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Covid-19 i Afrika: Beredskap efter ebola

African COVID-19: Preparedness after Ebola

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Sammanfattning

Introduktion
Afrika har haft flera utbrott av ebola (EVD). Det Västafrikanska EVD-utbrottet 2014-2016 var det mest förödande med mer än 28 000 fall och mer än 11 000 dödsfall. Utbrottet började i Guinea och spreds över gränsen till Sierra Leone och Liberia. 2018-2020 var det ett utbrott av EVD i Demokratiska Republiken Kongo (DRC) som spreds till Uganda. På grund av utbrotten av EVD har de drabbade länderna byggt upp kapacitet att hantera epidemier.

Syfte
Syftet med studien är att beskriva den kapacitet som byggts upp i respons till EVD-utbrott, och hur kapaciteten har varit till nytta för staterna under deras första sex månaders respons till covid-19 i Liberia, Guinea, Sierra Leone, Uganda, samt DRC.

Metod
Studien är en systematisk litteraturstudie.

Resultat
De tre Västafrikanska länderna var hårt drabbade av EVD på grund av svaga hälsosystem, en historia av interna konflikter, porösa gränser och det faktum att EVD kunde spridas till fler områden innan det upptäcktes. De Västafrikanska staterna kunde med internationell hjälp bygga upp kapacitet för att hantera epidemier, vilken har använts i arbetet mot covid-19. EVD-utbrottet i DRC hade en snabbare respons eftersom det hade byggts upp kapacitet både på en afrikansk- och internationell nivå sedan det Västafrikanska utbrottet.

Slutsats
De Afrikanska länderna i denna studie har kunnat använda sig av kapacitet som de byggt upp för att hantera EVD i sin hantering av covid-19. Detta trots att de fortfarande har fortfarande svaga hälsosystem och saknar resurser.

ABSTRACT

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Abstract

Introduction

Africa has had several outbreaks of Ebola (EVD). The West African EVD outbreak 2014-2016 was the most devastating with more than 28 000 cases and more than 11 000 deaths. It started in Guinea and spilled over the border to Sierra Leone and Liberia. In 2018–2020, there was an outbreak of EVD in Democratic Republic of Congo (DRC), which spilled over the border to Uganda. Due to the outbreaks of EVD, the affected countries have built capacity to respond to epidemics.

Aim

The aim of the study is to describe the capacity that was built-up to respond to EVD outbreaks and how the capacity has aided the countries in their first six months of response to COVID-19 in Liberia, Guinea, Sierra Leone, Uganda and DRC.

Methods

The study is a systematic literature study.

Results

The three West African countries were severely affected by EVD because of weak health systems, a history of civil conflicts, porous borders and the fact that the EVD could spread to several locations before it was discovered. The West African countries have with international help built up capacity against epidemics that has been used in response to COVID-19. The EVD outbreak in DRC had a more swift response since there has been capacity building on an African and International level since the West African outbreak.

Conclusion

The African countries in this study have been able to use capacity that was built-up to respond to EVD in their response to COVID-19, despite of the fact that they still have weak health systems with lack of resources.

Content

Abbreviations

Africa CDC	Africa Center for Disease Control
AFTCOR	Africa Taskforce for Corona Virus
AU	the African Union
CDC	US Center for Disease Control and Prevention
COVID-19	Corona Virus Disease 2019
DRC	Democratic Republic of Congo
DTF	District Task Force
EOC	Emergency Operations Center
ETC	Ebola Treatment Centre
EVD	Ebola Virus Disease
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
HPAI	Highly Pathogenic Avian Influenza
IDI	Infectious Diseases Institute
IDP	Internally Displaced Person
IMS	Incident Management Systems
IPC	Infection Prevention and Control
MoH	Ministry of Health
NGO	Non-governmental organisation
NPHI	National Public Health Institution
NTF	National Task Force
PC	Primary Care
PHAC	Public Health Agency of Canada
PHEOC	Public Health Emergency Operations Centre
PoE	Points of Entry
PopCAB	Population Connectivity Across Borders
PPE	Personal Protection Equipment
RCC	Regional Collaborating Centers
RRT	Rapid Response Team
SARS	Severe Acute Respiratory Syndrome
SDB	Safe Dignified Burials
SDG	UN Sustainable Development Goals
SOP	Standard Operating Procedures
SSA	sub-Saharan Africa
TB	Tuberculosis
VHT	Village Health Teams
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	the World Health Organization
ZEBOV	the Zaire-Ebolavirus

African COVID-19: preparedness after Ebola

1. Introduction

1.1 Background

The rise of zoonotic diseases such as Severe Acute Respiratory Syndrome (SARS) in 2003 and Highly Pathogenic Avian Influenza (HPAI) H5N1 in 2005 (Standley, et al., 2019) as well as repeated occurrences of Ebola Virus Disease (EVD) in Africa and Corona Virus Disease 2019 (COVID-19), has tested the epidemic response capacities among countries all over the world. In this paper, it will be described how the built up capacity in Liberia, Guinea, Sierra Leone, Uganda and DRC in response to EVD outbreaks from 2014 to 2020 has been used in response to COVID-19 during the first six months of COVID-19 in respective country.

1.1.1 Ebola

Several countries in sub-Saharan Africa (SSA) have had outbreaks of EVD:

Democratic Republic of Congo (DRC) 1976, 1977, 1995, 2007, 2008-09, 2012, 2014, 2017, 2018-20, 2021
Gabon 1994, 1996-97, 2001-02
Guinea 2014-2016, 2021
Ivory Coast 1994
Liberia 2014-2016
Mali 2014-2016
Nigeria 2014-2016
Republic of Congo 2001, 2003, 2005
Senegal 2014-2016
Sierra Leone 2014-2016
South Africa 1996
Sudan 1976, 1979, 2004
Uganda 2000-01, 2007-08, 2011, 2012-13, 2018-20
(CDC, 2021).

There are different types of Ebolavirus, of which the most common and most deadly is the Zaire-Ebolavirus (ZEBOV), which caused the large West African outbreak in 2014 - 2016 and the 2018 – 2020 outbreak in the DRC that also spread to Uganda (CDC, 2021) (WHO, 2020e).

The Ebola virus is transmitted through contact with body fluids from an infected person. The virus can infect through contact with eyes, nose, mouth or broken skin and can transmit through contaminated objects or through sexual contacts (WHO, 2020e).

1.1.2 COVID-19

The first known case of the virus SARS-CoV-2, that causes COVID-19, was registered in Wuhan, China, in December 2019 (WHO, 2020c). On the 20th of January 2020, there were reports of cases in Japan, South Korea and Thailand. On the 24th of January, the first case in Europe was detected in France (ECDC, 2020). The first case in SSA was discovered in Nigeria on February 28, 2020. On March 11, 2020, COVID-19 was declared a pandemic by the World Health Organization (WHO) (WHO, 2020c).

SARS-CoV-2 is highly contagious and an infected person on average infects 2 to 2.5 other people, compared to an average of 1.3 people for the common flu (OECD, 2020). It takes swift detection and rapid responses through established protocols and channels to combat the spread of infectious diseases across borders (The World Bank, 2020b).

SARS-CoV-2 is transmitted through droplets when a person is sneezing or coughing, or through aerosols, which are droplets smaller than 5 microns. Due to gravity, the larger droplets fall to the ground and can contaminate surfaces, while the aerosols are airborne and can under the right conditions travel further in an enclosed area. A person breathing in the aerosols can become infected (Prather, Wang, & Schooley, 2020; Zihang, Li, Zihang, Wang, & Molina, 2020; WHO, 2021a).

