that VHFs refer to a group of illnesses that are caused by several distinct families of viruses.

4.5.2 Availability of Emergency Preparedness and Response Plan (EPRP)

Participants were asked whether they knew the existence EPRP, 47.2% (137/290) said at the beginning of the year a team met and prepared the document, conversely as much as 51.4% (149/290) indicated they were not available. 1.4% (4/290) not sure if the there was a plan.

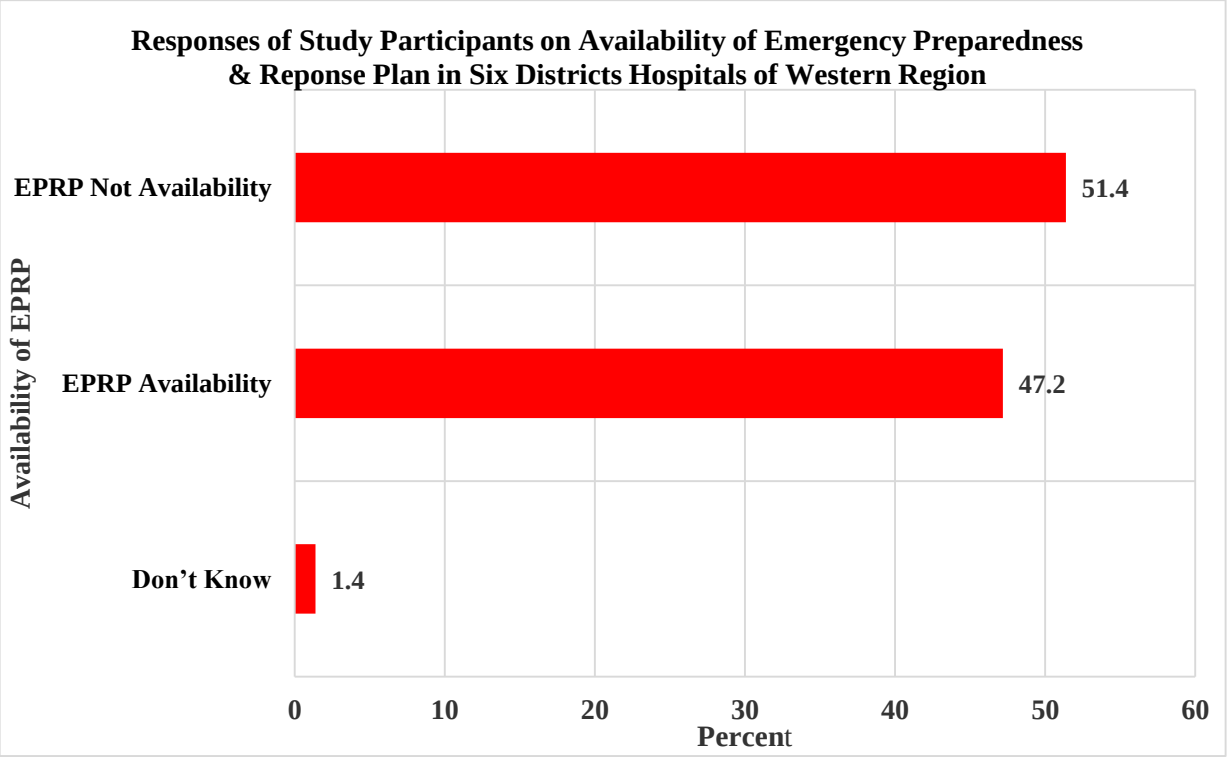

Figure 6: Responses on Availability of EPRP Participants in Six Districts Hospitals of Western Region

4.5.3 Public Health Emergency Committee (PHEMC) meetings

On Public Health Emergency Committee (PHEMC) meetings; overall, 69.3 % (201/290) of the HCW indicated that one PHEMC meeting was held. Out of this 39.9% (115/290) said they met once, 21.4% (62/290) met twice and 8.2% (24/290) met once a quarter or four times in a year.

