Global Journal of Medical Science ISSN (Online): 2709-8699 ISSN (Print): 2789-6951

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Policy Analysis

A Critical Analysis of the Bangladesh National Dengue Prevention and Control Strategy (2024-2030): A Comprehensive Roadmap in an Era of Climate Change

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DOI: 10.61561/ssbgjms.v6i02.99

Keywords

Dengue; Bangladesh; Health Policy; Climate Change; Integrated Vector Management; Public Health Surveillance

Article Information

Received Date:	Apr 18, 2025
Revised Date:	May 14, 2025
Accepted Date:	Jun 17, 2025
Published Date:	Jun 27, 2025

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Abstract

Dengue fever has emerged as a persistent and escalating public health challenge in Bangladesh, characterised by increasingly severe outbreaks in recent years that have overwhelmed healthcare infrastructure and led to significant morbidity, mortality, and economic burden. In response, the Government of the People's Republic of Bangladesh has developed the "National Dengue Prevention and Control Strategy (2024–2030)." This manuscript offers a critical evaluation of the strategy from a public health and epidemiological perspective. Grounded in a thorough situational analysis, the strategy identifies major contributing factors, including climate change, accelerated urbanisation, and evolving viral serotypes. It delineates seven primary strategic objectives: (1) strengthening governance and inter-sectoral coordination; (2) enhancing the capacity of the healthcare workforce; (3) institutionalizing integrated vector management practices; (4) improving real-time disease surveillance; (5) advancing risk communication and community mobilization; (6) fostering research initiatives; and (7) ensuring equitable access to vaccines. The strategy's principal strengths lie in its comprehensive, multi-sectoral "One Health" framework, its strong empirical foundation, and its anticipatory focus on climate adaptation and vaccine integration. Nevertheless, effective implementation faces considerable barriers, including the need for sustained financial investment, the complexity of inter-ministerial coordination, the growing threat of insecticide resistance, and the persistent fragility of the national health system. This analysis concludes that, although the strategy represents a scientifically rigorous and forward-thinking blueprint, its success will ultimately depend on sustained political commitment, dedicated resource allocation, and the effective operationalisation of its implementation roadmap.

Introduction

Dengue, a mosquito-borne arboviral disease, has evolved from an intermittent public health concern into a persistent and widespread endemic threat in Bangladesh[1,5]. Initially reported in the 1960s under the term "Dacca fever," the country has since experienced a marked increase in both the frequency and severity of dengue outbreaks, particularly since the early 2000s[2–4]. The years 2022 and 2023 were especially catastrophic, with unprecedented morbidity and mortality; in 2023 alone, more than 321,000 cases and 1,705 deaths were documented[5–7]. This alarming surge is the result of a multifactorial nexus involving high population density, rapid and unregulated urban expansion, and the simultaneous circulation of all four dengue virus (DENV) serotypes—an epidemiological condition that significantly heightens the risk of severe secondary infections[3,5].

A key strength of the national strategy lies in its explicit recognition of the increasing influence of climate change on dengue epidemiology in Bangladesh[2]. Rising ambient temperatures, irregular and intensified rainfall patterns, and persistently high humidity levels have collectively extended the breeding season and geographical distribution of the principal vector, Aedes aegypti[8,9]. The policy's inclusion of climate change as a central determinant of dengue transmission reflects a forward-looking and science-informed approach[7]. In light of these escalating risks, the Ministry of Health and Family Welfare, through the Directorate General of Health Services (DGHS), has formulated the Bangladesh National Dengue Prevention and Control Strategy (2024–2030). This manuscript seeks to offer a detailed evaluation and critical assessment of this strategy, focusing on its structural elements, strategic strengths, and foreseeable barriers to effective implementation.

Epidemiological Underpinnings of the Strategy

The 2024-2030 strategy is firmly grounded in a detailed analysis of Bangladesh's evolving dengue epidemiology.

- **Escalating Burden:** The document highlights the exponential rise in cases, from 5,551 in the first major outbreak of 2000 to 101,354 in 2019, and a record-shattering 315,623 cases with 1,629 deaths by mid-

December 2023. This data underscores the urgency and scale of the problem[1].

- **Shifting Serotype Dynamics:** The strategy notes the historical predominance of DENV-1 and DENV-2, with a shift to DENV-3 since 2019 and a re-emergence of DENV-4 in 2022. The co-circulation of multiple serotypes is a major concern, as sequential infections with different serotypes are a primary risk factor for severe dengue, including Dengue Shock Syndrome (DSS)[10]. The strategy identifies DSS as the cause of 74% of dengue-related fatalities, indicating probable delays in seeking or receiving appropriate care.
- **Demographic and Geographic Distribution:** Analysis within the strategy reveals that while males constitute a higher proportion of cases (60%), females have a higher case fatality rate (57% of deaths). The 21–40-year age group is most affected. Geographically, while urban centres like Dhaka have historically been epicentres, the disease is now spreading across the country[3].
- **Influence of Climate Change:** The document projects that climate change will lead to a significant increase in the dengue burden, with caseloads potentially doubling by 2050. It links climatic variables directly to mosquito lifecycle favorability, noting that minimum temperatures above 18°C and rainfall between 200–800 mm create ideal conditions for the vector to thrive[2].

The Seven Pillars of the National Strategy

The strategy is structured around seven interconnected strategic objectives that form a comprehensive framework for action[2,7].

