Vol. 4 No. 4 (2025)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Dengue Virus in Khyber Pakhtunkhwa, Pakistan: Variant Circulation, Patient Outcomes, and Public-Health Response Strategies

Dr. Anees Ullah Jan
MBBS, Changsha Medical University, China
Email: aneesullahjan2001@gmail.com

Dr. Syed Ahmad Ali Bacha
MBBS, Changsha Medical University, China
Email: s.ahmadshah564@gmail.com

Dr. Asim Khan
MBBS, Changsha Medical University, China
Email: asim.khan402040@gmail.com,

Dr. Syed Asadullah Bacha
Lecturer, Bacha Khan Medical College Mardan, Pakistan
Email: syedasadullahbacha@gmail.com

Author Details

Keywords:

Received on 15 Nov 2025
Accepted on 10 Dec 2025
Published on 25 Dec 2025

Corresponding E-mail & Author*:

Dr. Anees Ullah Jan
MBBS, Changsha Medical University China Email: aneesullahjan2001@gmail.com

Abstract

Background: Dengue is caused by mosquitoes that appear with different variants in the Khyber Pakhtunkhwa province of Pakistan. It is alarming that several dengue virus serotypes are circulating across the province's districts, and the number of patients is increasing daily.

Objective: The main objectives of the study were to determine which dengue serotypes and variants have been circulating in Khyber Pakhtunkhwa, explain the typical symptoms seen in dengue patients and briefly describe the clinical outcomes reported by the hospitals, compare the dengue-related experiences of public hospitals with those of private healthcare facilities in the province, identify the demographic and clinical factors where increase the growing severe dengue cases, and provide practical and effective recommendations for public-health actions and clinical management to reduce dengue virus related illness and death tolls.

Methods: The data were gathered from published articles, provincial dengue surveillance updates, and clinical reports from three major public hospitals: Khyber Teaching Hospital (KTH), Hayatabad Medical Complex (HMC), and Lady Reading Hospital (LRH). Clinical symptoms of patients, laboratory findings, serotype results, and public health responses were briefly summarised.

Results (summary): DENV-1 and DENV-2 are the common dengue serotypes. Khyber Pakhtunkhwa reports indicate that the infectious mosquito bite causes illness within 4 to 10 days. After ten days, the next stage of serotypes reaches and makes the conditions

more severe for the patients. Hospitals closely monitored the frequent rise in hematocrit and low platelet counts in extreme situations. It is alarming for the patients who came late for treatment to the hospitals, and some patients did not survive, and the majority recovered from illness after prompt treatment.

Conclusion: It is concluded that the worst situation is being handled down after continuous monitoring of the virus serotypes and their variants in the Khyber Pakhtunkhwa province of Pakistan. For this purpose, measures were taken to control mosquito breeding sites, prepare hospitals to cope with the situation, and raise public awareness of their role in combating dengue transmission and spread.

Introduction

Dengue is an infectious disease that is transmitted by the bite of an infected Aedes mosquito. Warm and humid areas are the best places for its evolution. Its breeding depends on the weather, especially during the monsoon, when the number of mosquitoes increases. World Health Organisation (WHO) (2025) reports that the dengue virus is usually spread across any area due to still water, where mosquitoes find a welcoming environment for nourishment and breeding. This situation is alarming in the Khyber Pakhtunkhwa province of Pakistan, where the number of dengue patients is increasing day by day and in the hospitals, there are no proper facilities to overcome these issues. Hospitals have a burden of patients due to the daily routine. The organisation suggests that it bring to notice which variant of dengue virus serotypes are circulating across the area and which areas and populations are being affected on a daily basis.

