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How Effective Are African Health Systems? An Analysis of Guinea, Liberia and Sierra Leone

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Abstract

While developed countries in the rest of the world have found themselves overwhelmed by the Covid-19 pandemic, in comparison, Africa has been minimally affected given that it has reported lower case counts since the start of the pandemic in March 2020. However, given the destructive potential of this pandemic, this raises the question: how prepared are health systems in Africa to face major outbreaks? To answer this question, this article explored the state of health systems and epidemic preparedness in African countries using Guinea, Liberia and Sierra Leone as case studies. Given that these three countries were epicenter countries during the 2014-2015 West Africa Ebola Virus Disease Outbreak, an examination of key response contributions from national governments and local communities was performed. Additionally, data from the 2019 Global Health Security Index was analyzed to determine the current state of epidemic preparedness in the three countries. Positive response strategies were detected across the three countries specifically with the implementation of infection prevention control guidelines by governments and the active engagement of community members in response efforts. In contrast, some gaps remain in the detection, health sector and response capabilities of the three countries regarding epidemic preparedness. This assessment suggests that these positive strategies need to continue to occur in African countries in times of major outbreaks and that special collaborations between stakeholders in Africa and international partners need to take place in order to fortify health systems and better prepare the continent for future epidemics or pandemics.

Introduction

The Covid-19 pandemic was an unexpected and disastrous occurrence in the global economy. Not only did it spread at an unpredictable rate but it has also completely disrupted economies and brought to light the vulnerability of health systems worldwide. As hospitals quickly filled to capacity and protective resources became limited, even developed nations like the United States have discovered that their health structures are no match for this pandemic. If that is the case, what about health systems in Africa? Compared to the rest of the world, Africa has not been as severely impacted by the virus, having reported less than 2 million cases and about 47, 000 deaths as of November 16, 2020 based on data from the Milken Institute's Covid-19 Africa Watch (https://covid19africawatch.org) .

Nevertheless, the continent remains largely unprepared to face major outbreaks like the current pandemic. For instance, Uganda has a nurse to patient ratio of 1:8 (Rosenbaum, 2020; Nuwagira et al., 2020) and there are not enough ventilators in Mali to service its millions of citizens (El -Sadr et al., 2020). It is thus evident that the nature of developing economies and scarcity of necessary resources in Africa raise concerns as to how prepared the continent really is to face major epidemics or pandemics. As such, it is important to examine another major outbreak that has occurred in Africa, namely the 2014-2015 West Africa Ebola Virus Disease (EVD) Outbreak. The EVD outbreak resulted in more than 28,000 infections and substantial increases in health spending in Sierra Leone, one of the countries worst impacted by the virus (see figure 1 in appendix).

The EVD outbreak also significantly impeded economic development in the three epicenter countries of Guinea, Liberia and Sierra Leone. As safety measures were put in place and borders were closed off, interregional trade reduced and public investment was suspended (UNECA, 2015). Additionally, the decrease in productivity that came from industries having to shut down operations resulted in tremendous economic losses in the three countries.

According to the World Bank Ebola Crisis Impact Update (2016), Guinea, Liberia and Sierra Leone lost approximately $2.8 billion in combined gross domestic product. (see figures 2.1, 2.2 and 2.3). Within the context of a major outbreak, such effects have the power to significantly hinder the development progress of not only individual African nations but the continent as a whole.

It is therefore critical to evaluate health systems in Africa and determine how prepared the continent really is to face epidemics or pandemics. The EVD outbreak does not match the scale of the Covid-19 pandemic but given the similar effects incurred from both outbreaks, it provides a good case study. Likewise, even though Guinea, Liberia and Sierra Leone are certainly not representative of the entire continent of Africa, given that they are low-income, developing nations, they serve as a good example for most African countries.

This research will be divided into two parts. The first section will examine the contributions of national governments and local communities to Ebola response efforts in each of the three epicentre countries. The second section will evaluate the state of health systems in the three countries in 2019 years after the Ebola epidemic in order to determine potential lessons learned. These two evaluations will culminate into an assessment that will inform future policymaking regarding epidemic/pandemic preparedness in African economies.

Theory

According to the Ebola Response Roadmap published by the World Health Organization in August 2014 (WHO, 2014), some key strategies to be followed during the Ebola response included: surveillance (contact tracing and monitoring); social mobilization (full community engagement in contact tracing and risk mitigation); case management (Ebola treatment centres with full infection prevention & control (IPC) activities).