On the 6th of May 2021, 155.6 million people had been infected with SARS-CoV-2 worldwide, of which more than 2.5 million people have died (WHO, 2021b). In addition to the human cost and suffering, the pandemic has also affected economies worldwide.

The costs of health care have rapidly escalated due to the treatment of people with serious COVID-19, SARS-CoV-2 testing, prevention against spread of the virus, surveillance and contact tracing (Tan-Torres Edejer, o.a., 2020). Simultaneously, societies have suffered from reduced production and economic activities due to the pandemic, which has generated negative effects on both local and international economies, which can trigger a long-term recession (The World Bank, 2020a).

1.1.3 COVID-19 in Africa

In January 2020, before the first case of COVID-19 had been detected in Africa, the Institut Pasteur in Senegal was one of the first laboratories in Africa to achieve accreditation for SARS-CoV-2 testing by the WHO. The Senegalese institute then trained another 25 laboratories, and an institute in South Africa further trained 18 laboratories to test for SARS-CoV-2 (The World Bank, 2020b).

Previous virus epidemics, such as outbreaks of EVD, have demonstrated that rapid response and correct information are crucial to curb the spread of the virus. When COVID-19 spread over the world, there was no cure or vaccine, which resulted in the need for behaviour changes to contain the disease. To succeed in imposing rapid response and behavioural changes, there is a need for preparedness and an acceptance from the local population affected (Celum et al., 2020).

The African countries have had a swift response to the threat of SARS-CoV-2 through imposed travel restrictions and closed borders at an early stage of the pandemic's development. This resulted in the ban of international travel in March 2020 as well as recommendations for social distancing and eventually different levels of lockdown measures (OECD, 2020).

1.2 The climate explanation to low transmission rates in Africa

The relatively low numbers of infections on the African continent have raised the question to whether this could be related to the African climate. A study, *Variation in SARS-CoV-2 outbreaks across sub-Saharan Africa* (Rice et. al, 2021) shows that the climate, such as temperature and humidity, had very little or no effects on the epidemic peaks. The study instead suggested that contact between different communities could explain the spreading patterns of SARS-CoV-2 (Rice et. al, 2021).

1.3 Capacity building

Between 2016-2018, 41 of the African countries (87%) had at least one epidemic. During the same period, 21 of the African countries (43%) had at least one annual epidemic of Cholera, Measles, Viral haemorrhagic disease or malaria (Talisuna et al., 2020). In response to these challenges, there has

been capacity building to respond to epidemics in countries that have not been affected by EVD (WHO Africa, 2021).

In connection to the West African EVD outbreak, countries at risk that borders or have strong trading connections with the three affected West African countries Guinea, Liberia and Sierra Leone were identified. These countries were Côte d'Ivoire, Guinea Bissau, Mali and Senegal, Burkina Faso, Benin, Cameroon, Central African Republic, the Gambia, Ghana, Ethiopia, Mauritania, Togo and Niger. In cooperation with the WHO EVD Preparedness and Strengthening Team, action plans were created and necessary capacity building to fill gaps in preparedness to prevent EVD outbreaks in respective country were made (WHO, 2015).

Due to their proximity to DRC, which had an ongoing outbreak of EVD 2018-2020, countries at risk of having EVD-outbreaks, have also strengthened their capacity in terms of EVD-response (WHO, 2019c). These countries were categorized into two groups, based on risk level. The risk levels were determined by proximity to areas where EVD cases had been reported and significant movement of goods and people across borders. Priority 1 countries were Burundi, Rwanda, South Sudan and Uganda. Priority 2 countries were Angola, Central African Republic, Republic of Congo, Tanzania and Zambia (WHO, 2019a).

All national plans for the nine countries have the same structure deriving from WHO technical areas for EVD preparedness (WHO, 2019a)**:**

Coordination: Public Health Emergency Operations Centre (PHEOC) were established in five of the countries: Rwanda, South Sudan, Uganda, Tanzania and Zambia. During the implementation of the coordination block, simulations of a crisis scenario were conducted in Burundi, South Sudan, Uganda and Tanzania to stress test the operational pillars. Rwanda, South Sudan and Uganda ran full simulations in their countries. In addition, the WHO deployed 250 experts to the nine countries for technical support.

Surveillance/Rapid Response Team (RRT)/contact tracing/Points of Entry (PoE): All of the countries conducted training of health care workers to detect and report suspected cases of EVD, which led to a rapid increase of reported cases. In Uganda, the RRTs were alerted to EVD cases and in South Sudan, some cases of yellow fever were detected. At the high-risk districts bordering the area of active cases in DRC, travellers were screened for EVD at the PoEs.

Laboratory capacity: In order to collect and analyse samples for Ebola virus, the nine countries trained a number of staff, and eight of the countries developed capacity to analyse EVD samples, with the exception of Angola. Further, were the nine countries equipped with the required material for packing and sending EVD samples to the WHO Collaborating Centres or laboratories. Eight of the countries (with the exception of Rwanda) have staff certified for paperwork to ship EVD samples via air transport.

Case management/Infection Prevention and Control (IPC)/Safe Dignified Burials (SDB): The minimum of one Ebola Treatment Centre (ETC) with the support of several isolation units were established in all of the nine countries. Among the Priority 1 countries (Burundi, Rwanda, South Sudan and Uganda), there were a minimum of one SDB team in each district and a minimum of one SDB team on national level in all countries with exemption of Angola. Eight of the countries had health workers that were trained in IPC with a focus on EVD.

Risk communication and community engagement: All nine countries developed risk communication plans and were working with informing communities and health workers.

Vaccination: In Burundi, Rwanda, Uganda and South Sudan, health workers with the highest exposure were vaccinated and there were preparations to expand the vaccination scheme.

Operation support and logistics: All of the nine countries were provided with Personal Protection Equipment (PPE) and temperature screeners. It was regarded essential that on both national and regional levels, logistic preparedness must be in place to rapidly respond to an emergency situation with outbreaks of EVD. Logistic capacity was enhanced under the guidance of WHO and in cooperation with World Food Programme (WFP) and the Ministries of Health (MoH) in the nine countries. A *Regional Staging Area* was established in Uganda to facilitate rapid deployment of supplies (WHO, 2019a).

1.3.1 Africa Center for Disease Control (CDC)

In the aftermath of the 2014-2016 outbreak of EVD in West Africa, the African Union (AU) decided to form a centre for disease control, and in 2017, the Africa Center for Disease Control (Africa CDC) was launched. Its objectives are to support and strengthen the AU member countries to "detect, prevent, control and respond quickly and effectively to disease threats" (Africa CDC, n.d.a).

The Africa CDC has three legs: The Africa CDC headquarter in Addis Ababa; five Regional Collaborating Centers (RCC) in Egypt, Gabon, Kenya, Nigeria and Zambia; and National Public Health Institutions (NPHI) in all AU member countries (Africa CDC, 2019a).

Some of the RCCs tasks are to strengthen the cooperation between African countries to improve the response to infectious diseases and other health emergencies. In addition, the RCCs are working to support member countries in capacity building for disease surveillance, laboratory facilities, networks, information systems, emergency preparedness, research and training of health staff (Africa CDC, 2019a).