Therefore, it is discovered that the present dengue virus belongs to the Flaviviridae family and owing to that, a large number of patients are suffering from that variant. Suleman (2016) realizes that it is too dangerous because the majority of people have no idea about the early symptoms in their bodies, but in hospitals, it was discovered through tests that they are suffering from the dengue virus. Khan, Afzal, Fatima and Aamir (2020) indicated that symptoms of the dengue virus are plasma leakage, bleeding, and shock. They added that in Pakistan, the patients of the dengue virus is sharply increasing through transmission every year in the monsoon season, when mosquitoes pass through the process of fertilization and breeding, and their number accelerates rapidly. It is challenging in Pakistan, especially in the Khyber Pakhtunkhwa province, to cope with situations like outbreaks, where immediate researchers are required by the healthcare authorities to study their patterns, variants, and impacts.

Dengue infection in Pakistan, especially in the Khyber Pakhtunkhwa province, is caused by a poor drainage system, heavy rainfall, and irregular methods to control the spread and growth of mosquitoes. There is a dire need to utilise alternate long-term transmission methods, and sudden abruption spikes can develop into major epidemics. However, whatever may be the major cause, the widespread occurrence of Aedes albopictus and Aedes aegypti (Ali et al., 2016; Aftab, 2024). Surveillance statistics indicate that a considerable number of variants are annually increasing, and a large number of cases occur in Pakistan during 2024–2025. In this period, the transmission of the virus is at its peak in Pakistan, with tens of thousands of illness cases recorded, while the World Health Organisation reported millions of cases worldwide (WHO, 2025; National Institute of Health Pakistan, 2024).

The cases of dengue virus in the Khyber Pakhtunkhwa province are in considerable numbers, and the second highest after the Punjab province. It is regrettable that thousands of confirmed cases have been reported, and the death toll rate is gradually increasing instead of decreasing. The total load of patients is on the Peshawar major hospitals, namely Lady Reading Hospital (LRH), Khyber Teaching Hospital (KTH), and Hayatabad Medical Complex (HMC), because there is no prominent city

where serious patients are being served (Economic Times, 2024; Dawn, 2025). In addition to that, the majority of people across the country are poor, and they have very few resources and capital to treat themselves or family members, and due to travel in transport services, a large number of patients die before reaching the hospital. In local areas, there are no professional doctors, and due to that very reason, patients do not survive, and on the other hand, there are no facilities in hospitals to cure the patients (Tribune, 2024; NIH Pakistan, 2024).

On the other hand, molecular data of the Khyber Pakhtunkhwa reports that the dengue virus simultaneously circulated with several dengue serotype variations, consisting of DENV-1, DENV-2, DENV-3, and DENV-4. Therefore, fighting against all the variants is challenging for doctors because the treatment of all these variants is different, with different parameters (Suleman, 2016; Khan et al., 2020). It is claimed that immunological process causes infection with a different serotype, and meeting the challenge is considered to discuss treatment for the patients (Iqbal et al., 2025). Similarly, the variants DENV-2 and DENV-3 were not emerged the first time in Peshawar but the variants have been emerged since 2017 in Peshawar and in roundabout areas and that serotype continually circulate (Khan et al., 2020; Ali et al., 2016) declared after first emergence to fight against dengue is rather difficult as compare to other diseases because it was difficult to diagnose it was and how to identify and give treatment to the patients (Raza et al., 2021).

It is reported that the majority of the children and young adults are the main victims of the dengue virus, but no one knows about the different circulating serotypes in the Khyber Pakhtunkhwa and other provinces of Pakistan. Initially, doctors analyse the disease based on some symptoms and give emergency treatment to them, but when the number of patients is increasing, the doctors put their heads that how to deal with them all, and the hospitals have been full of patients and they leave all the minor cases and focus on the dengue cases (Dawn, 2025; Tribune, 2024). Due to the rush of people to the government hospitals, they move towards the private hospitals for special treatment. When the survey was conducted between government and private hospitals, they found the same serotype circulation, and the majority of them were coming from the northern areas and recently merged districts of Khyber Pakhtunkhwa (NIH Pakistan, 2024; Economic Times, 2024).

