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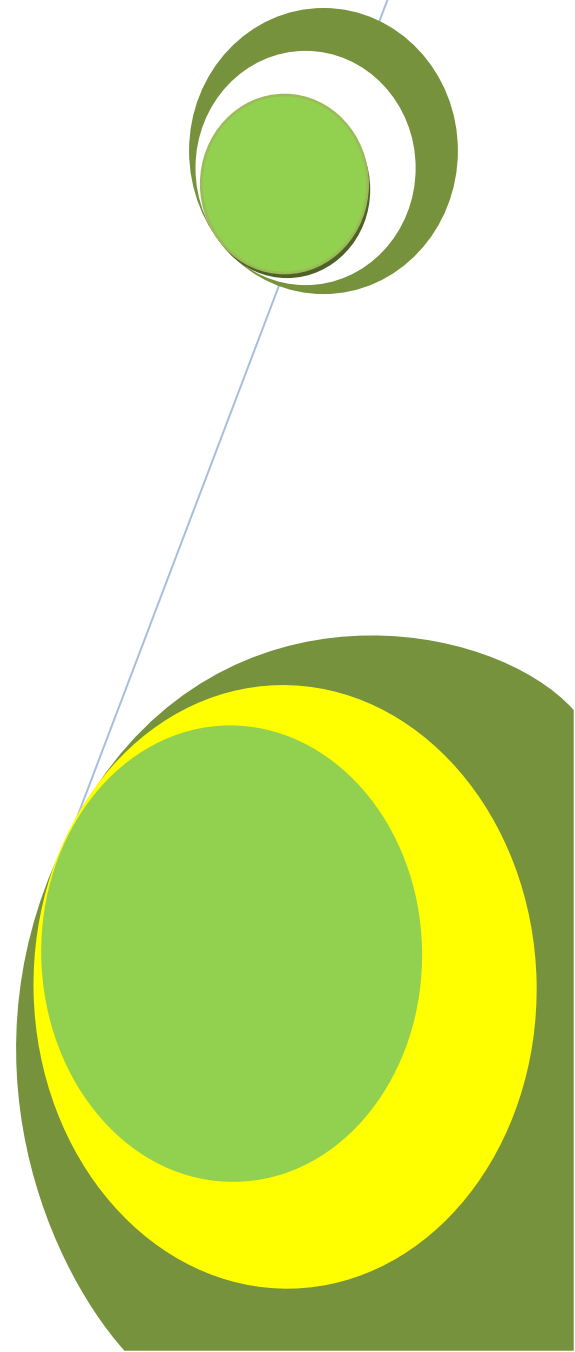
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How Prepared is Cameroon in the Wake of the Current Ebola Outbreak: Drawing Experiences from the Recent West African Outbreak Crisis

By

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How Prepared is Cameroon in the Wake of the Current Ebola Outbreak: Drawing Experiences from the Recent West African Outbreak Crisis

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ABSTRACT

The Ebola Virus Disease is of global concern due to the virulent nature of the virus with a case fatality rate varying from 25% to 90%. In a bid to protect her citizens, Cameroon took measures to prevent the virus from invading its territory during the West African Outbreak of 2013-2015. This research had as objectives to assess the extent to which recommended Ebola control measures are being implemented at the Points of entry (PoEs) and health facilities in the South West Region of Cameroon. An observational, cross-sectional descriptive study was employed. The study sites included PoEs in the South West Region and their corresponding health facilities and the Douala International Airport. A direct observation checklist was used to collect quantitative data at study sites. An in-depth interview with 11 focal persons for Ebola at the PoEs and health facilities was conducted to collect qualitative data. Fifteen PoEs were assessed and majority of the PoEs had $\leq 20\%$ of the required control measures: 7(77.78%), 14(82.75%), 3(60%) and 2(40%) respectively for required screening control measures, appropriate infrastructure and supplies, personnel competence and IEC control measures. Similarly many health facilities had $\leq 20\%$ of required control measures: 2(22.22%), 9(52.95%) and 2(40%) respectively for required screening control measures, appropriate infrastructure and supplies and personnel competence. Therefore we conclude that the control measures instituted at both the PoE and Health Facilities were sub-optimal and needed re-enforcement.

KEYWORDS: Ebola Virus Disease, Surveillance, Control Measure, Points of Entry, Health Facilities.

1. BACKGROUND

The Ebola Virus (family filoviruses) is helical, non-segmented, negative, single-stranded RNA virus, which is polymorphic with variable lengths. Ebola Virus Disease (EVD) formerly known as Ebola hemorrhagic fever, is caused by the genus Ebola Virus (*Filoviridae* family) of which are five different species: *Zaire ebolavirus*, *Sudan ebolavirus*, *Reston ebolavirus*, *Tai Forest ebolavirus* and *Bundibugyo ebolavirus* [1,2,3]. The EVD is said to have been first detected in 1976 in Africa with two simultaneous outbreaks recorded in Nzara-Sudan, and Yambuku-Democratic Republic of Congo in a village near the Ebola River from which it derived its name. There have been 34 outbreaks all over the world since its detection in 1976 [4].

