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Emerging and Reemerging Infectious Disease in West and Central Africa

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The United States has had a growing interest in Africa for nearly 30 years, as evidenced by an increase in military and humanitarian activities there, not overlooking the 2007 creation of the U.S. Africa Command. Apart from insurgencies, terrorism, and political upheaval, infectious disease is a major challenge to operations in Africa, especially in the western and central regions. Several significant disease outbreaks have occurred there in the past decade, warranting global response, including that from the U.S. Department of Defense. One of the more challenging aspects of these events is the impact posed by emerging and reemerging infections, defined by completely new or uncontrolled disease agents, as well as changes in the ability to control diseases that were once well managed. Some leading candidates for these disease outbreaks are primarily viruses like Ebola, Lassa, Crimean-Congo Hemorrhagic Fever, and various hantaviruses. Africa has been home to several new types of infectious-disease agents, and there is concern regarding the impact that new diseases would have on military operations there and in the vicinity of U.S. and allied forces and interests. This inquiry provides an initial investigation into operational considerations of emerging and reemerging infections in West and Central Africa.

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TI Research

A chief service of the DoDIAC is free technical inquiry (TI) research limited to four research hours per inquiry. This TI response report summarizes the research findings of one such inquiry. Given the limited duration of the research effort, this report is not intended to be a deep, comprehensive analysis but rather a curated compilation of relevant information to give the reader/inquirer a "head start" or direction for continued research.

Abstract

The United States has had a growing interest in Africa for nearly 30 years, as evidenced by an increase in military and humanitarian activities there, not overlooking the 2007 creation of the U.S. Africa Command. Apart from insurgencies, terrorism, and political upheaval, infectious disease is a major challenge to operations in Africa, especially in the western and central regions. Several significant disease outbreaks have occurred there in the past decade, warranting global response, including that from the U.S. Department of Defense. One of the more challenging aspects of these events is the impact posed by emerging and reemerging infections, defined by completely new or uncontrolled disease agents, as well as changes in the ability to control diseases that were once well managed. Some leading candidates for these disease outbreaks are primarily viruses like Ebola, Lassa, Crimean-Congo Hemorrhagic Fever, and various hantaviruses. Africa has been home to several new types of infectious-disease agents, and there is concern regarding the impact that new diseases would have on military operations there and in the vicinity of U.S. and allied forces and interests. This inquiry provides an initial investigation into operational considerations of emerging and reemerging infections in West and Central Africa.

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1.0 TI Request

1.1 Inquiry

What are the key emerging and reemerging infectious diseases in West and Central Africa?

1.2 Description

The inquirer asked about the forecast for emerging and reemerging infectious diseases in West and Central Africa that are related to potential public-health and operational challenges that U.S. forces stationed on the continent could potentially face, as well as health risks that may involve international humanitarian responses involving U.S. forces/civilian personnel.

2.0 TI Response

Africa has become a key region of interest for the United States, especially the U.S. Department of Defense (DoD) in recent years—so much that the United States established the U.S. Africa Command (AFRICOM) in October 2007. Headquartered in Stuttgart, Germany, AFRICOM's area of responsibility covers the entire African continent, except for Egypt (which falls under the Central Command). The timing of this inquiry coincides with an increase in military action across the continent, especially regarding counterterrorism efforts, and several major recent humanitarian responses. Africa has been a hotbed to both insurgencies and disease outbreaks, both of which threaten U.S. and allied interests in the region. It has been the source of origin for several significant infectious diseases, including Human Immunodeficiency Virus (known as HIV)/Acquired Immunodeficiency Syndrome (known as AIDS), and Ebola Virus Disease (EVD).

The rising presence of U.S. forces in Africa, along with its proximity to southern Europe and the Middle East and being a strategic location in key trade and shipping routes, increases the likelihood of disease transmission to other strategic areas and threatens the health, safety, and operational capacity of U.S. forces in the region. Thus, the importance of understanding emerging-disease risk in Africa is of high importance to U.S. military interests both home and abroad.