1.3.2 Africa CDC and COVID-19

In January 2020, the Africa CDC activated the operations centre and incident management system, after which the RCC member countries activated their PHEOCs. The RRTs were trained on case management, collection of specimens from SARS-CoV-2 tests and to investigate alerts of suspected cases that had come to their attention through rumours (The World Bank, 2021c).

1.3.3 Africa Taskforce for Corona Virus (AFTCOR)

In February 2020, the Africa CDC together with the WHO and the AU Commission established the Africa Taskforce for Corona Virus (AFTCOR). AFTCOR is, among other tasks, working on strengthening the member countries capacity in laboratory diagnosis of COVID-19. At the time of the setup of AFTCOR, there was only one laboratory in Senegal and one in South Africa, which had the capacity to test for SARS-CoV-2. By March 2020, the capacity had risen to 43 laboratories in 43 member countries (The World Bank, 2021c).

AFTCOR´s strategy is rapid detection of SARS-CoV-2 infected persons, and to isolate them. AFTCOR has five major lines of impact: 1) surveillance that includes border control, 2) supporting health care facilities infections prevention through making controls at the health facilities to make sure that they are following the guidelines, 3) clinical management of persons with severe COVID-19, 4) laboratory diagnostics and 5) risk communication to the public including community engagement (Africa CDC, 2020a)**.** The strategy set out by Africa CDC in response to COVID-19 is similar to the WHO outlined planning on EVD strategy (Africa CDC, n.d.b)**.**

1.4 Contact tracing

Contact tracing is an important component in contagion control, and is a method that has been used both in connection to EVD and COVID-19. By identifying people who have been in contact with an infected person, it is possible to isolate, test and monitor them in order to stop the spread of the disease. In contact tracing, it is imperative to obtain community engagement and support as well as trained contact tracers, logistic support and an information system designed for collecting, analysing and managing data (WHO, 2020d). At the beginning of the COVID-19 pandemic, the WHO and Africa CDC supported the countries in Africa to activate the surveillance and contact tracing systems that had been built up as a response the West African EVD outbreak (Emeto et al, 2021). The contact tracing may become complex with people who have many social contacts and it is therefore a true asset to have a software that supports the tracing activities adequately. WHO has initiated the development of Go.Data in the Global Outbreak Alert Response Network to be used by field workers. In 2019, Go.Data was adopted for contact tracing for EVD in DRC, which led to significant improvement and efficiency and it is now used by many countries for COVID-19 tracing (WHO, 2020d).

1.5 Relevance to Public Health Science

Pandemics, such as EVD, has been a significant threat in Africa. With porous borders and weak health systems, many people become at risk of communicable diseases. With limited resources available, it is therefore of utter necessity to deploy the resources to the most effective responses in order to contain and curb the diseases with minimal spread. This paper attempts to describe some of the capacities that the African countries implemented as a response to EVD and how these capacities have come to use in the response to COVID-19. As the paper also touches shortcomings in the response preparedness for COVID-19, it can be a guide into which areas that need to be strengthen in the future.

1.6 Sustainable Development Goals (SDG)

The SDG are the 17 goals in Agenda 2030, set by the UN to be achieved by the member states by 2030. The SDGs are focusing on different areas e.g. eradication of poverty, more equal opportunities and substantial development. Goal number three is “Good Health and Well-being”, which is the goal that most directly adhere to this paper as it clearly outlines the need for strong health care and protection of people from diseases. Goal number three has been broken down into targets, where targets 3B-3D outlines the following, which can all be included in the scope of this paper:

“3.B. Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.”

“3.C. Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States.”

“3.D. Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks”

Further, does target number 3.3 specify that the goal by 2030 is to "… end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases". Target number 3.8 specifies that **"**achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all".

Even other goals, such as number 17 "Strong Partnership for the Goals" has an indirect connection to the scope of this paper as it outlines the need for cooperation in order to strengthen all countries in order for them to be able to achieve the goals (UN, 2021).

1.7 Problem formulation

SARS-CoV-19 has spread over the world and countries are struggling to contain the virus. Methods used to contain the virus are among others contact tracing for those who have had contacts with people with COVID-19 and screening at PoE. Similar methods have been established by SSA countries in order to respond to EVD outbreaks. This paper intent to investigate whether the built-up capacity to respond to EVD has rendered the affected countries structures that could assist them in responding to COVID-19 during the first six months of the outbreak in respective country.

2. Aim

The aim of the study is to describe the capacity that was built-up to respond to EVD outbreaks and how the capacity has aided the countries in their first six months of response to COVID-19 in Liberia, Guinea, Sierra Leone, Uganda and DRC.

3. Method

3.1 Data collection.

This study is a systematic literature study, where scientific databases have been used to find original research articles that are peer reviewed. The searches have been taking place from April 1 to May 31, 2021.

3.1.1 Table 1 – article search

Data base	Search term	Exclusion criteria	Number of hits	Number selected	Articles used
Scopus	COVID-19 + Liberia	Full access article Publication stage: final Source type: journal	5	4	none
Scopus	COVID-19 + Uganda	Full access article Publication stage: final Source type: journal	70	22	(Nsubuga et al., 2021) (Ayebare et al., 2020)
Scopus	COVID-19 + Ebola + Uganda	Full access article Publication stage: final Source type: journal	8	1	none
Pub Med	COVID-19 + Uganda	Free full text Journal article	149	11	(Ondoa et al., 2020) (Nachega et. al, 2021)
Pub Med	COVID-19 + DRC	Free full text Journal article	48	3	(Juma et al., 2020) (Nachega et al., 2020) (Emeto, Alele, & Ilesanmi, 2021)
Pub Med	Sierra Leone + Ebola capacity building	Free full text Journal article	15	10	(Talisuna et al., 2020) (Dickson et al., 2017) (Marston et al., 2017) (Agbo et al., 2019)
Pub Med	Guinea + Ebola capacity building	Free full text Journal article	14	4	(Soeters et al., 2018) (Standley et al., 2019)
Pub Med	Liberia + Ebola capacity building	Free full text Journal article	20	3	(Bemah et al., 2019)
Pub Med	Uganda + Ebola capacity building	Free full text Journal article	7	1	none
Pub Med	DRC + Ebola capacity building	Free full text Journal article	4	3	(Merrill et al., 2020) (Aceng et. al, 2020)
Scopus	West Africa + Ebola response	All open access Social Sciences Nursing Journal Article Publication stage: Final Sierra Leone Guinea Liberia English	8	3	(Pedi et al., 2017) (Maxmen, 2020) (Cooper et al., 2016) (Perry et al., 2016)

The study is restricting the research to the first six months of response in respective country after the first case of COVID-19 had been registered. The reason is to attempt to isolate an initial response and what counter measures to the pandemic that has been efficient in the absence of a vaccine. In this paper, it is assumed that after the first six months, other factors can be affecting the response such as economy for medical supplies, humanitarian response, the livelihood of people despite restrictions in movement and fatigue among HCWs. The first six months of response is therefore assumed to constitute the emergency readiness of the country.

Scopus database has been used on the ground of being a generalised scientific database. PubMed has been used on the ground of being a scientific database with medical focus. By using scientific databases that renders results from recognised scientific journals, the quality of the used articles have been scrutinised before publishing.