On the 21st of March, 2014, the Guinean Ministry of Health (MOH), notified the international community of the outbreak of Ebola. This was closely followed by the Liberian MOH (two weeks later) and the Sierra Leone MOH (six weeks later) [5,6]. It was now certain that an outbreak was in West Africa and had been already labeled by WHO as the largest and most complex of the Ebola outbreaks recorded since its discovery in 1976 [5]. The *Zaire ebolavirus* was incriminated as the cause of the outbreak in West Africa and it was of global concern because there exists yet no proven treatment (though a range of potential treatments including blood products, immune therapies are currently being evaluated) and no licensed vaccine (2 potential vaccines are undergoing human safety testing) [5,7].

The origin of the Ebola Virus is uncertain, but it is harbored by its natural host-the fruit bats [8]. These bats can migrate from country to country and across continents. The virus is introduced to humans directly or indirectly by the close contact with secretions (blood, sweat, saliva, urine, semen, stools, vaginal secretions etc.) or bodies of infected persons, corpse of an Ebola patient or even eating poorly prepared fruit bats or other contaminated animals

such as chimpanzees [9,10]. Also man or other animals can be infected by eating infected fruits. Human to human transmission is responsible for the high transmission rates [9]. The *Zaire ebolavirus* holds an estimated case-fatality ratio ranging from 25% to 90% and out of the 20,331 cases recorded from December 2013 to February 2015, 7,905 were reported dead [1,11,12].

In order to ensure proper management and effective outbreak control, numerous and comprehensive interventions constituting a package have to be considered. These include: activation and testing of emergency plans; strengthening case management capacities; strengthening infection prevention and control (safe burials, proper waste management, proper use of PPE, avoid contact with infected persons/animals etc.) capacities, strengthening active surveillance and contact tracing, strengthening laboratory diagnostic capabilities, and enhancement of public information and social mobilization [2,13,14,15]. Community engagement is also an issue of prime importance as it is paramount to the success of all the other control measures. It is also important to have in mind that no single intervention by itself can bring the EVD under control, but as the adage goes, “a journey of a thousand miles begins with a step”, it is necessary to start somewhere. This research thus focused on assessing the extent of surveillance at the Points of Entries (PoE) and the corresponding health facilities of these PoEs in the South West Region of Cameroon.

2. PROBLEM STATEMENT AND OBJECTIVES OF THE STUDY

The West African EVD persisted over a long time and recorded a high toll of death rates despite all measures that were put in place. Just when there was a glimmer of hope, the highly affected countries again experienced a surge of incidences in the first week of February 2015 with Sierra Leone recording the highest cases of 80 followed by Guinea with 39 and Liberia with 5 [16]. This reoccurrence of the EVD only confirmed that the EVD response still had significant challenges. It was thus imperative for countries especially “at risk” countries to strengthen their monitoring and preventive measures. Cameroon by virtue of the fact that it shares boundaries to Nigeria (which had some cases and a few deaths) and is located in the mapped out area predicted to be “at risk” of emergence of the EVD was not exempted [17]. In October 2014, during a WHO consultation meeting in the Republic of Congo, the following countries were labeled “at risk” and considered as “high priority” when targeting preparedness interventions: Benin, Burkina Faso, Cameroon, Central African Republic, Cote d’Ivoire, Ethiopia, Gambia, Ghana, Guinea Bissau, Mali, Mauritania, Niger, Senegal, and Togo [18]. In an effort to prevent the virus from spreading into Cameroon, control measures were instructed for implementation at the points of entries and health facilities of the South West Region. It was thus interesting to assess these control measures to find out what was being done at these PoEs and corresponding health facilities at PoEs in the South West Region of Cameroon. It was against this backdrop that this study sought to assess the measures put in place at the Point of Entry and corresponding health facilities to prevent the transmission of the Ebola virus outbreak by assessing the extent to which recommended Ebola control measures were being implemented at the PoEs and the corresponding Health facilities at the PoEs in the South West Region of Cameroon.

3. METHODOLOGY

Study Design

An observational, cross-sectional descriptive study was employed.

