

Ebola preparedness of health facilities in the Greater Accra Region of Ghana

ABSTRACT

Aim: This study sought to evaluate the preparedness of health facilities in Greater Accra, Ghana's second most populated region, for a possible EVD outbreak, and identify issues of policy and public health relevance.

Study design: The study followed a cross-sectional design pattern.

Place and Duration of Study: The study was carried out in Greater Accra over a period of 4 months.

Methodology: 64 health facilities (32 government and 32 privately owned) in eight districts were selected for this study. Data was obtained using a semi-structured questionnaire administered to hospital administrators and analyzed qualitatively.

Results: Four hospitals in two metropolitan areas were considered adequately resourced to admit EVD patients and had protocols for managing disease cases with surveillance and logistical supplies available. Twenty-one other facilities comprising 17 hospitals, 2 polyclinics and 2 health centers were prepared to attend to initial EVD cases before referring suspected cases to the four adequately resourced hospitals. The remaining 39 health facilities (61) had no capacity for EVD management.

Conclusion: Health facility preparedness for handling potential EVD cases is inadequate in the region, mostly among private hospitals. Considering geographical distances, transportation challenges and irregular ambulance services, more health facilities should be resourced for EVD case management.

Keywords: Ebola virus disease; surveillance; response; health facilities; health care workers; Ghana

1. INTRODUCTION

Ebola virus disease (EVD) is a fatal viral disease caused by specific viruses under the genus Ebola virus in the family filoviridae [1]. There are five species of the Ebola virus namely the Bundibugyo Ebola virus, the Zaire Ebola virus, the Fai Ebola virus, the Sudan Ebola virus and the Reston Ebola virus [2]. The main symptoms of EVD include fever, headache, vomiting, diarrhoea, muscle pain, stomach pain, and inexplicable bleeding or bruising. Ebola is confirmed to be transmitted through two main routes: (1) through direct contact with a symptomatic infected patient (e.g. bodily fluids, saliva), and (2) through direct contact with contaminated objects. The disease causes significant morbidity and mortality in human and non-human primates, with human fatality rates reaching 90% during outbreaks of the Zaire subtype with an incubation period between 2 and 21 days [3].

The first documented outbreak of the Ebola virus disease (EVD) started in September 1976, at the Yambuku Mission Hospital near Bumba in Northern Zaire, now the Democratic Republic of Congo [4]. By October 1976, 280 fatal human cases of the known viral hemorrhagic fever had been documented

around Yambuku, with some occurring later in Kinsasha, along with 38 serologically confirmed survivors [4]. The Reston Ebola virus has never been proven to cause disease in humans but only in non-human primates [5], whereas the other four subtypes have been documented to cause human diseases. The Zaire Ebola virus strain particularly has been associated with over half of the entire Ebola virus outbreaks in the past decades [6].

Although all previous EVD outbreaks occurred in Central Africa, a new epidemic began in the West African nation of Guinea in late 2013 and was confirmed by the World Health Organization (WHO) in March 2014 [3]. The disease later spread to neighboring countries such as Liberia, Sierra Leone and Nigeria, with a few imported cases reported in Spain and the United States of America [7]. The magnitude of the outbreak, especially in Liberia and Sierra Leone, was most likely underestimated, due in part to affected individuals being cared for outside the hospital setting early on in the epidemic [8]. From February 2014 until November 2014, the disease claimed over 2500 lives in the West African sub-region, with Sierra Leone and Liberia recording the highest cases [9].

As a neighbour to the countries affected by the recent EVD outbreak, Ghana had (and probably continues to have) a high threat of spread of the virus due to regular human and animal migration. In fact, Ghana was the country with the highest probability of EVD importation in the 2014 outbreak, based on computational simulation using air traffic connection data [10]. Responding to this threat, Ghana's Ministry of Health, in collaboration with the WHO Regional Office for Africa institutionalized measures to ensure the prevention and immediate containment of disease importation to prevent spreading. These measures included: (i) resourcing the regional and district level Public Health Emergency Committees to develop, update and implement reliable epidemic resource plans (ii) training of frontline healthcare staff in safety precautions and EVD disease surveillance, management and public sensitization, (iii) establishment of referral centres for the provision of specialized diagnosis and care of possible cases, (iv) improvement of conditions at primary health facilities to enhance the capacity for initial disease handling prior to transfer of cases to the referral centres and the provision of personal protective equipment (PPE) [11].

