Strengthening dengue control in Pakistan

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Introduction

Climatic diversity is seriously impacting human health. Changes in climate, such as changes in rainfall patterns, flooding, catastrophic storms, severe fires, extreme precipitations, and intense droughts are exacerbating human pathogenic diseases and making the distribution of microbial species to surge drastically (*1*). Deficient water disposal facilities and poor flood control have increased the risks of water-borne diseases.

The dengue virus poses a serious threat globally, especially across the tropical countries. Dengue is caused by positive, single-stranded RNA viruses of the *Flaviviridae* family, and it is the most rapidly spreading arboviral disease. The virus is primarily transmitted by *Aedes Aegypti* mosquitoes and should be suspected when 2 of the following symptoms are accompanied by a high-grade fever of 40°C for 2–7 days: severe headache, retro-orbital pain, myalgia and arthralgia, vomiting, nausea, lymphadenopathy, or rash (*2*). Clinical presentation of infected patients is extensive and may differ, from asymptomatic infection to alarming complications such as dengue haemorrhagic fever, dengue shock syndrome, marked bleeding, coagulopathy, encephalitis, and intracranial bleed (*2*).

Epidemiology of dengue worldwide and in Pakistan

Dengue primarily prevails in tropical and subtropical regions, in both urban and suburban areas. The infection is now endemic in around 129 countries and is currently the fastest growing mosquito-borne viral disease (*2*). The WHO estimates that Asia represents around 70% of the global burden of dengue, posing significant health and economic hazards to the South-East Asia Region (*2*).

In Pakistan, dengue fever is a year-round, nationwide hazard with most cases being reported between September and December. The National Institute of Health, Islamabad, reported 22 938 cases of dengue fever in 2017, around 3200 in 2018, 24 547 cases in 2019, 3442 cases in 2020, and a total of 48 906 cases with 183 deaths countrywide in 2021 (*3*). In the last 15 years, specific regions of Pakistan have seen 10 times increase in the reported cases of dengue (*4*).

Favourable breeding conditions for the disease vector

Dengue cases generally increase during the monsoon season, as the collective effects of rainfall, humidity and elevated temperatures provide the most convenient environment for mosquito breeding (*4*). Mosquitoes typically breed in water stored in containers like cement and plastic tanks, used tyres, flower pots, as well as stagnant water bodies and construction sites in neglected urban areas. Indoor water holding domestic containers, lavatory cisterns, laundry tanks, drums, and pet dishes are also breeding grounds.

Heightened dengue cases following the devastating flood

In 2022, Pakistan experienced the most severe flooding in recent years, triggered by the unusual torrential monsoon rains. The floods swept away entire villages and destroyed rural communities, displacing around 33 million people and exposing them to increased risks of drowning, malnutrition and water-borne diseases, especially dengue (*5*). Historic data reveal that increases in dengue cases significantly correlate with the amount of rainfall (*6*). Thus, the recent heavy flooding, followed by an enormous spike in dengue cases, has caused serious calamity in the country.

In the wake of these calamitous floods, reported dengue cases continued to increase throughout the country, including in Karachi where the public blames the government for the city's poor sanitary conditions and for not carrying out timely fumigation campaigns (*7*). As of 15 September 2022, an estimated 3830 dengue cases had been reported in Sindh and at least 9 lives had succumbed to the virus (*5*).

Data from the tertiary care hospitals in Pakistan are often asserted by the health department, however, it is argued that the government's system is inadequate to collect data across the provinces (*8*). A total of 350 new cases of dengue were reported across Northwest Khyber Pakhtunkhwa on 19 September 2022. There were 188 cases in Punjab Province and 96 in Islamabad within 24 hours (*9*). According to Pakistan's climate minister, thousands of people were taking refuge in camps throughout the country with catastrophic healthcare consequences.

In addition to dengue, suspected malaria cases increased from 2.6 million in 2021 to 3.4 million in 2022. A sudden surge was observed following the devastating floods in Sindh and Baluchistan provinces in June 2022 (*10*). Confirmed malaria cases in Sindh Province reached 69 123 in August 2022, compared to 19 826 cases reported in August 2021. In Balochistan Province, 41 368 confirmed cases were reported in August 2022, compared to 22 032 cases in August 2021. These 2 provinces were severely affected by the floods and together accounted for 78% of all reported malaria cases in Pakistan in 2022. Reports from high-burden districts show that further 210 715 cases of malaria were reported in September 2022, compared to 178 657 cases reported in the same districts in August 2022 (*10*).

Suggested measures for tackling vector-borne diseases in Pakistan

Vector-borne diseases (VBDs) such as malaria, dengue and cutaneous leishmaniasis have serious consequences for Pakistan and the main method for tackling them and neglected tropical diseases (NTDs) is proper vector management. The 2022 historical malaria outbreaks in Pakistan indicate a need for comprehensive approach to integrated VBDs control in Pakistan with adequate resources for preparedness. Although emergency response is essential when there is an outbreak, it is not enough for containing dengue and other VBD outbreaks in the long-term. Isolated control programmes result in overlapping of measures and wastage of resources. A viable dengue prevention and control programme integrated with other vector control programmes is needed for greater efficiency and sustainability of control measures.

Integrated vector management (IVM) is a cost-effective, rational approach to sustainable vector control and it is promoted by WHO to curb vector population, destroy plausible breeding sites and minimize exposure to disease vectors (*11*). With adequate sanitation, improved drainage systems and environmental management, and mosquito-proofing of water storage materials, there will be a reduction in the need for chemical control measures. Vector control measures should be implemented in all communities and especially in urban centres because of the dense population.

Personal prophylaxis includes the application of mosquito repellent lotions, use of mosquito coils, wearing protective clothing to minimise exposure, use of indoor residual sprays, and since *Aedes* mosquitoes bite during the day with peak activity at dawn and dusk, it is recommended to stay indoors and use window screens or mosquito nets (*2*). However, with the low income and low literacy levels in the country, personal prophylaxis may not be cost-effective and practical for the masses. Key public health messages on how to reduce the risk of dengue transmission among the population through personal protective measures, which depend on individual compliance, must be provided. Community-based health workers and the media should be sensitized to promote messages on reducing the risk of dengue transmission throughout the country.

In addition to IVM, vector and human case surveillance should be boosted in all affected areas and across the country. Many Pakistanis seek health care services from private practitioners who should be properly trained on dengue management, referral and notification. There is need for a robust and sustainable digital notification system that connects all health care providers in the country.

The Global Vector Control Response 2017–2030 provides a new approach to fortifying vector control worldwide through augmented capacity, enhanced surveillance, improved coordination, and integrated action across sectors and diseases. It calls on Member States to develop or adapt national vector control strategies and operational plans that align with this strategy (*12*).

Multisectoral collaborations for the control of vector-borne diseases is required as well as political will with adequate and sustained resource allocation for reinforced monitoring, increased technical capacity, improved infrastructure, and community mobilization.

Improved infrastructure and better drainage systems are needed, together with affordable diagnostic testing, training of health care providers for standard management of cases in out and in-patient settings, and easier access to platelets for needy patients. All these measures should be complemented with advocacy for better control of dengue in Pakistan.

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