The first part of this study will focus on the Ebola response contributions from two key players in society: national governments and local communities. First, national governments are featured because they represent the prime policymaking body in each country. Additionally, in cases of outbreaks, many of their contributions to response efforts are often effectuated in close collaboration with international organizations. In the case of Ebola specifically, international partners such as the World Health Organization (WHO), U.S Centers for Disease Control (CDC) and Médecins Sans Frontieres (MSF) were heavily involved with officials in the formation of an incident management system (IMS) to properly organize and effectuate the necessary response strategies dictated in the Ebola Response Roadmap (Dahl et al., 2016) .

Moreover, in times of outbreaks such as Ebola, health care workers represent a particularly vulnerable sector of the population due to their proximity with patients and the potential lack of sanitary and protective equipment in health structures. Indeed, in Liberia, they were 32 times more likely to contract the virus than the average population (Bemah et al., 2019). It was thus imperative for governments to put in place strategies to protect health care workers as that is a key way to reduce nosocomial transmissions of a virus (infections within a healthcare setting) (Keita et al, 2018). For this reason, special attention was placed by the countries' respective health ministries and their partners to educate front line workers on infection prevention control in order to reduce their risk of contracting and spreading Ebola. This included ensuring that Infection Prevention Control guidelines were properly implemented to ensure the safety of not only patients in health structures but also health care workers.

Secondly, local communities are also included in the study given that strong community systems make up an integral part of the mitigation efforts during an outbreak and they may significantly contribute to the reduction of its spread (Abramowitz et al, 2015). Implementing adequate measures of prevention in local communities that were hot spots for Ebola was necessary to prevent the spread of the disease. However, misinformation and stigmas

surrounding the virus got in the way of that. For instance, some locals believed that they could catch the virus at community care centers and were thus reluctant to report symptoms (Pronyk et al, 2016). Some also believed that upon contraction of the disease, death was guaranteed and so there was no need to even seek treatment. Others were entirely distrustful of national and international public health officials and did not trust their sensitization messages. As a result of all these factors, social mobilization initiatives were paramount to educate locals on Ebola in order to arm them with the right knowledge and resources to combat its spread within their communities. Therefore, social mobilization and involvement from community members are important elements to examine because they can provide insight on the types of preventative measures that were undertaken at a micro-social level of the society and how these may have helped to support the overall response effort.

Previous assessments of the response efforts undertaken in Guinea, Liberia and Sierra Leone during Ebola have been made but these have not been combined with an up to date examination of the epidemic prevention capability for each country. As such, this article will draw on these past assessments to highlight some key response efforts that occurred in the three countries during the outbreak and it will also examine the current state of epidemic preparedness in the three countries in order to draw lessons for future major outbreak response.

Methods

i.   *Overview of response efforts*

A compilation of past assessments of Ebola response efforts in the three countries will be provided. Given the extent of research that has been conducted on Ebola over the years, specific articles have been selected with the goal of providing a general overview of response efforts that took place in the three countries.

ii.   *Epidemic Preparedness*

Data collected from the 2019 Global Health Security Index will be evaluated. The index provides data to gauge countries' epidemic or pandemic preparedness based on the following categories: prevention, detection, response, health, norms and risk. For this analysis, the focus was placed on the detection, response and health categories with respect to Guinea, Liberia and Sierra Leone. The data that follows displays each country's score and global rank for each indicator.

Overview of Response Efforts

Guinea

The Guinean Ministry of Health relied heavily on numerous partners throughout the implementation of its response plans for Ebola. For one, following a re-structuring of the response as an IMS, specific response strategies were identified and categorized under the leadership of a specific group namely: 1) Surveillance (WHO); 2) Care and treatment (MSF); 3) Sanitation (International Federation of Red Cross); Communication (UNICEF) and; Research (a Congolese professor) (Dahl et al., 2016). The CDC also supported surveillance and contact tracing efforts across Guinean prefectures. Another notable aspect of the CDC's contributions was their implementation of a cerclage system(Hersey et al, 2015; Dahl et al. 2016) to contain the virus in Guinean communities. Basically, this approach consisted of public health officials encouraging community members to remain in a designated area (home or village) and thus limit their movements and interactions with the associated contacts of recent Ebola patients in order to reduce the likelihood of them contracting the virus.

As part of the measures put in place to ensure the safety of health care workers, the Guinean Ministry of Health implemented Infection Prevention Control training for non- Ebola focused health centres in a municipality in Conakry. This involved specific health care workers following a rigorous IPC training meant to educate them on Ebola-focused safety practices.

