INTEGRATED PREVENTION AND CARE STRATEGIES FOR DENGUE AND CHIKUNGUNYA

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Introduction Dengue and chikungunya are re-emerging global public health threats transmitted by Aedes mosquitoes. Their overlapping geographic spread, coupled with urbanization, climate change, and increased travel, has led to frequent outbreaks that threaten health systems worldwide (Bowden et al., 2023). Although chikungunya typically has lower mortality (~1 per 1,000), it causes substantial acute and chronic morbidity, particularly joint pain that can persist for months or years (Rodrigues Faria et al., 2016). Dengue continues to affect nearly 100 million people annually, with severe forms leading to shock and hemorrhage in a subset of cases (Bhatt et al., 2013). The socioeconomic cost of these epidemics includes not only healthcare expenditure but also lost productivity and strain on infrastructure (Bowden et al., 2023).

Burden & Epidemiology In recent years, dengue incidence has surged globally, fueled by the four virus serotypes and monotonic expansion of mosquito habitats (Bhatt et al., 2013). Chikungunya, historically endemic to Africa and Asia, has now spread globally, with outbreaks reported even in Europe and the Americas (Rodrigues Faria et al., 2016). In Sri Lanka, a notable chikungunya outbreak occurred in early 2025, with increasing case burdens reported in several districts (Premaratne et al., 2024). These patterns underscore the pressing need for coordinated prevention strategies that transcend national borders.

Current Prevention Strategies Since no specific antiviral treatment exists for either virus, prevention hinges on vector control and personal protection (Wu et al., 2024). Community-based habitat reduction—such as eliminating stagnant water, covering water containers, and clearing debris—is the cornerstone of mosquito control (Rojas et al., 2021). Biological interventions, like releasing Wolbachia-infected Aedes mosquitoes, have demonstrated significant dengue reductions—up to 57% overall incidence reduction in Singapore field trials (Tan et al., 2023).

Additional vector control includes insecticide spraying, larvicides, and environmental management, with Colombia reporting cost-effective gains from such integrated approaches (Rojas et al., 2021).

On an individual level, personal protective measures—such as the use of repellent, wearing long sleeves, using bed nets, and installing window screens—reduce mosquito bite exposure (Simmons et al., 2012). Traveler advisories and pre-travel counseling have also been effective, with CDC guidelines emphasizing bite prevention as the sole protective measure (Choo and Blackwood, 2017).

Vaccination & Emerging Technologies For dengue, two vaccines—Dengvaxia (CYD-TDV) and Qdenga (TAK-003)—are presently approved. Dengvaxia is recommended only for those with prior infection to mitigate antibody-dependent enhancement risk, while Qdenga is suitable for individuals aged four years and older, regardless of dengue history (Capeding et al., 2014; Biswal et al., 2019). Research into mRNA-based dengue vaccines is underway, including development of second-generation candidates that could offer broader protection (Patel et al., 2024).

Chikungunya vaccine efforts have recently borne fruit: the FDA approved the live-attenuated vaccine Ixchiq in November 2023, and an EU recombinant vaccine followed in early 2025 (Chang et al., 2022). Shortly after rollout, regulators paused use in older adults due to adverse event reports, pending investigations (Chang et al., 2022). These vaccines offer promise, but carefully monitored public health deployment will be critical.

Clinical Management of Cases Treatment for both diseases remains largely supportive. For dengue, management centers on hydration and pain relief with acetaminophen; NSAIDs and aspirin are contraindicated due to hemorrhagic risk (WHO, 2025). Clinical guidelines emphasize fluid resuscitation based on severity, with intravenous crystalloids preferred and platelet transfusions reserved strictly for active bleeding (WHO, 2025).

Chikungunya care highlights rest, fluids, and analgesia—again avoiding NSAIDs until dengue has been excluded to prevent hemorrhagic complications (WHO, 2025). Chronic joint symptoms may benefit from physiotherapy and longer-term anti-inflammatory interventions (Rodrigues Faria et al., 2016). WHO's integrated clinical guidelines now standardize care across dengue, chikungunya, Zika, and yellow fever, helping frontline providers make severity-specific decisions in resource-limited settings (WHO, 2025).

Policy Recommendations A multi-pronged policy framework is essential:
1. Expand integrated vector control programs—including public education, community clean-up, larviciding, and innovations like Wolbachia and automated trap systems—with targeted investment based on cost-effectiveness modeling (Wu et al., 2024; Rojas et al., 2021).

2. Scale vaccination strategically—deploy dengue vaccines where prior infection is known or low-risk; introduce dengue and chikungunya vaccines under strong pharmacovigilance systems; and support equitable access in endemic regions (Capeding et al., 2014; Biswal et al., 2019; Patel et al., 2024).

3. Strengthen clinical care—adopt WHO-aligned treatment protocols; train primary care staff in hydration management; standardize laboratory and diagnostic approaches; and incorporate chronic care for post-chikungunya arthritis.

4. Improve surveillance and early warning—use climate-based models (e.g., monsoon/rainfall predictors), digital tools like mobile tracking, and geospatial systems to identify outbreaks early (Premaratne et al., 2024; Tan et al., 2023; Patel et al., 2024).

5. Enhance cross-sectoral collaboration—unify health, environment, education, and local governments under a One Health model to manage vector habitats and disease risk at the community level (Simmons et al., 2012; Rojas et al., 2021).

6. Boost health system readiness—ensure hospitals are stocked with essential fluids, diagnostics, and have protocols in place for surge capacity during outbreaks; allocate resources based on local risk.

7. Promote research and innovation—support ongoing studies on mRNA vaccines, biologics, antivirals, vector genetic modifications, and improved diagnostic tools.

Conclusion Dengue and chikungunya pose intersecting epidemics with extensive health, social, and economic impacts. A comprehensive policy must integrate prevention, vaccination, early detection, optimized clinical care, and cross-sector collaboration. By targeting vector control, responsibly deploying vaccines, standardizing care protocols, and investing in surveillance and research, policymakers can curb the burden of these arboviral diseases. A One Health approach that combines environmental, clinical, and community actions is paramount to achieving long-term control and resilience.

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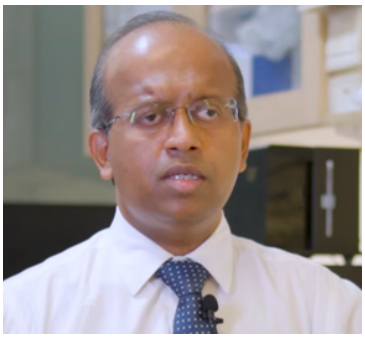

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