It however remains largely unknown the extents to which different categories of hospitals in the country are resourced to respond to potential future EVD epidemics. Thus, this study sought to evaluate the level of preparedness of health facilities in the Greater Accra region of Ghana towards addressing possible EVD outbreaks.

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58 **2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY**

59 **2.1. Study Area**

The study was carried out in eight administrative metropolitan and municipal areas of the Greater Accra region of Ghana. The region is bordered on the north by the Eastern region, on the east by Lake Volta, on the south by the Gulf of Guinea, and on the west by the Central region of Ghana. The Greater Accra region comprises 16 administrative areas. The centre of population of the region is located in the Greater Accra metropolitan area, which comprises the Accra metropolitan, the Tema metropolitan, the Adenta municipal, the Ashaiman municipal, the Ledzokuku municipal, the Ga East municipal, the Ga West municipal, and the Ga South municipal assemblies [12].

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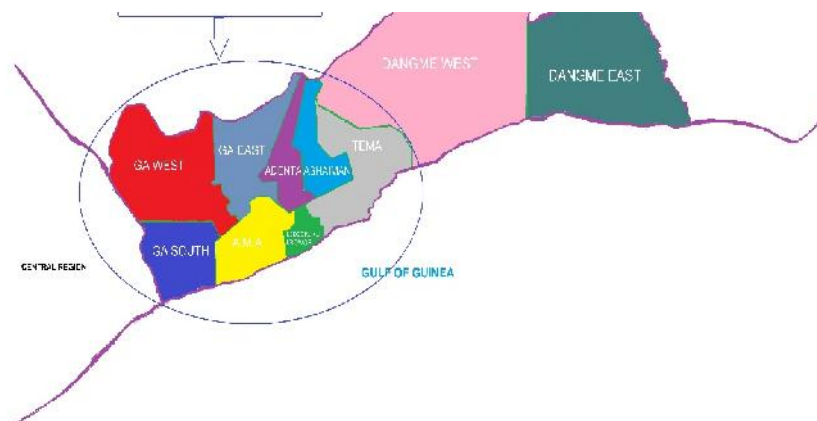


Fig 1: A schematic illustration of the geographical distribution of the municipal and metropolitan areas where the study was conducted.

2.2 Study Design

The study design followed a cross sectional survey pattern, selecting 8 out of the 16 administrative districts in the region. Using strategic random sampling technique, eight hospitals (comprising four government - and four privately-owned) were selected from each participating municipal within the Greater Accra region. In total, sixty-four (64) hospitals were selected for the study.

2.3 Data collection

A well-structured, closed ended questionnaire was administered to each participating hospital administrator to record demographic characteristics followed by knowledge of EVD. It was a face-to-face interview system that lasted a maximum of 45 minutes for each session. The knowledge section included questions related to communicability, symptomatology and diagnostics. The administrators were selected to fill the questionnaire because they were aware of the facilities available at the hospitals and in some cases they were paramedics as well.

2.4 Data Analysis

Data obtained was entered into Microsoft excel 2010 version and later exported into the Statistical Package for Social Science (SPSS) version 24 for analysis.

3. RESULTS AND DISCUSSION

3.1. PARTICIPANTS CHARACTERISTICS

We selected the most populated metropolitan and municipal areas in the Greater Accra region, assuming that the possibility of spread of EVD would be highest in these areas.

A total of sixty-four questionnaires were distributed among health facilities within the eight (8) divisions in the Greater Accra Region as illustrated in the figure below.

