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Monkeypox public health research priorities for Africa: A DEENIP paradigm for strengthening global health security

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Abstract

While clinically less severe than smallpox, monkeypox is a viral zoonosis with symptoms that are comparable to those of smallpox. The 2022 multi-country monkeypox outbreak which is an international public health emergency has raised challenging issues for research. For instance, even though monkeypox can be prevented, detected, and treated with the use of vaccines, medicines, and diagnostics, further studies are required to help establish the appropriate use of these medical products. There are further concerns regarding the length of illness and the reasons why some people get sicker than others. Priorities for monkeypox public health research in Africa are to raise awareness of studies that could be conducted whose conclusions, when they are made, will significantly improve global health security. We present 6 key Monkeypox Public Health research priorities for Africa from a DEENIP paradigm for strengthening global health security. The DEENIP priorities as an organizing framework are D= D: Diagnostic tools and surveillance, E =Epidemiological, clinical and immunological traits, E= Equitable, effective, and safety distribution of vaccines including therapeutics, N= New and innovative methods for assessing medical countermeasures, I=Improve equity and reduce stigma during public health emergency, P = Public health communication strategies.

Keywords: Monkeypox; DEENIP; Global Health Security; Public Health research; Africa

1. Introduction

The recent surge in monkeypox cases has made clear precisely how little is known about the virus [1] . Additionally, the need for governments to regularly strengthen global public health research, advance, and sustain their International Health Regulation (IHR) dimensions has been highlighted by lessons learned from other global health emergencies like COVID-19, Ebola, and the Zika virus. Monkeypox is endemic in 10 countries in Central and Africa West, with dozens of cases this year-2022 in the Democratic Republic of the Congo (DRC), Nigeria, Cameroon, and the Central African Republic (CAR). During the smallpox era, monkeypox (MPX), a viral zoonosis, remained mostly concealed. It wasn't until the last phases of smallpox eradication campaigns that MPX was identified as a human disease [2]. While clinically less severe than smallpox, monkeypox is a viral zoonosis (a virus that spreads from animals to people). It has symptoms that are comparable to those of smallpox. Monkeypox has replaced smallpox as the most significant orthopoxvirus for public health since smallpox was eradicated in 1980 and smallpox vaccinations were subsequently discontinued [3]. Primarily affecting central and west Africa, monkeypox has been spreading into cities and is frequently seen close to tropical rainforests [4]. Numerous rodent species and non-human primates serve as hosts for animals. In areas where monkeypox outbreaks are unusual, like Spain, Portugal, United States and the United Kingdom, cases surged thus swift, global reaction ensued, including the provision of vaccines in several nations even though limited monkeypox vaccines

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in Africa. Although there have been outbreaks of monkeypox in some regions of Central and West Africa for years, limited resources to combat monkeypox have been made available, paradoxically where the illness has caused the greatest amount of suffering. African countries have long been dealing with epidemics of monkeypox for example in Nigeria, a large outbreak of monkeypox started in 2017 with more than 200 confirmed cases and 500 suspected cases while the Democratic Republic of Congo has experienced thousands of suspected cases over the previous ten years, along with hundreds of alleged fatalities [5]. With this history of monkeypox outbreak such that the virus that has infected people in Central Africa is more virulent, it is crucial to shed light on the research themes for monkeypox in Africa, which are based on the DEENIP paradigm for enhancing global health security.

2. DEENIP

DEENIP paradigm as an Organizing Perspective for Public Health research priorities on Monkeypox in Africa; cornerstone for strengthening Global Health Security

2.1. D: Diagnostic tools and surveillance

Since the start of the most recent monkeypox outbreaks, scientists in the United States, Belgium, Germany, Portugal and France have sequenced viral genomes obtained from monkeypox patients [6]. Also, there is a need for more research into evidence-based methods for expanding testing accessibility, conducting serosurveys, and developing better serologic assays. The most significant discovery they have made thus far is that each of the genomes closely resembles a strain of West African monkeypox. The virus is significantly less deadly than another found in Central Africa, with a fatality rate of less than 1% in underprivileged rural people. In order to close the gap in levels of undetected transmission, research must be done on the validation and strategic application of already-existing and innovative diagnostics. Additionally, Africa needs to focus on a crucial scientific topic called viral detection across specimen types. The sequences of the monkeypox virus that are currently circulating are most comparable to those from a few cases of monkeypox that occurred outside of Africa in 2018 and 2019 and were connected to travel to West Africa [6]. A significant discovery might be made with the aid of computational virologists who research the evolution of poxviruses in Africa.