1. **Governance and Effective Coordination:** This pillar aims to establish a robust multi-sectoral coordination mechanism, including a high-level Central Coordination Committee and a National Task Force. This reflects a "One Health" approach, recognising that dengue control transcends the mandate of the health ministry alone and requires collaboration with local government, finance, education, and public administration[1].
2. **Enhance Healthcare Workforce Capacity:** The plan focuses on improving the skills of doctors, nurses, and allied health professionals in prompt diagnosis, fluid management, and treatment of severe dengue in line with national guidelines. This includes developing standardised training materials and creating a resource hub.
3. **Institutionalise Integrated Vector Management (IVM):** This is a cornerstone of the strategy. It calls for an evidence-based approach combining environmental management (source reduction), biological controls (e.g., larvivorous fish), and chemical controls (larvicides and adulticides). Critically, it emphasises the need for a national entomological laboratory, robust surveillance to monitor insecticide resistance, and the creation of skilled entomologist posts at divisional and district levels[3].
4. **Strengthen Real-Time Surveillance and Reporting:** This objective seeks to enhance the country's health information system to enable real-time reporting, characterisation of disease trends, prediction of outbreaks, and rapid response. This includes community-based surveillance and mandatory investigation of every dengue death[11].
5. **Strengthen Risk Communication and Community Engagement (RCCE):** The strategy prioritises empowering communities with knowledge for household-level prevention. It plans for multi-channel communication campaigns, engagement with local government and youth organisations, and the use of digital platforms to disseminate credible information and combat misinformation[12].
6. **Undertake Research:** This pillar calls for research into effective dengue vaccines, improved clinical management protocols, novel diagnostic tools, and new vector control methods like Wolbachia-based strategies.
7. **Ensure Vaccine Availability and Undertake Vaccination:** In a forward-looking move, the strategy includes the objective to undertake nationwide dengue vaccination using WHO-prequalified vaccines through global collaboration. This acknowledges that vaccination will be an essential tool for long-term control[13].

Critical Analysis: Strengths and Implementation Hurdles

As a blueprint for action, the strategy possesses significant strengths, but its translation into tangible outcomes will face considerable challenges.

Strengths:

- **Comprehensive and Holistic:** The plan's multi-pronged approach, which integrates clinical management, vector control, surveillance, community action, and research, is commendable. Its embrace of a multi-sectoral governance structure is a crucial recognition that dengue is a societal problem, not just a health issue[2].
- **Evidence-Based and Data-Driven:** The strategy is informed by a robust situational analysis of past outbreaks and entomological surveys, lending it scientific credibility[2].
- **Climate Change as a Central Theme:** The explicit and repeated linkage of climate change to the dengue crisis is a significant strength[8,9]. By projecting future caseloads based on climate models, the strategy frames dengue control as a critical component of climate adaptation[11].

- **Inclusion of Vaccination:** The strategic objective focused on securing and deploying a WHO-prequalified vaccine demonstrates foresight and alignment with global public health advancements[13].

Implementation Challenges:

- **Financial Commitment and Sustainability:** A comprehensive strategy requires substantial and sustained funding. While the plan mentions developing a detailed costed "Implementation Plan," securing these funds amidst competing national priorities and ensuring their efficient use at all administrative levels will be a primary obstacle[4].
- **Operationalizing Coordination:** While the proposed multi-sectoral committees are structurally sound, achieving seamless and effective coordination between disparate government ministries, city corporations, and local government institutes is notoriously complex and requires continuous political will[4].
- **Insecticide Resistance and Vector Control:** The reliance on chemical control must be carefully managed. Widespread insecticide resistance is a growing problem, and effective IVM requires a significant investment in surveillance and a pivot towards more labor-intensive biological and environmental controls[3].
- **Health System Capacity:** The strategy's goals of enhancing workforce capacity and ensuring uninterrupted supplies are laudable but ambitious. Bangladesh's health system is often overstretched, and implementing these measures—particularly in rural and remote areas—will require significant investment in infrastructure and human resources[3,12].
- **Public Awareness and Behavior Change:** Sustaining community engagement and achieving lasting behavioral change (e.g., consistent elimination of household breeding sites) beyond peak outbreak periods is a persistent challenge that requires innovative and continuous RCCE efforts[12].

Conclusion & Recommendations

The Bangladesh National Dengue Prevention and Control Strategy (2024-2030) represents a robust, well-researched, and ambitious framework for confronting one of the nation's most pressing public health threats. Its comprehensive nature, strong evidence base, and crucial integration of climate change and vaccination position it as a progressive and scientifically sound policy document.

However, the gap between an excellent strategy and successful implementation is significant. The success of this plan will ultimately depend on three critical factors:

1. **Sustained Political and Financial Commitment:** The government must ensure that the strategy is backed by adequate, ring-fenced budgets and the political will to enforce its multi-sectoral mandates.
2. **Meticulous Implementation Planning:** The forthcoming detailed "Implementation Plan" is crucial. It must contain clear, measurable key performance indicators (KPIs), defined timelines, and unambiguous roles and responsibilities for all stakeholders, from the national to the community level.
3. **Robust Monitoring and Adaptation:** The planned mid-term assessment in 2027 is essential. A transparent monitoring and evaluation system must be established from the outset to track progress, identify bottlenecks, and allow for adaptive management in response to new evidence and evolving challenges.

If these conditions are met, the strategy has the potential not only to significantly reduce the burden of dengue in Bangladesh but also to serve as a valuable model for other nations grappling with the health impacts of a changing climate.

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To cite: Kazi Faisal Alam, Thrina Islam. A Critical Analysis of the Bangladesh National Dengue Prevention and Control Strategy (2024-2030): A Comprehensive Roadmap in an Era of Climate Change. SSB Global Journal of Medical Science [Internet]. 2025 Jun. 27 [cited 2025 Aug. 3];6(02):26-9. Available from: https://ssbjournals.org/index.php/ssbgjms/article/view/99