100 **Table 1: Distribution of health facilities within the Areas**

Metropolitan and municipal areas	Hospitals		Polyclinics/ Clinics		Health Centers		Total Facilities
	Gover nment	Priva te	Govern ment	Priva te	Governm ent	Priva te	
Accra	4	4	0	0	0	0	8
Adenta	1	1	2	3	1	0	8
Ashiaman	3	4	1	0	0	0	8
Ga East	4	4	0	0	0	0	8
Ga South	1	4	0	0	3	0	8
Ga West	2	3	2	0	0	1	8
Ledzokuku Krowor	3	4	0	0	1	0	8
Tema	4	3	0	0	0	1	8
TOTAL	22	27	5	3	5	2	64

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102 **3.2 SUPPLIES**

103 The majority of respondents from both government and private hospitals (87.5% and 84.4%
104 respectively) stated that PPEs (i.e. masks, gloves, eye protection) were easily accessible to
105 healthcare workers particularly in frontline areas. Among the 55 respondents who confirmed the
106 availability of PPEs, only 11 hospitals (17.2%) admitted to have processes in place for regular checks
107 (i.e. expiry date) on PPE items to ensure their appropriate usage. 19 (34.6%) out of the 55
108 respondents had the full complement of isolation gowns. Most of the respondents (82.8%) reported
109 that even though they had supplies of PPE, they were still uncertain about their ability to combat the
110 disease or care for affected cases.

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3.3 WILLINGNESS TO ADMIT EBOLA PATIENTS

In general, 64 health facilities were included in this study. Four (4) hospitals (6.3%) (3 out of the 32 government facilities and 1 out of the 32 private facilities) were fully equipped to handle EVD cases in the Greater Accra Region. Some hospitals (33%) reported that they would prefer transferring Ebola patients to a regional facility rather than treating them within their own facility. These preferences differed substantially by hospital type and size. The figure below illustrates further.

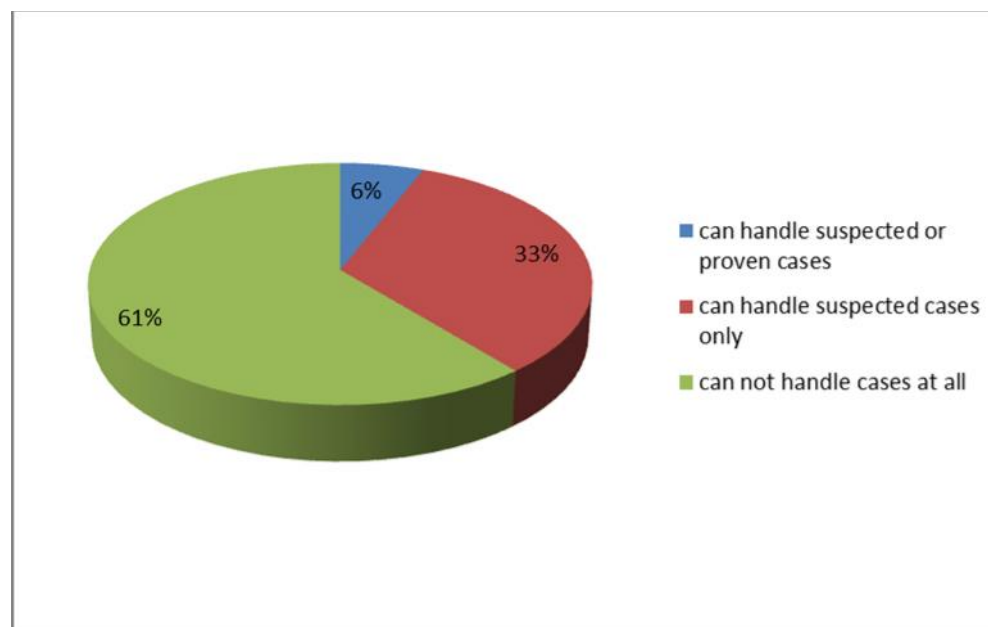


Fig 3: Willingness of facilities to handle EVD cases

3.4. AVAILABILITY OF WRITTEN PROTOCOLS

Most respondents (49 out of 64 hospitals, thus, 76.6%) reported that their facility had written protocol for managing and testing suspected Ebola patients. Out of the 76.6% health facilities, seven (7) facilities (14.3%) reported that they reviewed their protocols very often while twenty four (24) facilities (49.0%) occasionally reviewed their protocol. Nine (9) facilities (18.4%) rarely reviewed their protocol while nine (9) other facilities (18.4%) never reviewed their protocol. Fifteen (23.4%) of the health facilities had no written protocol in place for the assessment of EVD cases.