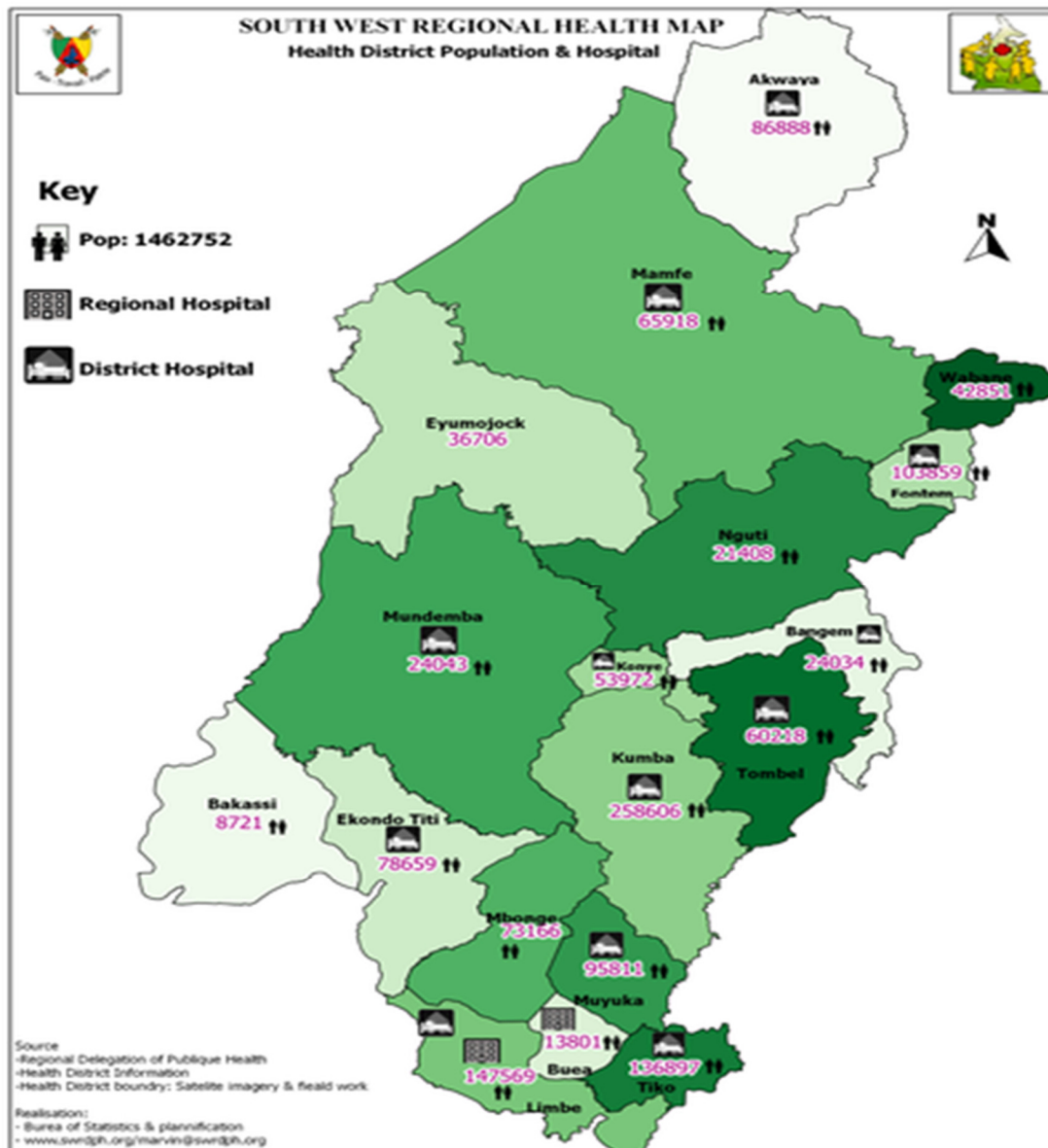
Study Area and setting

The South West Region of Cameroon has Buea as headquarter with a land surface area of 25419 square km and a population of 1,316,079 inhabitants. The region has six divisions managed by the Governor and eighteen health districts (this comprises several health areas) headed by the Regional Delegate of Public Health. A health district is headed by a District Medical Officer (DMO).

It is bordered by the North West Region to the North, Nigeria to the West, the Atlantic Ocean to the South, Littoral Region to the South East and the Western Region to the North East.

Trade between Cameroon and Nigeria is in good terms and the points of entries at the borders are used as business routes.

The study took place at the border towns of the South West Region located along the west border line in the health districts of Akwaya, Eyumojock, Mamfe, Mundemba, Bakassi, Ekondo Titi, Limbe and Tiko



Akwaya, is bordered by three Nigerian states: Cross River, Benue and the Taraba states. Twelve villages in Akwaya (Ngali, Kajinga, Amana, Kalimu, Matene, Okerika, Ojini, Hieve, Mavash, Bagundu, Injobo and Macy) are along this border line of the three states. Many unofficial routes run into the Health District from these states with the means of transport being the motorcycle and by foot. The people of Akwaya, Ekok, Mundemba and to some extent Eyumojock interact very closely with those of neighboring Nigerian States. In fact intermarriages amongst people from these towns and the neighboring Nigerian states is common, with some Nigerians living in these towns and vice versa. Also, the Nigerian currency (Naira) is used in these Cameroon border towns and the Francs CFA is also used in the neighboring towns of Nigerian states as medium of exchange. It is common for people to commune between the two countries on a daily basis as they have relatives on both sides. In fact on Sundays you would see Cameroonians cross the border to attend church in Ikom and vice versa. On Mondays it's the Ikom Market day and Cameroonians move into Ikom to buy and trade likewise the Ekok market day. The only possibility of going to Ekok from Akwaya is through Nigeria.

