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Beyond the rubble: Dengue, Chikungunya, and Vector-Borne Disease risks after 2026 Venezuela's earthquake doublet

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The earthquake doublet that struck north-central Venezuela on 24 June 2026 has produced an emergency whose consequences extend well beyond trauma and displacement [1, 2]. The Capital District and the states of Aragua, Carabobo, Falcón, La Guaira, Miranda, and Yaracuy form a heterogeneous ecological and epidemiological corridor, encompassing densely populated coastal and metropolitan areas as well as peri-urban, rural, foothill, and forest-fringe communities. This diversity matters: a uniform post-earthquake infectious-disease response will overlook the distinct conditions that govern vector exposure, transmission, and access to early care [3-7].

Earthquakes do not directly cause vector-borne disease outbreaks, and the threat should not create avoidable alarm [8, 9]. They can, however, dismantle the barriers that limit transmission: reliable water supply, waste collection, vector-control operations, functional surveillance, clinical access, and public confidence in health services. During the rainy season, damaged homes, debris, discarded containers, interrupted water supply, household water storage, and temporary shelters may converge to increase risk. The task is not to predict an inevitable epidemic, but to prevent conditions that increase the likelihood of one [8, 10, 11]. As of 20 July 2026, publicly available post-earthquake information documented population displacement, temporary sheltering, infrastructure damage, and interruptions of essential services. However, no publicly reported entomological assessment had demonstrated an increase in *Aedes* abundance, and no increase in vector-borne disease transmission attributable to the earthquakes had been documented. Accordingly, the disease-specific risks discussed below are prospective and conditional, unless explicitly identified as documented observations.

Among the anticipated vector-borne risks, dengue warrants particular immediate attention in preparedness [3, 12, 13]. PAHO reported 1,366,831 suspected dengue cases in the Americas through epidemiological week 29 of 2026 (July 14, 2026) (388,878 confirmed cases) (https://www.paho.org/en/arbo-portal/dengue-data-and-analysis). However, this represented a decrease compared with both 2025 and the five-year average [14-17]. PAHO also identified dengue as one of the vector-borne diseases of concern following the Venezuelan earthquakes and emphasized the need for strengthened surveillance and outbreak prevention [14-17]. Although dengue transmission was established in Venezuela before the disaster, recent publicly accessible national and municipality-level surveillance data that would permit assessment of transmission intensity in the affected areas were

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unavailable [18]. Therefore, this prioritization reflects the combination of endemic transmission, urban *Aedes* ecology, the rainy season, and earthquake-related disruptions in water supply, waste management, and housing, rather than evidence of a post-earthquake increase in dengue incidence [19]. Debris, tires, plastic waste, damaged roofs, construction materials, and abandoned properties can further expand mosquito-breeding opportunities [3, 4, 10]. The emergency therefore requires attention beyond Caracas and La Guaira. Urban and peri-urban communities in Aragua, Carabobo, Falcón, Miranda, and Yaracuy may face similar disruptions but with differing vector densities, water systems, health service capacity, and mobility patterns.

Chikungunya should be considered alongside dengue [17]. It shares the same principal urban vectors and many operational determinants [20]. Acute fever, rash, myalgia, and arthralgia may be difficult to distinguish from dengue, Zika, or other febrile illnesses when laboratory capacity is overwhelmed [21, 22]. Yet chikungunya has distinctive implications: persistent joint symptoms can prolong disability, compromise recovery after injury, and impose an additional burden on displaced people, health workers, and responders [23]. Zika also remains relevant, especially for pregnant people and those of reproductive age, because its apparent clinical mildness must not obscure potential congenital consequences. Surveillance should thus detect acute febrile illness early while preserving access to confirmatory testing [24].

Clinical vigilance is especially important in shelters, emergency posts, and primary-care facilities. Patients with fever should be assessed for dehydration, bleeding, warning signs of severe dengue, pregnancy, extremes of age, comorbidities, and the feasibility of follow-up. Until dengue is reasonably excluded, aspirin and non-steroidal anti-inflammatory drugs should generally be avoided. Clear referral pathways, protected fluid stocks, basic hematology, and timely reassessment can prevent avoidable deaths even when access to advanced diagnostics is constrained [25].

