

# Topic: “Advancing Disease Mitigation: The Imperative for Japanese Encephalitis Vaccination in Bangladesh”

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## Abstract

Japanese Encephalitis (JE) is a viral disease caused by the Japanese Encephalitis Virus (JEV) which is a mosquito-borne, single-stranded, RNA flavivirus belonging to the Flaviviridae family. It is imperative to note that JE can cause severe inflammation of the brain, leading to long-term neurological complications or even death in some cases. JE vaccine provides a crucial defense against this potentially fatal disease. Given the high prevalence of JE in Bangladesh, widespread vaccination campaigns and public health initiatives are necessary to promote awareness and ensure that individuals at risk receive the vaccine. The commentary emphasizes on how crucial it is that individuals who are at risk of JE infection receive the vaccine through nation wide immunization campaign in Bangladesh.

## Topic:

**“Advancing Disease Mitigation: The Imperative for Japanese Encephalitis Vaccination in Bangladesh”**

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## ARTICLE:

### Advancing Disease Mitigation: The Imperative for Japanese Encephalitis Vaccination in Bangladesh

## ABSTRACT:

Japanese Encephalitis (JE) is a viral disease caused by the Japanese Encephalitis Virus (JEV) which is a mosquito-borne, single-stranded, RNA flavivirus belonging to the Flaviviridae family. It is imperative to note that JE can cause severe inflammation of the brain, leading to long-term neurological complications or even death in some cases. JE vaccine provides a crucial defense against this potentially fatal disease. Given the high prevalence of JE in Bangladesh, widespread vaccination campaigns and public health initiatives are necessary to promote awareness and ensure that individuals at risk receive the vaccine. The commentary emphasizes on how crucial it is that individuals who are at risk of JE infection receive the vaccine through nation wide immunization campaign in Bangladesh.

## INTRODUCTION:

Japanese Encephalitis (JE) is a viral malady engendered by the Japanese Encephalitis Virus (JEV), an RNA flavivirus of the Flaviviridae family, transmitted by mosquitoes. The transmission of JE ensues through a zoonotic cycle encompassing reservoirs, predominantly pigs, carriers exemplified by water birds, vectors typified by mosquitoes, and humans, deemed as dead-end hosts due to their low viremia levels post-infection (1,2). The primary vector responsible for JE transmission is *Culex tritaeniorhynchus*, with secondary vectors in the region including *Culex gelidus*, *Culex fuscocephala*, and *Culex annulirostris* (3,4). The incidence of JE evinces geographical disparities, with epidemic proclivities observed in northern realms of Asia, such as Bangladesh, Bhutan, the People's Republic of China, Taiwan, and Japan, where the disease exhibits temporal patterns. Conversely, JE is endemic in southern domains such as Australia, Burma, Brunei Darussalam, and Cambodia, where disease occurrences transpire sporadically throughout the year (5).

## RECENT JAPANESE ENCEPHALITIS STATUS IN BANGLADESH:

A systematic review conducted by Campbell et al. underscores the vulnerabilities in the surveillance system and estimates the overall incidence of JE in Bangladesh at 86,000 cases with 13,600 to 20,400 annual fatalities, predominantly afflicting regions with suboptimal or negligible vaccination coverage (6,4). The inaugural outbreak of JE in Bangladesh was documented in 1977, encompassing 22 cases and seven mortalities. Subsequent surveillance and hospital-based investigations have revealed an estimated incidence ranging from 0.6 to 2.7 per 100,000 individuals in Chittagong and Rajshahi (5). The risk cohorts for JE primarily comprise denizens toiling in agrarian hinterlands with pronounced rice cultivation and recurrent irrigation inundation. In Bangladesh, JE infections evince higher prevalence in areas contiguous to the endemic enclaves of India (7). The lion's share of JE infections manifest as either asymptomatic or manifest with mild symptoms, such as pyrexia and cephalalgia. However, children under the age of 15 evince heightened susceptibility to the ailment, often presenting with gastroenteric distress and emesis (4). A severe manifestation of JE befalls approximately one in every 250 patients, characterized by an abrupt onslaught of fever, cephalodynia, myalgia, and anorexia, succeeded by neuropsychiatric perturbations, comatose states, seizures, and a case fatality rate of 30% among symptomatic sufferers (4,5). Furthermore, protracted neurological and psychiatric sequelae, encompassing paralysis, amnesic deficits, aberrant behavior, dysphasia, and coordination abnormalities, bedevil approximately 20% to 30% of JE survivors (2).