3.2 Selection

This systematic review describes the capacity that was built up among countries affected by EVD outbreaks from 2014 - 2020 and how the preparedness have been used to reduce the spread of COVID-19. The countries that have had outbreaks of EVD since 2014 are Guinea, Liberia, Sierra Leone, Uganda and DRC. Eighteen articles were selected according to their relevance to this paper. They were chosen due to their focus on the relevant countries and on the subject of EVD response/capacity building or COVID-19 response.

3.3 Analysis

The study is qualitative and it is attempting to describe how EVD prevention capacity among the countries has been used during the initial period of COVID-19 prevention. The investigated period is the first six months after which the first case was discovered in each country. SSA is comprised of 46 countries, which includes all African countries except North African countries (Algeria, Egypt, Tunisia, Morocco, Libya, Sudan and West Sahara) (UNSTATS, n.d).

In this paper, purposive sampling method has been used for selection of relevant articles. To achieve the best results, data collection has been considered satisfying when saturation of information has been achieved in accordance to chapter 18 in *Samhällsvetenskapliga metoder* (Bryman, 2016).

The articles were categorised according to the country they described and if they were describing of EVD response/capacity building or COVID-19 response. The information was then organised in a loose chronological order starting with the EVD outbreaks in West Africa and finalising with the COVID-19 situation during autumn 2020, where the headlines for each important section was created to summarise the content of the section.

3.4 Ethical considerations

As this is a literature study, no personal data has been processed and therefore there has been no need for an official permit to undertake this study. The ethical aspects in this research are in accordance to the guidelines in the publication by The Swedish Research Council ”*God forskningssed*” (Vetenskapsrådet, 2017). In this systematic literature study, that is mainly concerning to openly and honestly refer to the sources that has been used in the study to allow for reproduction of the study and for evaluation of the sources. It will also be give an account that the work is not a plagiary.

Malterud (2014) is writing that the author´s pre-understanding of a subject and the wishes to achieve specific results risk to taint the way data is being used, by for example selecting only the type of data

that suits the wished outcome of the study. In this study, all data has been reported honestly and the author have not had any affiliations that could affect the outcome of the study or wishes to steer the study in any direction. This paper is a pure investigative piece of work and by clearly display the process of informationgathering and processing the reliabilty of the paper has been granted as the research could be repeted. The validity of this paper is being guaranteed by using reputable scientific search engines that are returning articles from reputable scientific journals which gives high standard articles as basis of this paper in combination with the selection of articles relevant to the task of this paper.

4. Results

4.1 Table 2 - results

Reference	
(Aceng et. al, 2020)	*Uganda's experience in Ebola virus disease outbreak preparedness, 2018–2019*
	Summary: Uganda activated the EVD response in 2018 because of the EVD outbreak in DRC. Up to mid-2019, no cases had been reported in Uganda.
(Agbo et al., 2019)	*Establishing National Multisectoral Coordination and Collaboration Mechanisms to Prevent, Detect, and Respond to Public Health Threats in Guinea, Liberia, and Sierra Leone 2016-2018*
	Summary: From 2016 and onwards, Guinea, Liberia and Sierra Leone have, with international help, built better health care systems to respond to EVD.
(Ayebare et al., 2020)	*Leveraging investments in Ebola preparedness for COVID-19 in Sub-Saharan Africa*
	Summary: African countries close to DRC have prepared themselves to respond to EVD, some of this capacity would be possible to use against COVID-19.
(Bemah et al., 2019)	*Strengthening healthcare workforce capacity during and post Ebola outbreaks in Liberia: an innovative and effective approach to epidemic preparedness and response*
	Summary: HCWs have been trained in Liberia since the outbreak of EVD in 2014 and onwards. In total, more than 21 000.
(Cooper et al., 2016)	*Infection prevention and control of the Ebola outbreak in Liberia, 2014–2015: key challenges and successes*
	Summary: Evaluation of the measures taken against EVD in Liberia at the beginning of the outbreak.
(Dickson et al., 2017)	*Enhanced case management can be delivered for patients with EVD in Africa: Experience from a UK military Ebola treatment centre in Sierra Leone*
	Summary: Treatment of EVD-infected in Sierra Leone. By making sure infected persons were given high levels of electrolytes, the survival rate increased.
(Emeto, Alele, & Ilesanmi, 2021)	*Evaluation of the effect of border closure on COVID-19 incidence rates across nine African countries: an interrupted time series study*
	Summary: Examining the effect on COVID-19 incidence rates of the closed borders in some SSA-countries. Concluded that it had little effect.
(Juma et al., 2020)	*COVID-19: The Current Situation in the Democratic Republic of Congo*
	Summary: A summary of shortcomings in DRC response to COVID-19.
(Marston et al., 2017)	*Ebola Response Impact on Public Health Programs, West Africa, 2014–2017*
	Summary: About how the EVD-capacity building have affected the structure of health care in Liberia, Sierra Leone and Guinea.
(Maxmen, 2020)	*Ebola prepared these countries for coronavirus — but now even they are floundering*
	Summary: West African countries´ struggle with COVID-19 response. Illustrating challenges with HCW´s not getting paid.
(Merrill et al.., 2020)	*An approach to integrate population mobility patterns and sociocultural factors in communicable disease preparedness and response*
	Summary: About mapping people´s movements and PoEs in relation to DRC and the EVD outbreak.
(Nachega et. al., 2021)	*Contact Tracing and the COVID-19 Response in Africa: Best Practices, Key Challenges, and Lessons Learned from Nigeria, Rwanda, South Africa, and Uganda*
	Summary: Contact tracing is necessary, but labour intensive, it can be done thorough mobile masts.
(Nachega et al., 2020)	*Responding to the Challenge of the dual COVID-19 and Ebola epidemics in the Democratic Republic of Congo—priorities for achieving control*
	Summary: Summarises how the achievements of the built-up structures for controlling EVD-outbreaks are being used.
(Nsubuga et al., 2021)	*Evaluation of the Ebola Virus Disease (EVD) preparedness and readiness program in Uganda: 2018 to 2019*
	Summary: Preparedness was built with international support and worked well as cases were detected and handled.
(Ondoa et al., 2020)	*Covid 19 testing in Africa: lessons learnt*

	Summary: About how existing laboratories can be upgraded to test for COVID-19 in Africa.
(Pedi et al., 2017)	*The Development of Standard Operating Procedures for Social Mobilization and Community Engagement in Sierra Leone During the West Africa Ebola Outbreak of 2014–2015*
	Summary: How routines for curbing EVD including contact tracing with HCW were established in Sierra Leone in the middle of the EVD outbreak.
(Perry, et al., 2016)	*Community health worker programmes after the 2013–2016 Ebola outbreak*
	Summary: Describing the importance of HCWs in preparedness for contact tracing and screening for infected people.
(Soeters et al., 2018)	*Infection prevention and control training and capacity building during the Ebola epidemic in Guinea*
	Summary: Describing the training of HCWs in Guinea during the EVD-outbreak.
(Standley et al., 2019)	*Assessing health systems in Guinea for prevention and control of priority zoonotic diseases: A One Health approach*
	Summary: How Guinea has starting to work in a paramount manner including several aspects of health, including even veterinaries to prevent outbreaks of diseases.
(Talisuna et al., 2020)	*Spatial and temporal distribution of infectious disease epidemics, disasters and other potential public health emergencies in the World Health Organisation Africa region, 2016–2018*
	Summary: A summary of all infectious disease epidemics in Africa 2016-2018 and commentary on capacity build-up.