Finally, it has been observed that the spread of dengue virus depends on a specific weather, climate, and the time of the day like at sun rise and sun set, the chances are much more to affect the people and on those who sleep at night at open places in the courtyard or on the roof of the house or specially the area where there is too much greenery, trees and water like lakes, streams, canals etc. On the other hand, the cause of the disease may be due to heavy rains and flooding, where the dengue mosquito breeding rises when the temperature drops, humidity drops, or control measures are dynamically enforced (WHO, 2025; NHRS-C, 2025).

On account of public health facilities, the condition of Pakistan is deplorable, where Fogging, larvicide, and cleansing stagnant water culminate and make the conditions more severe, but not only that causes numerous other diseases. There are unhygienic conditions, and diseases are spreading across the country, showing an alarming situation. Nonetheless, persistent difficulties remain, such as unequal case reporting, limited access to accurate diagnostic tests, and insufficient genetic surveillance to uncover new mutations at an early stage (Dawn, 2025; DEAG Punjab, 2024).

Clinically, Khyber Pakhtunkhwa province hospitals have patients whose hematocrit levels critically rise, and platelet counts decline due to the dengue virus attack. Some patients experience shock, hemorrhage, or liver damage, especially in cases where they reach the hospital late, and the secondary infection circulates in their blood, and the whole body feels pain (Iqbal et al., 2025; Suleman, 2016). In general, those patients

who arrive on time at the hospital have recovered from the illness. In this regard, private hospitals like Evidence from hospitals like Rahman Medical Institute (RMI) and North West General Hospital (NWGH), where patients are provided quick treatment, but the approach these hospitals take for the poor people is a dream. In these hospitals, patients are treated properly, and serious outbreaks are handled properly (RMI Clinical Reports; IDSR summary).

Consequently, the dengue virus with different variants exists in Pakistan, but in the Khyber Pakhtunkhwa province, due to the already discussed reasons. They are occurring again and again with consistency, but depend on the weather conditions too, with many serotypes circulating across the locality at the same time. The condition is alarming, where a significant increase in the number is a threat to the government's measures to cope with the situation. Due to a low budget for health, the problem is deteriorating violently. Despite these problems, surveillance and research indicate that early detection of the dengue virus and cautious fluid management in blood has improved the public health matters, and continued control of the mosquito nurseries improves the decline in cases, and other control measures are already underway.

Objectives

Determine which dengue virus serotypes and variants have been circulating in Khyber Pakhtunkhwa (KP).

Explain the typical symptoms seen in dengue patients in KP and summarize the clinical outcomes reported by hospitals.

Contrast the dengue-related experiences of public hospitals with those of private healthcare facilities in the province.

Identify the demographic and clinical factors that increase the likelihood of developing severe dengue illness.

Provide practical and effective recommendations for public-health actions and clinical management to reduce dengue-related illness and death in KP.

Methods

This study is based on a review of existing information and does not involve the collection of new patient data. The material examined included:

Published studies and preprint articles related to dengue in Pakistan, particularly in Khyber Pakhtunkhwa (KP).

Provincial dengue surveillance updates from KP and national reports from the Integrated Disease Surveillance and Response (IDSR) system.

Clinical summaries and hospital records from major public hospitals (KTH, HMC, LRH) as well as two private hospitals (RMI and NWGH).

The review focused on identifying circulating dengue serotypes, describing the typical pattern of illness, summarizing laboratory trends such as platelet counts and hematocrit changes, reviewing reported hospital outcomes, and assessing public-health response activities. When information was available, differences between public and private healthcare facilities were also compared.

Results

Objective 1: Determine which dengue virus serotypes and variants have been circulating in Khyber Pakhtunkhwa.

Serotypes and Variants

Research from Pakistan shows that all four main dengue serotypes (DENV-1, DENV-DENV-3, and DENV-4) have appeared in different regions of the country Evidence from KP confirms that more than one type circulates in the province at the same time.

Recent surveillance suggests that DENV-1 and DENV-2 are reported most often, although the dominant serotype changes from year to year.

Patterns of Serotype Circulation in KP

DENV-1: Regularly detected across multiple outbreak seasons and often linked to mild or moderate illness.

DENV-2: Frequently the most common serotype in KP and associated with more severe disease, especially in secondary infections.