## PREVENTION AND CONTROL MEASURES FOR JAPANESE ENCEPHALITIS:

Supportive management to palliate symptoms and optimize nutritional status comprises the crux of JE therapeutics. Given the mosquito-borne nature of JE, prophylactic measures such as the utilization of pesticides and mosquito nets, swine segregation and culling, and vaccination campaigns for porcine populations are deployed. However, human immunization stands out as the quintessential approach to curbing disease burden (4).

Japanese encephalitis (JE) constitutes the preeminent vaccine-preventable encephalitis in Asia (8). Four vac-

cine variants are currently available: mouse brain-derived inactivated, cell culture-derived live-attenuated, cell culture-derived inactivated, and genetically engineered live-attenuated chimeric vaccines (9). Each vaccine necessitates 2 to 3 primary doses along with subsequent boosters administered according to distinct schedules (10). According to the WHO surveillance in 2016, JE vaccination has already been implemented in neighboring countries such as India and Nepal, initially in response to epidemiological outbreaks in various regions, and has now become a part of their national immunization programs targeting the 1-15 years old population (11,12,13). While financial and logistical constraints persist, UNICEF and Gavi continue to provide support to endemic countries, assisting them in integrating JE vaccination into their national immunization strategies. However, Bangladesh has yet to seize this golden opportunity, likely due to several challenges within its healthcare system, including a shortage of healthcare workers and inadequate infrastructure in rural areas, which hamper vaccine administration and the monitoring of its efficacy in disease prevention.

The majority of JE cases (80%) occur between July and November, during the monsoon and post-monsoon seasons (14). Furthermore, compared to other regions, the case fatality rate in the Rajshahi region of Bangladesh surpasses that of northwestern areas (15). It is imperative to highlight these specific areas and devise robust management protocols to effectively control and prevent potential outbreaks. The Centers for Disease Control and Prevention (CDC) also recommend JE vaccination for individuals traveling to Bangladesh. When prioritizing vaccine introduction in Bangladesh, healthcare professionals have identified five major qualitative criteria, including the incidence rate of the disease, case fatality rate, vaccine efficacy, size of the population at risk, and type of population at risk, along with two quantitative criteria, weighting and scoring, to analyze and establish a vaccine priority list (16). The incidence rate and case fatality rate criteria carry substantial weight, underscoring the significance of disease burden in the selection process. Considering these parameters, JE vaccination emerges as the top priority in Bangladesh.

In light of annual outbreaks during the monsoon season and the heightened risk of contracting this viral disease, particularly among those residing in or traveling to rural areas, individuals working with animals, or spending substantial time outdoors, it is imperative that comprehensive vaccination campaigns and public health initiatives be implemented to raise awareness and ensure that individuals at risk receive the vaccine. Furthermore, vaccination should be administered at least two weeks prior to potential exposure to the virus to ensure optimal protection. Numerous considerations and implementations must be undertaken from the grassroots level. Strengthening the surveillance system in tertiary hospitals is crucial for accurately assessing the burden of JE. Given the safety and affordability of current vaccines, policymakers should spearhead mass vaccination programs in regions burdened by the disease. Additionally, the government should conduct awareness programs targeting the general public and healthcare workers to eradicate the disease and facilitate early detection. Adequate vaccine logistics, including robust cold chain capacities and effective programmatic solutions, should also be promptly addressed.

## CONCLUSION AND RECOMMENDATION:

In summary, JE vaccination is an imperative health intervention that can substantially alleviate the burden of this disease in Bangladesh. Urgent action and advocacy are necessary to promote JE vaccination in the country.

## CONFLICT OF INTEREST:

The authors declared no conflict of Interest.

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## ETHICAL APPROVAL STATEMENT:

Not Applicable

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