

# Re-Emerging Deadly Nipah Virus Outbreak in India: Advancing Nipah Roadmap Investment for Rapid Response and Community Resilience Methods Implementation

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## Abstract

The ongoing re-emerging Nipah Virus (NiV) outbreak represents serious public and global health concern with 12 deaths including 3 laboratories confirmed, and over 25 suspected cases in Kozhikode district, Southwest coast of India. Overall, more than 100 deaths out of over 600 reported human cases have been reported since 1998 mainly in Bangladesh, Malaysia, Singapore and elsewhere. Fostering R&D and operational research priority on NiV and risk factors mapping in forecasting and modelling in improving further R&D investment for better communities' preparedness and similar to Ebola and SARS viruses' outbreaks threats and consequences. NiV outbreak R&D roadmap leadership and investment is crucial to ensure availability of diagnostic tools, accurate and timely safe drugs NiV/HeV infection or vaccine for scale immunization in endemic areas in addition to community awareness and training, health education and resilience programs is vital to increase the likelihood and sustainable development.

**Keywords:** Nipah virus; Outbreak; Roadmap; R&D; Vaccine, Alertness; Capacity building India; Bangladesh; Malaysia; Singapore

## Introduction

The ongoing re-emerging Nipah Virus (NiV) outbreak also called "Mystery Disease" led to 12 deaths including 3 laboratories confirmed, and over 25 suspected cases more have been hospitalized in health centers represents serious public and global health concern in Kozhikode district, Southwest coast of India and worldwide [1]. The virus causes severe disease in both humans and animals with reported the fatality rate up to 40-75% in previous outbreaks. Kerala state is a tourism hub and home of about 33.3 million Indians. It was first identified during and reported a 1998 outbreak among pig farmers from Kampung Sungai Nipah in Malaysia and spread to Singapore with more than 100 deaths and nearly 300 human infected cases cumulatively [2,3]. Previous two reported NiV outbreaks in 2001 and 2007 outbreaks claimed 50 lives in India alone, whereas Bangladesh has borne the brunt of Nipah viral disease in recent years, with more than 100 deaths out of over 600 reported human cases between 1998 and 2015 since its first outbreak reported in 2001 [2-4]. The identified virus source in 2004 was reported from humans became infected with Nipah after eating date palm sap contaminated by infected fruit bats [3,5].

Nipah Virus (NiV) is a newly emerging virus caused a zoonotic virus of the Henipa Virus (HeV) genus that is normally hosted by fruit bats (natural hosts of the virus) to other species, which gets transferred from animals to humans, and it causes severe disease in both animals as well as humans [5]. The natural host of the virus is fruit bats of the "Pteropodidae Family, Pteropus genus". It is often carried by fruit bats to humans, bat secretions can also spread to domestic and wildlife animals notably pigs, human-to-human close contact with infected patients, blood or body fluid samples and contaminated raw food products and cause disease pathophysiology in vulnerable populations [1-3,6,7]. Yet wild bats are common in this part

of Kerala and have never before been identified as a NiV source of infection and little is known of extremely deadly virus [1,3].

In absence on population-based NiV surveillance systems, diagnostic and treatment standards and best practice in hospitals and community-health centers including private clinics in Kerala, Goa and Mumbai affected and other unknown new areas [1,3,7]. It is still unclear and challenging to quantify and ascertain the spread and impact improvements in NiV awareness and training, and to ensure availability of diagnostic tools accurate and timely safe drugs NiV infection or vaccine for scale immunization in endemic areas to increase the likelihood and sustainable development [1,3,8,9]. We recommend urgent Indian governments and affected communities, WHO, and other stakeholders including humanitarian and Non-governmental organizations rapid and coordinated response leadership, resource mobilization and disbursement to prevent further spread, fast-track an understanding contextual risk factors, and contain the deadly urban NiV/HeV outbreak transmission dynamics and losses can be averted, prevent and contain through proven effective and innovative approaches, and sustainable strategies [1,3,4,8-16] include:

A. Advocacy on NiV/HeV R&D roadmap taskforce development and implementation of outbreaks countermeasures (diagnostics, therapeutics and vaccines) that are most needed by affected and prone countries through national and international multidisciplinary and intersectoral stakeholder's partnership and resource mobilization.

B. Intensification of community and stakeholders' engagement, social mobilization, awareness and health education and outreach on NiV outbreak, risk factors/contamination and transmission source pathways to individual and collective precautionary approaches and collaborative partnership and measures.

C. Re-enforcement of individual preventative and precautionary measures, and community alertness to reduce and minimize contact with infected bats, pigs and raw food products which may have been contaminated sources and host reservoirs diversity.

D. Enhanced clinical, laboratory, and public health infrastructure in endemic and at-risk areas to promote early diagnosis, treatment, and implementation of vaccination programs for NiV prevention and control

E. Establishment of diagnostic protocols and treatment guidelines, contact tracing and tracking procedures of NiV/HeV infection surveillance (epidemiologic and laboratory) data from susceptible animal species and proximate predicted risk in human populations by understanding and determining the level of human spillover and to build preparedness for detection of human cases and for limiting exposure, particularly important in areas where public health surveillance programs are not feasible or justifiable.

F. Fostering outbreak preparedness and surge capacity for effective risk communication and response strategies in line

with WHO public health outbreak of concern including travel information update and isolation/quarantine measures.

G. Improved quality standardized and validated NiV/HeV assays, and best practice in hospital associated infection prevention and control tools and strategies in affected areas and nationwide

H. In the absence safe NiV vaccine and efficacious treatment, only receive intensive and supportive care to control and keep patients comfortable against the backdrop of reported ranged of infection signs and symptoms include fevers, persistent convulsions and vomiting, headache followed by neurological (drowsiness and mental confusion) personality changes to severe inflammation of the brain (encephalitis) and respiratory difficulty complications and death.

I. Strengthening local community, referral and private clinics NiV "One Health" approach surveillance and early detection adoption and closely monitoring implementation in gathering quality data and data sharing for timely reporting and targeted virology, immunology, and pathogenesis of NiV in humans and animals to inform development of NiV MCMs interventions acceptability and uptake in at-risk populations.

J. Enhanced capacity for data sharing and analysis (particularly of NiV sequence data) to support collaborative clinical research, including methods for collecting, standardizing, and sharing clinical data under the authority of local leadership.

K. Generating comprehensive fruits bats/population migration, phylogenetic mapping of the global NiV/HeV strains genetic variability and evolutionary data is needed to understand and monitor viral heterogeneity and antigenic changes over time that may impact the epidemiologic and clinical interventions and continuous operational research is needed to better assess and define the occurrence and trend of NiV and other henipaviruses seroconversion, drivers of infection, natural reservoir hosts and pathogenicity.

L. Fostering R&D and operational research priority and investment is crucial in NiV/HeV surveillance and risk factors mapping in forecasting and modelling, in improving development pipeline for safe drug and vaccine discovery, clinical trials and deployment, in addition to better communities' preparedness effective communication and resilience similar to proven global momentum and impact on Ebola and SARS viruses outbreaks threats and consequences prevention and control activities.

### Authors' Contributions

ET conceived the idea and conceptual framework. ET collected and analyzed the data. ET and AGED provided more insights. Both authors revised and approved the final version.

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