Study Population and Sampling

The study population included the PoEs to Nigeria in the South West Region of Cameroon the corresponding health facilities in the Health Districts containing the PoE. The focal persons for Ebola surveillance in these

Health Districts were also included. The sample thus included all PoEs, the Douala international airport (the Douala International airport is included because though found in the Littoral Region, it is a major and international PoE bordering the SWR and thus Nigeria), the Limbe Regional Hospital, all the District Hospitals of the border towns and the health facilities closest to the points of entries in the South West Region. A purposive sampling of health facilities was done. Focal persons were identified at Health Districts from the District Medical Officer (DMO) or Chief of Bureau Health (CBH).

Data Management and Analysis

The variables analyzed were: availability of screening post, screening of all travelers, availability of public health screening questionnaires, availability of temperature measurement tool, type of temperature measuring tool, further assessment of potential EVD patients, availability of an emergency plan, availability of focal personnel, availability of an allocated area for health assessment in an event of suspected case, availability of quarantine area, availability of Standard Operating Procedures (SOPs) for referral to designated health facility, SOPs for management of data collected from screening, SOP for management of linens/supplies/equipment of people under investigation, SOPs for management of sharps, SOPs for handling laboratory specimen, SOP to share relevant information among stakeholder, availability of ambulance, availability of stand-by emergency number, availability of referral forms, availability of trained personnel, proportion of personnel who are actually trained, availability of personnel protective equipment (PPE), availability of disinfectants, availability of communication phones, availability of passenger locator forms on board flights and boats, availability of communication on Ebola to arriving and departing passengers.

Analyses were by quantitative and qualitative methods and a triangulation of both methods.

Qualitative analysis was done by analyzing in-depth interview data. Data from in-depth interview was summarized immediately after each day of interviewing, transcribed and identifying information removed. After each night of transcription, reflective notes were written down with the aim of looking for potential themes among the participants. This redirected subsequent interviews towards better organized, focused and refined themes. At the end of all the in-depth interviews and transcription, the transcribed data was reviewed line by line in detail and concepts which stood out strongly were assigned a code. Further codes were assigned to reflect concepts that emerge; and given an already created code to sentences that illustrate an earlier coded concept.

To determine if a code has been appropriately assigned, we compared text sentences with sentences that had been previously assigned the same code to see if they reflect the same concept. The codes which have same concepts were reduced into one broad code. The broader codes were further reduced into patterns, related categories and themes. A network of themes was made to understand links and relationships between the categories and themes. This final analysis was given together with transcribed text for peer (a fellow mate) review to see if they agree on attained links, relations and arguments.

Quantitative analysis of checklists was done to characterize the Points of entry by describing them with respect to PoE type, size (by approximating the number of persons who move into PoE/day) and whether official or unofficial.

Checklist data was analyzed quantitatively to assess the effectiveness/extent of the implemented recommended measures. Collected data was imputed into excel sheet and imported into Stata/ic 10.1, tables of variables were run to have proportions of available variables. Tables of results were drawn to present the proportions of the various control measures available at the PoEs and health facilities.

The results obtained from the in-depth interviews were compared to that from the checklist to assess how well the statistical findings of the checklist complement the qualitative evidence of the interviews.

Ethical Considerations

Ethical approval was gotten from the Faculty of Health Science Institutional Review Board (FHS IRB). Authorization to conduct research at the selected points of entry and associated facilities was taken from the Faculty of Health Sciences (University of Buea), Regional Delegations of Public Health of South West and Littoral Regions, and the directorates of the various PoE. The researcher explained to the concerned persons and participants the aims and objectives of the study. Participants (focal persons) were made to understand that participation was voluntary and they were given a chance to ask for any clarification about points on which they had not understood before signing a written consent form. They were assured that minimal risk were involved in the study and that the information they provided will aid to raise awareness on the country's strengths and weaknesses as regards preparedness at entry points. They were also assured that information collected in the course of the study will be kept confidential; ID numbers were used with no names revealed. Consent forms were signed by participants only after full understanding of the study.

4. RESULTS

4.2. In-depth Interviews

11 (91.67%) focal persons were interviewed and the “Preparedness of PoE/Health Facilities” and “control measures in place” were explored as themes.

Preparedness of PoE/Health Facilities

During the interviews, all the participants stated that the health facilities/PoE were not prepared to properly survey and manage the Ebola crisis. Respondent #5 illustrates this by saying:

“... I'll want to say that I don't think the district is very well prepared to handle an Ebola outbreak considering that Cameroon is bordered by Nigeria (...which is also in the high risk zone), a country that reported more than a case for Ebola. When you look at these border areas there is nothing that has been put in place there to help fight the invasion of this virus into the district and then in terms of training we as health personnel have not had any official training...”

