

Water Storage Practices Linked to Dengue Outbreak in Narra, Palawan, Philippines: March 2024 Case–Control Study

Reinier G. Alberto, Kenn Manuel V. Palmares III, Rammell Eric C. Martinez, Vito G. Roque Jr., Gerna M. Manatad

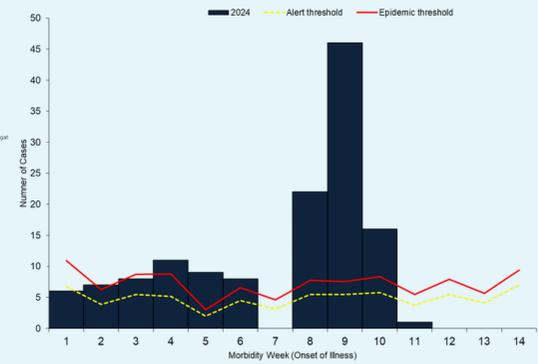
Background

- Dengue is the leading vector-borne viral disease in the Philippines, causing ~390M infections globally each year and ~843,000 clinically diagnosed cases locally.
- Palawan, including Narra, has a tropical climate with seasonal rains and household water storage, creating ideal mosquito breeding sites (Fig 1.). In March 2024, dengue cases in Narra exceeded the epidemic threshold, affecting 16 of 23 barangays (Fig 2.).
- This study investigated the outbreak by verifying its existence, describing the clinical profile of cases, and identifying vector breeding sites and associated risk/protective factors.

Fig 1. Narra Palawan Map



Fig 2. Dengue Cases by Date of Onset Narra, Palawan, January 1 to March 15, 2024



Methods

Descriptive Study

- Active Case Finding
- Case Definition
 - Fever (2–7 days) + ≥2 symptoms: Headache, Malaise, Myalgia, Arthralgia, Retro-orbital pain, Anorexia, Vomiting, Diarrhea, Flushed skin, Rash, with or without laboratory confirmation (NS1, IgM, or RT-PCR)
- Key Informant Interviews (KII)
- Environmental Survey
- Entomological Survey
- Laboratory Specimen Collection

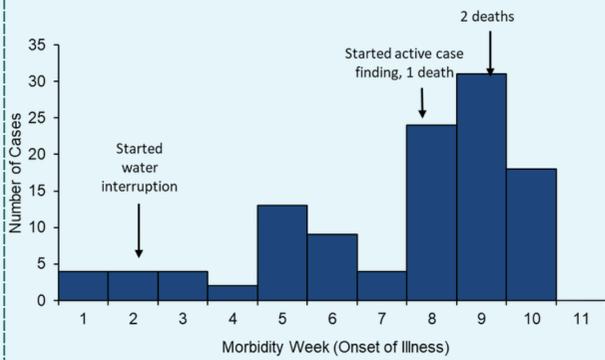
Case- Control Study

- Controls → Asymptomatic residents, dengue-negative
- Sample Size → 31 cases, 31 controls (1:1 unmatched)
- (Odds ratios, aOR, CI, p-values)



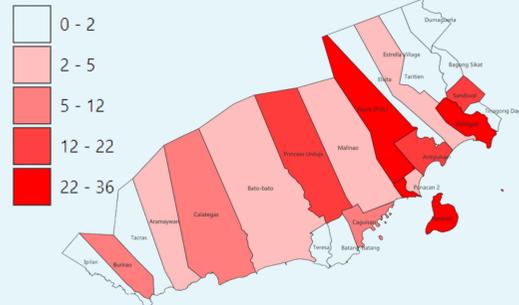
Results

Fig 3. Dengue Cases by Date of Onset (N = 113) Narra, Palawan, January 1 to March 15, 2024



- Water interruption & school absences preceded the outbreak; consultations surged after the first death.
- 113 cases (CFR = 2.65%) peaked in MW 9; most affected were children 5–14 years (median age = 12), 56% female.
- Clinical & lab findings: common symptoms were fever, headache, abdominal pain, thrombocytopenia; 65% PCR positive from 86 specimens.

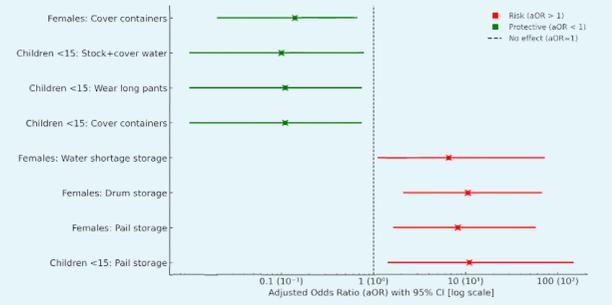
Fig 4. Attack Rate by Barangay (N = 113) Narra, Palawan, January 1 to March 15, 2024



- 16 of 23 barangays affected; highest AR in Poblacion (37/10,000), Malatgao (35/10,000), and Panacan (29/10,000).

- Environmental survey found breeding sites in uncovered pails, drums, and water tanks.
- Entomological survey showed high dengue risk: Poblacion (HI: 15%, BI: 29, PPI: 128.61) and Panacan (HI: 20%, BI: 27, PPI: 387.25); main containers included drums, pails, basins, and aquariums.

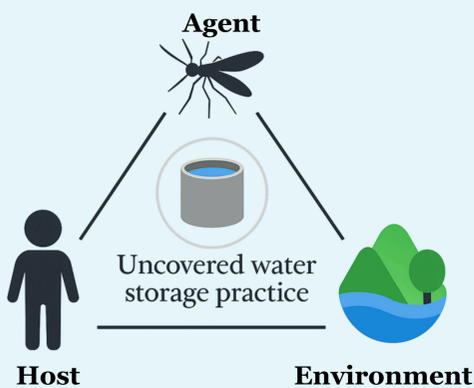
Fig 5. Forest Plot: Risk vs Protective Factor Narra, Palawan, January 1 to March 15, 2024



- Risk factors: Pails (aOR = 9.45) and drums (aOR = 8.27) significantly increase dengue risk.
- Protective factor: Covering containers such as pails and drums reduced infection odds by ~80%.



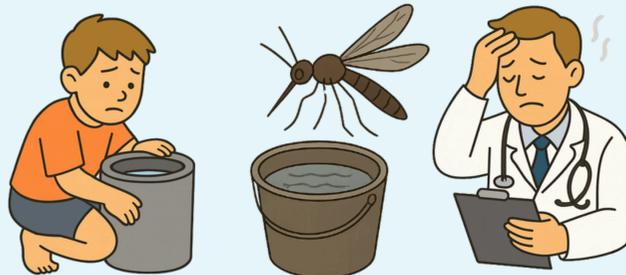
Discussion



- The outbreak was driven by the interaction of a susceptible host group, an abundant vector, and an enabling environment of unsafe water storage.

Conclusion

Susceptibilities



- Uncovered water storage was the main driver of the outbreak, disproportionately affecting school-aged children, with delayed consultation contributing to severe outcomes.
- The outbreak revealed critical vulnerabilities in water supply, vector control, and health response in Narra.
- Addressing these gaps is essential to prevent future dengue outbreaks.

Recommendation

- Vector Control:** Intensify entomological surveillance, targeted larviciding, and barangay clean-up drives.
- Water Storage:** Promote covered containers and safe household water storage practices.
- Health System:** Establish dengue “fast lanes” in health facilities and train barangay health workers for early recognition and referral.
- Community Engagement:** Mobilize households, schools, and local leaders for sustained dengue prevention and risk communication.

