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PERSPECTIVES

The Looming Threat of Dengue Fever: The Africa Context

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In Africa, compared to 2019, dengue infections have surged ninefold by December 2023, with over 270 000 cases and 753 deaths reported across 18 African Union (AU) Member States. This commentary synthesises the context of dengue outbreaks in Africa and provides recommendations for sustainable control. In 2023, 18 African Union Member States reported outbreaks of dengue, among which seven had ongoing armed conflicts. These countries were amongst the top 15 African countries contributing to the most displaced persons on the continent and accounted for 98% of all dengue cases reported in the continent in 2023. Climate change remains an important driver, both through the displacement of people and global warming. The continent continues to face several challenges in detection, reporting and management, such as the lack of local laboratory capacity, misclassification of dengue cases and lack of medical countermeasures. Solutions targeting the strengthening of cross-border surveillance and early warning systems using a multisectoral one-health approach, local research and development for therapeutics and diagnostics and community engagement empowering communities to protect themselves and understand the gravity of the threat could help curb the spread of the disease in Africa.

Keywords. Africa; climate change; Dengue; humanitarian crises.

Dengue fever, a mosquito-borne viral infection, has emerged as a significant public health concern worldwide, resulting in >5 million cases and >5000 dengue-related deaths in >80 countries and territories in 2023 [1]. This translated to an 8-fold increase in the number of cases when compared with 2019. The World Health Organization estimates that nearly half of the world's population is at risk of dengue infection [2, 3]. Dengue, once known to circulate only in tropical and subtropical regions, has now spread to regions with temperate climate, including Europe, Eastern Mediterranean, Western Pacific, and North America. Its rapid spread and potentially fatal complications pose a great challenge to health security across the globe [1, 4]. With its complex epidemiology, intertwining with existing humanitarian crises and expansion of vector distribution due to climate change and mobility, dengue epidemics are creating a public health perfect storm in Africa and other low- and middle-income countries. This commentary delves into the multidimensional nature of dengue fever, exploring its epidemiology in the context of climate change and humanitarian crises on the African continent while highlighting the urgent need for comprehensive solutions.

Africa is believed to be endemic to all 4 serotypes of the dengue virus—DENV-1, DENV-2, DENV-3, and DENV-4—although DENV-2 has reportedly caused the most recent epidemics on the continent. The presence of the vector (*Aedes aegypti*) has been reported in 47 of 55 African Union member states. Nevertheless, only 34 of the 47 countries with the presence of the vector have reported cases of dengue. In Africa, as compared with 2019, dengue infections surged 9-fold by December 2023, with >270 000 cases and 753 deaths across 18 African Union member states (Figure 1) [5]. Dengue symptoms overlap with endemic febrile illnesses such as malaria, and as such, several cases are presumptively diagnosed as malaria. This misclassification underestimates the burden of dengue in these countries and is a cause for concern for future risk of antimalaria resistance.

Even though first reports of dengue in Africa date back to the late 18th and early 19th centuries, the current context of the escalating epidemiologic situation is concerning [6]. The disease was previously known to affect mainly children; however, cases are now being reported across all age groups, including pregnant women and persons who are immunocompromised, which further strains the already-overstretched health care systems on the continent [7, 8]. In addition, the risk of contracting dengue has increased over

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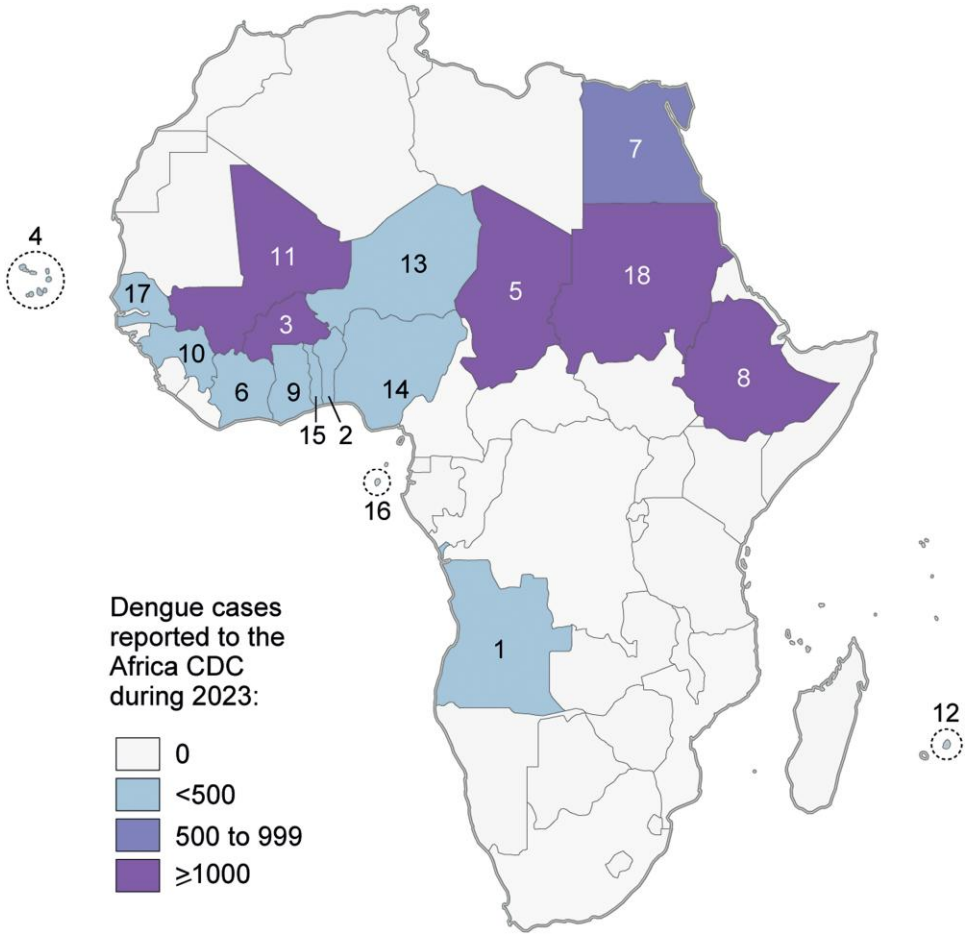

Figure 1. Map shows DENV cases reported to the African CDC by African Union Member States experiencing DENV outbreaks in 2023. The corresponding country names and the number of reported DENV cases are detailed in the accompanying table.

the past years with many more nonendemic countries reporting outbreaks due to increased mobility across the borders.