DENV-3: Seen during major outbreaks, such as in Peshawar in 2017, and known worldwide to cause more severe cases.

DENV-4: Found only occasionally, indicating low-level circulation in the region.

Why Serotypes Matter

Different serotypes can lead to outbreaks of different intensity.

Getting infected with one serotype and later with another increases the chance of severe disease.

Knowing which types are circulating helps predict risks and guide vaccination strategies.

2. Clinical Course and Laboratory Findings

Typical Illness Pattern

After an infectious mosquito bite, symptoms usually appear within four to ten days.

Most patients develop fever, strong headaches, joint and muscle pain, nausea, vomiting, weakness, and sometimes a rash.

Within three to seven days, some patients may enter a "critical phase."

Warning Signs

Signs that indicate the illness may be getting serious include:

Severe stomach pain

Ongoing vomiting

Sudden drop in platelets

Rising hematocrit (sign of fluid leakage)

Bleeding from the gums or nose

Difficulty breathing

Extreme tiredness or restlessness

Common Laboratory Findings in KP Hospitals

Insufficient platelets (thrombocytopenia)

High hematocrit (blood becomes concentrated due to plasma leakage)

Excessive liver enzymes (ALT/AST)

Number of low white blood cells

Hospital Outcomes in Khyber Pakhtunkhwa, Pakistan

Recovery

Hospital treatment is faster for those who:

They reach the hospital early.

Fluids are managed properly.

Warning signs are coming into observation quickly.

Severe Illness

A smaller number of patients progress to severe dengue, which may include:

Substantial plasma outflow

Serious flow of blood

Tremor

Liver problems or any organ failure

These complications consistently occur when:

Patients arrive at the hospital late
A second serotype infects the same person
Patients have existing health problems
Hospitals are overcrowded during peak weeks

ICU Admissions and Deaths

Some patients need ICU care due to shock, pain, headache, serious bleeding, difficulty in breathing, or any organ failure. Although the overall death rate is low due to urgent treatment, mortalities increase during:
The monsoon season
Periods of hospital overload
Delayed arrival during the critical phase
In a severe outbreak, the number of deaths increases and reaches several dozen.

Comparison of Public and Private Hospitals in Khyber Pakhtunkhwa, Pakistan

Both the Public and private sector hospitals have the facilities to treat the dengue-affected patients, but both have limited resources and facilities for the treatment of the patients, especially proper research and conducting diagnostic tests for the patients.

Public Hospitals (KTH, HMC, LRH)

Treatment of patients in these hospitals who come from the far-flung areas
Despite overcrowding, these hospitals face outbreaks of the dengue virus.
Handle moderate and severe patients on an urgent basis.
Dealt with the late arrival cases too
One thing was lacking, which was slower laboratory results during peak overcrowded and workload conditions.
Hospitals face higher complications when patients reach severe conditions and which causes an increase in death rates.

Private Hospitals (RMI, NWGH)

Well-off and moderate people come for treatment, where private hospitals provide them with proper facilities, receiving a bulk of the amount from them.
Diagnosing the variant on an urgent basis to treat the patients
Test reports were prepared before sending them to the doctors for immediate action.
Private patients were treated with the best facilities, and their infections and treatment were regularly monitored in the hospitals.
Accept cases, but it depends on the case situation.
Due to accepting moderate or less severe cases, the rate of deaths in private hospitals is rather low.
Generally, the overall load of the hospital is on public sector hospitals, where a large number of economically poor people come and in private sector hospitals, those patients whose cases are serious or have the ability to spend on their treatments. But both sectors have played their crucial role in coping with the alarming situations.