3.5. EBOLA HEALTH CARE TEAM AND GUIDLINES

29 (45.3%) health facilities had specific team of healthcare personnel to care for Ebola patients while 35 (54.7%) lacked such personnel. The difference between the two groups was observed to be statistically significant ($P < 0.001$). The majority of facilities (52; 81.25 %) were aware of national guidelines in place for implementation of appropriate measures upon the notification of a suspected case of EVD and 15 facilities had developed their own internal guidelines in addition to the national guidelines.

3.6. COMMUNICATION

Communiqués that provided information on Frequently Asked Questions (FAQs) in response to the EVD outbreak had been implemented in all the four (4) hospitals that admitted EVD suspected cases and in all the twenty-one (21) facilities that will refer EVD cases. Visual tools such as PPE teaching posters and videos in respective languages were available and had been disseminated in these facilities. Internal communication mechanisms were also in place providing regular updates to healthcare workers.

3.7. TRAINING ACTIVITIES OF HEALTHCARE WORKERS

Information on training activities to ensure that healthcare workers were informed about standard precautions and information relating to visitors that visit health facilities and their awareness of cough etiquette and hand hygiene were assessed. Preparedness activities in response to the EVD outbreak incorporated education and training. 14 out of 25 hospitals that would manage EVD patients had plans in place to conduct regular in-house training, to ensure that the necessary systems were put in place. Evidence of training activities to ensure healthcare workers were informed about standard precautions was observed in all of the facilities enrolled in the study. Table 2 below further illustrates.

Table 2: Prevention Strategies for Health Care Workers and Visitors to Health Facilities

Vigilance and awareness of healthcare workers and visitors to Health facilities	Facilities that would admit and treat EVD patients (Have Functional isolation units) (4, (6.25%))		Facilities that would refer EVD patients (Not having functional isolation units) (21, (32.81%))		Facilities that cannot handle EVD patients (39, (60.94%))	
	In place	Action Needed	In place	Action Needed	In place	Action Needed
There is evidence of training to ensure all healthcare workers (HCWs) know about standard precautions and isolation precautions	4	0	21	0	39	0
HCWs are aware of cough etiquette and hand hygiene	4	0	21	0	39	0
Patients are aware of cough etiquette and hand hygiene	4	0	21	0	39	0
Visitors are aware of cough etiquette and hand	4	0	21	0	39	0

hygiene						
There are training teams in place who can rapidly train all staff in hospital on infection control	4	0	21	0	31	8
Training and exercises are conducted periodically to ensure staff competency and safety in use of PPE	4	0	21	0	37	2
Where applicable, training and competency assessment is planned for staff handling human waste management e.g. the use of the autoclave machine	4	0	21	0	35	4

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158 For the purpose of comparing the preparedness of facilities within both the government and private
159 health sector in the handling of suspected Ebola cases, nine (9) cardinal parameters were selected.
160 The table below gives an illustration of information gathered.

161 **Table 3: Preparedness of Government and Private Health Facilities in Respect of EVD.**

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Comparison of Preparedness	Government (n = 32) (%)	Private (n = 32) (%)	P-value (<0.05)
Ebola Preparedness	78.13	37.5	0.0010
Outbreak Management Team Available	56.25	25.0	0.0109
Protocol for Management of EVD Available	56.25	34.38	0.0789
PPE Education Available	75.00	34.38	0.0011
Equipped for EVD Outbreak	71.88	37.50	0.0057
Ebola Care Supply	53.13	18.75	0.0042

Admit EVD Suspected Cases	25.00	9.38	0.0000
Have Intensive Care Units	15.63	6.25	0.0001
Have Microbiology Laboratory	18.75	6.25	0.0004