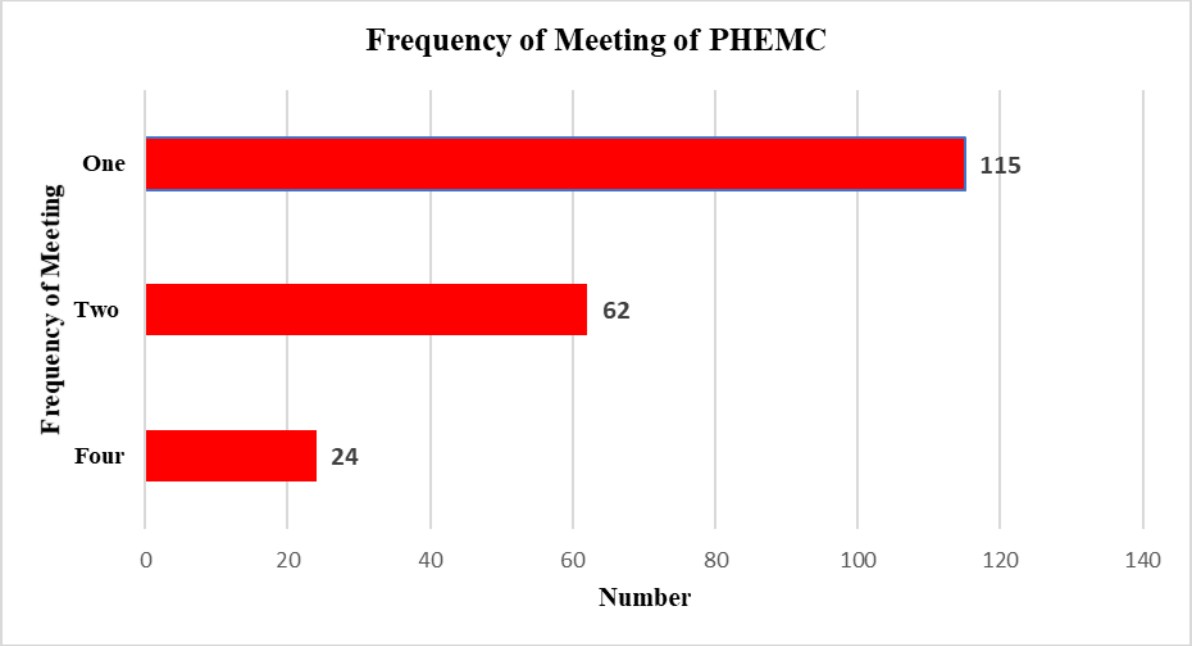

Figure 7: Participants responses on Frequency of Meeting of PHEMC in Six Districts Hospitals of Western Region

4.5.4 Training on Emergency Preparedness

About 50.7% (147/290) of the respondents said they were sufficiently trained to handle VHF. Whislt about 49.3% (143/290) said they not adequately trained. Those who were adequately trained had been working averagely for 7 years (SD = 7.0136 ± 6.588 years)

4.5.5 Simulation and Skill Drill of Emergency Preparedness

As much as 89% (258/290) of the HCWs said that there was no simulation exercise to practice skill drill. Only 11.0%(32/290) indicated that simulation for staff was conducted to practice skill drill. The simulation was in the area of triaging of cases, surveillance and case detection, nosocomial infection, case holding, transpotation of cases and case management of VHFs.

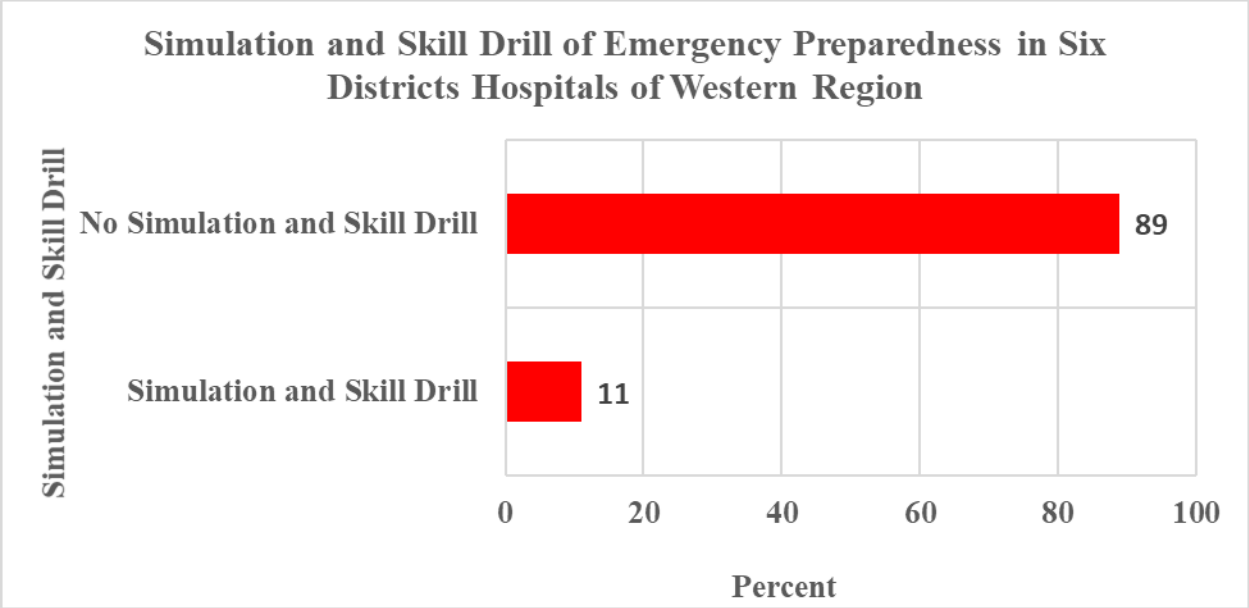

Figure 8: Participants responses on Simulation and Skill Drill of Emergency Preparedness in Six Districts Hospitals of Western Region

4.5.6 Key Challenge

Majority of the 91.0% (264/290) mention funding as a major challenge. Only 9% (26/290) said they received funding support from either WHO or IOM for most of the emergency preparedness activities. These respondents were from Essam and Half Assini Government hospital where they have designated points of entry.