Public-Health Response in Khyber Pakhtunkhwa, Pakistan

What Has Been Done

The government take the case on an emergency basis, and the following measures have been taken by them, such as:
Spraying in the affected areas
Fogging operations in the affected areas
Finishing nurseries of the mosquito larvae
Campaigns to clean the areas from polluted waters and slums

Awareness campaign for cleanliness
Advertisement to the public through social media and the common masses
Circulating letters to the hospitals to be ready beforehand for the treatment of severe dengue

Gaps Identified
insufficient vector control before the monsoon season
Inconsistent rapid genomic lab testing
Uneven access to quick laboratory tests
Incomplete case reporting across many facilities

Risk Factors for Severe Dengue
Studies from across Pakistan and especially in the Khyber Pakhtunkhwa province highlight some factors that may change the cases of severe illness:
The higher risk of people contracting infections of a different serotype is a major risk factor.
The age risk factor is crucial, as the young and elderly are more influenced due to high immunological naivety.
Elsewhere in the literature, as mentioned, diabetes, hypertension, asthma, organ failures of the heart, kidney, and liver, as well as obesity, are serious health risks.
Hospital arrival is the most critical risk factor for death in the critical stage.
Abdominal pain and vomiting. Signs of mucosal bleeding, tachypnoea, pain, and the classic hematological syndrome of a rising hematocrit and sudden steaming drops of platelets are warning signs.
Hematological warning signs include a drop in platelet count to less than 50,000, a high liver count, and a low total white cell count.
The blurring of normal pregnancy is fraught with higher risks of bleeding and complications.
Potentially harmful predictable emergencies include monsoonal rain floods, warm and humid.
Climates.
Poor socioeconomic environments show the serious risk of crowding and social housing, and the low availability of health care.
Practical Public Health and Clinical Measures

Public Health Actions
Eliminate stagnant water and clean the drain water
Apply larvicides to the water storage
Do targeted fogging in confirmed hotspots
Educate on covering containers and using repellents
Enhance IDSR hospital reporting
Bolster genomic testing for serotype
Preposition hospitals with additional beds and fluids, and trained personnel, before the monsoon

Clinical Management
Apply the WHO warning signs for early triage
Administer fluids judiciously and avoid fluid overload
Administer platelets only when there is a bona fide bleeding risk
Ensure there is a rapid mechanism to access CBC, NS1, and ultrasound
Educate families on home care and signs of danger

Long-Term Strategies
Develop an integrated vector control
Enhance urban drainage and sanitation
Use serotype information to plan for future dengue vaccines
Enhance near real-time hospital data interoperability

Study Findings
Objective 1: Determine which dengue virus serotypes and variants have been circulating in Khyber Pakhtunkhwa (KP).
Results
Evidence from Pakistan indicates that all four major dengue serotypes DENV-1, DENV-2, DENV-3 and DENV-4 have been identified in the country, and KP also reports the circulation of multiple types concurrently.
Seasonality must be considered, but recently available satellite imagery indicates that DENV-1 and DENV-2 are the most prevalent in KP.
DENV-3 is associated with serious complications and increases in incidence during some outbreaks, like the one in Peshawar in 2017.
DENV-4 is the least common and appears to be underreported.
The existence of multiple serotypes in the same area increases the probability of secondary infections, and of those that are more severe.

Objective 2: Typical symptoms seen in dengue patients in Khyber Pakhtunkhwa (KP) and summarize the clinical outcomes reported by hospitals.
Explain the typical symptoms seen in dengue patients in KP and summarize the clinical outcomes reported by hospitals.
Contrast the dengue-related experiences of public hospitals with those of private healthcare facilities in the province.
Identify the demographic and clinical factors that increase the likelihood of developing severe dengue illness.
Provide practical and effective recommendations for public-health actions and clinical management to reduce dengue-related illness and death in KP.

Results
Many patients exhibit a sudden onset of fever, severe headache, pain radiating behind the eyes, pain in the body, nausea, and vomiting, fatigue, and sometimes rash.
Warning signs, in the form of severe abdominal pain, vomiting, and bleeding from the mouth or nose, are possible during illness days 3 to 7. Signs of rising hematocrit and a precipitous drop in platelets are also important.
The laboratory trends that are being reported from different hospitals in KP include the following:
Low platelet count
High hematocrit level
Elevated liver enzymes (ALT, AST)
Low leukocyte count
The severe form of the illness includes significant bleeding, shock, or damage to the major organs and other fluid accumulation that may progress to severe dengue.
If they are monitored and receive the appropriate fluid therapy, most patients will be fine in about a week.
The most significant public hospitals, KTH, HMC, and LRH, are the ones that receive the largest proportion of the dengue patients in KP.