4.2 EVD outbreaks covered in this paper

Guinea had an outbreak of EVD in late 2013, which spilled over to Liberia and Sierra Leone and is known as the West African Ebola outbreak 2014-2016.

DRC had an outbreak of EVD in 2018, which is known as the 10th outbreak in DRC. This outbreak spilled over the border to Uganda in 2019 (CDC, 2021).

4.3 The West African Ebola outbreak 2014-2016

The first case of the EVD outbreak originated from Guinea in December 2013 (Dickson et al., 2017). The origin of the virus appears to be transmission from bats to humans in south-eastern Guinea (Standley et al., 2019). In August 2014, WHO declared the EVD outbreak a Public Health Emergency of International Concern. This had the effect that the international community extended considerable aid to the West African countries (Dickson et al., 2017). Although with national specific adoptions, the outline of the EVD response of the three West African countries were similar and facing similar challenges.

During the 2014-2016 EVD outbreak in West Africa, it was found that health care use decreases exponentially with the distance to the clinic. Therefore, EVD could spread in distant villages at its origin in Guinea for three months without adequate response. A similar pattern was repeated once EVD had crossed the border to Sierra Leone (Perry et al., 2016).

During the EVD outbreak in Guinea, Liberia and Sierra Leone 2014-2016, more than 28 000 people were infected, resulting in over 11 000 deaths (Marston et al., 2017). Previous outbreaks in Africa have normally lasted for 3-4 months and had a few hundred cases (Cooper et al., 2016). The affected countries suffered from weak health systems and infrastructure. Therefore, the capacity to rapidly identify infected people and act on containing the virus was lacking, which led to the spread into three countries (Marston et al., 2017).

Guinea had for a long period been a socio-economic underdeveloped country with weak health systems, a problem they were sharing with their neighbours, Liberia and Sierra Leone. The West-African outbreak of EVD, which originated from Guinea, spilled over to Liberia and Sierra Leone through the porous borders. The outbreak factors and spread of the virus were connected to poor communication between the governments and underdeveloped health systems (Aceng et. al, 2020). In addition, the local population had a mistrust against the authorities and the foreign aid agencies, combined with lack of understanding of the response interventions (Agbo et al., 2019).

Establishing a functional health system with capacity to rapidly respond to epidemics is usually a long-term task. However, in West Africa the systems had to be established in response to an ongoing crisis. To control the outbreak response, an Incident Management Systems (IMS) were established in the three countries. Several international partners aided the West African countries in capacity building, among those were WHO, US Center for Disease Control and Prevention (CDC), Public Health Agency of Canada (PHAC) and military health support from Britain and Canada (Marston et al., 2017; Dickson, et al., 2017). The major urgency involved finding infected people to isolate, test and treat the infected, contact tracing and to establish SDB practises of the diseased (Dickson et al., 2017).

During the EVD outbreak, the HCWs who worked in the frontline were at high risk and a large share of the HCWs were infected. Reports from Guinea in 2016 showed 5.8 % of the HCWs were infected (Soeters, o.a., 2018). In Sierra Leone, a substantial part of the people infected were HCWs and the mortality among them reduced the number of HCWs with 7 % (Parmley, et al., 2021). An estimation for the three countries combined, points out that there was 32 times more likely to be infected with EVD for the HCWs than the rest of the population (Bemah et al., 2019).

During the outbreak of EVD, most staff in health facilities in Guinea, Sierra Leone and Liberia received training in IPC. Some basic level of IPC measures were established in response to EVD such as spatial separation of patients, well ventilated waiting areas, handwashing stations and areas for disinfection of equipment (Soeters et al., 2018; Parmley et al., 2021; Bemah et al., 2019).

In Sierra Leone, it was discovered that there was a need to move away from the top-down approach in communication and tailor the messages and approaches, learning from best practise among organisations working on grassroots' level. In that way, it was possible to engage in social mobilisation and community engagement on a better level in order to build a dialogue with local communities and receive greater understanding for the policy implementations and the need for changed behaviours (Pedi, et al., 2017).

4.4 Structures built up for EVD prevention after the West African Ebola outbreak

During the 2014-2016 EVD outbreaks in West African countries and the outbreak in DRC in 2018, it became clear that public health systems suffered from many shortcomings, which was one of the reasons identified for the spread of the virus. Among the key features to combat an infectious disease, is strong coordination of the contribution of the different stakeholders. During the 2018 EVD outbreak in DRC, that ended in 2020, the WHO contributed with a regional plan and support to strengthen the preparedness for EVD in DRC and nine neighbouring countries (Burundi, Rwanda, South Sudan, Uganda, Angola, Central African Republic, Republic of Congo, Tanzania and Zambia (Ayebare et al., 2020; Nsubuga et al., 2021).

Community outreach and risk communication on safe practises were important features in the EVD-prevention strategy. When successful, it created behavioural changes among the citizens in terms of social distancing and hand hygiene (Celum et al., 2020). Similar to the situation of EVD, COVID-19 is surrounded by lack of public knowledge, which provides a basis for rumours and misinterpretations. Therefore, the risk communication platforms have been utilised to identify rumours and replace them with the correct information. PPE such as facemasks and gloves for EVD could also be used for protection against COVID-19, and the countries could initially use the emergency equipment that was already in place. The built-up capacity and practices for PoE screening for EVD, could easily be shifted to screening for COVID-19 (Ayebare, et al., 2020).

Through the use of already developed platforms for Human Immunodeficiency Virus (HIV) and tuberculosis (TB) testing, with encouragement from the WHO and the cooperation of private manufacturers of testing equipment, it has been possible to reconfigure some platforms and thereby open them for SARS-CoV-2 testing, which has resulted in an increase of testing capacity. Examples of this, is the conversion of 26 HIV and TB testing facilities in Nigeria to enable testing for SARS-CoV-2 and in Ethiopia, where Abbott, the manufacturer of testing equipment, added features to include SARS-CoV-2 testing (Ondoa et al., 2020).

Africa CDC has initiated *Partnership to Accelerate COVID-19 Testing* that will bring together the AU member countries for collective procurement of test kits and related supplies. The partnership will also act to decentralise SARS-CoV-2 testing, streamline testing methods and laboratory workflows, as well as increase the laboratory workforce (Ondoa et al., 2020).

4.5 Strengthening preparedness in response to DRC outbreak

Before the EVD outbreak in Uganda that originated from infected travellers from the DRC in June 2019, Uganda has experienced outbreaks of Ebola starting in 2000, 2007, 2011 and 2012. The most devastating outbreak took place in 2000 -2001 and had 425 cases of which 224 died (Aceng et al., 2020).

In the aftermath of the 2014-2018 EVD outbreaks in West Africa, the WHO presented a plan to its member countries for strategies on epidemics and pandemics, which was among other countries, accepted by Uganda. Due to being one of the neighbouring countries of the DRC during the 2018-2020 outbreak of EVD, Uganda was one of the Priority 1 countries to receive support from the WHO to build prevention capacity (Aceng, et al., 2020; WHO, 2019a).

The situation at the Ugandan borders with DRC was largely problematic with rebel movements and a vast number of people crossing the border at both official and unofficial crossings. On a crowded day, the number of people crossing at a single PoE could rise from 5000 to 20000 people visiting markets in towns near the border and travelling further into the interior of Uganda. In addition, there was movement of refugees crossing the borders to reach the refugee camps in Uganda and in reversed direction to visit family in DRC (Aceng et al., 2020).