Control measures instituted at site

There was a considerable positive feedback on IEC as this was the first measure which was quickly listed by all the participants-though at varying degrees of intensity. Most of them stated that there were massive IEC activities in the various communities containing the PoEs. As expressed in respondent # 4 and 7 words respectively:

“Sensitization was done in taxis' churches, meetings, on farms, in fact, in every avenue you could find people. This was very important because of the gross misconception in the population concerning Ebola and issues about the EVD. The issue of use of salt to bathe as a preventive measure was getting out of hand. There was panic and people were packing and leaving, even the officials had to be educated. This mass sensitization reduced the panic and fear”

“...We went to churches-all the churches, market places, and meeting houses to inform people of the signs and symptoms of Ebola. And we try now to urge our drivers not to carry corpses or sick patients without wearing gloves and mask. Then the consumption of bush meat was also stopped here...”

However, though they all acknowledged that there had been IEC activities, a handful of them confessed that the IEC activities were not that exhaustive. Some focal persons even stated that they had only posted charts containing Ebola information at health facilities and a few public places; and a “one-time talk” on Ebola at the village market square.

All the assessed health facilities had a screening post and all in-coming clients were screened, but on second thoughts one is tempted to ask if these screenings were conducted as a normal routine or were they intended to screen for potential EVD. On the other hand, some PoEs had a screening post but the majority did not. Interestingly, even at the PoEs with a screening post, the screening of incoming travelers was inconsistent. Respondent #3 explained this as follows:

“Some interventions were put in place but there was no consistency e.g. screening could be done in the morning and because only one person was involved, she would go to take a rest in the afternoon. During this break, many more people would pass without being screened”

No official screening questionnaire was used at all the sites. In fact, in places where collected data was recorded, the data was limited only to: arrival and departure destinations, fever status, and phone number and even so, these sites had no proper established measures to manage the collected data. But some respondents pointed out that had established a system to call and follow-up travelers on their current health status.

At some point in time, the borders were officially closed by the Cameroon Government, but this posed other problems as other multiple illegal and unreported entry points were created by the locals of all the border town communities.

“Government closed it (pause) but then the pressure from the local population was so high on the commissioner so much so that he had to open the border for people to go and get things from the other side. ... they even broke the barrier that was put around the borders and people went to Nigeria, bought things and returned. And even if they say

the borders were closed, (a gentle laugh) it is usually opened on Mondays which is usually a market day of one of the communities around the Nigerian border. Lately, before this news ... that the borders have been re-opened, people were crossing at will with no strict control again. And I should say that the closing of the borders gave room for many other clandestine entry points ... the officials were aware of only a few of these.” (Respondent # 3)

No PoE or health facility were given stocks of PPEs, the few that were given during the ministers' visit to the sites (i.e. a facemask, a thermoflash, disposable gloves and a gown for each site) were for demonstration purposes. Interestingly, only three PoEs still had their “demonstration” thermoflashes which they used as a temperature measurement tool. Respondent #5 states bluntly:

“...I remember we were sent one face mask, one protective wear, and gloves during the minister's visit...”

Respondent # 4 puts it this way:

“... there were no PPEs, you know you can get Ebola from someone's sneeze. You cannot help someone while risking yourself. So some personnel didn't show up for work...”

All participants confirmed they had had some training on Ebola and were quick to further explain that the training was limited to causes, prevention and case identification of Ebola. The un-seriousness attributed to this training is evident in the fact that the training came in as an interlude during a normal regional meeting at the Regional Delegation of Public Health as expressed by all focal persons. The Regional Rapid Intervention Teams were to be officially trained and stationed at the district awaiting any emergencies. In an event of an emergency, they would be dispatched to the concerned sites. From all the worries gathered from the participants, they had been awaiting a proper training of the full package of causes, prevention, and case identification and management of Ebola. Respondent #2 expressed the dire issue as such:

“I am a focal person but ... a focal person should be well trained and of course I do not consider that speech during the Regional meeting as a training. We just heard over the radio that some people have been selected for training on how to handle emergency (which was called the rapid intervention team) but no training was conducted.”

Nine (81.82%) respondent confirmed that quarantine units for potential Ebola cases had been created, but a hand few expressed doubts as to where exactly these were found. Some even pointed out that the Quarantine Units were single unequipped rooms which often had poor hygienic (no toilet, and no regular water supply) conditions. These views are further expressed by respondent # 5 and 7 respectively.

“During the minister's visit, a quarantine unit was created just around the council ... within the town ... but immediately after the visit, talks about it died down.”

“When plans to open a quarantine unit, it should also contain plans for the unit to be equipped ... provide the person who is in charge with materials so that the person also cannot be contaminated”

Only two (18.18%) focal persons had the WHO float phones for 2-way emergency communication. The majority (81.81%) had to use their personal phones in an event of an emergency. When asked if they had been given an emergency number to call in such scenarios, they all referred to the District Medical Officers (DMOs) number.