These trained individuals could then later on set up cascade trainings for other health care workers in their facilities. (Chaulagai et al, 2005; Keita et al, 2018). This endeavor proved meaningful as a study performed in the community of Ratoma, Guinea by Keita et al. (2018) showed that health centres with at least two or more IPC-trained staff were eight times as likely to have an IPC score above median while structures with staff trained as a result of cascade training were five times as likely to have an IPC score above median.

At the community level, social mobilization efforts consisted of a group effort from national, international and local partners. For one, the WHO and the CDC were heavily involved in those efforts. With the help of Médecins Sans Frontieres, they went door to door to promote awareness of the virus and encourage locals to report suspected cases (Dahl et al., 2016). Similarly, locals themselves contributed significantly to the efforts. Village leaders and local volunteers were enlisted by CDC to foster a more positive environment and decrease some of the mistrust from local community members. Another example are the communities in the mining town of Siguiri, which was a hot spot for Ebola at the onset of the epidemic in August 2014 (WHO, 2014). In this town where mobilization efforts were led by WHO and the Guinean Red Cross, mining employees were educated on hygiene regulations that they needed to follow to halt the spread of the disease. Likewise, religious authorities were instructed on the importance of conducting safe and sanitary burials. Finally the media, specifically radio announcers, were also utilized to relay necessary information to local audiences.

Liberia

In Liberia, upon advising from the CDC, the Liberian Ministry of Health and Social Welfare replaced the Liberian Ebola Task Force with a more efficient and specified Incident Management System (Nyenswah et al., 2016 ; Pillai et al., 2014). Following the establishment of the IMS, the response was then centered on the following: 1) early detection and isolation of confirmed Ebola patients; 2) safe transport of suspected Ebola patients; 3) support of infection

control to prevent nosocomial transmission; 4) safe burials. An advisory board comprised of officials from WHO, the CDC and the UN Mission for Ebola Emergency Response was set up to ensure proper supervision of the IMS (Dahl, et al. 2016).

The Liberian Ministry of Health also put in place a National IPC Task Force that implemented various infection prevention trainings for frontline workers (Bemah et al. 2019). These included the "Keep Safe, Keep Serving" and "No Touch Policy" for example. Following these trainings, the prevalence of Ebola amongst health workers reduced significantly from 9% in October 2014 to 5% in January 2015 (Bemah et al., 2019).

Secondly, amidst general social mobilization initiatives promoted by international partners in collaboration with the government, as mentioned above, reticence from community members was very common. In Liberia's case specifically, the locals had a good reason to be sceptical of government enforced policies regarding Ebola given the Liberian government's reputation for corruption and civil abuse. In some instances, locals believed that Ebola was a scam perpetrated by the government as a means to collect more international aid (Abramowitz et al., 2017). It is this kind of scepticism that prevented locals from taking their government seriously regarding Ebola and in turn made them even more vulnerable to the disease (Blair et al., 2017; Tsai et al., 2020). To tackle this problem, officials needed to rebuild trust amongst local communities in order to properly educate them on the gravity of Ebola. One way that they were able to do this was through the implementation of mobilization campaigns led by volunteers from the communities (Tsai et al.,2020). The fact that volunteers were residents of the communities themselves not only meant that they shared intimate ties with other residents, but it also made it easy for them to be held accountable by their fellow locals. These factors contributed to the overall success of the campaign as locals became more trusting of the government and were thus more inclined to follow its Ebola related policies (Tsai et al.,2020)

Sierra Leone

In Sierra Leone, the Ministry of Health and Sanitation's (MOHS) approach to infection prevention control was heavily influenced and aided by foreign partners. A national IPC unit was established with the help of the CDC and WHO to impart IPC knowledge and resources to public and private structures to protect health care workers and health structures as a whole (Dahl et al,. 2016). Moreover, another strategy that was put in place by the MoHS (with the help of WHO, CDC, the UK Department of International Development and others) to promote safety in health facilities was the CDC's Ring Infection Prevention and Control strategy (Nyenswah et al., 2015; Dahl et al., 2016). With its sanitation and screening practices, this method further protected health care workers and helped contain the spread of the virus.

Another noteworthy aspect of the response in Sierra Leone was the use of digital contact tracing. Specifically, the digital platform CommCare allowed for more efficient storage and management of real-time data regarding contacts of confirmed Ebola patients (Sacks et al., 2015; Danquah et al., 2015). Despite challenges with regards to the design and implementation of this digital contact tracing system, it proved to be a valuable data resource within the context of the outbreak (Danquah et al., 2015). Furthermore, local communities in Sierra Leone benefitted from the establishment of community care centers, which provided them with not only basic Ebola care but a trusted resource for the reporting of suspected cases (Pronyk et al., 2016).