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164 This survey showed a substantive degree of preparation for the screening, diagnosis, and
 165 management of EVD cases with the larger hospitals reporting a higher level of preparedness.
 166 Regardless of the number of respondents that indicated that they would prefer to transfer Ebola
 167 patients to specialized treatment centres rather than care for them at their facility, some showed
 168 further preparation efforts indicating recognition of the importance of their ability to effectively prepare
 169 as well. The government is stepping up efforts at containing any Ebola case that may rear its head in
 170 the country. Four operational isolation centres' were noted during the study in Greater Accra. The
 171 Isolation centres had facilities such as wards, changing rooms for male and female infected persons,
 172 change rooms, a cadaver holding bay, among others.

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174 Ghana has a fragile health systems, with majority of medical staff concentrated in the Greater Accra
 175 region [13]. The surveillance system is also fragile, with challenges identified in collection, analysis
 176 and reporting of data and intelligence. The Ebola virus is of great risk to health care workers. It is a
 177 serious nosocomial disease which requires strict infection control procedures. Contact with body fluids
 178 of an infected person is probably the major mode of spread. Ghana has a peculiar risk in view of the
 179 combination of a varied number of factors which have the potential to facilitate importation of the virus
 180 and trigger an outbreak, one of which is the intense traffic between Ghana, Nigeria and Liberia, as
 181 well as with other neighboring countries. It is estimated that on the average, 30 flights land and depart
 182 from the Kotoka International Airport on a daily basis, transporting around 4,000 to 10,000
 183 passengers on daily basis. Air, land and sea border crossing are frequent. An estimated 57 approved
 184 entry points are used daily, and the number of unauthorized crossing points is estimated to be higher
 185 than the approved ones. There are measures for screening at the borders / points of entry. The
 186 resources needed to manage the entry borders are; staff for public health issues and case
 187 management, resources for screening (material and logistic), isolation unit, quarantine facilities, and
 188 ambulance on standby at the heavy entry points. The resources needed to manage the nations'
 189 borders such as staff for public health issues and case management, resources for screening
 190 (material and logistic), isolation unit, quarantine facilities, and ambulance on standby at the heavy
 191 entry points, should be made readily available.

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193 Education is the most effective means to prevent the spread of the Ebola virus. One of the problems
 194 in past outbreaks was lack of knowledge. It is therefore important for the public to understand the
 195 disease and its mode of transmission in order to curb it. The Centre for Disease Control and
 196 prevention enhanced its guidelines for care of patients with viral haemorrhagic fever in 1995 and has

been working to implement these practices in small rural communities all over the world [14]. Ebola Virus Disease (EVD) is inevitable and will continue to emerge in communities in Africa and perhaps around the world. This is a disease that can be contained with the first few victims. People first have to recognize the disease early so that it does not spread.

Although the current outbreak has ended in most countries in West Africa, we must not forget that many features of this tragic outbreak strongly reinforces the benefit of continued investment in global health security efforts. Preparedness, vigilance and community awareness will be crucial to the success in the fight against complex public health crises like Ebola. The public and medical personnel should be aware of the early signs and symptoms of the Virus. They should know the measures that should be taken in order to prevent themselves from acquiring and spreading the disease.

4. CONCLUSION

This study revealed that the general preparedness levels for management of potentially suspected cases of Ebola virus disease are only partially adequate in hospitals. Hospitals designated for admitting EVD suspected and proven patients had more frequently implemented Infection Control Preparedness activities than hospitals that would subsequently transfer potential EVD cases to other centers. The government hospitals were evidently adequately resourced and more prepared especially in terms of facility availability than the private hospitals. This calls for a framework aimed at future efforts to improve the general preparedness of hospitals in Greater Accra and other regions as the case may demand.

CONSENT

"All authors declare that 'written informed consent was obtained from the Hospital Administrators for publication of this experimental report and accompanying images".

ETHICAL CLEARANCE

The study was granted permission by the Greater Accra Regional Directorate of the Ghana Health Service. All participants provided their consent prior to participation.

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