To better understand the potential for emerging and reemerging infectious diseases that threaten U.S. interests in Africa, the Homeland Defense & Security Information Analysis Center conducted a keyword search using open-source information from publicly available resources, including Google Scholar, PubMed, and relevant government and nongovernment organization websites.

2.1 Background

Africa is the second-largest and second-most populated continent, with 20% of Earth's land mass and 1.4 billion people [1]. There are 54 fully recognized sovereign states in Africa. However, more than half of African nations rank at the bottom of the Human Development Index, and 50% of the population lives in poverty. Africa, in general, is home to several extremist and terrorist groups that threaten not only the stability of local and regional political systems but also interests of the United States and its allies. Due to this fragility, nearly 40 million people across Africa are refugees or internally displaced persons [2]. Some of the more active areas of Africa are found in the west and central regions.

The United Nations geoscheme places 16 countries and 1 UK overseas territory in West Africa [3]:

- Benin
- Burkina Faso
- Cabo Verde
- Cote d'Ivoire
- Gambia
- Ghana
- Guinea
- Guinea-Bissau
- Liberia
- Mali
- Mauritania
- Niger
- Nigeria
- Saint Helena (UK Territory)
- Senegal
- Sierra Leone
- Togo

Middle (Central) Africa consists of [4]:

- Angola
- Cameroon
- Central African Republic
- Chad

- Congo
- Democratic Republic of the Congo
- Equatorial Guinea
- Gabon
- São Tomé and Príncipe

The United Nations Regional Office for Central Africa also includes Burundi and Rwanda in the region, which are considered part of East Africa in the geoscheme [4].

U.S. military and humanitarian activities have expanded across Africa since the late 1990s, especially in West and Central Africa. In 1998, President Clinton ordered a series of cruise-missile strikes on terror targets in Sudan (and Afghanistan) following the bombings of the U.S. embassies in Nairobi, Kenya, and in Dar es Salaam, Tanzania. Following the attacks on 11 September 2001, the United States established a mix of at least 20 temporary and permanent military bases in strategic areas across Africa, including [5, 6]:

- U.S. Army Bases in Benghazi, Misrata, and Tripoli, Libya
- Thebephatshwa Air Base, Botswana
- Cooperative Security Location Kismayo, Somalia
- Ouallam and Diffa, Niger
- Camp Lemonier, Djibouti
- Manda Bay, Kenya
- Air Base 101, Niamey, Niger (United States vacated in 2024)
- Air Base 201, Agaedez, Niger (United States vacated in 2024)
- Contingency Location Garoua, Cameroon

One of the most recent consequential events involving the United States (especially the DoD) in Africa was a large humanitarian response from 2014 to 2016, following a massive outbreak of Ebola virus (EBOV) in Guinea, Liberia, Sierra Leone, Nigeria, and Senegal [7].

2.2 Infectious-Disease Risk

Infectious disease has posed great risk to humanity since the dawn of time and has been especially challenging to military forces throughout history. One of the more complicated aspects of managing infectious disease is the concept of emerging and reemerging infection. Emerging infectious disease can be defined by the following criteria [8]:

- Outbreaks of new diseases that were unknown before
- Known diseases that are now spreading quickly in the number of cases, or in the number of areas where people are sick
- Known infectious diseases that are persistent and cannot be controlled

Reemerging diseases can be defined as diseases that return after appearing to have been in a major decline for some time. This may be attributable to problems in public-health actions for diseases that were once under control (such as low vaccination rates for preventable illnesses or improper use/overuse of antibiotics) or when there are new strains of known diseases that may not respond as well to current treatment methods [8].

Africa has been the source of several emerging (and reemerging) diseases throughout history, some of which have significantly impacted regional and global affairs. Additionally, there have been major disease outbreaks in West and Central Africa within the past decade. Table 1 provides an overview of some of the most likely candidates for current emerging and reemerging infectious-disease threats in West and Central Africa.