None of the focal persons had a clearly stated referral procedure in the event of a suspected case. They all stated that in such situations the DMO who knew exactly what to do will be called. Again no PoE had a standby ambulance, the DMOs car was to be used to transport or refer suspected/potential cases. Concerns on this is further stressed by respondent # 4:

“... though there are no equipment the DMO knew what to do. The DMO kept reminding me that if there is any suspected case, we should isolate the case while awaiting instructions. There was no quarantine area at PoE ... no stand-by ambulance but my number and the DMOs number was on the wall of the post to be called in any emergencies.”

4.3.1 Checklist Assessment of the extent of recommended Ebola control measures at PoEs

Overview of Control Measures at PoEs

Thirty control measures were assessed at fifteen identified PoEs, eleven (36.67%) of these control measures recorded 0% availability at all 15 PoEs and seventeen (56.67%) control measures recorded availability at PoEs in varying proportions.

Proportion of Screening control measures available at the at PoEs (Table 1)

Nine control measures were in this category and described the required screening activities at the screening post. Four (44.44%) of these control measures (Screening of all persons, Temperature assessment, Further assessment of potential EVD patients, Emergency plan at PoE) recorded 0% availability. Five (55.56%) of the screening control measures recorded varying proportions of availability with four (80%) of these (surveillance question, screening post, Thermometer type, and triage system at emergency department) recording less than 40% availability.

Table 1: Proportion of Screening control measures available at the at PoE and HFes

Control Measures		N (PoEs)	%	N (HFes)	%
Surveillance Questionnaire?	No	14	93.33	11	100.00
	Yes	1	6.67	0	0.00
Screening post?	No	11	73.33	3	27.72
	Yes	4	26.67	8	72.73
Screening of all persons?	No	15	100.00	2	18.18
	Yes	0	0.00	9	81.82
Temperature assessment?	No	15	100.00	2	18.18
	Yes	0	0.00	9	81.82
Thermometer type?	Traditional	13	86.67	7	63.64
	Thermoflash	2	13.33	4	36.36
Further assessment of potential EVD patients?	No	15	100.00	6	54.55
	Yes	0	0.00	5	45.45
Emergency plan?	No	15	100.00	10	90.91
	Yes	0	0.00	1	9.09
Step-down list of Focal persons?	No	3	20.00	4	36.36
	Yes	12	80.00	7	63.64
Triage system at emergency department?	No	14	93.33	4	36.36
	Yes	1	6.67	7	63.64

Proportion of Infrastructure and Supplies control measures available at the PoEs (Table 2)

Eleven control measures were in this category. These described availability of the appropriate infrastructure and supplies to the PoEs. Of these, one (9.09%) (SOP for specimen handling in lab pasted on the wall) was not applicable at the PoEs. Five (45.45%) of these (SOP for special handling of Linens/supplies/equipment of persons under investigation or confirmed as case, SOP for handling of sharps, Stand-by Ambulance, Stated structured referral procedures for confirmed cases, PPE available) recorded 0% availability. Five (45.45%) recorded availability in varying proportions, with four (36.36%) scoring <40%.

Table 2: Proportions of Infrastructure and Supplies control Measures at PoEs and HFs

Control Measures		N (PoEs)	%	N(HFs)	%
Quarantine area/room?	No	12	80.00	5	45.45
	Yes	3	20.00	6	54.55
SOP to refer ill travellers to designated management centers?	No	10	66.67	5	45.45
	Yes	5	33.33	6	54.55
SOP to manage data collected from Screening?	No	13	86.67	7	63.64
	Yes	2	13.33	4	36.36
SOP for special handling of Linens/supplies/equipment of persons under investigation or confirmed as case	No	15	100.00	7	63.64
	Yes	0	0.00	4	36.36
SOP for handling of sharps?	No	15	100.0	5	45.45
	Yes	0	0.00	6	54.55
SOP for specimen handling in lab pasted on the wall?	No	0	0.00	7	63.64
	NA	15	100.00	4	36.36
SOP to share relevant health data between key stakeholders?	No	8	53.33	4	36.36
	Yes	7	46.67	7	63.64
Stand-by Ambulance?	No	15	100.00	5	45.45
	Yes	0	0.00	6	54.55
Stated structured referral procedures for confirmed cases?	No	15	100.00	11	100.00
	Yes	0	0.00	0	0.00
PPE available?	No	15	100.00	11	100.00
	Yes	0	0.00	0	0.00
Disinfectant available?	No	14	93.33	11	100.00
	Yes	1	6.67	0	0.00

Proportion of competent personnel available at the PoEs (Table 3)

Five control measures were in this category and described the proportion of medical or paramedical personnel mobilized for Ebola surveillance at PoEs and the type of training they received. Two (40%) of the required control measures (Staff trained on proper specimen collection procedures for testing and staff trained on gowning and donning of PPEs) recorded 0% training at all the PoEs. Three (60%) control measures recorded training in varying proportions with each $\leq 40\%$.