In 2023, 18 African Union member states reported outbreaks of dengue, among which 7 have ongoing armed conflicts: Burkina Faso, Chad, Ethiopia, Mali, Niger, Nigeria, and Sudan (Figure 1, Table 1) [9]. These 7 countries accounted for 98% of all the dengue cases reported on the continent in 2023. Furthermore, these countries are among the top 15 African countries contributing to the highest number of displaced persons on the continent, increasing the likelihood of disease spread to other nonendemic countries. It is interesting to note that the first outbreak of dengue in Chad was reported in 2023 following the displacement of people due to the Sudan crises into the neighboring Chad province of Ouaddaï. When such complex epidemiologic and mobility scenarios are coupled with suitable climatic conditions for *Aedes* spp vectors, outbreaks are bound to occur with increased frequency. In countries such as Nigeria (Sokoto State), the humanitarian crises continue to impede the implementation of vector control and other response measures. The numbers of forcibly displaced Africans in 2023 represents a >2-fold increase in the numbers displaced vs 2016 [9]. Given the growing rise in humanitarian crises on the continent and an estimated 40.4 million forcibly displaced Africans in 2023 alone, including internally displaced persons, refugees, and asylum seekers, the level of vulnerability to dengue and other diseases, as well as the frequency of dengue outbreaks on the continent, is expected to steadily increase.

Climate change continues to remain an important factor to consider in the spread of dengue through displacement of persons and global warming [10, 11]. Since 2019, around 2 million people on the continent have permanently been displaced due to persistence flooding, drought, and storms. Several studies suggest that the prevalence of dengue in Africa may increase due to climate change in the coming decade [11, 12]. However, it may be difficult to monitor changes in dengue incidence over time due to low awareness, lack of local laboratory infrastructure and capacity, and misclassification of dengue cases in many settings [12].

Table 1. African Union Member States Reporting DENV Cases and Deaths, According to Armed Conflict and Environmental Crisis Status

No.	Member State	DENV Cases	DENV Deaths	Armed Conflict	Environmental Crisis
1	Angola	3	0		
2	Benin	6	1		
3	Burkina Faso	240 298	707	Yes	
4	Cape Verde	410	0		
5	Chad	1581	1	Yes	
6	Cote d'Ivoire	3895	27		
7	Egypt	578	0		Yes
8	Ethiopia	21 469	17	Yes	Yes
9	Ghana	18	0		
10	Guinea	6	1		
11	Mali	6177	34	Yes	Yes
12	Mauritius	265	0		
13	Niger	148	0	Yes	Yes
14	Nigeria	84	0	Yes	Yes
15	São Tomé and Príncipe	1227	11		
16	Senegal	254	0		
17	Sudan	1664	7	Yes	Yes
18	Togo	8	0		
	Total	278 091	806		

Abbreviation: DENV, dengue virus.

One of the major challenges in the fight against dengue has been the development of a safe and effective dengue vaccine [13]. Currently, the only licensed vaccine is the tetravalent Sanofi dengue vaccine, which is recommended for individuals aged 9 to 45 years who live in endemic areas and have been previously exposed to dengue. However, there is significant limitation in the deployment of this vaccine in the African continent. First, dengue serologic and molecular surveillance across many settings in Africa remains challenging. Second, this vaccine can be administered only to individuals with previous exposure to the disease, which limits the opportunity for preventive use among health care workers and other vulnerable persons living in dengue-endemic settings with no previous exposure. Two other dengue vaccine candidates, Takeda and Butantan/NIH/Merck, seem to show promising results in terms of safety and efficacy but are yet to be licensed.

To prepare for the coming storm, there is need for a multisectoral approach. First, it is important to strengthen surveillance and early warning systems by establishing a continental network that can detect, track, and respond to dengue outbreaks in real time. This would involve strengthening laboratory capacity and leveraging existing networks, such as the pathogen genomic surveillance network established by the Africa CDC, to improve dengue genomic sequencing on the continent [14, 15]. Currently, only 2% of the available dengue nucleotide sequences deposited in NCBI GenBank are from Africa, hindering our understanding of dengue diversity and serotype dynamics in the continent. In addition, it is critical for members states to leverage innovative approaches for mapping population movements across borders to generate data for early warning and response [16]. Second, the Africa CDC Event Based Surveillance and One Health frameworks could serve as important tools for establishing early warning systems through a One Health multisectoral approach that leverages meteorologic and vector distribution models [17]. Third, there is an urgent need to accelerate local research and development, prioritizing not just vaccine development but also novel mosquito control methods and therapeutic interventions. Fourth, investment in community engagement and awareness campaigns, empowering communities to protect themselves and understand the gravity of the threat, will be critical to the success of dengue control programs. Finally, and perhaps most important, we need collaborative surveillance, global solidarity, and cooperation for improved decision making [18]. Dengue knows no borders, and neither should our response. Equitable sharing of data, expertise, and resources across nations will be crucial to build an effective and united strategy against this global public health threat.

Note

Potential conflicts of interest. All authors: No reported conflicts.

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