The vector-borne landscape is broader than *Aedes*. Yellow fever deserves continued attention because Venezuela has recently faced renewed national transmission and epizootic activity [26,27]. The earthquake should not divert resources from vaccination, surveillance of non-human primate deaths, laboratory testing, and rapid investigation of suspected cases. Risk is particularly relevant for people moving between affected urban centers and rural, forested, or foothill areas, including responders engaged in recovery, transport, construction, and environmental work. Vaccination should follow national recommendations and individual risk assessment, with attention to people who have lost records or whose access to immunization has been interrupted [25].

Malaria is unlikely to be the foremost locally acquired threat in the most densely urban affected settings. Nevertheless, it must remain in the assessment of acute febrile illness. Population movement can connect the affected corridor with malaria-endemic areas, and disrupted care can delay diagnosis among patients with recent travel, migration, occupational, or environmental exposure. Rapid diagnostic testing, microscopy where feasible, and prompt treatment must remain available for compatible histories. A similar principle applies to Oropouche and Mayaro viruses: neither should be presumed to cause post-earthquake transmission [28], but both warrant diagnostic consideration when compatible syndromes and exposure histories are present, especially in communities connected to rural or forested environments [29, 30].

Cutaneous leishmaniasis and Chagas disease are unlikely to cause immediate, large urban outbreaks. Yet they remain medium-term considerations in rural and peri-urban zones. Housing destruction, outdoor sleeping, debris, changes in vegetation and animal shelter, and displacement of domestic and synanthropic animals may alter contact with sandflies and triatomines. Health teams should retain the capacity to recognize persistent ulcerative lesions, prolonged fever with hepatosplenomegaly where relevant, and clinical or epidemiological clues suggestive of acute Chagas disease. These threats reinforce the need to integrate vector surveillance with environmental recovery, housing reconstruction, veterinary services, and community engagement [31]. *Table 1* summarizes vector-borne diseases potentially relevant to the post-earthquake setting, their etiological agents and principal vectors, and priority preventive measures at the individual, household, collective, and public health levels.

The response should begin with integrated vector management tailored to each locality. Rapid mapping should identify affected neighborhoods, temporary shelters, water service interruptions, waste accumulation, drainage problems, and sites with historically or currently high *Aedes* productivity. The photographs in *Figure 1* document general temporary-settlement and environmental conditions. They were not accompanied by direct breeding-site inspection or entomological sampling and therefore indicate areas warranting assessment rather than evidence of mosquito proliferation [3, 15, 17].

Surveillance must be active, decentralized, and linked to action. Daily reporting of acute febrile illness, rash, severe arthralgia, neurological symp-

Table 1 - Priority vector-borne diseases, principal vectors, and prevention measures in earthquake-affected areas of Venezuela.

Vector-borne disease	*Etiological agent*	*Main vector(s)*	*Individual and shelter prevention*	*Collective and public-health measures*
Dengue	Dengue virus (DENV-1-4)	*Aedes aegypti; Aedes albopictus*	Prevent daytime mosquito bites with repellents, long clothing, screens, and insecticide-treated nets when sleeping during the day; cover, clean, empty, or safely treat water-storage containers; seek early care for warning signs; protect febrile persons from mosquito bites.	Rapid febrile-illness and entomological surveillance; restoration of reliable water supply and waste collection; elimination of containers, tires, and debris that retain water; targeted larval control and focal adult mosquito control when indicated; clinical preparedness for triage, fluid management, and referral of severe cases. Dengue is currently a vaccine-preventable disease.
Chikungunya	Chikungunya virus (CHIKV)	*Aedes aegypti; Aedes albopictus*	Apply the same personal protection measures used for dengue; avoid mosquito exposure while febrile; seek clinical assessment for intense arthralgia, persistent symptoms, pregnancy, or comorbidities.	Integrated *Aedes* control; laboratory capacity to distinguish chikungunya from dengue and Zika; early detection of clusters; access to clinical follow-up, pain management, rehabilitation, and support for persistent arthralgia. Dengue is currently a vaccine-preventable disease.
Zika	Zika virus (ZIKV)	*Aedes aegypti; Aedes albopictus* may contribute	Prevent daytime mosquito bites; remove household breeding sites; pregnant people and their sexual partners should receive counseling on mosquito-borne diseases and prevention of sexual transmission; seek care for a rash, fever, conjunctivitis, or neurological symptoms.	Integrated *Aedes* surveillance and control; prioritized testing and clinical follow-up for pregnant people with compatible illness or exposure; surveillance for congenital anomalies and neurological complications; risk communication focused on reproductive health.
Yellow fever	Yellow fever virus (YFV)	*Haemagogus* spp. and *Sabethes* spp. in sylvatic cycles; *Aedes aegypti* may support urban transmission	Verify yellow fever vaccination status in accordance with national recommendations; use repellents and protective clothing during daytime outdoor activities in rural, forested, and foothill areas; promptly report dead non-human primates without handling carcasses.	Maintain vaccine supply, cold chain, and targeted vaccination activities; surveillance and investigation of suspected human cases and non-human primate deaths; laboratory confirmation; entomological assessment in forest-fringe, peri-urban, and urban-risk areas. Yellow fever is a vaccine-preventable disease.