Table 3: Proportions of Competent Personnel Available at PoEs and HFs

Control Measures		N(PoEs)	%	N(HFs)	%
Number of medical and paramedical staff trained and mobilized for Ebola surveillance	0 to 5	13	86.67	7	63.64
	≥ 6	2	13.33	4	36.36
Staff trained on proper specimen collection procedures for testing?	No	15	100.0	11	100.00
	Yes	0	0.00	0	0.00
Staff trained on causes, signs and symptoms and prevention of the EVD	No	9	60.00	2	18.18
	Yes	6	40.00	9	81.82
Staff trained on EVD case identification and management?	No	9	60.00	3	27.27
	Yes	6	40.00	8	72.73
Staff trained on gowning and donning PPEs?	No	15	100.0	11	100.00
	Yes	0	0.00	0	0.00

Proportion of Control measures on Communication on Ebola Awareness at PoEs (Table 4)

Five control measures (described Ebola communication activities) were in this category. Of these, one (20%) (Ebola information incorporated into educational activities) recorded 100% availability. Four (80%) recorded availability in varying proportions with three (75%) of these scoring <40%.

Table 4: Proportions of Control measures on Communication on Ebola Awareness at PoEs and HFs

Control Measures		N(PoEs)	%	N(HFs)	%
Passenger locator forms on board flights/boats/vehicles?	No	14	93.33	0	0.00
	Yes	1	6.67	11	100.00
System in-place to raise awareness among conveyance operators of the need to immediately notify health authorities prior to arrival of any suspected cases?	No	14	93.33	0	0.00
	Yes	1	6.67	11	100.00
Float phone given?	No	10	66.67	2	18.18
	Yes	5	33.33	9	81.82
Ebola information incorporated into educational activities?	No	0	0.00	3	27.27
	Yes	15	100.00	8	72.73
Is information disseminated among all relevant stakeholders at?	No	2	13.33	0	0.00
	Yes	13	86.67	11	100.00

4.3.2. Checklist Assessment of the extent of recommended Ebola control measures at health facilities.

Overview of Control Measures at Health Facilities

Thirty control measures were assessed at eleven identified health facilities. One (3.33%) of these control measure was not applicable at health facilities, two (6.67%) scored 100% at all 11 health facilities, 6 (20%) scored 0% at all 11 health facilities. 21 (70.00%) were available at the health facilities in varying proportions.

Proportion of screening control measures available at the at Health Facilities (Table 1)

Nine control measures were in this category which described the screening requirements at screening posts. One (11.11%) of these control measures (Surveillance Questionnaire) recorded 0% availability. Eight (88.89%) recorded varying degrees of availability with two (25%) of these (ie Thermometer type, and Emergency plan) scoring ≤40%.

Proportion of Infrastructure and Supplies control measures available at the Health Facilities (Table 2)

Eleven control measures which described availability of appropriate infrastructure and supplies to the health facilities were in this category. Three (27.27%) recorded 0% availability, these included: Stated structured referral procedures for confirmed cases, PPE available and disinfectant available at Health Facilities. Eight (72.72%) recorded availability in varying proportions, with three (37.50%) scoring <40%.

Proportion of competent personnel available at the Health Facilities (Table 3)

Five control measures which described the proportion of medical or paramedical personnel mobilized for Ebola surveillance at Health Facilities and the type of training they received were in this category. The staff were not trained in two (40%) of the required control measures (Staff trained on proper specimen collection procedures for testing and staff trained on gowning and donning of PPEs) and these scored 0%. One (20%) recorded varying proportions of availability with each ≤40%.

Proportion of Control measures on Communication on Ebola Awareness at Health Facilities; (Table 4)

Five control measures which described the required activities of Ebola communication were in this category . Of

these, two (40%) (Passenger locator forms on board flights/boats/vehicles at health facilities and System in-place to raise awareness among conveyance operators of the need to immediately notify health facility health authorities prior to arrival of any suspected cases) were not applicable at health facilities. One (20%) (Information disseminated among all relevant stakeholders at health facility) scored 100%. Two (40%) recorded varying proportions (>40% each) of availability.

DISCUSSION

Integrating and comparing data from in-depth interviews and checklist, clearly evident that some variables were noticeably absent from both the PoEs and HFs and these included: surveillance questionnaire, established SOP for referrals and PPEs. With PoEs and HFs having $\leq 20\%$ of the required screening control measures, potential EVD patients will pass un-noticed thereby exposing many others.