Epidemic Preparedness Capability

The following tables present the scores and global rankings of each country for specific indicators regarding their prevention capabilities for epidemics. The results vary greatly. Guinea holds a perfect score for laboratory capabilities and all three countries have fairly good scores for access to communications infrastructure. Nonetheless, some areas still in need of

improvement are detection measures, the implementation of IHR simulation exercises and the supply of necessary infection control equipment for the protection of health workers.

Fig 3: Early Detection & Reporting Epidemics Of Potential International Concern

	Liberia	Guinea	Sierra Leone
Lab capacity for detecting priority diseases	0.0 =159	0.0 =159	25.0 =146
Laboratory quality systems	0.0 =119	100.0 =1	0.0 =119
Indicator and event-based surveillance and reporting systems	75.0 =9	50.0 =41	75.0 =9
Interoperable, interconnected, electronic real-time reporting systems	0.0 =117	33.3 =63	66.7 =35
Transparency of surveillance data	100.0 =1	100.0 =1	100.0 =1
Coverage and use of electronic health records	0.0 =99	0.0 =99	16.7 =72
Existence of applied epidemiology training program such as FETP and FETPV	100.0 =1	100.0 =1	100.0 =1
Epidemiology workforce capacity	0.0 =59	100.0 =1	0.0 =59
Overall score & rank	29.1 =131	57.2 =52	45.8 =72

Source: Global Health Security Index

Fig 4: Rapid Response to and Mitigation of the Spread of An Epidemic

	Liberia	Guinea	Sierra Leone
National public health emergency preparedness and response plan	50.0 =25	0.0 =102	37.5 =51
Private sector involvement in preparedness and response	0.0 =23	0.0 =23	0.0 =23
IHR simulation exercises	0.0 =54	0.0 =54	0.0 =54
Emergency response operation	33.3 =10	33.3 =10	33.3 =10
Risk communication systems	100.0 =1	0.0 =74	100.0 =1
Access to communications infrastructure	53.4 =170	51.7 =173	60.1 =150
Government restriction of trade and travel	100.0 =1	100.0 =1	100.0 =1
Non-government restrictions of trade and travel	100.0 =1	100.0 =1	100.0 =1
Overall score & rank	40.5 =82	23.0 =166	44.8 =64

Source: Global Health Security Index

Fig 5: Sufficient & Robust Health Sector To Treat The Sick & Protect Health Workers

	Liberia	Guinea	Sierra Leone
Available human resources for the broader healthcare system	0.7 =187	0.7 =187	33.8 =59
Facilities capacity	2.6 =166	0.7 =190	1.1 =185
Capacity to acquire medical countermeasures	100.0 =1	0.0 =98	0.0 =98
Existence of system for dispensing MCMs during a public health emergency	0.0 =22	0.0 =22	0.0 =22
Systems to receive foreign health personnel during a public health emergency	0.0 =7	0.0 =7	0.0 =7
Access to healthcare	51.5 =172	85.5 =86	50.4 =176
Healthcare worker access to healthcare	0.0 =6	0.0 =6	0.0 =6
Communication with health care workers during a public health emergency	0.0 =43	0.0 =43	50.0 =18
Infection control equipment availability	0.0 =9	0.0 =9	0.0 =9
Healthcare associated infection (HCAI) monitoring	0.0 =74	0.0 =74	0.0 =74
Regulatory process for clinical trials of unregistered interventions	50.0 =20	0.0 =124	100.0 =1
Regulatory process for approving medical countermeasures	100.0 =1	0.0 =147	50.0 =42
Overall score & rank	19.9 =107	8.0 =176	25.3 =84

Source: Global Health Security Index

Discussion

Overview of response efforts

Some key insights stood out from the overview of response efforts. First, in all three countries, each government recognized the urgency of implementing sanitary practices in hospitals for the protection of patients and health workers and put in place adequate and necessary IPC protocols. As proven by the literature, these protocols were useful in further educating healthcare workers and increasing safety levels in health structures. Secondly, there were meaningful collaborations between international partners and national governments at practically every stage of the response. Specifically, in the cases of Liberia and Guinea, the CDC and others played an extensive role in the design of governments' Ebola response plans. Finally, social mobilization and the engagement of community members were also notable aspects of the Ebola response efforts in the three countries. The proximity of locals with their neighbors, the personal ties that they shared and the fact that they were all a part of each other's daily lives (ex: religious leaders and radio announcers) created an atmosphere of trust and ease which facilitated the execution of local response activities.