2.2. E: Epidemiological, clinical and immunological traits

Researchers have not yet been able to estimate the serial interval distribution with confidence since there are so few pairs of monkeypox cases that have been identified that are epidemiologically connected and have known dates when symptoms first appeared. Similar to the reproduction number, R, there is little information around reliable estimates because there are many missing case data points and other sources of estimation uncertainty [7]. These are the areas of research that require focus. The dynamics and modes of monkeypox transmission, particularly the methods of transmission through close contact with the lesions, body fluids, and respiratory droplets of infected individuals or animals, must be fully defined. However, according to the Associated Press, health officials have been looking into sexual activities at two raves in Spain and Belgium as potential spreaders of monkeypox, which has led to speculation that the virus may have changed to become more effective at sexual transmission. More research must be done to link instances to sexual behaviour. Research in Africa is required to determine the effectiveness of contact tracing, clinical presentation, and risk factors for monkeypox. The focus of zoonotic disease research frequently is on infectious illnesses that animals have transmitted to people [8]. Nevertheless, a growing number of data suggest that people are contaminating animals with illnesses. Rapid transportation methods in use today have made public health issues in the modern era more complicated. A pathogen that is discovered today in one nation can readily travel undetected in less than a day through humans, animals, plants, or food products to other nations. Due to their extreme mobility, emerging infections are extremely challenging to track and develop therapies for. Understanding the ecology of new illnesses is essential to these efforts.

2.3. E: Equitable, effective, and safety distribution of vaccines including therapeutics

Monkeypox infections have been increasing in sub-Saharan Africa for years, according to researchers. This is partly due to the fact that nations stopped immunizing people against smallpox, which is brought on by the variola virus, which is closely linked to the virus that causes monkeypox [9]. After smallpox was eliminated in 1980 and vaccinations were discontinued, a greater proportion of people have become susceptible to it and therefore to monkeypox. There is a need for additional study on monkeypox in the areas of therapeutic effectiveness (post-exposure prophylaxis and therapy), monkeypox vaccine development and effectiveness, evaluating the efficacy and safety of one dose versus two dosage vaccines, as well as various dose sparing regimens. Studies on specialized populations, such as immunosuppressed individuals, pregnant women, and children, should be given careful consideration.

2.4. N: New and innovative methods for assessing medical countermeasures

Monkeypox medical countermeasures (MCMs) which are drugs and medical equipment that can be used to treat, diagnose, or prevent the monkeypox outbreak is a priority research area worth exploring. In the context of a multi-country outbreak of monkeypox, MCMs can comprise biologic items such as vaccinations, blood products, and antibodies, pharmaceuticals such as monkeypox antiviral medications, and devices such as personal protective equipment (PPE) and diagnostic tests to identify threat agents.

2.5. I: Improve equity and reduce stigma during public health emergency

The equitable division of resources (such as access to and distribution of vaccines and medicines) for outbreak response in non-endemic countries with control in endemic nations is a perennial point of controversy. For underserved groups in Africa, studies that assess the equitable distribution of monkeypox testing, treatment, and preventative methods will be very helpful.

2.6. P: Public health communication strategies

An essential study objective would be to directly collect data using mix-methods approaches and viewpoints from affected populations to help develop responsive actions in the domain of health communication. It is crucial to examine how the public feels about measures to combat monkeypox in order to decide whether more general or targeted adjustments are required. Infodemics, which can skew beneficial health outcomes for the overall population [10], have plagued Africa, thus need for context specific and user friendly public health communication strategies to mitigate this phenomenon.

3. Conclusion

The DEENIP paradigm gives key importance to the challenging issues that have come up throughout this multi-country monkeypox outbreak. For instance, even though monkeypox can be prevented, detected, and treated with the use of vaccines, medicines, and diagnostics, further studies are required to help establish the appropriate application of these medical measures and products. There are further concerns regarding the length of illness and the reasons why some people get sicker than others. There are concerns regarding how individuals become infected, how the virus evolves, how it is found in different specimen types, and how to predict who will get sick given that the current outbreak of monkeypox appears to be distinct from previous ones. Everybody should be safeguarded as a result of the reaction to an outbreak. Everyone should benefit from the knowledge created by such research projects, both in Africa and other endemic and non-endemic nations throughout the world. Education, outreach, trust-building, and community buy-in are necessary for an effective response. Therefore, a continuous evaluation of research priorities should be conducted from the DEENIP perspective in order to halt this public health threat as effectively as possible and thus strengthen global health security.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest.

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The views and opinions expressed in this short communication are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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