The lack of Ebola surveillance questionnaire at almost all the PoEs and Health facilities to accurately capture and report potential EVD patients only increased the chances of missing these people thereby exposing many more people. Also in case of an outbreak, it may become very difficult to trace these persons during contact tracing. Having in mind that approximately 9% of Ebola infections are health workers, there is dire need to implement/reinforce standard infection control measures during the pre-epidemic phase in all health care settings in order to minimize the risk transmission of the virus from all possible sources [15]. The screening process is further handicapped by a serious human resource shortage at all sites as is clearly evident from both data sources with all focal persons declaring there were not enough personnel at the forefront.

Also, as expressed by all the focal persons, all the mobilized focal persons to the health posts still maintained their duties at the various health facilities. They were therefore caught in-between activities at both the PoEs and health facilities thus the inconsistency in screening at PoEs. This shortage of resources (human and material) discredits the already implemented measures as research has shown that a serious shortage in timely materials is a key factor responsible for “disproportionate” scale of the epidemic in West Africa [2].

As gathered from the in-depth interviews, the closure of the borders caused the locals to create many more illegal PoEs which jeopardized the Ebola surveillance efforts. Secondly, the closure was hardly ever effective as locals of the border towns were allowed to commune between the two states, this gave room for further risk of importation of the virus. The question here is “should authorities be quick to shut down borders in situations like this?” Rather than be quick to shut down borders, it may be more efficient if the authorities will go through the pains to institute control measures at these borders. The cost of dealing with eradication of an outbreak as a result of importing a single case as a result of this mere negligence are far reaching.

Also the in-depth interviews revealed that staff were trained to some extent on signs and symptoms, causes and prevention, and case identification, these correlates with findings from checklist wherein all PoEs and HFs recorded 100% on staff trained on causes, signs and systems and case identification and management. However, staff were not trained on specimen collection and shipment guidelines, and gowning and donning procedures of PPEs. These findings align with Macneil et al’s stipulation that early outbreak detection and management in remote resource limited settlement is largely reliant on basic case identification and infection control strategies [2]. However, knowing that most staff are exposed during the gowning and donning process, it is important that basic procedures as these be taken seriously.

The lack of PPEs and disinfectant agrees with findings of in-depth interviews wherein all participants declared these were not supplied. With health staff not protected, both their lives and those of their clients are at risk and this gives room for many more persons to be exposed.

The unavailability of structured referral procedures for confirmed cases at PoEs and HFs is also a call for concern. With no actual Ebola referral system clearly stated as evident both from in-depth interview and checklist data, health personnel may want to follow the dysfunctional pre-existing referral system which may introduce many delays thus leading to many complications.

The health personnel both at PoEs and HFs were generally not prepared to manage potential/suspected cases given that the staff was not given any training on case management. From the in-depth interviews, Rapid Intervention Teams were to be trained and dispatched to the facilities in an event of a confirmed case. But again, with no PPEs, and no proper screening protocols in place a lot will have happened between confirming a case and dispatching of Rapid Intervention Teams to facility. Take a place like Akwaya which is very hard to reach (poor road network, poor cell network and no lights to charge phones); contacting the authorities early enough may not possible.

In the event of a suspected case, clients will need to be isolated a little longer for secondary screening. Interestingly, 12 (80%) of PoEs do not have provision for isolation units. Data from in-depth interviews indicate that the quarantine units for most of the health districts are located in the city/town far from the PoEs; this gives room for further contamination during the transportation process. Worst still no PoE or HF had a standby ambulance and when asked how they planned to transport potential cases, they were quick to declare that the DMO's (these are actually district owned cars) car will be used. The question is "would this car be available for use in an event of an emergency"?

CONCLUSION

Though much has been implemented at the PoEs and HFs as control measures against Ebola, there still exists a gap comparing recommended measures to implemented control measures implying that the preparation at PoEs and HFs is sub-optimal. This means that even the chances of containing the virus in an event of an outbreak is low. This is because according to Roca et al, models have been made to show that the epidemic can be contained if all the surveillance strategies are employed even if they have an efficacy of 60% each. On the contrary, more efforts will be needed to contain the virus if these are implemented independently even if they had an efficacy of 90% each [2]. This therefore means that efforts should be made in implementing all the required variables and at all the sites of interest.

RECOMMENDATIONS

We therefore recommend that the Regional Delegation of Public Health should:

1. Employ the multi-sectorial approach in the interventions of Ebola and other epidemic prone diseases from the national level to include planning and resources for health emergencies; coordination; accelerated health system and capacity strengthening; improving outbreak operations through stronger logistical systems; and system monitoring, evaluation and testing.
2. Deploy resources and materials/equipment to all the PoEs and health facilities at the "at-risk" Health Districts as early as possible into the disaster preparedness phase in order to prevent shortage of resources at the sites
3. Manage the risks of Ebola emergence by expanding an enhanced surveillance systems to all the PoEs and HFs concerned immediately to detect and report cases of illness compatible with Ebola virus disease, or any other unusual health event possibly associated with the virus. This will ensure a rapid investigation, follow-up and if necessary treatment.

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