In response to the EVD threat from DRC in 2018, the Minister of Health activated the PHOEOC, the National Task Force (NTF) and District Task Forces (DTF). The DTFs consisted of a combined leadership driven from the district politics, the civic society, the security sectors and the health sector. The

Ugandan Director General of Health Service and the WHO jointly chairs the NTF. The NTF created an IMS to support in management of preparedness activities, resources, communication and information management. The NTF deployed six teams to work with the WHO outlined tasks:

1. Coordination by PHEOC
2. Surveillance, RRT, contact tracing, PoE
3. Laboratory capacity
4. Case management, IPC, SDB
5. Risk communication and community engagement
6. Vaccination
7. Operation support and logistics

(Aceng et al., 2020)

In order to map and analyse the movement patterns across the border to DRC, Population Connectivity Across Borders (PopCAB), an application developed for risk assessment cross-border movements, was used (Aceng et al., 2020). PopCAB has also been used in connection to other situations when monitoring flows across borders to prevent the spread of communicable diseases. It is based on identifying what PoEs are used, by which people, where they came from and where they are going, why they are crossing the border and how long they are staying (Merrill et al., 2020). In 2019, the Infectious Diseases Institute (IDI), Uganda, together with the Ministry of Health (MoH) in Uganda and US CDC, jointly undertook a mapping exercise to establish population movement patterns between DRC, Uganda and Rwanda. They identified 31 locations and roads that could be linked to the EVD areas. The information was obtained by focus group discussions and through local knowledge (Aceng et al., 2020). The mapping was included in the PopCABs data (Nakiire et al., 2020).

After identifying the PoEs, staff was deployed to screen everyone crossing the border from the DRC to Uganda and all refugees at refugee reception centres. The screening was carried out with infrared thermometers to detect heighten body temperature. In health facilities, teams were searching to make early identifications of suspected cases of EVD. Laboratory staff collected and packed specimens from suspected EVD cases after which they were sent to Uganda Virus Research Institute for testing. In order to reduce the turnaround time from the laboratory, an electronic tracking system was tested (Aceng et al., 2020).

4.5.1 COVID-19 Uganda

In preparation for the expected first cases of COVID-19, Uganda developed the COVID-19 Response Plan and activated an IMS to give instructions on how the public areas should change to prevent spreading of SARS-CoV-2 (Nachega et al., 2021). The president of Uganda took strong leadership and addressed the nation on several occasions, calling for a change of culture, as in not to have large gatherings at for example funerals. Further, personal hygiene primarily through handwashing, and to avoid handshaking was emphasised. The messages and the implementation of the presidential orders were carried through the healthcare system to the district and community leaders, who were responsible for overseeing that no gatherings were taking place and that there was soap and water in public places for handwashing. The MoH and the WHO undertook the task of training health staff at hospitals in preparation to provide hospital service for COVID-19 infected persons (Besigye et al., 2020).

Primary Care (PC) in Uganda is organised on a hierarchical system with different level of service in the districts. On the village level, there are village health teams (VHTs) consisting of HCWs, which ensures that more than 80 % of the Ugandan population live no longer than 5 km from a PC health facility (Besigye et al., 2020).

Initially, Uganda chose to deploy central teams to the 14 health care regions to conduct contact tracing for COVID-19. The number of people that needed to be included in the contact tracing became overwhelming to the central teams and Uganda solved this by decentralising the contact tracing to district and community healthcare teams. In October 2020, there were village taskforces for COVID-19 established in every village, which further strengthened the tracing capacity (Nachega et al., 2021).

The contact tracing teams interviewed the COVID-19 infected people in order to obtain data for contact tracing. They utilised the Go.Data application that can be installed on mobile phones and is used for saving and processing data for contact tracing. At the beginning of November 2020, 97 % of the contacts had been traced och 13 % of them had COVID-19 (Nachega et al., 2021).

Initially, there was only one laboratory, which had the capacity to process tests for COVID-19 (the Uganda Virus Research Institute). Therefore, tests had to be transported from district hospitals to where people had to travel to be tested. The turnaround for a test answer could be up to 36 hours (Besigye et al., 2020). Uganda performed 478 687 SARS-CoV-2 tests between March and September 2020 (Nachega et al., 2021).

4.5.2 COVID -19 DRC

DRC has areas with civil unrest, refugees and rebel movements, which makes healthcare operations extremely difficult to carry out. The difficulty to operate in such areas in combination with large number of people movements could be a contributing factor in the spread of communicable diseases. (Aceng et al., 2020).

To respond to COVID-19, a national committee was created in DRC, modelling on the structure built up during the 10th EVD-outbreak. It was including a Presidential Task Force that liaised with the President´s Office and a Strategic and Operational Management Task Force with support from WHO, Africa CDC and other international stakeholders. The COVID-19 response was merged into the existing structure for health care in DRC, thus building on established capacity. To speed up the development of Standard Operating Procedures (SOPs), the EVD SOP was used as a template that was adjusted. Further, follow-up on infected people and contact tracing followed the routines that were established during the EVD response, but with different intervals due to COVID-19´s different epidemiology. HCWs were already established at the different health care levels, such as villages and neighbourhoods, and could be used for COVID-19 response (Nachega at al., 2020).

There were initiatives to reconfigure mobile laboratories that had been established during the EVD outbreak in order to use them for COVID-19 testing. Functions for collecting community feedback from the EVD responses were reactivated to be used as communication platforms in the COVID-19 response (Nachega at al., 2020).

As part of the National Plan, several hospitals were made ready to receive COVID-19 patients, but there were few hospital beds and too little equipment. Initially, there were only 60 ventilators available in

the whole DRC, a country with a population of almost 100 million people. In addition, the country was short of oxygen supply (Nachega at al., 2020).

In autumn 2020, COVID-19 testing was available only in four major towns in DRC with a total capacity of 900 tests per day. Tests had to be transported to the National Institute of Biomedical Research in the capital, Kinshasa, which was the only laboratory that could test for COVID-19. The medical supplies, PPE and diagnostic devises were short in supply. There was also a shortage of HCWs and due to delays in payment, HCWs had been striking in Kinshasa. The government had not been able to support the livelihood of people who had been quarantined, which had led them to leave their homes to obtain supplies and led to spread of the virus. Many people in DRC neglected to be tested due to stigma, fear of being quarantined and lack of believe in the virus due to misinformation by non-official sources. This probably led to underreporting of number of people infected in the DRC (Juma et al., 2020).

In areas with conflicts, many internally displaced persons (IDPs) could not practise social distancing, because of their situation in IDP-camps. Also, in these areas, rebel movement had caused 18 health centres being abandoned by the HCWs and another 10 being destroyed by rebels (Juma et al., 2020).

To avoid importing COVID-19 cases, DRC decided to close the borders. This affected the important cross-border trade negatively and with a population depending on daily earnings to sustain their livelihood and it is suggested by Emeto, Alele, & Ilesanmi (2021) that inofficial PoEs were still used and the borders were de facto not closed as such. To support this, the authors have investigated the Incidence Rates (IR) and come to the conclusion that closing of borders did little difference in DRC in terms of new cases of COVID-19 (Emeto, Alele, & Ilesanmi, 2021).