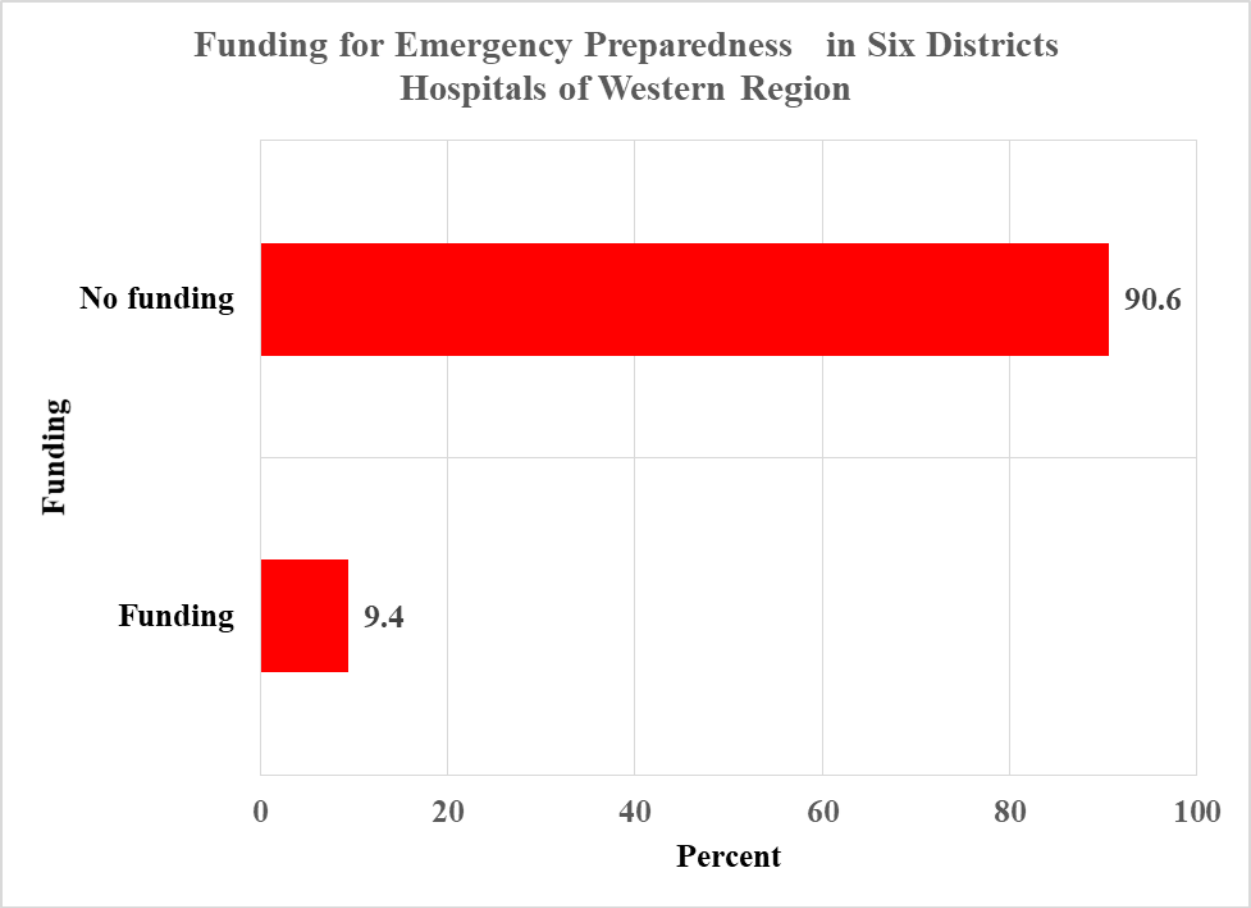

Figure 9: Participants responses on Funding for Emergency Preparedness in Six Districts Hospitals of Western Region

Qualitative Data

Twelve (12) key informants purposely selected, were interviewed on VHF surveillance and response preparedness. The informants included 3 medical superintendents, 1 Medical Officer, 3 district directors, 1 Pharmacist, 2 disease control officers, 1 laboratory officers and 1 hospital administrator.

The majority of the informants interviewed were males (10/12). The female's informants included a pharmacist district directors of health service and a Disease Control Officer. The mean age was 46 years and standard deviation of 5.9 years. **Table 4.2 shows the background information of the informants**.

