WEEKLY EPIDEMIOLOGICAL REPORT

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Nipah Virus outbreaks
Part III

*This is the third article of a series of 3 articles on the "**Nipah Virus outbreaks.** ".*

Nipah virus outbreaks in Bangladesh

The first NiV outbreak in April 2001 was from a village in Meherpur district with 13 cases and 9 deaths (69.2%). Since then, Bangladesh has reported almost yearly outbreaks of NiV encephalitis from various parts. These pose a big public health threat in Bangladesh due to the highly infectious nature of the NiV strain and corresponding poor medical care facilities. The number of yearly cases has ranged from zero to 67, although, in the past five years, a comparatively lower range has been noted from zero in 2016 to eight in 2019. In early 2023, however, 10 confirmed cases (including one probable) and eight deaths (73%) were reported. Of the 11 cases reported in 2023, four were females and seven were males with ages ranging from 15 days to 50 years. Of these cases, ten had a history of consuming date palm sap, while one case - a 15-day-old infant is considered as a secondary case.[8]

In 2006, Bangladesh established targeted hospital-based surveillance to identify and proactively respond to outbreaks of NiV and to identify isolated cases so that the mechanism of spillover from bats to humans could be identified.[8] Investigations revealed that **consumption of raw date palm sap** was a primary route of transmission of the Nipah virus from the *Pteropus* bats to people with a considerably lesser quantity of cases spread via contact with sick animals. In the winter in Bangladesh, the date palm sap is harvested by shaving the bark from the sugar date palm tree and collecting the sap into open clay pots. *Pteropus* bats that occasionally shed Nipah virus in their saliva, frequently visit these trees during sap collection and lick the sap as it is running into the pot. While most date palm sap is cooked into molasses, raw date palm sap is a seasonal delicacy and it is consumption of this raw sap that has been implicated in outbreaks among humans.[9] Other potential modes of transmission were considerably less such as pigs, cattle and goat farms in Bangladesh which are usually raised by scattered small producers in lower densities in contrast to the large commercial pig farms in Malaysia. Sero surveillance studies of *Pteropus* bats in Naogaon were found to have antibodies against the NiV.[9] Control and prevention measures have been implemented by the government of Bangladesh including coordination among relevant health authorities, enhanced surveillance with contact tracing, strengthening case management, ensuring that HCWs observe proper IPC measures, and engaging in risk communication and community engagement activities.[8]

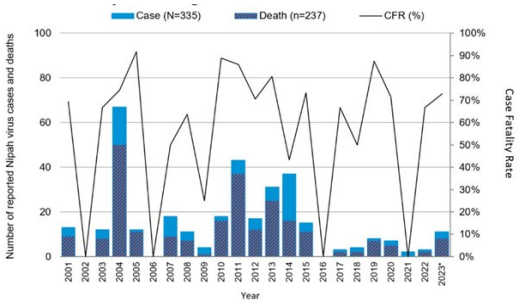

Figure 4 - Number of reported Nipah virus cases & deaths by year, 1 January 2001 - 13 February 2023, Bangladesh; Source: Bangladesh Ministry of Health & Family Welfare *as of 16 February 2023.

Outbreak in the Philippines

In April 2014, an initial report of human deaths in 2 villages in the Philippines (Tinalon & Midtungok) 15 km apart was reported.[10] The National Epidemiology Centre in the country thereafter identified additional human deaths due to infection along with concurrent neurologic disease and sudden deaths in several horses, which had later been consumed by the villagers as well. Altogether 17 human cases were identified with 9 related deaths (53%). Of these cases, 7 (41%) had participated in horse slaughtering and horse meat consumption while 3 (18%) had only consumed horse meat. Five (29%) cases had been exposed to other human case-patients but not to any horses. Of these five, two were HCWs who had not visited the villages, had no contact with sick horses and did not consume horse meat. However, they reportedly had worn minimal PPE during patient procedures. Further two had cared for previous cases in their homes and the fifth case had helped transport a previous case to a hospital.[10]

Around the same time, ten horse deaths were also reported in the same 2 villages. While 2 had died, the others except one, showed neurologic signs. Testing of blood samples from several suspected cases, contacts of humans, horses and other domestic animals were collected and some revealed positive for

Contents **Page**

henipaviruses. Along with the clinical presentation, epidemiologic findings and serologic results, the virus causing this outbreak was thought to be the henipavirus with NiV being the most likely or a virus genetically closely resembling the NiV. The most probable transmission route according to epidemiological data was suggested to be either direct exposure to infected horses, contact with contaminated body fluids during the slaughtering of sick horses and/or consumption of undercooked meat from infected horses. For the five cases without suspected animal contact, the evidence suggested that direct human-to-human transmission was the most likely. While the cause for infection among horses was unclear, it was stipulated that the most likely source was fruit bats (*Pteropus),* which have been reported near at least one of the two affected villages.[10]

Can the Nipah virus spread easily?