Table 1. Forecasted Emerging and Reemerging Infections of Concern in West and Central Africa [9–13]

Type	Category	Disease Agent	Disease
Virus: *Monjiviricetes*	*Filoviridae* (Filoviruses)	EBOV	EVD/Ebola Hemorrhagic Fever
		Marburg Virus	Marburg Virus Disease
	Paramyxoviridae (Henipaviruses)	Hendra Virus	Hendra Virus Infection
		Nipah Virus	Nipah Virus Infection
Virus: *Bunyaviricetes* (Bunyaviruses)	*Arenaviridae* (Arenaviruses)	Lassa Virus	Lassa Hemorrhagic Fever
		Lymphocytic Choriomeningitis Virus	Aseptic Meningitis, Encephalitis, or Meningoencephalitis
	Nairoviridae	Crimean-Congo Hemorrhagic Fever Virus	Crimean-Congo Hemorrhagic Fever
	Phenuiviridae	Rift Valley Fever Virus	Rift Valley Fever
	Hantaviridae	Hantaviruses (Old World Hantaviruses)	Hemorrhagic Fever with Renal Syndrome (HFRS)
Bacteria	*Mycobacteriaceae*	*Mycobacterium Africanum*	Tuberculosis

Building on the risk of these potentially impactful diseases, the African Risk Capacity Group, a specialized agency of the African Union founded in 2012, has identified four of these diseases as high-epidemic potential in Africa (see Figure 1) [14].