Table 3: Background Information of Key Informants in Six Districts Hospitals of Western Region

No	Designation	Age	Sex	Facility
1	Medical Superintendent	47	Male	Essam Government Hospital
2	Environmental Health Officer	49	Male	Oseikojokrom POE
3	District Director of Health	40	Female	Aowin District
4	District Disease Control Officer	43	Male	Aowin
5	Disease Director of Health	51	Male	Jomoro
6	Medical Superintendent	49	Male	Half Assini Hospital
7	Pharmacist	48	Male	Bibinai Government Hospital
8	Municipal Disease Control Officer	33	Female	Bibinai Government Hospital
9	Medical Superintendent	53	Male	Tarkwa Municipal Hospital
10	Hospital Administrator	49	Male	Tarkwa Municipal Hospital
11	Medical Officer	47	Male	CDU, Effia Nkwanta
12	Biomedical Scientist	38	Male	Tarkwa Municipal Hospital

The following are key quotes generated from the key informant interview.

KI1"*We detected three suspected cases of yellow fever in the district. We collected blood samples and was sent to the laboratory in Accra but all were negative" (District Director of Health Service)*

The response from one Environmental Officer KI2 '*Even though we have infra-red thermometers, we do not have adequate Personal Protection Equipment; the waiting room at the*

border here is small and there are only two beds in that holding room''. (Environmental Officer at Point of Entry Oseikojokrom).

KI3. *"The surveillance system is satisfactory yellow fever but the screening for other VHFs cases is weak. There are no gloves for workers. If we should have a case of VHF such as Ebola, we will not be able to withstand it"*. (*Municipal Disease Control Officer)*

KI4. *"It cost a lot of money to transport specimens from the district to the region. We have sent a lot of samples. We have not received any funds for emergency preparedness. (District Director of Health Service2)*

KI5 *"Public Health Emergency Committee meeting is irregular because of lack of funds. Apart from that key members of the committee are always busy. (Medical Superintendent 1)*

The informants confirmed the existence of factors such as inadequate funding, low quality PPEs, limited resources, and poorly equipped laboratories seriously affecting disease surveillance for VHFs

4.7 Functionality of Public Health Emergency Management Committee (PHEMC)

The indicators in table 5 were verified in the process of conducting the interview with HCWs. Scores were awarded to indicate the functionality of Public Health Emergency Management Committees.

Table 4: Functionality of Public Health Emergency Management Committee (PHEMC)

Indicators	ESGH	EGH	HAGH	BGH	TMH	ENRH
Existence of PHEMC	1	1	1	1	1	1
Members of PHEMC	3	3	3	3	3	3
Frequency of PHEMC Meetings	3	3	3	3	3	3
Availability of Minutes	4	4	2	4	3	4
Existence of Plans for Meeting	2	3	3	2	2	2
Availability of Funding for Emergencies	2	2	2	2	2	2

Key: Yes=1, No=2, Not up to expected =3 and Not up to date =4

Table 5: Assessment of Infrastructure Capacity of Facilities

Indicators	ESGH	EGH	HAGH	BGH	TMH	ENRH
Triaging Area	1	1	1	1	1	1
Isolation Unit	1	1	1	1	1	1
Bed Capacity	3	3	3	3	3	3

Key: Yes=1, No=2, Not adequate =3

Table 6: Summary Grading of Facilities Assessment

Driver	ESGH	EGH	HAGH	BGH	TMH	ENRH
Infrastructural Capacity	3	3	3	3	4	4
Functionality	2	2	2	2	4	4
HR Capacity	2	2	2	2	2	2

The grading was based on a 5-point Likert scale starting from: 1-25% (not prepared at all), 2-below 50% but greater than 25 (averagely preparedness), 3 (above 50% above averagely), 4 (>75% prepared) to 5 (>90% highly prepared)

Table 7: Interpretation of Scores

Driver	Facilities	Category of Score Obtained	Interpretation
Infrastructural Capacity	• Essam Government Hospital • Enchi Government Hospital, • Half Assini Government Hospital • Bibiani Government Hospital,	3	Above average
	• Tarkwa Nsuaem Municipal Hospital • Effia Nkwanta Regional Hospital.	4	Partially prepared
Functionality	• Essam Government Hospital • Enchi Government Hospital, • Half Assini Government Hospital • Bibiani Government Hospital,	2	Below average
	• Tarkwa Nsuaem Municipal Hospital • Effia Nkwanta Regional Hospital.	4	Partially prepared
Human Resource Capacity	• Essam Government Hospital • Enchi Government Hospital, • Half Assini Government Hospital • Bibiani Government Hospital	2	Below average
	• Tarkwa Nsuaem Municipal Hospital • Effia Nkwanta Regional Hospital.	4	Partially prepared

CHAPTER FIVE

DISCUSSION

The objectives of the study were to assess infrastructural capacity of the six hospitals to effectively manage Viral Hemorrhagic Fevers, the level of functionality of the hospitals for Viral Hemorrhagic Fevers and assess human resources capacity for Viral Hemorrhagic Fevers readiness and response. This include Essam Government hospital in the Bia West districts; Enchi Government Hospital in Aowin district, Half Assini Government Hospital in Jomoro, Bibiani Government Hospital, Tarkwa Municipal Hospital and Effia Nkwanta Regional Hospital.