Although the Nipah virus has the potential to cause deadly infection, there is little evidence to support it spreading widely outside of areas where people or their livestock come into contact with infected bats. When outbreaks of NiV do occur, it can be an indication of habitat loss due to human incursions, thereby forcing greater contact between humans and animals which can increase the risk of animal-to-human transmission of NiV. Thus, while the R-value may be low, infected animals being transported into large cities with increased population density can potentially increase the risk of person-to-person transmission as well.

Could the Nipah virus cause a pandemic?

Nipah virus is considered to be a stage III zoonotic disease (infectious agents that can spill over from animals to humans and cause limited outbreaks of person-to-person transmission). Sporadic outbreak chains of person-to-person transmission have been recognized frequently.[9] RNA viruses have the highest rate of mutation of any virus, which in turn can contribute to viral adaptation to new environments. Further, considerable genetic heterogeneity among strains of NiV has been observed in human isolates from Bangladesh, while in Malaysia, only a single strain of the virus was predominantly identified throughout the outbreak. Additionally, the reservoir – *Pteropus* bats have a wide geographical range from Pakistan to Southern China and Australia. While person-to-person transmission was observed rarely in Malaysia; in Bangladesh – over one-third of cases were by person-to-person transmissions. Malaysian patients also received treatment in better facilities with increased supplies than patients in Bangladesh. The close physical contact with severely ill patients which is characteristically seen in Bangladeshi culture is more likely to expose family members of the patients to increased secretions and will potentially contribute to increased person-to-person transmission. Strain differences are also probably responsible for the frequency of transmission between Bangladesh and Malaysia. While only 14% of patients infected with the Malaysian strain presented with cough, 62% of infected patients in Bangladesh presented with cough with 69% developing breathing difficulties. Thus, the evidence suggests that different strains of NiV possess different capacities for person-to-person transmission. While the human infection is not a normal part of the NiV life cycle and is not necessary for its survival; environmental changes can provide infectious agents with new opportunities for an expanded range, thus natural selection will favour agents that produce more variants, such as RNA viruses.

So, what can be done?

Studies to explore the molecular and genetic basis of respiratory transmission of henipaviruses, the variability of the genome, and its stability would help to estimate its potential risk. As the *Pteropus* bats are known to drop partially eaten saliva-contaminated fruit on the ground, searching for evidence of henipavirus infection in mammals exposed to bat secretions would help model the risk of adaptation to humans. Human surveillance for clusters of infectious diseases across the geographic range of *Pteropus* bats would be useful as well. Early efforts to interrupt transmission chains should be a global priority. Limiting person-to-person transmission in densely crowded areas in South Asia would reduce the risk of the emergence of pandemic strains of NiV and other infectious agents as well. While animal studies have shown that vaccines against henipaviruses infection are effective, it is yet to be developed for human trials. Cost effectiveness is also another criterion that needs to be considered as only a small number of people are affected each year in countries like Bangladesh. While trials on treatment in infected animals have shown promise, there is as yet no recommended drug for NiV. Treatment is primarily supportive.

Thus, the focus should ideally be on infection prevention and control measures such as isolation of patients, using appropriate PPW and decontamination of surfaces. Further, surveillance is also critical and needs to be carried out considering possible contacts and surrounding areas. Information sharing is a key feature as well with the government using all available channels to counter rumours and inform people what the risks are and how to protect themselves. In addition, cooperation with the animal health and wildlife sectors is also required. Having a strong, effective and connected health system in connection with other relevant departments is vital to preparedness and immediate response, to effectively deal with such infectious diseases.

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Table 1: Selected notifiable diseases reported by Medical Officers of Health 25th– 01st Dec 2023 (48th Week)