Epidemic Preparedness Capability

Regarding detection capabilities, all three countries rank relatively low on the global scale. The three countries also scored particularly low with regards to laboratory capabilities. This is a problem given that in times of public health crises, laboratories need to have effective operations in order to properly contribute to detection efforts. Apart from Guinea which scored perfectly for this indicator, Sierra Leone and Liberia have very low scores for epidemiology workforce capacity. This is interesting given that all three countries have a perfect score for the existence of epidemiology training programs Additionally, the three countries each hold a perfect score for transparency of surveillance data.

All three countries scored perfectly with regards to government or non-government travel restrictions as a result of an epidemic. This is very important as this is a key factor in the containment of a virus and the mitigation of its spread across borders. The three countries did fairly well in terms of access to communications infrastructure which is a necessity for the reporting of cases and for the facilitation of communication between health structures, patients and prevention staff. In contrast, areas that still need to improve are the national public health emergency response plan and International Health Regulations (IHR) simulation exercises. Governments need to prioritize IHR exercises because these can help countries determine the best methods to utilize in times of public health crises which will enable them to increase their prevention capabilities

Regarding the state of health systems, it is clear that all three countries' health sectors are unfortunately still very ineffective. Based on the indicators, they all lack effective systems to distribute infection protection equipment and medical countermeasures (MCM). Moreover, health care workers do not have proper access to protections as well. This is extremely worrying given that they are on the frontlines in times of outbreaks and providing them with the right equipment is necessary to reduce nosocomial transmissions. Regarding access to healthcare,

the three countries scored a moderate score (Guinea scoring the highest). Possible reasons for this might be a lack of efficient health structures or resources for people to be able to afford to receive care. It is also important to remember that in times of outbreaks, it is often quite common for locals in African countries to avoid hospitals for fear of contracting the disease there.

Policy Recommendations

The above literature reviews and data analysis have brought forth valuable lessons for outbreak response policymaking in Africa. For one, African governments need to continue to place emphasis on infection prevention control trainings in health settings as these help ensure the protection of front line workers and in turn reduce the rate of viral infections in health settings. Secondly, local communities must continue to be actively recruited and engaged in response efforts as the close ties between community members can contribute to the success of social mobilization and other forms of community-centered responses. Furthermore, digital contact tracing tools similar to CommCare need to be explored as these could help to optimize surveillance and contact tracing strategies in times of outbreak.

One element that was evident during the Ebola outbreak is the serious reliance of Guinea, Liberia and Sierra Leone on their international partners. It is true that these organizations are needed to provide the necessary funds, equipment and manpower which are scarce resources in Africa in times of outbreaks. However, being completely dependent on them can be detrimental to African countries in instances when these organizations fail to respond in a timely and efficient manner. In the case of Ebola, the WHO contributed greatly to response efforts but it has consistently been blamed since then for its delayed response (Southall et al., 2017).

For this reason, African countries need to not only collaborate with international partners but they also need to make a point to learn from them. One way that this can be done

is with more countries in Africa making International Health Regulations exercises and simulations a priority. These will enable African countries to be more knowledgeable on basic reactions that are needed in times of outbreak which will enable them to be better prepared for future epidemics or pandemics. Secondly, exchanges need to be facilitated between national governments and international public health experts to allow the latter to instruct the former on key strategies to feature in an optimal outbreak response plan. These will enable governments to become even more proficient with their decision-making at the onset of an outbreak thus allowing them to respond swiftly and effectively. These recommendations are not perfect fixes by any means. Implementing them will require proper organization of already scarce resources in Africa in addition to harmonious and productive exchanges between African stakeholders and international partners. However, if carried out correctly, they could help significantly improve the state of health systems and epidemic preparedness in Africa.

Limitations

Given that specific articles were selected from various phases of the EVD outbreak to provide an overview of response efforts in Guinea, Liberia and Sierra Leone, it is likely that specific events which may supplement or contradict some of the ones mentioned in my research, are missing. Likewise, a concern with a lack of data availability from the GHS index is likely the reason for the significantly low or non-existent scores that some countries received for select indicators in the section regarding epidemic preparedness capability.