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Vector-borne disease	*Etiological agent*	*Main vector(s)*	*Individual and shelter prevention*	*Collective and public-health measures*
Malaria	*Plasmodium* spp., principally *P. vivax* and *P. falciparum*	*Anopheles* spp., including *Anopheles darlingi* and *A. aquasalis* in Venezuelan endemic foci	Use insecticide-treated nets, repellents, and long clothing from dusk to dawn; seek prompt testing for fever after travel, migration, work, or residence in malaria-risk areas; avoid self-treatment without diagnosis.	Maintain access to rapid diagnostic tests, microscopy, antimalarial treatment, and referral; investigate febrile illness among displaced or mobile populations; deploy insecticide-treated nets and indoor residual spraying in appropriate transmission foci; monitor imported and locally acquired cases. Anti-*Plasmodium* treatments should be considered for confirmed cases.
Oropouche fever and Orthobunyavirus complex	Oropouche virus (OROV)	*Culicoides paraensis* biting midges; other vectors may require local assessment	Use repellents, long clothing, and fine-mesh screens or nets, particularly in rural, vegetated, and high-exposure settings; seek care for acute febrile illness, especially during pregnancy or when neurological symptoms occur.	Strengthen laboratory differential diagnosis of acute febrile syndromes; entomological surveillance for biting midges; environmental sanitation and targeted management of potential breeding and resting sites guided by local entomological findings; community education.
Mayaro fever	Mayaro virus (MAYV)	Primarily *Haemagogus* spp. in sylvatic cycles; *Aedes* spp. may act as potential bridge vectors	Use repellents and protective clothing during forest, rural, agricultural, or recovery-related outdoor work; seek assessment for fever with rash and persistent arthralgia.	Strengthen surveillance of febrile illness in rural and forest-linked communities; preserve diagnostic capacity for emerging arboviruses; undertake vector and epizootic monitoring where epidemiologically indicated; communicate occupational and environmental exposure risks.
Leishmaniasis	*Leishmania* spp.	Phlebotomine sandflies, including *Lutzomyia* sensu lato	Use repellents, long clothing, and fine-mesh insecticide-treated nets; minimize exposure from dusk to dawn; seek early evaluation for persistent skin ulcers or prolonged fever with systemic manifestations.	Restore safe housing and reduce wall cracks, animal shelters, vegetation, and organic debris near dwellings; conduct focal residual insecticide spraying and use treated nets where indicated; strengthen diagnosis and timely treatment; integrate animal health measures in areas at risk of visceral leishmaniasis. Anti-*Leishmania* treatments should be considered for confirmed cases.
Chagas disease	*Trypanosoma cruzi*	Triatomine bugs, including *Rhodnius*, *Triatoma*, and *Panstrongylus* spp.	Avoid sleeping in damaged or visibly infested houses when alternatives exist; use bed nets; report suspected triatomines; seek assessment after suspected exposure or compatible acute febrile illness.	Entomological surveillance and targeted residual insecticide spraying; reconstruction of housing with sealed walls, roofs, and entry points; food-safety measures to prevent oral transmission; and maintenance of screening and follow-up pathways for pregnant people, newborns, and other at-risk populations. Anti-*T. cruzi* treatments should be considered for confirmed cases.

