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Article in *Disaster Medicine and Public Health Preparedness* · February 2023

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Cite this article: Vohra LI, Aqib M, Jamal H, Mehmood Q, Yasin F. Rising cases of dengue and malaria in flood affected areas of Pakistan: A major threat to the country's healthcare system. *Disaster Med Public Health Prep.* 17(e323), 1–2. doi: <https://doi.org/10.1017/dmp.2022.293>.


Keywords:

dengue; malaria; floods; mosquitoes

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Rising cases of Dengue and Malaria in Flood Affected Areas of Pakistan: A Major Threat to the Country's Healthcare System

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Dear Editor,

Flooding in 2022 in Pakistan have led to rising cases of mosquito-borne illnesses like dengue and malaria in the affected areas, which is a major public health threat to the country. Affecting up to 400 million people worldwide annually, dengue is a mosquito-borne disease caused by any of a group of viruses: Dengue virus 1, 2, 3, and 4.¹ In most cases, female mosquitoes of *Aedes aegypti* spread the virus from 1 person to another. Although most cases of dengue fever are asymptomatic; its cardinal symptoms include high grade fever, severe headache, periorbital pain, and myalgia, as well as nausea, vomiting, abdominal pain, and rash.² Malaria, a fatal but preventable as well as curable illness, is caused by a genus of parasites called *Plasmodium* that usually infects a specific type of mosquito, *Anopheles*, which feeds on humans.³ The mosquito, *Anopheles*, usually lives in dirty water and harbors the parasite. Fever, chills, headache, and muscle pains, as well as fatigue, nausea, vomiting, and diarrhea, are the symptoms that most people experience.⁴

According to the National Disaster Management Authority, 33 million people have been impacted by the flooding and torrential rains, and 81 districts have been officially designated as 'calamity struck': 32 in Balochistan, 23 in Sindh, 17 in Khyber Pakhtunkhwa, and 6 in Gilgit-Baltistan, with 3 in Punjab.⁵ In addition to the 1468019 houses that have been destroyed entirely or partially, 1290 individuals have also lost their lives.⁶ Nearly 4210 medical camps have been established by the authorities to treat flood victims, out of which the majority presented with complaints of diarrhea, skin illnesses, respiratory illnesses, and malaria, as well as snake bites and dog bites. This is due to exposure to and ingestion of contaminated water, which also acts as a breeding ground for mosquitoes.⁷ The recent flooding has caused a socioeconomic decline leaving the government and the general populace overburdened by the cost of healthcare, worsening Pakistan's already failing healthcare system.

Natural calamities such as floods are associated with a high incidence of communicable and non-communicable infectious diseases such as diarrhea, tetanus, gas gangrene, and respiratory infections like pneumonia and asthma, as well as gastrointestinal conditions such as cholera and hepatitis A, and vector-borne infections in which mosquitoes are the most common culprit vector, including dengue, and malaria. In addition, floods also cause many other diseases like tuberculosis and measles due to poor sanitary conditions and overcrowding.⁸

Floods can particularly affect reproduction, growth, behavior patterns, and population dynamics of arthropod vectors such as mosquitoes and ticks acting as carriers for dengue, plasmodium, and nonhuman vertebrate reservoirs either independently, or collectively. During their favorite rainfall season, the mosquito gangs become active, and the incidence of mosquito borne diseases (MBD) such as dengue and malaria increases appreciably.⁹ When an area becomes flooded, the populations and territories of many vectors, especially mosquitoes, may initially vanish, but when the water subdues after rainfall, they return to these areas as receding flood water can provide ideal breeding sites for them. Poor sanitary conditions and lack of resources such as mosquito nets and insect repellents may also increase the risk a lot. As stagnant water pools build up due to prolonged rainfall, the spread of notorious mosquito-borne diseases escalates in the affected areas.¹⁰ The lack of public awareness significantly adds to the problem regarding the spread of disease.

Effective and timely preventive measures can reduce the burden of disease and save us from the hazardous effects of infectious diseases. To combat these illnesses, the population affected by the floods needs access to basic health services as soon as possible. Other urgent objectives include strengthening and expanding disease surveillance, preventing and controlling outbreaks, and ensuring a well-coordinated response. Prompt action must be taken to purify water by chlorination and dispose of contaminated water and other waste, as well as stockpiling rehydration drinks and antimalarial medications in health facilities situated in high-risk areas, to ensure public health safety. Public health officials should make substantial efforts to raise public

awareness of preventative actions, such as simple measures of wearing insect repellent, covering up, donning clothes with permethrin treatment, or utilizing mosquito nets, that can stop or minimize the spread of the dengue virus. Provision of Vitamin C supplements, fluid, and electrolyte balance to boost immunity is an important measure to deal with dengue. Practicing solar disinfection, good hygiene, and getting the community actively involved is also recommended to deal with rising cases.

Conflicts of interests. All authors declare no conflict of interest.

Funding statement. The authors did not receive any funding for the project.

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