4.5.3 COVID-19 West Africa

The government of Sierra Leone established countermeasures against the spread of COVID-19 as soon as the first case was detected at the end of March 2020, such as temporary lockdowns, 14-day quarantine of international travellers, isolation and daily monitoring of COVID-19 cases at treatment centres. During the EVD outbreak, Sierra Leone created an Emergency Operations Center (EOC), from where the coordination of the EVD response was carried out, such as data gathering and planning. Deriving experience from the EVD EOC, Sierra Leone has created a COVID-19 EOC to coordinate the response between the governmental agencies and the non-governmental organisations (NGOs) (Parmley, et al., 2021).

Liberia, Sierra Leone and Guinea formed COVID-19 task forces that met regularly to respond to the epidemiological developments, a structure that was adopted from the EVD response. In Liberia, a COVID-19 task force included many of the physicians and public-health experts that had previously worked on the EVD-response. The task force acquired SARS-CoV-2 tests from WHO and set up teams to work on contact tracing and community sensitisation.The task forces jointly decided to isolate everyone that tested positive. People with severe symptoms were admitted to hospitals and others were taken in to COVID-19 facilities, where they stayed until they tested negative (Maxmen, 2020).

In Sierra Leone, there were several shortcomings in the COVID-19 response. Some of them being leadership and coordination, health information, rapid identification, diagnosis, isolation and clinical procedures. There are also a lack of IPCs and procedures, which may have resulted in transmission of

SARS-Cov-2 between patients or to HCWs. An estimation during autumn 2020 resulted in approximately 9 % of the total number of COVID-19 infected were HCWs. Sierra Leone is lacking infrastructure for water and sanitation in many locations. In addition, the country was short on basic PPE supplies such as masks, gloves and soap, which created severe strains in terms of responding to COVID-19. Testing for COVID-19 was centralised (Parmley, et al., 2021).

HCWs in contact with COVID-19 infected persons have been on strike because the risk of being infected due to the lack the PPE and neglect of IPC measures. Further reasons for striking has been unpaid hazard or bonus payments to the HCWs (Parmley, et al., 2021; Maxmen, 2020). Parmley, et al., (2021) have identified similarities in the situation for the HCWs to the situation during the EVD outbreak with strikes, high workloads, irregular hours, lack of PPE and safe procedures.

Name of country	Infected share of population[1]	Population	Date first case detected[2]	Number infected after 6 months[3]	GDP/ capita USD[4]	Population density km² [5]	Urban population % [6]	Health expenditure % of GDP[7]	Health expenditure/ capita[8]	Physicians/ 1000 people[9]
Burundi	0,004%	12177799	2020-03-31	508	261	435	13	7,74	24,03	0,1
Niger	0,005%	24914928	2020-03-19	1183	554	18	17	7,33	30,36	0
Chad	0,007%	16808031	2020-03-19	1149	710	12	23	4,1	29,24	0
Burkina Faso	0,007%	21368260	2020-03-09	1476	787	72	30	5,63	40,25	0,1
Mauritius	0,007%	5154268	2020-03-18	366	11099	623	41	5,83	635,4	2,5
Eritrea	0,010%	3586453	2020-03-21	364	643	34	36	4,09	23,79	0,1
DR Congo	0,011%	90616740	2020-03-10	10343	581	37	45	3,3	18,51	0,1
Angola	0,012%	33364401	2020-03-20	3991	2790	25	66	2,55	87,62	0,2
Uganda	0,014%	46300135	2020-03-21	6468	794	213	24	6,53	43,14	0,2
Mali	0,015%	20723747	2020-03-25	3064	879	16	43	3,88	34,95	0,1
Togo	0,018%	8436381	2020-03-06	1488	679	145	42	6,7	41,84	0,1
Benin	0,018%	12380926	2020-03-16	2280	1219	102	48	2,49	30,94	0,1
Somalia	0,021%	16252859	2020-03-16	3390	320	24	46	x	x	0
Mozambique	0,022%	31965636	2020-03-22	7114	504	38	37	8,17	40,26	0,1
South Sudan	0,024%	11300846	2020-04-05	2726	1120	17	20	6,4	26,79	x
Nigeria	0,025%	210288757	2020-02-28	53477	2230	215	51	3,89	83,75	0,4
Liberia	0,026%	5104116	2020-03-16	1332	622	50	52	6,74	45,42	0
Sierra Leone	0,028%	8040571	2020-03-31	2238	527	106	42	16,06	85,78	0
Malawi	0,030%	19531221	2020-04-02	5783	411	192	17	9,33	35,5	0
Sudan	0,030%	44681175	2020-03-13	13516	442	23	35	4,51	60,17	0,3
Rwanda	0,035%	13212958	2020-03-14	4602	820	499	17	7,54	58,31	0,1
Zimbabwe	0,051%	15039342	2020-03-20	7683	1464	37	32	4,73	140,3	0,2
Ethiopia	0,055%	117286184	2020-03-13	64301	856	97	21	3,3	24,23	0,1
Madagascar	0,057%	28268918	2020-03-20	16053	523	45	38	4,79	22,05	0,2
Comoros	0,061%	884665	2020-04-30	537	1370	447	29	4,59	65,23	0,3
Kenya	0,066%	54734238	2020-03-13	36157	1816	90	28	5,17	88,39	0,2
Ivory Coast	0,070%	26908743	2020-03-11	18916	2276	79	51	4,19	71,88	0,2
Cameroon	0,072%	27082464	2020-03-06	19604	1508	53	57	5,53	54,14	0,1
Zambia	0,075%	18801525	2020-03-18	14022	1305	23	44	4,93	75,99	1,2
Guinea	0,076%	13271378	2020-03-13	10045	963	51	37	3,93	38,32	0,1
Senegal	0,080%	17102030	2020-03-02	13743	1449	82	48	3,98	58,9	0,1
Congo	0,088%	5628395	2020-03-15	4934	2280	15	67	2,14	47,52	0,2
Lesotho	0,095%	2156130	2020-05-13	2041	1118	69	29	9,28	124,8	0,1
Central African Republic	0,097%	4898163	2020-03-15	4775	468	7	42	10,99	53,66	0,1
Guinea Bissau	0,116%	2005792	2020-03-25	2324	697	67	44	7	53,29	0,1
Botswana	0,133%	2390258	2020-03-30	3172	7961	4	70	5,85	483	0,5
Gambia	0,141%	2471730	2020-03-17	3473	778	225	62	3,09	22,16	0,1
Seychelles	0,142%	98845	2020-03-14	140	17448	210	57	5,11	833,1	3,1
Ghana	0,144%	31600505	2020-03-12	45434	2202	131	57	3,54	77,91	0,1
Mauritania	0,153%	4748850	2020-03-13	7276	1679	4	55	4,58	54,49	0,2
Equatorial Guinea	0,347%	1440294	2020-03-14	5000	8132	47	73	3	314,3	0,4
Namibia	0,381%	2578374	2020-03-14	9818	4958	3	51	7,95	471,5	0,4
Gabon	0,382%	2268404	2020-03-14	8654	7767	8		2,75	218,4	0,7
Sao Tome and Principe	0,404%	222472	2020-04-06	898	1947	220	74	6,27	125,4	0,1
Eswatini	0,461%	1169974	2020-03-14	5397	3895	66	24	6,54	271,1	0,3
Djibouti	0,540%	999715	2020-03-18	5403	3415	41	78	x	x	0,2
Cabo Verde	0,937%	560918	2020-03-20	5257	3604	135	66	5,36	194,9	0,8
South Africa	1,063%	59918854	2020-03-05	636884	6001	48	67	8,25	526	0,9

4.6. Table 3 – statistics for SSA

4.6.1 Statistics for SSA

Infected share of population show the share of the population that was infected with SARS-CoV-2 six months after the first case had been detected in respective country. Countries with EVD outbreaks in 2014 and later are highlighted with orange.