RDHS	Dengue Fever		Dysentery		Encephalit		Enteric Fever		Food Poi-		Leptospirosis		Typhus		V. Hep.		H. Rabi.		Chickenpox		Meningitis		Leishmania-		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	341	13382	0	16	0	18	0	4	0	12	9	349	0	0	0	6	0	0	16	360	0	46	0	7	**41**	**100**
Gampaha	92	12707	0	21	0	21	0	13	0	14	10	591	0	12	0	20	0	0	3	294	3	128	2	46	**11**	**99**
Kalutara	34	4462	1	29	0	5	0	1	0	19	26	835	0	2	0	10	0	1	5	524	0	97	0	4	**320**	**100**
Kandy	175	7461	0	41	0	3	0	11	0	23	4	294	0	64	0	5	0	2	6	317	0	30	2	36	**84**	**100**
Matale	94	1789	0	5	0	3	0	1	9	39	2	139	0	14	0	8	0	0	1	72	0	10	20	338	**25**	**100**
NuwaraEliya	16	324	1	158	0	5	0	3	0	51	4	187	1	75	0	6	0	0	3	206	0	34	0	3	**58**	**100**
Galle	121	3112	2	53	0	15	0	6	3	42	13	897	0	73	0	2	0	1	6	364	2	33	0	3	**36**	**100**
Hambantota	42	1382	3	17	0	4	0	1	0	9	26	340	1	69	0	9	0	0	6	150	0	19	19	637	**31**	**100**
Matara	28	1866	1	29	0	9	0	1	0	69	10	524	0	34	0	7	0	2	7	302	1	24	0	182	**54**	**100**
Jaffna	196	2684	11	154	0	2	1	16	3	45	0	14	17	565	1	8	0	2	7	192	1	20	0	2	**70**	**93**
Kilinochchi	5	110	3	22	0	0	0	1	0	18	1	10	0	8	0	1	0	0	0	19	0	2	0	0	**48**	**100**
Mannar	7	107	1	8	0	0	0	1	0	0	1	40	1	7	0	1	0	0	0	3	1	11	0	1	**56**	**100**
Vavuniya	4	187	0	14	0	1	0	0	0	26	2	39	0	10	0	3	0	0	0	34	0	17	0	11	**19**	**100**
Mullaitivu	3	130	1	16	0	1	0	5	0	12	0	40	0	7	0	1	0	0	0	19	0	2	0	8	**27**	**99**
Batticaloa	55	2367	8	224	0	11	0	5	1	19	2	112	0	2	0	8	0	4	6	144	1	50	0	1	**64**	**100**
Ampara	13	269	1	18	0	1	0	1	0	70	25	159	0	2	0	2	0	0	1	95	3	65	0	12	**14**	**100**
Trincomalee	21	2083	0	28	0	1	1	2	0	69	14	89	0	15	0	5	0	0	1	87	1	31	0	7	**30**	**100**
Kurunegala	131	3223	3	65	0	17	0	1	0	9	31	472	1	20	0	15	0	3	7	515	13	223	8	570	**28**	**100**
Puttalam	102	3224	4	49	0	5	0	1	0	2	3	114	0	9	0	1	0	0	3	126	5	90	2	25	**29**	**99**
Anuradhapur	13	754	0	16	0	1	0	1	1	12	8	290	0	33	1	5	0	2	4	239	0	50	13	687	**29**	**100**
Polonnaruwa	10	600	0	26	0	6	0	1	0	11	8	196	0	9	0	16	0	0	3	95	0	18	0	416	**36**	**99**
Badulla	43	1348	0	45	0	6	0	0	0	45	4	337	0	63	0	96	0	0	3	196	3	52	0	43	**63**	**100**
Monaragala	22	722	0	26	0	6	0	0	0	8	27	532	0	39	0	33	0	1	4	78	4	84	1	179	**30**	**100**
Ratnapura	155	2287	4	65	0	19	0	3	4	63	77	1289	1	31	1	19	0	2	25	254	6	148	22	209	**34**	**100**
Kegalle	96	3090	2	28	1	3	0	2	3	22	14	717	1	46	0	6	0	0	11	460	0	93	2	45	**34**	**100**
Kalmune	9	1723	1	72	0	12	0	0	0	4	1	61	0	1	0	0	0	0	5	181	2	44	0	0	**51**	**100**
SRILANKA	**1828**	**71393**	**47**	**1245**	**1**	**175**	**2**	**81**	**24**	**713**	**322**	**8667**	**23**	**1210**	**3**	**293**	**0**	**20**	**133**	**532**	**46**	**1421**	**91**	**3472**	**41**	**99**

Source: Weekly Returns of Communicable Diseases (esurvillance.epid.gov.lk). T=Timeliness refers to returns received on or before 24th Nov, 2023 Total number of reporting units 358 Number of reporting units data provided for the current week: 339**C****-Completeness *

A = Cases reported during the current week. B = Cumulative cases for the year.

Table 2: Vaccine-Preventable Diseases & AFP

25th– 01st Dec 2023 (48th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2023	Number of cases during same week in 2022	Total number of cases to date in 2023	Total number of cases to date in 2022	Difference between the number of cases to date in 2023 & 2022
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	01	00	00	00	00	00	00	01	00	02	02	89	80	11.2 %
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	01	01	00	00	01	03	00	00	01	07	05	212	93	127.9 %
Measles	08	00	00	03	00	00	00	00	00	11	01	747	37	1918.9 %
Rubella	00	00	00	00	00	00	00	00	00	00	00	09	00	0 %
CRS**	00	00	00	00	00	00	00	00	00	00	00	02	00	0 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	06	05	20 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Japanese Enceph-alitis	00	00	00	00	00	00	00	00	00	00	02	04	14	-71.4 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	07	01	600 %
Tuberculosis	94	00	15	01	13	15	11	04	13	166	19	8541	6186	38.06%

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

RDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,

Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis

CRS =**Congenital Rubella Syndrome

NA = Not Available

Take prophylaxis medications for leptospirosis during the paddy cultivation and harvesting seasons.

It is provided free by the MOH office / Public Health Inspectors.

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