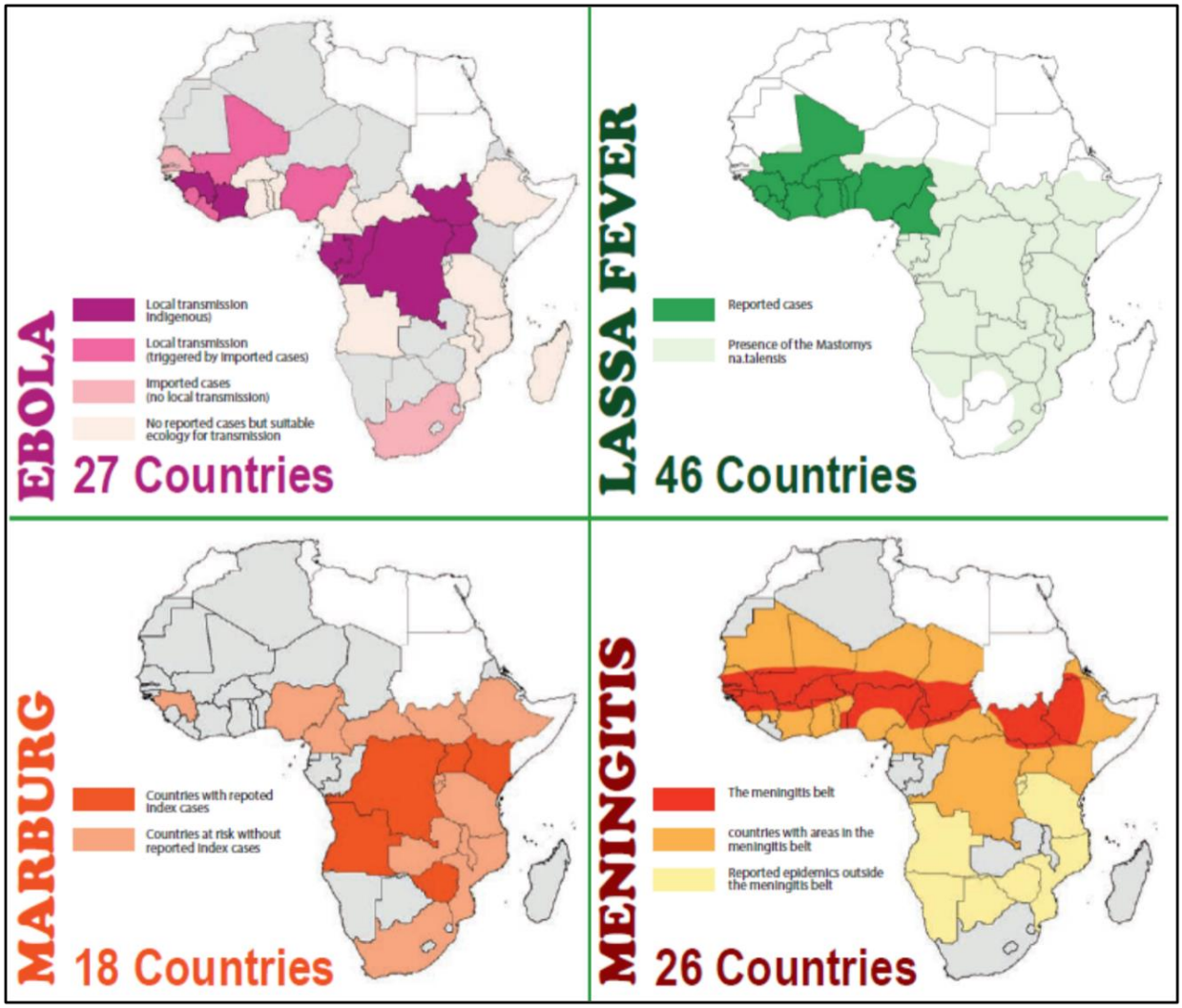

Figure 1. African Risk Capacity Outbreaks and Epidemics Program Targets Four High-Priority Diseases of Epidemic Potential [14].

2.2.1 Current Examples of Emerging Infection

One of the greatest infectious-disease threats to public health is the emergence of an agent of unknown origin and unknown activity, often referred to as Disease X. While this is more of a theoretical use case to assist in public-health preparedness research and development efforts, it is helpful in setting the stage for the constant threat that exists. For example, there have been two separate incidents in Democratic Republic of the Congo this year (2025), in which several clusters of disease have not yet been assigned to any existing cause [15, 16].

In 2006, a new type of hantavirus (Sangassou virus) was isolated from the African wood mouse and confirmed to be the first-known hantavirus indigenous to Africa [17]. Several other types of hantaviruses have since been identified in African bats, including the fourth and latest one in 2022 (Kiwira virus) [18]. Hantaviruses are known to cause two types of disease forms in humans: (1) Hantavirus Pulmonary Syndrome, which typically occurs with strains in the Americas, and (2) HFRS, which is the typical outcome for hantaviruses originating in Europe, Asia, and now Africa. While there has been no evidence of these newer viruses causing infection in humans, it is extremely possible they could likely do so, given that other hantaviruses cause disease in humans. Wolfe et al. [19] describe five stages "through which a pathogen exclusively infecting animals may become transformed into a pathogen exclusively infecting humans" (see Figure 2).