Objective 3: Contrast the dengue-related experiences of public hospitals with those of private healthcare facilities in the province.

Results:

Both the public and private sector hospitals play a crucial role in diminishing dengue-related experiences.

Both hospitals manage a greater proportion of the severe cases. By severe cases, we mean the late referrals and the patients who are already in shock, are leaking, and have organ failure.

As a result, private hospitals, such as Rahman Medical Institute (RMI) and North West General Hospital (NWGH, have less of a patient burden, but they seem to have better documentation and are faster in providing the necessary support when it comes to diagnosing the ailments.

During the peak seasons, public hospitals also tend to have a lot of congestion, and are very slow to provide the results of the laboratory tests. They also have a shortage of available beds, medical equipment, and medical supplies.

Complications, deaths, and poor outcomes from medical treatment tend to be caused by the late introduction of patients, as well as the lower nurse-to-patient ratio, commonly observed in private facilities.

Because public hospitals are receiving most of the critically ill patients, they are the ones who are also getting most of the dengue deaths on record.

Objective 4: Identify the demographic and clinical factors that increase the likelihood of developing severe dengue illness.

Results

The most significant single factor that determines the extent of the illness, as well as the poor outcome, is that it is the second time that one has contracted the infection with a different dengue serotype.

Complications are more common in the younger and older population groups.

Pre-existing health conditions such as diabetes, hypertension, asthma, heart, kidney, or liver disease, and obesity increase the risk for severe forms of dengue.

Delayed arrival to the hospital significantly increases the risk of experiencing shock, bleeding, and organ failure.

Warning signs of severe disease (abdominal pain, vomiting, mucosal bleeding, and critical thrombocytopenia, alongside elevated hematocrit levels) often point to the presence of the disease already.

Important severe case laboratory predictors include thrombocytopenia (less than 50,000/µL), decreased white blood cells, and above normal range liver enzymes, and increasing hematocrit levels.

Severe illness is exacerbated by a combination of environmental and social conditions, including the rainy monsoon season, flooding, extreme humidity, poverty, and overcrowding.

Objective 5: Provide practical and effective recommendations for public-health actions and clinical management to reduce dengue-related illness and death in KP.

Results

KP shows distinct seasonal patterns of dengue, with cases reported significantly higher during and immediately after the monsoon.

Heavy rainfall and flooding lead to stagnant water, which, in turn, increases mosquito breeding and subsequent infection surge.

Each year, the extent of the outbreak is influenced by weather conditions, circulating serotype(s), and resource gaps in mosquito control.

Urban regions, especially Peshawar, consistently report the highest number of hospital admissions.

Objective 6: Assess the Efficacy of Public Health Initiatives

Results

Common response measures include the application of fogging, the use of larvicides, clean-up campaigns, and the initiation of educational and awareness campaigns.

Health facilities do prepare for the surges of cases, but such preparations are usually late and reactive.

Reporting improvements through the IDSR system are noted, although there are still gaps in various health facilities.

There is not enough genomic surveillance, and it must be significantly improved in order to identify serotype shifts in a timely manner.

Patients in urban settings continue to be highly vulnerable, as there is still a lack of adequate routine pre-monsoon vector control in numerous areas.

Objective 7: Recommend feasible Public Health and Clinical Interventions

Results

There is a significant decrease in case fatality when there is prompt triage and adequate fluid resuscitation.

There is a resource saving, without adverse outcomes, by not doing unnecessary platelet transfusions.

There can be a significant reduction of breeding sites when there is community participation in mosquito control, and it is done in advance of the monsoon.

To ensure timely treatment, early detection must be improved, and the barrier to accessing rapid diagnostic tests, such as NS1 and CBC, should be removed.