5.1 Infrastructural capacity of the six hospital to effectively manage Viral Hemorrhagic Fevers

There are three main components for assessing infrastructural capacity of health facility. These includes triaging system, isolation facility and bed capacity in the isolation area. In this study it was reported all the facilities has designated a room for holding of suspected cases of VHFs. Four out of every five participants interviewed said they had isolation unit and three-forth responded that they had adequate beds in the isolation rooms in their facility. The study agrees with the findings of another study by Gborgborvor et al (2016) which reported same.

More than ninety per cent of participants indicated they had triaging area in their facility. The high figure could be attributed to the task shifting officers employed by the national Tuberculosis programme for screening Tuberculosis cases and other communicable diseases including VHFs. Although there are triaging system in place it is froth with many difficulties including screening and case detection. In this study, four out of five participants indicated availability of isolation unit in their facilities. This is encouraging and it is probably due to awareness and sensitization

during the outbreak of Ebola in the sub region on need of health facilities to designate a place for communicable diseases including VHFs. Bed capacity in the isolation or holding room were said to be adequate and was verified. As much as three-quarters of the study participants responded that the isolation unit were furnished to receive suspected cases. Generally for infrastructure capacity, Essam Government Hospital, Enchi Government Hospital, Half Assini Government Hospital, Bibiani Government Hospital preparedness was above average. Tarkwa Nsuaem Municipal Hospital and Effia Nkwanta Regional Hospital were partially prepared.

5.2 Level of functionality of the hospitals for Viral Hemorrhagic Fevers.

Functionality is mainly assessed by Infection prevention and control (IPC) which occupies a unique position in the field of patient safety and quality universal health coverage since it is relevant to health workers and patients at every single health-care encounter. In emergency readiness for communicable diseases such as viral hemorrhagic fevers, Universal Standard-Based Precautions (USBP) and Transmission-Based Precautions (TBP) are the two tier of basic infection control. All the hospitals had personal protective equipment (PPE) in place.

This included N95 masks, gloves, gowns, aprons, glasses and boots. The level of Functionality of the facilities are as follows; Enchi Government Hospital, Half Assini Government Hospital, and Bibiani Government Hospital preparedness were below average. Essam Government Hospital, Tarkwa Nsuaem Municipal Hospital and Effia Nkwanta Regional Hospital were partially prepared.

5.3 Human resources capacity for Viral Hemorrhagic Fevers Preparedness and Response.

The third objective of the study assessed human resources capacity for Viral Hemorrhagic Fevers readiness and response, what structures and processes that had been put in place towards the facilities readiness towards communicable diseases outbreak including VHFs.

From the study, more than seven out of ten of the key informants correctly identified the cause of VHFs, whilst about three out of ten did not know the cause and that VHFs referred to a group of illnesses that are caused by several distinct families of viruses.

On availability of Emergency Preparedness Plan, it was expected management will provide maximum support for the preparation of emergency preparedness plans but that does not seem to be the case as more than half of the respondents indicated that they knew of the existence of Emergency Preparedness and Response Plan (EPRP) in their facilities. The plan is for all epidemic prone diseases which included cholera, measles and Yellow fever. On Public Health Emergency Committee (PHEMC) meetings; overall, seven out of ten the HCW indicated that PHEMC meeting was held. This high figure is probably due to the fact that it is one of the key indicators in the routine monitoring checklist and facilities were always assessed on. However the percentage of HCW that indicated they met once a quarter or four times in a year was low. This low output was attributed to lack of regular funding to organize such meetings in the absence of outbreaks. The irregular meetings could probably be attributed to the lack of support of the team from management. Blondel-Hill (1996) also believes that infectious disease prevention plan in health care is very important and should be available at all time to guide in preventing and controlling the spread of communicable diseases should they happen in any health care facility.

About half of HCWs interviewed indicated they were not adequately trained to handle VHF including an EVD suspected case. These results clearly shows that HCWs were not prepared in the face a possibly life threatening epidemic prone diseases, VHFs such as EVD in Ghana. Those who were adequately trained have been working for averagely not less than 7 years and might have received trainings during the ebola outbreak in the subregion and many countires including Ghana were preparing for it. Strong workforce is one of the most important factors for hospital preparedness capacity. To develop a robust workforce in support of public health emergency readiness, it requires the conditions that support the recruitment and retention of adequate staff, but also ensure efficient training and drills program to meet the demand. On simulation and skill drill of emergency preparedness as much as nine out ten of the HCWs said that there was no simulation exercise to practice skill drill. Chen G,(2006) and Sidika TY(2006) indicated that competency of staff on preparedness can only be improved through effective and continuous training and drilling programmes.