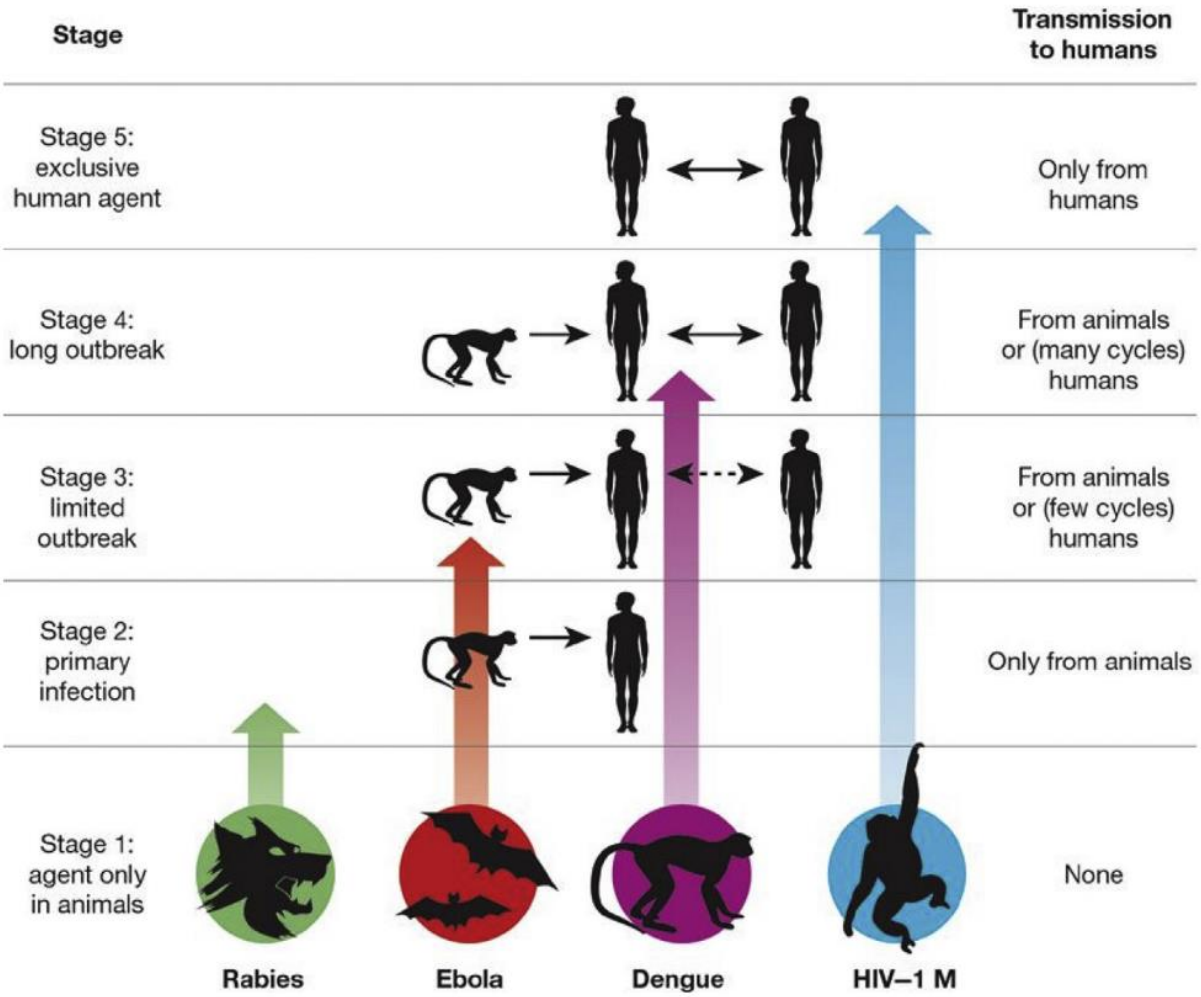

Figure 2. Five Stages Through Which Pathogens of Animals Evolve to Cause Diseases Confined to Humans [19].

2.2.2 African Partnership Outbreak Response Alliance

Following the West Africa EBOV outbreak in 2014 and subsequent humanitarian response, the African Partnership Outbreak Response Alliance (APORA) was formed “to mitigate the threat of emerging and reemerging pathogens due to lack of early-warning detection and response systems” [20]. The alliance was developed through AFRICOM, U.S. Air Forces in Europe, and U.S. Air Forces Africa. APORA has continued to grow and evolve and now consists of 32 countries that meet annually to train together and discuss how best to prepare for epidemics.

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Biography

Gregory Nichols is a public-health professional, with more than 25 years of experience covering healthcare, public-health research, and defense activities. He is currently the operations manager for the Health Studies Program at Oak Ridge Associated Universities and a Homeland Defense & Security Information Analysis Center subject matter expert and frequent contributor. He holds a Master of Public Health from the University of Tennessee, along with certifications in public health, quality management, and safety. He has published and presented extensively on emerging technology risks and currently participates in several nationwide health-related communities of practice. Mr. Nichols is a prior U.S. Navy Hospital Corpsman, having served in hospitals based in the United States and Europe.

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