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Anthrax outbreak amidst the COVID-19 pandemic in Africa

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ABSTRACT

Anthrax and coronavirus disease 2019 (COVID-19) are both notable zoonoses that have high morbidity and mortality, not to mention adverse socio-economic and health consequences on the communities they ravage. Anthrax wreaks disease amongst mammalian species worldwide and has an endemic distribution in Africa and Asia. Kenya, for example, records an average of 10 outbreaks annually. In 2014 and 2017, it held anthrax attack rates of 15% and 29%, respectively, and case fatality rates of 1–5%. As with COVID-19, effective surveillance, containment, and vaccination programs are crucial in the fight against anthrax. While there is no evidence of direct, human-to-human transmission of anthrax currently, *Bacillus anthracis* remains a disease of public health concern that serves to fuel the devastating effects of SARS-CoV-2 in African communities. In this commentary, we examine anthrax spread in Africa amidst COVID-19, the challenges faced by these simultaneous zoonoses, and the efforts put to combat both equally.

1. Introduction

Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus that primarily infects the respiratory system [1]. The World Health Organisation (WHO) declared COVID-19 as a global pandemic on March 11, 2020 [2]. Subsequently, various vaccines have been developed to combat the rapidly spreading virus, with approximately 8 billion vaccine doses administered by December 2021 [1]. Nearly two years since the first outbreak, COVID-19 has scaled over 250 million confirmed cases and 5 million deaths, as reported by the WHO [1]. Due to its rapid transmission, COVID-19 has a high mortality rate and has resulted in a variety of co-morbidities worldwide [3].

On the contrary, anthrax, a zoonotic disease primarily affecting domestic and wild herbivores, is transmitted through ingestion of bacterial spores from vegetation and soil [4]. Contact with infected human carcasses or contaminated animal products may be a cause of natural human infection. Depending on the route of transmission, various forms of human anthrax, such as cutaneous (being the most common), inhalational, and ingestion forms, exist. Currently, no evidence is suggestive of direct human-to-human transmission [5]. The distribution of anthrax outbreaks varies with local practices of the areas, as there are more or fewer interactions between humans and animals in different regions. The difference in implementation of control strategies and weather patterns have also been shown to influence outbreaks, as weather extremes have shown to be a significant trigger of outbreaks [6–8].

2. The context of fighting Anthrax before COVID-19 in Africa

Anthrax is a listed international disease with endemic distribution in Africa and Asia, whilst globally, it occurs only in intermittent, low-incidence attacks in developed countries [9,10]. The epidemiological pattern of anthrax in Africa involves humans, livestock, wildlife, and the environment. Hence, the fight against anthrax had been regarded as an example of the One Health Concept [11]. There are many established programs in different African countries to minimise the burden of anthrax. In Tanzania, anthrax is integrated into the human health surveillance program as part of the electronic integrated diseases surveillance and response system (eIDSR). In the eIDSR, a human suspected case of anthrax is reported using a mobile application. In addition, as part of the animal health information system (AHIS), other surveillance systems are linked to animal clinics, farms, and livestock markets [12]. The surveillance system in Zimbabwe, conversely, is reported for animal and public health acts for both human and animal cases, which follow international animal health codes administered by the WHO [13]. In Kenya, an average of 10 anthrax outbreaks occurs annually, and the responses to these outbreaks occur by multidisciplinary teams of different experts. These teams conduct active case searching, key informant interviews and snowballing techniques using the case definition of the WHO to determine the population and animals at risk. Blood smears are then used for confirmation [14].

3. The burden of anthrax in Africa amidst the COVID-19 pandemic

Bacillus anthracis, the causative agent of anthrax, is known to have a worldwide disease burden, especially in mammalian species of savannah ecosystems like Sub-Saharan Africa. Multiple human anthrax outbreaks across the African continent demonstrate a high burden of disease, particularly in Kenya, where previous outbreaks in 2014 and 2017 have had attack rates of 15% and 29%, respectively, and case fatality rates of 1–5% [15]. Despite the overshadowing global concerns of the COVID-19 pandemic, anthrax remains a disease of public health importance across Africa. As of March 30, 2021, anthrax outbreaks have occurred in Zimbabwe and Southern Kenya, demonstrating high morbidity [16–20] and low mortality [21,22]. Sourcing meat from different communities was a common trait in causality in both countries, together with

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inadequate control, non-functional zoonotic committees, and improper coordination response by veterinary and health departments to the anthrax outbreaks.