Augmented response during periods of high case volume can be achieved through improved surge planning, along with competency training of the staff.

Discussion

Certain dengue virus serotypes co-circulate in KP, which necessitates assessing which types are circulating in each season. When an individual is infected with one serotype of the dengue virus and is later infected with a second serotype, the individual is more likely to experience severe dengue disease and related complications. Ongoing serotype tracking is important for estimating the likely timing of potential outbreaks and for warning the public in advance. Active serotype tracking is also useful for estimating potential disease severity, which in turn is essential for proactive public health measures and early development of vaccines.

With timely and appropriate care, dengue-related complications and deadly outcomes can be avoided. As evidenced by numerous hospitals, early case recognition (particularly of patients with warning signs, such as abdominal pain, vomiting, and rising hematocrit levels) is important for improving outcomes with appropriate fluid management and careful monitoring. However, public hospitals are overburdened during the peak of the outbreak, and factors like high patient volume, understaffing, and quiet laboratories can contribute to delays in case recognition and management. As a result, community-based interventions, such as reducing mosquito breeding habitats to improve waste and water management, educating households about the early warning signs, etc., become the most effective means to prevent disease spread and to reduce the overall disease burden.

The other main issues brought up in KP are the surveillance and reporting lag. Limited availability of genomic testing and data consistency from different facilities hampers the ability to identify changes in serotypes and newer variants during the critical early

season. Furthermore, the phenomenon of delayed care-seeking occurs in individuals as they tend to arrive after the critical phase, when the likelihood of shock, hemorrhage, and multiple organ failure drastically increases. This indicates that the surveillance systems in the province and the unavailability of early diagnostics are the major contributors to the severe dengue burden in the province, and that they need to be addressed.

Conclusion

Dengue in Khyber Pakhtunkhwa displays a uniform seasonality with epidemics occurring at the onset of the monsoon and the weather getting cooler. Each year, multiple dengue virus serotypes are endemic to the province, with DENV-1 and DENV-2 being the most common. The vast majority contract the illness, which entails a fever, arthralgia, and generalized malaise, but is self-limiting with early treatment. However, a small subset of individuals can suffer serious complications that include hemorrhage, shock, and organ failure, and can be life-threatening if there is a delay in appropriate medical care.

Public hospitals handle the majority of the clinical caseload and take on the most complex and challenging cases, while private hospitals handle more straightforward cases and have fewer patients. Those who are extremely ill have a secondary dengue infection, have co-morbidities and are patients late and within the critical window.

In order to lessen the consequences of dengue in KP, strong community mobilization, effective monitoring, and readily available hospitals ahead of the monsoon are crucial. Tx and death rates drop markedly when there is fast access to warning signs, rapid diagnostics and ongoing control of the vector. Early removal of mosquito breeding sites and fast action on community protection are necessary in dengue-dominated communities.

Recommendations

Short Term Action (before the upcoming monsoon)

Community campaigns to remove stagnant water and reduce mosquito breeding sites.

Providing major hospitals with supplies, including IV fluids, cannulas and basic emergency supplies.

Raising awareness focused on the early warning signs and prevention of mosquito exposure.

Medium-term Goals

Improving all district-level facilities so they have the capacity to do CBC tests, as well as access to rapid diagnostic tests such as the NS1 test.

Teaching doctors and nurses HM and fluid management, as per the WHO recommendations.

Simple genomic surveillance system sending some NN dengue positive samples to some reference labs (NIH, etc.).

Long-term Goals

Establish a joint vector control program including local governments, municipal services and communities.

Improving drainage systems and safe water storage practices in the neighborhoods with frequent outbreaks.

Keeping in mind the future dengue vaccinations as per the national recommendations.

Improving the exchange of dengue case data from hospitals to the IDSR system in real time so that timely detection of a case and response can occur.

References

Aftab, S. (2024). Dengue epidemic: Pakistan on alert. The Lancet. https://www.thelancet.com/

Aftab, S. (2024). Dengue epidemic: Pakistan on alert. The Lancet.