Conclusion

This research has highlighted that serious flaws still exist in the health systems of African countries and their ability to detect and respond to epidemics or pandemics. However, it has also shown that despite these limitations, effective epidemic response strategies have previously been carried out with success in Africa (as proven by the IPC guidelines and community

engagement which were key elements of response efforts during the EVD outbreak). Maintaining these strategies and building on them with the help of international partners will enable African governments and other stakeholders to put in place policies that will improve health systems and epidemic preparedness in Africa. This will prevent African economies from suffering severe economic shocks from major outbreaks which will in tun safeguard the development of African nations and the continent as a whole.
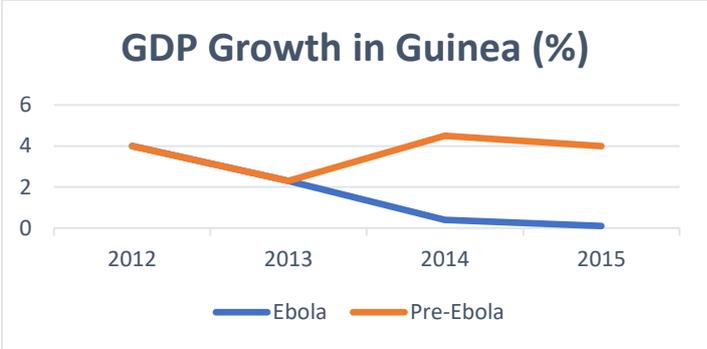
<u>Appendix</u>

1. Health Expenditure in Sierra Leone as % of Gross Domestic Product (based on data from the WHO Global Health Expenditure Database)
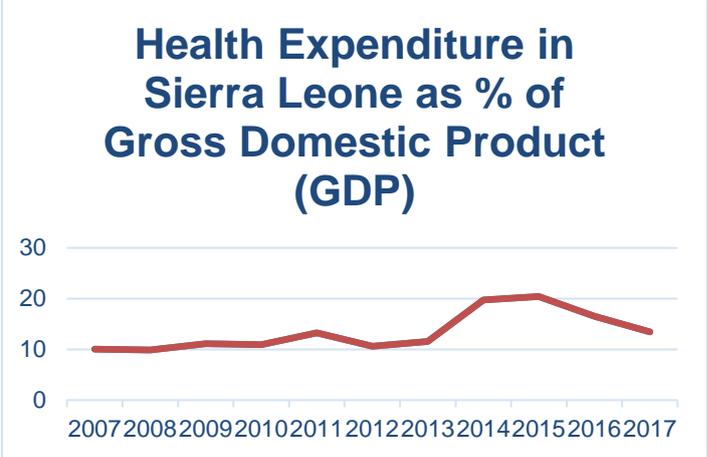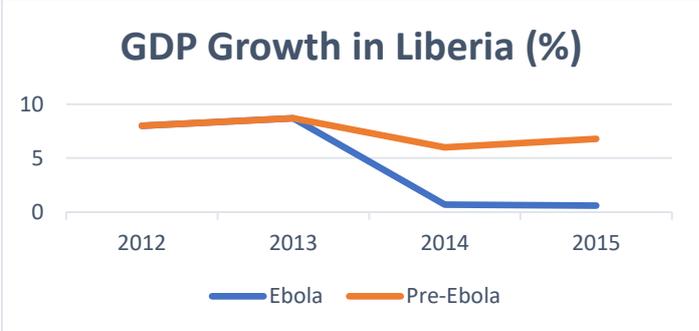

<u>Source:</u> WHO Global Health Expenditure Database

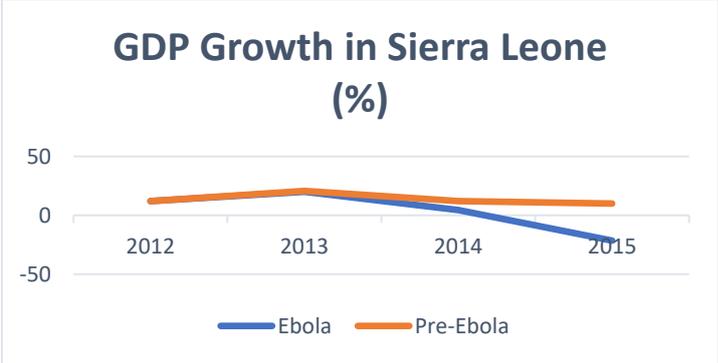2. GDP Growth in Guinea, Liberia & Sierra Leone (based on 2014 World Bank projections)

2.1.

2.2.

2.3.

GDP Growth in Sierra Leone (%)

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