Majority of the respondents, nine out of ten mention funding as a major challenge. Only less than ten percent said they received funding support from either WHO or IOM for most of the emergency preparedness activities. These respondents were from Essam and Half Assini Government where they have designated points of entry. To determine the emergency preparedness level of health facilities in disaster management certain key areas needs to be put into consideration such as treatment guidelines, trained personnel plans, equipment and epidemiologic surveillance (Rivera Gutiérrez, et al. 2013) and these things seems to be in place in all the study facilities. On human resource capacity, Enchi Government Hospital, Half Assini Government Hospital, Bibiani Government Hospital were classified as below average. Essam Government Hospital, Tarkwa Nsuaem Municipal Hospital and Effia Nkwanta Regional

Hospital were partially prepared. Effia Nkwanta Regional is located in the regional capital and Tarkwa Municipal hospital is basically a mining town and has all categories of staff being posted there

5.4 Limitations of the Study

The study had some limitations. Poor documentation made verification of documents a problem.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions were drawn based on the findings of the study conducted and in accordance to the objectives of the study.

The current status of Emergency preparedness for Viral Hemorrhagic Fevers in the six hospitals of Western Region is sub-optimal. There are three main components for assessing infrastructural capacity of health facility. These includes triaging system, isolation facility and bed capacity in the isolation area. Most of the respondents said they had isolation unit, had adequate beds in the isolation rooms in their facility which was physically verified by data collectors. There was also triaging areas in their facility for screening VHFs.

Less than half of the participants said sufficiently equipped to handle and manage VHFs patients based on USBP and TBP. All the hospital had personal protective equipment (PPE) in place. This included N95 masks, gloves, gowns, aprons, masks, googles and boots. However they were not adequate.

This study revealed that all the hospitals had at least one emergency plan but this was not accessible to team members. There were emergency preparedness teams in all the six hospitals. Although there were emergency preparedness plans in all the facilities that the study was conducted in, they did not include Viral Hemorrhagic Fevers.

6.2 Recommendations

The following recommendations are made based on the findings of the study.

6.2.1 National level

- Provide adequate PPEs, funding for training of HCW and support simulation exercises

6.2.2 Region level

- Strengthen PHU in hospitals to fully adopt the National Technical Guidelines for IDSR to be better positioned to prepare for and identify outbreaks and proper management and response

6.2.3 DHA/Hospital

- Improve triaging system for case detection of all communicable including VHFs

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APPENDICES

Appendix 1: Informed Consent Form

Project Title: Public Health Emergency Preparedness of Hospitals for Viral Hemorrhagic Fevers in Western Region

Introduction

My name is **Agudey Daniel Tetteh**, an MPhil student offering Applied Epidemiology and Disease Control at the School of Public Health, University of Ghana Accra. My mobile phone number is +233(0)24 41 532 521 and e-mail, danielagudey@gmail.com .

Background and Purpose of Research

My research topic is **Public Health Emergency Preparedness of Hospitals for Viral Hemorrhagic Fevers in Western Region**. This is part of the requirements for the award of a master's degree in Applied Epidemiology and Disease Control. The study seek to assess the current status of Hospital Emergency preparedness for Viral Hemorrhagic Fevers in six public hospitals of Western Region in Ghana.

Nature of the study

The design is mainly cross- sectional descriptive study of purposively selected health facilities. The study will be divided into three parts; the first part looked at the health care workers of the various facilities and their understanding on emergency preparedness, disease outbreaks and communicable diseases. And the second part at the facilities preparedness in terms of

infrastructure, policy, chain of command and structures put in place to handle emergency situations. The third part will assess the functionality of the hospital for viral hemorrhagic fevers.

Duration/What is involved

The study will be a one-on-one interview between you and the interviewer. The interviewer will use a questionnaire to seek answers from you. The entire session for both the interview and measurements will take at most 30 minutes of your time.

Potential Risks or discomfort

There are no known risks or discomfort associated with this study. You have the right not to answer any questions.

Direct and indirect benefits

There are no direct benefits to you that will result from your participation in this study. However, this study will indirectly provide the necessary information to improve Public Health Preparedness of the hospitals in-district, and subsequently improve on the delivery of quality health care in Ghana.

Costs

You will not be asked to pay any fee before, during and after the interview.

Compensation

You will NOT receive any form of compensation be it monetary or any form of favour for your participation in this study.

Confidentiality

We will do everything possible to protect your privacy. Your identity will not be revealed in any publication resulting from this study. You are not required to provide your name and your identity will not be linked to your responses in this study. All data will be kept under lock and key and only the principal investigator and her supervisor will have access to this information. Confidentiality will be provided to the fullest extent possible by law.

For key informants only: if we tape record your interview, apart from ensuring your confidentiality as stated above, we will destroy the tape after it has been transcribed and the final work submitted, which we anticipate will be after six months of recording.

Voluntary participation/withdrawal

Your participation in this study is purely voluntary. You may choose not to participate and you may also redraw your consent to participate in this study at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Outcome and feedback

The results of this study will be published in scientific journals. You can however ask the principal investigator for a copy of the results if you are interested.

Funding information

This is a self- funded project. The principal investigator bears the full cost of this study.

Conflict of interest

Data generated from this study will solely be for the principal investigator, supervisor of the principal investigator (Prof. Edwin Andrews Afari) and the school in which the principal investigator is affiliated to (University of Ghana)

Provision of information and consent for Participants

You are required to sign a consent form in agreement to participate in this study before the beginning of the interview. Copies of this information sheet and consent form will be given to you to send home.