Ali, A., Ahmad, H., Idrees, M., Zahir, F., Aslam, M. A., & Hussain, A. (2016). Circulating serotypes of dengue virus and their incursion across Pakistan during 2011–2013 outbreaks. Journal of Infection and Public Health, 9(3), 405–413.

Ali, A., Ahmad, H., Idrees, M., Zahir, F., Aslam, M. A., & Hussain, A. (2016). Circulating serotypes of dengue virus and their incursion across Pakistan during 2011–2013 outbreaks. Journal of Infection and Public Health, 9(3), 405–413.

Associated Press. (2025). Heavy monsoon rains in Pakistan kill 54 people in 24 hours. AP News. https://apnews.com/

Dawn. (2025). KP reports the fourth death due to dengue in the current year. Dawn News. https://www.dawn.com/

Dawn. (2025). KP reports the fourth death due to dengue in the current year. Dawn News.

DEAG Punjab. (2024). Dengue Expert Advisory Group annual advisory report. Government of Punjab. https://deag.punjab.gov.pk/

Economic Times. (2024). Pakistan reports over 20,000 dengue cases, 10 fatalities in 2024. Economic Times Health. https://health.economictimes.indiatimes.com/

Iqbal, N. T., Qadir, M., Shabbir, S., & Farooq, F. (2025). Clinical characteristics and serotype association of dengue in Pakistan: A multi-centre analysis. Journal of Infectious Diseases and Public Health, 18(2), 233–241.

Iqbal, N. T., Qadir, M., Shabbir, S., & Farooq, F. (2025). Clinical characteristics and serotype association of dengue in Pakistan: A multi-centre analysis. Journal of Infectious Diseases and Public Health, 18(2), 233–241.

Iqbal, N. T., Qadir, M., Shabbir, S., & Farooq, F. (2025). Clinical characteristics and serotype association of dengue in Pakistan. Journal of Infectious Diseases and Public Health.

Khan, N. U., Afzal, M., Fatima, Z., & Aamir, U. B. (2020). Serotype distribution and clinical features of the 2017 dengue outbreak in Peshawar, Pakistan. PLOS Neglected Tropical Diseases, 14(10), e0008672.

Khan, N. U., et al. (2020). Serotype distribution and clinical features of the 2017 dengue outbreak in Peshawar. PLOS Neglected Tropical Diseases.

Khan, N. U., et al. (2020). Serotype distribution in the 2017 Peshawar outbreak. PLOS Neglected Tropical Diseases. Top of FormBottom of Form

National Institute of Health, Pakistan. (2024). Integrated Disease Surveillance & Response (IDSR) weekly report. Government of Pakistan. https://nih.org.pk/

NHRS-C. (2025). National Health & Research Services Advisory on Dengue Fever 2025. Government of Pakistan. https://www.nhsrc.gov.pk/

Raza, F. A., Rehman, A., Khalid, R., & Malik, M. (2021). Concurrent dengue and chikungunya infections in Pakistan: Clinical impacts and diagnostic challenges. International Journal of Infectious Diseases, 102, 123–130.

Rehman, M., Shah, S., & Tariq, H. (2022). Clinical profile of dengue patients admitted to tertiary hospitals in Peshawar. International Journal of Biomedical Research.

Suleman, M., Faryal, R., Khan, A., & Akbar, H. (2016). Dengue virus serotypes circulating in Khyber Pakhtunkhwa, Pakistan: Molecular and clinical findings. Virology Journal, 13(1), 107.

The Express Tribune. (2024). Dengue nightmare continues to haunt K-P. The Express Tribune. https://tribune.com.pk/

World Health Organisation. (2025). Dengue and severe dengue: Factsheet & clinical guidance. WHO. https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue
World Health Organisation. (2025). Dengue and severe dengue: Factsheet & global update. WHO.
World Health Organisation. (2025). Dengue fever—Pakistan: Situation analysis and global dengue update. WHO. https://www.who.int/