Priorities should be adapted to municipality-level epidemiology, vector distribution, seasonality, environmental disruption, population mobility, laboratory capacity, and national guidance. The table summarizes prevention and preparedness priorities based on pre-existing epidemiology and plausible post-disaster exposure pathways; it should not be interpreted as evidence of post-earthquake increases in vector abundance or active transmission of any listed disease.

Figure 1
Temporary settlement environments after Venezuela's earthquake doublet in La Guaira. A. Caraballeda. B. Playa Verde, Catia La Mar. Both photographs were taken on 7 July 2026 by coauthor Alejandro Risquez and are reproduced with his permission. They were obtained as contextual photographs in public settings without collecting personal information; no identifiable individuals are shown. The images document general environmental and settlement conditions but were not accompanied by larval surveys, entomological sampling, or direct inspection of potential breeding sites. Therefore, they should not be interpreted as evidence of mosquito breeding, increased vector abundance, or post-earthquake transmission of vector-borne diseases.

toms, jaundice, and unusual clusters should be coupled with sentinel entomological monitoring. Data should be disaggregated by locality, shelter, age, pregnancy status, and recent travel. A rise in fever consultations is meaningful only if it triggers investigation, diagnostic sampling, vector assessment, clinical preparedness, and public communication. Laboratories need prioritized capacity for dengue, chikungunya, Zika, malaria, and yellow fever, with specimen-referral networks preserved when local testing is unavailable. Community health workers, shelter coordinators, volunteers, and rescue teams can support source reduction and report heavy mosquito nuisance, visible breeding sites, water accumulation, or animal deaths suggestive of epizootic activity [3, 15, 17, 26, 30].

Risk communication must be practical, credible, and free of blame. Communities should understand that mosquito breeding can increase after service disruption, but that household and neighborhood action remains powerful. Messages should encourage early consultation for fever, abdominal pain, persistent vomiting, bleeding, marked lethargy, jaundice, rash in pregnancy, neurological symptoms, or severe joint pain. They should also explain that repellents, long clothing, window screens, and the elimination of water-holding containers complement rather than replace public services. Engaging schools used as shelters, community leaders, women's groups, clinicians, and youth volunteers can turn prevention into a shared recovery activity [32].

Venezuela's earthquake doublet occurred in a setting where health-system fragility, interrupted basic services, and pre-existing vector-borne disease transmission may magnify one another. This does not make epidemics inevitable; it makes early, locally informed action indispensable. Preventing dengue and chikungunya transmission must be a central priority while maintaining surveillance and preparedness for yellow fever, malaria, Zika, leishmaniasis, Chagas disease, and emerging arboviruses. A One Health response that links clinical care, entomological surveillance and control, environmental services, animal health, laboratories, and affected communities can make vector-borne disease prevention an essential component of protecting lives after the rubble is cleared.

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This article has been registered in the Research Proposal Registration of the Coordination of Scientific Integrity and Surveillance of Universidad Cientifica del Sur, Lima, Peru. The authors dedicate this publication to the memory of all those whose lives were lost in the earthquakes, with particular remembrance of the children whose futures were so tragically cut short. We also extend our deepest sympathy to every family in Venezuela and abroad who is now living with the irreplaceable absence of a parent, child, relative, friend, colleague, or member of their community. May this work stand not only as a contribution to prevention and public health but also as a tribute to those affected by this profound tragedy. We honor the lives that were lost and acknowledge the enduring grief carried by their loved ones. In the midst of devastation, we also recognize the remarkable solidarity, courage, compassion, and collective strength shown by families, communities, volunteers, health professionals, and rescuers (both domestic and from countries that have shown solidarity). May the memory of those who have passed remain alive in our hearts and inspire a lasting commitment to care, preparedness, and protection of the most vulnerable. May their legacy remind us that, even in moments of immense sorrow, humanity can respond with dignity, empathy, and hope. We also want to dedicate this Editorial to the still undefined number of physicians and health professionals who died during this catastrophic event.

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