Thank you.

For further clarification

Contact the principal investigator for further questions regarding this study.

Agudey Daniel Tetteh

Principal Investigator

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Appendix 2: Sample Questionnaire

SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES,

UNIVERSITY OF GHANA

Introduction

Good morning/afternoon. I am a student at School of Public Health, University of Ghana. I will be administrating questionnaire to health workers in the public hospital facilities in Western Region to find out your views and ideas about the emergency preparedness of health facilities on viral hemorrhage fevers. This study is purely for academic purpose therefore whatever you say will be treated confidential, so feel at ease to express your candid opinion. Be assured that your responses will not in any way be linked to your identity.

SECTION A (Socio - Demographics)			
No.	**Question**	**Response**	**Comments**
1.	Name of hospital:		
2.	What is your profession?		
3.	Department you are currently working		
4	Educational level:	[a] Degree [b] Diploma [c] Certificate [d] SSS/SHS level	
5.	How long (Years) have you been working in the health sector?		
6	How long (Years) have you been working in this facility?		
Section B: Infrastructure Assessment			
7	Does the health facility have an existing evaluation or triage area/s for	Yes _____ No_____	

	all incoming patients?		
8	In the event of an epidemic, can this area be adequately isolated from the rest of the facility?	Yes _____ No_____	
9.	Are there specially designed infectious disease isolation units in the hospital?	Yes _____ No_____	
10	What is the total bed capacity of all the isolation units?		

Section C. Functional Assessment			
No.	**Question**	**Response**	**Comments**
11.	11. Are your facilities sufficiently equipped to handle and manage VHFs patients?	Yes _____ No_____	
12.	Are the following Personal Protective Equipment (PPE) available in your health facility?	(Please fill up the table below.) PPE No. of units Supplier Disposable particulate respirators (N95 or higher) _____ Personal air-purifying respiratory hoods _____ Eye protection devices _____ Face shields Disposable gloves _____ Disposable long-sleeved gowns	
13.	Are the following materials used for cleaning possibly infected surfaces readily available in your health facility? *(Please fill in the table below.)* Equipment No. of units Supplier Alcohol-impregnated wipes ……. Antiseptic hand cleansers …….		

	Antiseptic surface cleansers …….		
14.	Does the health facility have an adequate supply of surgical masks for all incoming patients with respiratory symptoms?	Yes _____ No_____	
15.	Adequacy of PPE for the entire facility?	Yes _____ No_____	
16.	Which component(s) of the universal respiratory etiquette strategy is/are strictly enforced in the facility during an epidemic?	(Please check all applicable answers.)	
17	All patients with respiratory illness are provided with surgical masks and given instructions regarding proper use.	Yes _____ No_____	
18	Hand hygiene materials are present in the evaluation areas, and all patients and staff are encouraged to practice hand Hygiene	Yes _____ No_____	
19.	Patients with respiratory symptoms are segregated from other patients	Yes _____ No_____	
20.	Health-care personnel use proper protective equipment when evaluating infected patients.	Yes _____ No_____	

21	Droplet precautions are consistently observed until it is determined with certainty that the patient's respiratory illness does not require any safety measures above the standard precautions	Yes _____ No_____	

Section D. Human Resources Assessment			
No.	**Question**	**Response**	**Comments**
22.	Existence of hospital EMC	Yes _____ No_____	
23.	Existence of hospital EMC	Yes _____ No_____	
24	Regularity of meetings of the hospital EMC	[a] Monthly [b] Quarterly [c] Twice in a year [d] Once a year	
25.	Existence of emergency preparedness and response plan	Yes _____ No_____	
26.	Training on epidemic response IDSR	Yes _____ No_____	
27.	Availability of emergency stocks of drugs, supplies and materials for case management of outbreaks	Yes _____ No_____	
28.	Availability of funds for emergency response to outbreaks (VHFs)	Yes _____ No_____	
29.	Simulation exercise to practice/ skill drill	Yes _____ No_____	
30.	Funding Adequate	Yes _____ No_____	

31. Other challenges:

……

……..

……..

31. Recommendations:

……

……..

……..

Thank You

Appendix 3: Sample of Questionnaire for Key Informants

Public Health Emergency Preparedness of Hospitals for Viral Hemorrhagic Fevers in Western Region-2019

Knowledge of VHFs

i. VHF detection, VHF data reporting,

- Mention the various VHFs syndrome……

- Source of knowledge of VHFs

a. During academic training
b. From a colleague
c. Media
d. Workshop
e. Other

ii. Laboratory support and confirmation, Response

- Type of sample to be taken

  a. Blood
  b. Stool
  c. Saliva

- Know where samples of VHF (eg Ebola) are sent for processing

  a. Noguchi
  b. Reference laboratory Korle-bu
  c. Reference laboratory Takoradi

- Disinfectant required for attending to VHFs (eg EVD patient
  a. 70% Ethanol
  b. 100% Ethanol
  c. 0.5% Sodium Hypochlorite
  d. 50% alcohol gel
  e. Other