4. Current efforts and challenges facing responses to Anthrax outbreak in Africa during the COVID-19 pandemic

Africa has the lowest capacity to provide critical and intensive care in the world. For several years, Africa has been plagued by recurring anthrax epidemics that have affected both animals and people. Some of the programs developed and experiences acquired during past Ebola-affected regions in Africa may have laid the basis for managing the current anthrax epidemic during the COVID-19 pandemic [23]. Telecommunication firms have also been employed by countries such as So Tomé and Principe, Zambia, Nigeria, and Burkina Faso to promote the distribution of information about preventive and control methods. Some African countries are also attempting to disseminate relief supplies, food, and other assistance to the needy with the help of donors and governments. Despite various efforts to reduce the effects of COVID-19, no uniform early warning system has been created or sustained, particularly for the management of anthrax crises during COVID-19, posing life-threatening challenges to animals, humans, and the environment. While few would argue against establishing programmes to combat zoonotic epidemics, there are worries that their remedies may eventually end up costing more than the diseases themselves, and that these costs would fall disproportionately on the world's poorest populations. However, developing effective vaccinations against cattle coronavirus-related illnesses with large economic costs has proven difficult. Nevertheless, the annual vaccination campaign is one of the government's top priorities in Mozambique for preventing and controlling animal illness outbreaks, some of which can be passed to people. As a result, Mozambique organised a livestock vaccination drive, immunising 522,972 cattle against anthrax, to prevent uncontrolled animal movement, and reduce the risk of complications and contamination among animals and humans. Controlling coronavirus and other zoonotic diseases such as anthrax in farmed domestic animals, farmed and captured wildlife and companion animals are challenging in many nations, and may be impossible in many developing ones. The finest veterinary practice necessitates the use of vaccinations, biosecurity measures, movement controls, and husbandry management in combination, all of which are extremely difficult to execute in developing countries [24–26].

5. Future recommendations

Several studies demonstrate that factors causing the outbreaks of anthrax in Africa are exposure or contact with dead animal carcasses that had died from anthrax [27,28], eating poorly cooked meat of dead animals [27–32], and leaving dead carcasses unattended. Under-reporting of the existing surveillance is also a major obstacle to estimating the true burden of anthrax in hotspot areas [33].

Possible, future recommendations to combat and reduce the risk of an outbreak are cattle vaccinations, health education, and awareness campaigns among farmers to safely dispose of dead animals and avoid handling or eating meat from livestock that died of unknown causes. Moreover, integration, cooperation, strengthening links and promotion of interdisciplinary between sectors will enhance preventative control measures under one health approach. Additionally, this will prevent outbreaks by addressing the root cause of exposures such as food insecurity. Furthermore, providing post-exposure antimicrobial prophylaxis for all exposed individuals averts the spread of anthrax. Most importantly, more studies are warranted to redefine both low and high-risk areas for anthrax in Africa, based on improved surveillance.

6. Conclusion

The outbreak of anthrax amid the COVID-19 pandemic greatly strains the already overstretched public health systems in Africa. Therefore, the situation should serve to fuel innovation, collaboration, and more investment in prevention and containment efforts in a bid to mitigate the health and socio-economic consequences. Exact figures of the outbreaks in Africa are non-existent due to reporting challenges, posing a need for better surveillance programs. In conclusion, the lessons learned from the global response since the genetic sequence of SARS CoV-2 was published on January 11, 2020, up to the currently ongoing test-and-trace and vaccination programs should be applied to the management of anthrax outbreaks. In these unprecedented times, if we do not invest in scaling up surveillance and control measures now, the world may witness other global pandemics and outbreaks, putting more vulnerable populations at risk.

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Author contribution

Olivier Uwishema: Conceptualization, Project administration, Writing-review and Designing, **Rawa Badri:** Collection and assembly of data, **Olivier Uwishema**: Reviewed and edited the first draft, supervisor, **Jack Wellington MSc (LSHTM) FGMS:** Reviewed and edited the second draft, **Helen Onyeaka:** Reviewed and edited the final draft, Supervisor.

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Consent

Not Applicable.

Declaration of competing interest

No conflicts of interest declared.

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