Due to lack of reported information, Tanzania is not included in the table. Data on the number of people tested for COVID-19 six months after the first detected case were very irregularly reported among the different countries, and have not been included in the table.

What can be concluded from the data in the table is that there are no clear indicators to help explain the different numbers of SARS-CoV-2-infected people during the first six months of COVID-19 presence in each country. The indicators for GDP, population per km², share of urban population, health expenditures, and physicians per 1000 people does not shed light on any patterns corresponding to the proportion of COVID-19 cases in each country.

Two of the countries with previous EVD-outbreaks, DRC and Uganda, have reported among the lowest proportions of infected people. They are also the countries with the most recent outbreaks of EVD with preparedness capacity building that rested on the knowledge from the West African EVD outbreak. DRC had an ongoing outbreak of EVD that was declared over in November 2020 (UN News, 2020), while the WHO was still in place and managing both the EVD and COVID-19 situation. Uganda, with its proximity to DRC, has been working to prevent a major outbreak of EVD in Uganda and were already on alert for EVD prevention (WHO, 2019c).

[1] (Worldometer, 2021)
[2] (Worldometer, 2021)
[3] (Worldometer, 2021)
[4] (The World Bank, 2021d)
[5] (The World Bank, 2021f)
[6] (The World Bank, 2021c)
[7] (The World Bank, 2021a)
[8] (The World Bank, 2021b)
[9] (The World Bank, 2021e)

5. Discussion

5.1 Main findings

The examined SSA countries have been able to use the capacities built as preparedness for EVD-response in responding to COVID-19. They still have weak health systems with many challenges in responding to the pandemic. The most important parts of the response have been the ready established SOPs that have given a rapid organisation and leadership of the responses, combined with the use of HCWs.

5.2 Results discussion

Since the EVD outbreaks in 2014, the EVD-affected countries have, with the support of WHO and other stakeholders, built a better response capacity to infectious diseases than they previously had.

The statistics in *Table* 2 regarding the number of infected persons during the first six months in each SSA country does not give clear evidence that the countries with a history of EVD should be better equipped than other countries to respond to COVID-19. What can be seen from the number of infected persons during the first six months is that none of the countries with EVD preparation was among the top third in terms of numbers of infected people in SSA, and that four of them are below 0.03 % infection rate of the population. There are also other SSA countries with infection rates below 0.1 %, which have not had the EVD preparations.

However, lockdowns and self-isolation might cause distress among most Africans, as the majority of the citizens are small-scale self-employed persons, with very limited resources to live without a steady income. Moreover, African countries have had little resources, if any, to support minor businesses (OECD, 2020).

Another explanation to the low numbers of COVID-19 cases in SSA might be that there is a young population that does not have severe symptoms or are asymptomatic and therefore do not go to be tested (Maxmen, 2020) and will therefore not be visible in the statistics. In addition, Emeto, Alele, & Ilesanmi (2021) are suggesting that low levels of testing could have masked the true number of people infected with COVID-19 in Africa.

During the West African EVD outbreak, EVD was spreading in both Guinea and Sierra Leone in rural locations that were far from clinics, and was therefore spread without any control in the beginning of the outbreak. In the case of COVID-19, the disease was expected and there was preparedness at the borders, which could give part explanation to why there has been greater success in the initial response to COVID-19 than it was to EVD.

Despite the experience and existing plans for containing a communicable disease, the countries´ health systems are weak with limited resources. Contact tracing is a labour intensive task and the wide spread SARS-CoV-2 made it difficult for the contact tracers to keep pace with the new cases registered. South Africa and Rwanda have been able to use mobile applications and cellphone tower data for contact tracing and thereby reducing the required work force (Nachega et al., 2021).

Within the scope of this paper, it is not possible to analyse if the EVD-prepared countries have had a more rapid development progress in preparedness for epidemics than other SSA countries. What is clear is that the countries that has prepared for EVD have lifted their level of preparedness from before they started the efforts.

It appears that HCWs have played a very important role in the work against EVD by being locally connected and being able to work on household level to screen for infected people as well as contact tracing and are now deployed to similar tasks in the work against COVID-19. There has also been reports of HCW being at risk for infections and not getting their salaries, which has triggered strikes.

Ethiopia is an example of a country that has been operating with the help of HCWs on large scale. Their HCWs are regularly visiting every household and are among other things working to control contagious diseases such as HIV, tuberculosis and malaria with commendable results (Perry et al., 2016).

The countries with EVD history have been able to establish best practices through actually working themselves through EVD outbreaks and have been able to create planning and structures that have been utilised during the COVID-19 outbreak. They were therefore not take by surprise when reports about COVID-19 started coming, but could at an early stage activate a response to the oncoming threat even before it had reached Africa.

Ground crossings may be of informal nature between countries and may not have any clear markings or barriers to mark the borders. The sometimes-large number of informal PoEs constitutes a risk to the local population in case of an outbreak of a communicable disease, as people are able to cross international borders without being screened for the disease. There is therefore of importance to map both formal and informal PoEs. The mapping can be done by observation, focus group discussion and information from local security officials.

5.3 Method discussion

The estimated time consumption to search for relevant articles in scientific databases was widely exceeded when writing this paper. Information relevant to the paper has been scattered and it has been sometimes challenging to obtain the relevant information due to the subject of COVID-19 being a recent pandemic and there is still limited numbers of articles relating to the subject and the SSA countries response.

If the search term “sub-Saharan Africa” had been used in the search combinations, it might have given more articles to include in this paper as well as extending the search to several more academic search engines. More search term combinations might also have brought more article hits that could have been relevant to this paper.

5.3.1 Strengths

To respond to COVID-19 is a topical subject that has been worked on in every country in the world since the beginning of 2020. The articles used in this paper are no older than from 2016 and therefore the information can be considered as current.

5.3.2 Weaknesses

Due to the resent outbreak of COVID-19, there might still be too few articles to choose from and the subject can therefore be seen as immature in terms of a literature study. Despite this, there might be literature that could have been included in this paper to shed more light on certain angles. Writing about several countries can cause that detailed explanations give way for the bigger picture.

5.3.3 Ethical considerations

Despite attempting to at every stage be neutral, the researcher might unintentionally have caused some bias. One possible example is to use more than one article from the same scientific journal (Pan African Medical Journal and American Journal of Tropical Medicine and Hygiene), which potentially could be a source of bias.

5.4 Conclusion

The African countries that have had cases of EVD 2014-2020, have built capacity to respond to epidemics and pandemics. Those capacities have been helping them in response to COVID-19, although the health systems in the countries are still weak and lacking resources. No clear advantage over other SSA countries could be established, nor could any demographic explanation be concluded as an explanation to the different levels of infection among the SSA countries.

What is evident is that the HCWs situation has not been good and would still need to be improved in terms of availability to PPE and regular salaries. They play an important role and the health systems, as they are constructed, are dependent on the HCWs.

5.4.1 Suggested future research

Future research could include information on a higher detail level and compare the EVD-affected countries level of preparedness before and after the COVID-19 pandemic to map which areas that has improved due to need to respond to COVID-19 and possibly evaluate if these structures are in place to be used against EVD for a safer future SSA.

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