Preparedness for VHFs (eg. EVD) outbreak by HCW category

b. **Infrastructure capacity**:

i. ***VHF detection,***

- Availability of isolation unit. Yes____ No. _____
- Willingness to attend to a VHFs case Yes____ No. _____

c. **Functionality:**

i. ***Laboratory support and confirmation, Response***

- Qualified Staff to take sample required Yes____ No. _____

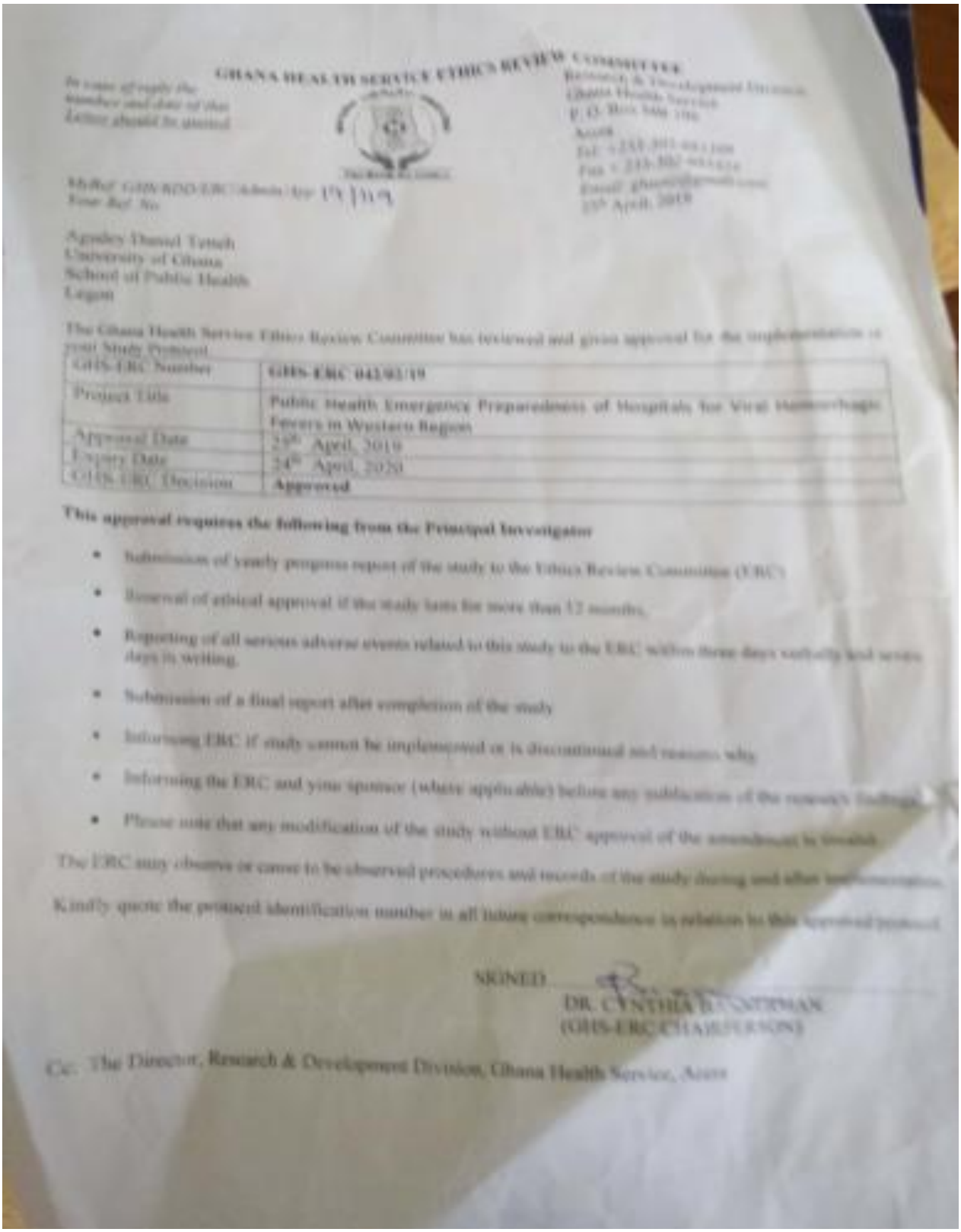
d. **HR Capacity**:

i. VHF surveillance supervision and training & surveillance resources

- Whether health staff is adequately trained or not Yes____ No. _____
- Is the facility is equipped to handle VHFs cases Yes____ No. _____

Thank You

Appendix 4: Ghana Health Service Ethical Clearance



GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

Agnidey Daniel Tetteh
University of Ghana
School of Public Health
Legon

GHS-ERC Number	GHS-ERC 042/03/19
Project Title	Public Health Emergency Preparedness of Hospitals for Viral Haemorrhagic Fevers in Western Region
Approval Date	29th April, 2019
Expiry Date	24th April, 2020
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol.

SIGNED

DR. CYNTHIA B. COTTRMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra