

## MONITORING OF EXOTIC TRANSBOUNDARY ANIMAL DISEASES IN THE REGION

**Reporting Period: July 2021 - June 2022**

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### 1. Background

Animal biosecurity encompasses safeguarding of livestock farming systems and the wildlife faunal species in the country from the risk of entry, establishment and spread of animal diseases. The tall snow-capped mountains, deep valleys, torrential rivers, and thick forests of Bhutan acted as the natural barriers for biosecurity protection of the country. However, these natural barriers have been breached especially in the 21<sup>st</sup> century with modern, high-speed transport systems and the global economic patterns where people are moving animal species and their products at an unprecedented rate across national borders which lead to transboundary movement of dangerous diseases including zoonoses. Besides, spread of arthropod vectors into new geographical areas as an effect of climate change results in transboundary spread of vector-borne animal diseases. For instance, Bhutan saw a sporadic outbreaks of Lumpy Skin Disease in cattle since 2020, which was never reported in the Kingdom before.

To prevent incursion of such exotic diseases and to reduce their impact on animal health and food security of the country, it is critical that the animal biosecurity situation in the region especially in the trading partner countries are closely monitored and appropriate measures put in place to prevent incursion, and that incursion if any, is detected early to respond effectively in a timely manner to reduce their impacts.

The Bhutan Agriculture and Food Regulatory Authority (BAFRA) is implementing its normative functions to prevent and control animal disease through implementation of animal biosecurity measures in the international trade of animal and animal products. The approach to managing the risk of incursion of exotic diseases is multi-layered, involving complementary measures applied along the biosecurity continuum at pre-border, border and post border points.

Pre-border activities seek to prevent biosecurity risk reaching Bhutan's border through implementation of import risk assessment, prescribing certification requirements, audit activities, intelligence gathering etc., while the border activities seek to intercept biosecurity risk that are present at border entry points through implementation of import inspections for conformance to import requirements, inspection of animals and products, vehicles, and post arrival quarantine. Post border arrangements are designed to prevent establishment of the disease in the country through monitoring and surveillance for exotic diseases.

### 2. Assessment of the Biosecurity Situation

For the purpose of managing animal biosecurity for the country, those animal diseases that the country did not experience outbreak in the past five years [July 2017 to June 2022], and those that were subjected to official control measures even if reported during the period were considered exotic to Bhutan. During the last five years, Bhutan reported 43 outbreaks of 12 different animal diseases

[excluding aquatic animal diseases] to the Office International des Epizootis (OIE), now renamed as the World Organization for Animal Health. Details are provided in Table 1 of the document.

Outbreaks of animal diseases [exotic to Bhutan] in nine countries in the region [India, Bangladesh, Nepal, Pakistan, Sri Lanka, Maldives, Myanmar, China and Thailand] were remotely monitored during the reporting period of July 2021 to June 2022, assessed the risk of incursion and appropriate measures taken. Information on the disease outbreaks and spread in the region were gathered from the websites of international organizations viz. the OIE, FAO and WHO, and the websites of the national governments. Information were also gathered from different media publications and were validated through appropriate means.

Together, these countries experienced 68 outbreaks of 15 diseases [Table 2] that are exotic to Bhutan. Out of 15 diseases, one [African Swine Fever] entered the country at Sampheling Gewog of Chukha Dzongkhag in April 2022 with a catastrophic consequence. Hence, the percent of exotic animal diseases prevented from entry into the country has been calculated at 93.33% [ $100 - \{1/15\} \times 100$ ].

Fifteen diseases reported by countries in the region are;

### **2.1 Bovine viral diarrhoea (BVD)**

Sri Lanka reported the BVD outbreak in July 2021 to the OIE. The disease was introduced into the country when it imported 20000 high-yielding milch cows from Australia in 2017.

BVD is a disease of cattle and other ruminants caused by the Bovine Viral Diarrhoea Virus (BVDV). BVD is currently one of the costliest diseases of cattle industry. Abortions, infertility, and/or embryonic deaths associated with BVD lead to significantly reduced reproductive performance and increased premature culling of the animals. These symptoms are especially marked if one or more BVDV carriers are in the herd. Animals that develop acute diarrhoea and fever may die or have long, costly recovery periods with decreased milk production and growth. Most animals become exposed to the disease through contact with other recently infected or persistently infected animals that are shedding the virus. It is also possible for cattle to become infected via contact with contaminated farm equipment.

Purchasing animals through an auction market; introducing animals directly into the herd without spending a week or two in isolation; failure to maintain a strong herd vaccination program against the disease at all times; failure to test new additions to make sure that they are not BVDV carriers; and use of contaminated semen are some common portal of entry of the virus into healthy herds.

In the past years, some countries in the region viz. Thailand (2011), Myanmar (2016) and India (1999, 2017) have demonstrated detection of antibody titres to BVD in animal population. However, the countries did not report active outbreak of the disease.

### **2.2 Lumpy skin disease (LSD)**

Till 1980s, LSD was mostly confined to Africa and west Asia. Since 2015, it has been rapidly spreading to new territories, including, more recently, several south and south-east Asian countries. In November 2020, Myanmar reported its first LSD outbreak. Similarly, Countries like Sri Lanka,

Thailand, Nepal and India also reported LSD outbreaks during the period between July – September 2021. Pakistan is the latest country in South Asia that reported the first outbreak in March 2022. The country is still grappling with the disease. Bhutan also reported its first outbreak in October 2020 but was successfully controlled.

Lumpy skin disease is a viral disease that affects cattle. It is transmitted by blood-feeding insects, such as certain species of flies and mosquitoes, or ticks. It causes fever, nodules on the skin and can also lead to death, especially in animals that have not previously been exposed to the virus. Control options include vaccinations programs, movement control of infected animals, vector control programs etc. Lumpy skin disease can lead to significant economic losses for the farmers.

### 2.3 Kyasanur forest disease (KFD)

Kyasanur forest disease (KFD) is a tick borne zoonotic disease that causes acute febrile haemorrhagic illness in humans and monkeys especially in southern part of India. The disease is also called “monkey fever”. The disease was first reported from the Kyasanur forest range of Karnataka in India in March 1957. Hence the name Kyasanur forest disease. The disease is caused by highly pathogenic Kyasanur Forest Disease Virus (KFDV) which belongs to member of the genus *Flavivirus* and family *Flaviviridae*. The disease is transmitted to monkeys and humans by infective tick *Haemaphysalis spinigera*. A variety of animals are thought to be reservoir hosts for the disease including porcupines, rats, squirrels, mice, and shrews. Monkeys are

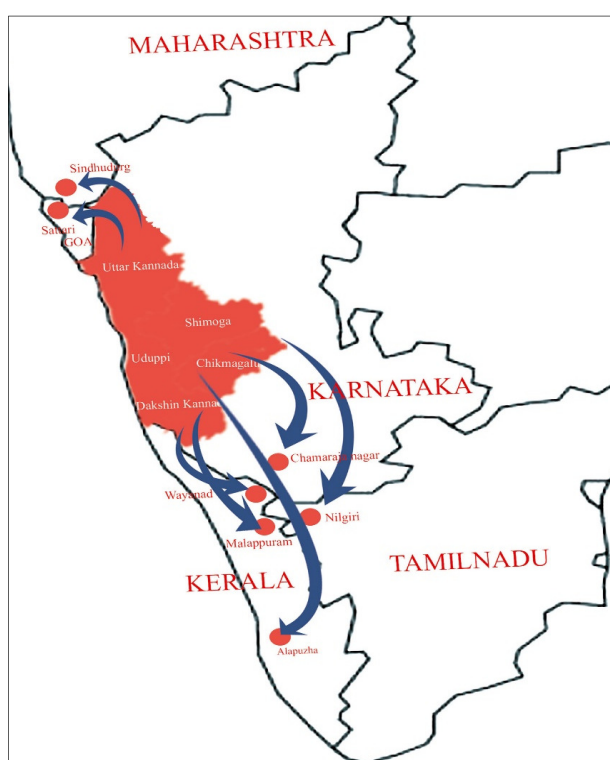


Fig 1: Map showing spread of KFD in South India

the main amplifying hosts for KFDV and they are also affected by the virus. Monkeys develop tremendous viremia and infect the ticks, *Haemaphysalis spinigera* which is the vector for disease transmission. Humans contract infection from the bite of nymphs of the tick.

The disease initially reported from Shimoga district of Karnataka (1957) has now spread to many other districts in the state. The disease is gradually spreading and is already reported by the states of Kerala, Tamil Nadu, Goa and Maharashtra in India. Three separate human incidents of KFDV infections or deaths have been reported in Kerala and Karnataka states in between July 2021 and June 2022.

**Table 1: Animal disease outbreaks reported by Bhutan to OIE in the last five years**

<b>Animal Disease Outbreaks Reported by Bhutan to OIE from July 2017 to June 2022</b>		
<b>Semester, Reporting Year</b>	<b>Animal Disease</b>	<b>Outbreaks in (Animal category)</b>
Jan-Jun, 2022	African Swine Fever	Domestic animals
Jan-Jun, 2021	African Swine Fever	Scavenging animals
Jan-Jun, 2021	Lumpy skin disease	Domestic animals
Jan-Jun, 2021	Sheep pox and goat pox	Domestic animals
Jul-Dec, 2020	Haemorrhagic septicaemia	Domestic animals
Jul-Dec, 2020	Infectious bursal disease	Domestic animals
Jul-Dec, 2020	Lumpy skin disease	Domestic animals
Jul-Dec, 2020	Peste des petits ruminants	Domestic animals
Jul-Dec, 2020	Rabies	Domestic animals
Jul-Dec, 2020	Sheep pox and goat pox	Domestic animals
Jul-Dec, 2020	Sheep pox and goat pox	Wild animals
Jan-Jun, 2020	Anthrax	Domestic animals
Jan-Jun, 2020	Brucella abortus	Domestic animals
Jan-Jun, 2020	Foot and mouth disease	Domestic animals
Jan-Jun, 2020	Haemorrhagic septicaemia	Domestic animals
Jan-Jun, 2020	Infectious bursal disease	Domestic animals
Jan-Jun, 2020	Newcastle disease	Domestic animals
Jan-Jun, 2020	Rabies	Domestic animals
Jul-Dec, 2019	Anthrax	Domestic animals
Jul-Dec, 2019	Brucella abortus	Domestic animals
Jul-Dec, 2019	Foot and mouth disease	Domestic animals
Jul-Dec, 2019	Infectious bursal disease	Domestic animals
Jul-Dec, 2019	Rabies	Domestic animals
Jan-Jun, 2019	Anthrax	Domestic animals
Jan-Jun, 2019	Brucella abortus	Domestic animals
Jan-Jun, 2019	Foot and mouth disease	Domestic animals
Jan-Jun, 2019	High pathogenicity avian influenza (H5N1)	Domestic animals
Jan-Jun, 2019	Infectious bursal disease	Domestic animals
Jan-Jun, 2019	Newcastle disease	Domestic animals
Jan-Jun, 2019	Peste des petits ruminants	Domestic animals
Jan-Jun, 2019	Rabies	Domestic animals
Jul-Dec, 2018	Foot and mouth disease	Domestic animals
Jul-Dec, 2018	High pathogenicity avian influenza (H5N1)	Domestic animals
Jul-Dec, 2018	Peste des petits ruminants	Domestic animals
Jul-Dec, 2018	Rabies	Domestic animals
Jan-Jun, 2018	Foot and mouth disease	Domestic animals
Jan-Jun, 2018	High pathogenicity avian influenza (H5N1)	Domestic animals
Jan-Jun, 2018	Newcastle disease	Domestic animals
Jan-Jun, 2018	Peste des petits ruminants	Domestic animals
Jan-Jun, 2018	Rabies	Domestic animals
Jul-Dec, 2017	Brucella abortus	Domestic animals
Jul-Dec, 2017	Foot and mouth disease	Domestic animals
Jul-Dec, 2017	Rabies	Domestic animals

*Monitoring of Exotic Transboundary Animal Diseases in the Region [July 2021 - June 2022]*

**Table 2: Details of the disease outbreaks in countries in the region during the period July 2021 - June 2022**

Exotic diseases	Countries in the region that experienced disease outbreaks during the period July 2021 - June 2022								
	India	Nepal	Bangladesh	China	Thailand	Myanmar	Sri Lanka	Pakistan	Maldives
Bovine viral diarrhoea	X	X	X	X	X	X	Jul - Dec 2021 (1)	X	X
Lumpy skin disease	Jul - Dec 2021 (1)	Jul - Dec 2021 (1)	X	X	Jul - Dec 2021 (1)	Jan - Jun 2022 (1)	Jul - Dec 2021 (1)	Jan - Jun 2022 (3)	X
African swine fever	Jan - Jun 2022 (4)	Jan - Jun 2022 (1)	X	Jul - Dec 2021 (2) Jan - Jun 2022 (3)	Jan - Jun 2022 (1)	X	X	X	X
Kyasanur forest disease	Jul - Dec 2021 (1) Jan - Jun 2022 (2)	X	X	X	X	X	X	X	X
Glanders	X	Jul - Dec 2021 (1)	X	X	X	X	X	X	X
CCHF	Jan - Jun 2022 (1)	X	X	X	X	X	X	Jul - Dec 2021 (1)	X
Nipah virus	Jul - Dec 2021 (1)	X	Jul - Dec 2021 (1)	X	X	X	X	X	X
Psittacosis	X	X	X	Jul - Dec 2021 (1)	X	X	X	X	X
Leptospirosis	Jul - Dec 2021 (1)	X	X	X	X	X	X	X	X
PRRS	X	Jul - Dec 2021 (1) Jan - Jun 2022 (1)	X	Jul - Dec 2021 (1) Jan - Jun 2022 (1)	X	X	X	X	X
PPR	Jul - Dec 2021 (1)	X	X	Jul - Dec 2021 (1) Jan - Jun 2022 (1)	X	X	X	X	Jul - Dec 2021 (1) Jan - Jun 2022 (1)
H5N2 (Avian Influenza)	X	X	X	Jul - Dec 2021 (1)	X	X	X	X	X
H5N8 (Avian Influenza)	Jul - Dec 2021 (11)	X	X	X	X	X	X	Jul - Dec 2021 (1)	X
H7N9 (Avian Influenza)	X	X	X	Jan - Jun 2022 (1)	X	X	X	X	X
H5N1 (Avian Influenza)	Jul - Dec 2021 (3) Jan - Jun 2022 (3)	Jan - Jun 2022 (4)	X	Jul - Dec 2021 (2) Jan - Jun 2022 (2)	X	X	X	Jul - Dec 2021 (1)	X

Note: Period during which outbreak occurred is provided in cells against the disease and the country. Number in bracket represents number of outbreaks during the period

## 2.4 African swine fever (ASF)

Until 2017, ASF was restricted to Africa and some countries in Europe. In 2018 the virus spread to Asia, affecting more than 10 percent of the total pig population in several countries, leading to severe economic losses in the pig sector. In August 2018, China reported the first African swine fever outbreak in Liaoning province. By April, 2019, the virus was reported to have spread to every region of China as well as parts of Southeast Asia including Cambodia, Laos, Thailand and Vietnam. On 29 April 2020, India reported its first African Swine Fever outbreaks in the state of Assam and Arunachal Pradesh. Countries like India, Nepal and China are still battling the disease as these countries reported fresh outbreaks in May 2022.

Bhutan reported its first outbreak on 16<sup>th</sup> May 2021 in the scavenging pigs of Phuentsholing town bordering Jaigaon, West Bengal, India. The disease resurfaced in the month of April 2022 in Sampheling Gewog of Phuentsholing Dungkhag.

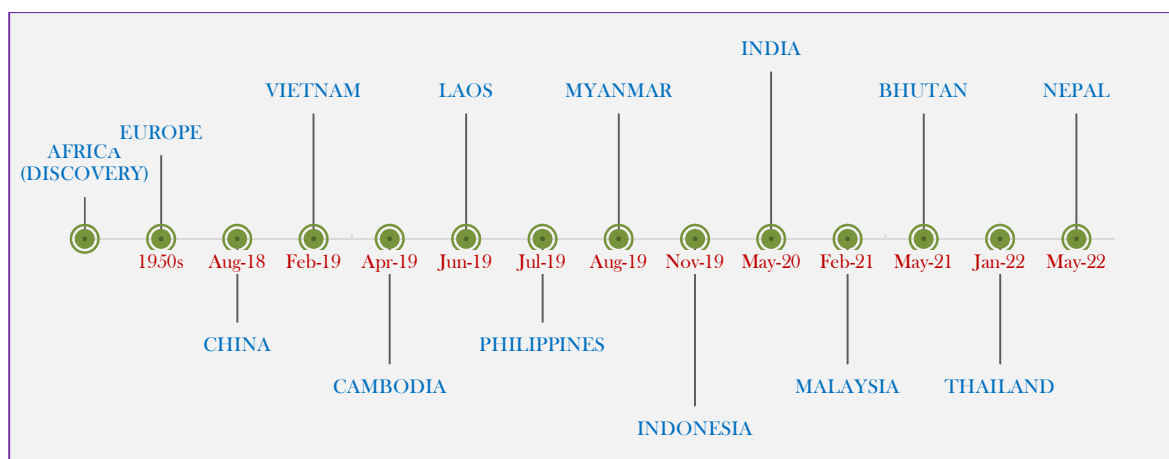


Fig 2: Timeline of ASF spread from Africa to Asia

## 2.5 Porcine reproductive and respiratory syndrome (PRRS)

Porcine Reproductive and Respiratory Syndrome (PRRS) is a viral disease of pigs characterized by two overlapping clinical presentations involving both reproductive and respiratory systems. The PRRS virus is an enveloped RNA virus in the genus *Arterivirus*, classified in the virus family, *Arteriviridae*. Shedding carriers probably are the most common means of virus introduction to a herd of pigs. The virus is highly infectious. It is present in nasal secretions, urine, semen, mammary secretions and faeces. With the advent of artificial insemination, semen became a major source of viral introduction.

Table 3: RRRS outbreaks in the region

Country	PRRS outbreaks reported to OIE by year					
	2017	2018	2019	2020	2021	2022
China						
India						
Nepal						
Myanmar						
Thailand						

Nepal reported PRRS outbreak for the first time in 2021 on a commercial pig farm with 356 susceptible animals. The origin of the infection is currently unknown. The outbreak is still being reported by that country. The disease is endemic in China. Thailand also reported the disease outbreak consecutively from 2017 till 2021.

## **2.6 Glanders**

Glanders is a contagious, usually fatal disease of the equine caused by the bacterium *Burkholderia mallei*. Humans and other animals viz. donkeys, mules, goats, dogs, cats etc. are susceptible, and infections are usually fatal. The disease is characterized by the development of ulcerating growths that are most commonly found in the upper respiratory tract, lungs, and skin. The disease is commonly contracted by consuming food or water contaminated by the nasal discharge of carrier animals and entry is through skin abrasions, nasal and oral mucosal surfaces, or inhalation. The organism can survive in a contaminated area for more than 1 year, particularly under humid, wet conditions.

The disease was once prevalent worldwide. It has now been eradicated or effectively controlled in many countries, including Bhutan. In the past five years, the disease was reported in India (2017, 2018, 2019), China (2018, 2019) and Nepal (2020, 2021, 2022).

Nepal saw cases of glanders in November 2020. Equine cases were detected from Banke district of Lumbini. Cases were also detected from Dhading and Lalitpur districts of the Bagmati Province later in December 2020. Outbreak continued through the year 2021 and by September 2021, sixteen horses have died of the disease. While the actual cause of the outbreak is unknown, unauthorized movement of equine species to and from Indian State of Uttar Pradesh is suspected to have introduced the disease in Nepal.

## **2.7 Crimean congo haemorrhagic fever (CCHF)**

CCHF is caused by infection with a tick-borne virus, *Nairovirus* in the family *Bunyaviridae*. The disease was first characterized in Crimea and later recognized as the cause of the illness in Congo in 1944 and 1969 respectively. Hence the current name of the disease. Ixodid ticks, especially those of the genus, *Hyalomma* serves both as an environmental reservoir and a vector for the CCHF virus. Varieties of wild and domestic animal species viz. cattle, goats, sheep, hares, hedgehogs, rats etc. serve as amplifying hosts for the virus. It is a zoonotic disease and the transmission to humans occurs due to bite by infected ticks or contact with infected animal blood. CCHF can be transmitted from one infected human to another by contact with infectious blood or body fluids.

CCHF is found in Eastern Europe particularly in the former Soviet Union, throughout the Mediterranean, in north-western China, central Asia, southern Europe, Africa, the Middle East, and the Indian subcontinent particularly India and Pakistan.

In September 2010, Pakistan saw outbreak of the disease in human population in Khyber Pakhtunkhwa province. Since then, sporadic outbreaks in humans were reported in 2014, 2016 and the latest one being reported in August 2021.

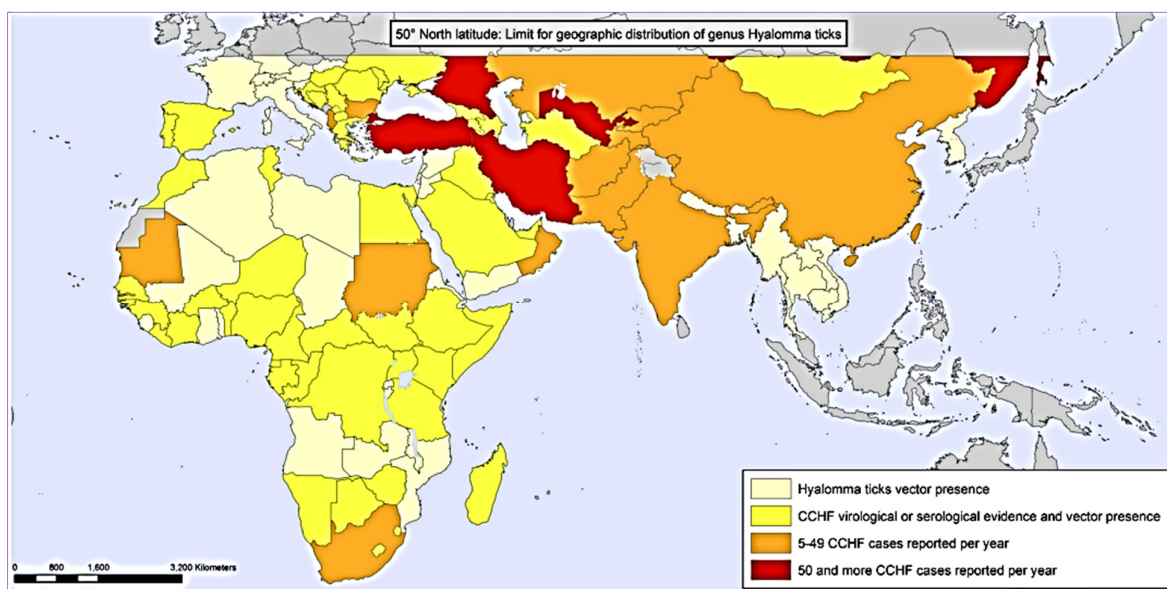


Fig 3: Geographic distribution of CCHF, [Source: WHO, 2017]

In January 2011, the first human cases of CCHF in India was reported in Sanand, Gujarat, India. Since then, the country reported sporadic human cases of the disease in 2013, 2015 and the latest one being in April 2022, all in the state of Gujarat. By 2015, CCHF was recognized as widespread among livestock population in India. Investigators from the National Institute of Virology in Pune found antibodies of CCHF in cows, sheep and goats from 22 states and 1 union territory. The disease is still not detected in Bhutan. However, the vector for the disease, *Hyalomma* tick is prevalent in the country.

## 2.8 Psittacosis/Avian chlamydiosis

Psittacosis is a zoonotic infectious disease of birds caused by a bacteria *Chlamydia psittaci*. The disease infects parrots, pigeons, sparrows, ducks, chickens and many other species of birds. Infection is usually by the droppings of another infected bird, though it can also be transmitted by feathers and eggs, and is typically either inhaled or ingested. The bacteria can infect people and cause a disease called psittacosis.

Psittacosis in people is most commonly associated with pet birds, like parrots and cockatiels, and poultry, like turkeys and ducks. It is important to know that infected birds do not always show signs of disease or seem sick. Both sick birds and infected birds without signs of illness shed the bacteria in their droppings and respiratory secretions. When the droppings and secretions dry, small dust particles (that include the bacteria) can get into the air. The most common way someone gets infected is by breathing in the dust from these dried secretions.



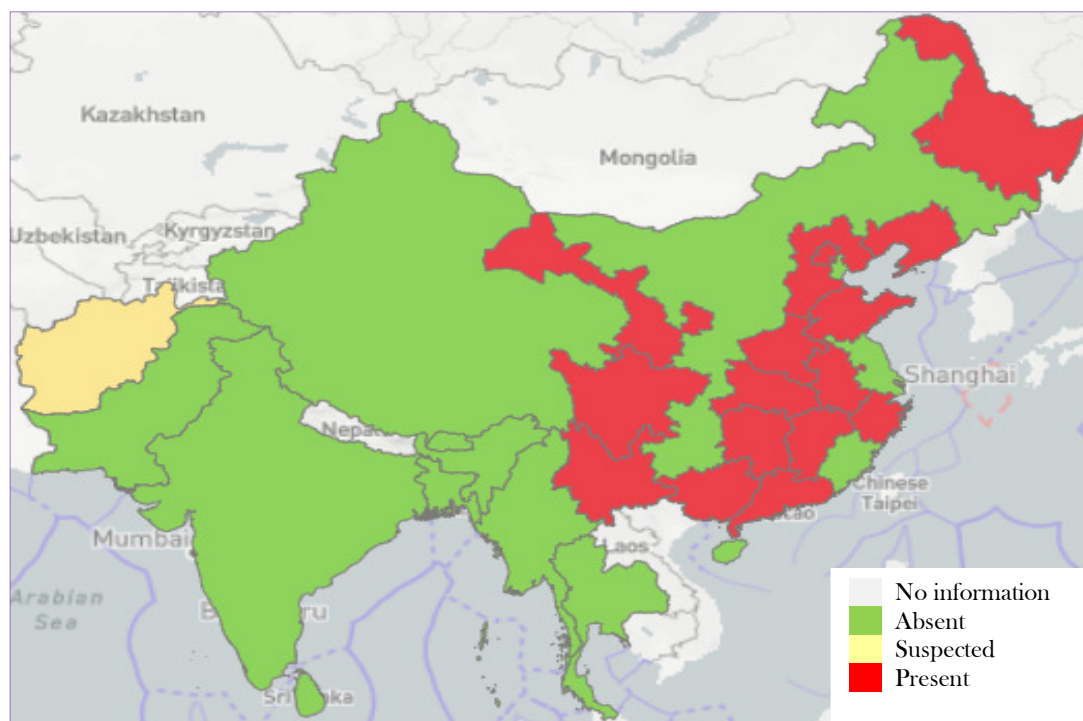


Fig 4: Geographic distribution of Avian chlamydiosis in the region [Source: OIE, 2022]

In the region, only China reported the disease outbreaks. Except for the year 2020, China has consistently reported the outbreak of the disease to OIE in the last five years. In October 2021, the country saw human cases of the disease in Lishui of Zhejiang province where seven people became infected in which one died. Owing to the presence of large number of pigeons alongside human settlements especially in the town areas in the country, risk of the disease outbreak in Bhutan is high.

## 2.9 Leptospirosis

Leptospirosis is a contagious zoonotic disease affecting domestic animals, wildlife and humans, caused by infection with the pathogenic group of *Leptospira spp.* The bacteria cause both acute and chronic forms of the disease, with severity of infection depending on the virulence of the organism, host susceptibility and species of host affected. The bacteria are generally transmitted either directly or indirectly from a clinically unaffected maintenance host to other species via ingestion of water, feed and fodder contaminated with urine or by inhalation of urine droplets from infected maintenance host, the rats. Favourable environmental conditions, such as warm temperatures, moisture, neutral soil pH and standing surface water support the survival of *Leptospira spp.* in the environment for an extended period of time, increasing infection opportunities. Piggeries and cattle herds are proven risk factors for leptospiral infections in cattle and horses, respectively. Horses, in most cases, are accidental hosts.

Leptospirosis is a common infection during the monsoon in India. Areas that are prone to flooding and waterlogging during monsoon become the source of infection. India sees sporadic outbreak of the disease every year during monsoon seasons. In June and July 2021, the outbreak of the disease was reported in Mumbai, Maharashtra in human population.

## 2.10 Peste des petits ruminants (PPR)

Peste des petits ruminants is an acute or subacute viral disease of goats and sheep characterized by fever, necrotic stomatitis, gastroenteritis, pneumonia, and sometimes death. It was first reported in the Ivory Coast in 1942 and subsequently in other parts of West Africa. Goats and sheep appear to be equally susceptible to the virus, but goats exhibit more severe clinical disease. The virus also affects several wild small ruminant species. Cattle, buffalo, and pigs are only sub-clinically infected.

PPR has been reported in all parts of the African continent, the Middle East, and the entire Indian subcontinent. In the last 15 years, PPR has rapidly expanded within Africa and to large parts of Asia including Bhutan. The last time Bhutan reported PPR outbreak to OIE was during the second half of 2020, and since then, the country did not see any case of PPR in the country. India last reported PPR outbreak in the second half of 2021, while China and Maldives reported the disease outbreak in the first half of 2022.

## 2.11 Nipah virus

Nipah virus (NiV) causes emerging infectious diseases which first appeared in domestic pigs in Malaysia and Singapore in 1998 and 1999 respectively where over 1 million pigs were destroyed to control the disease. Nipah virus causes respiratory and occasionally nervous signs in pigs, and has a devastating zoonotic potential. The disease is caused by *Nipah henipavirus* belonging to the family *Paramyxoviridae*.

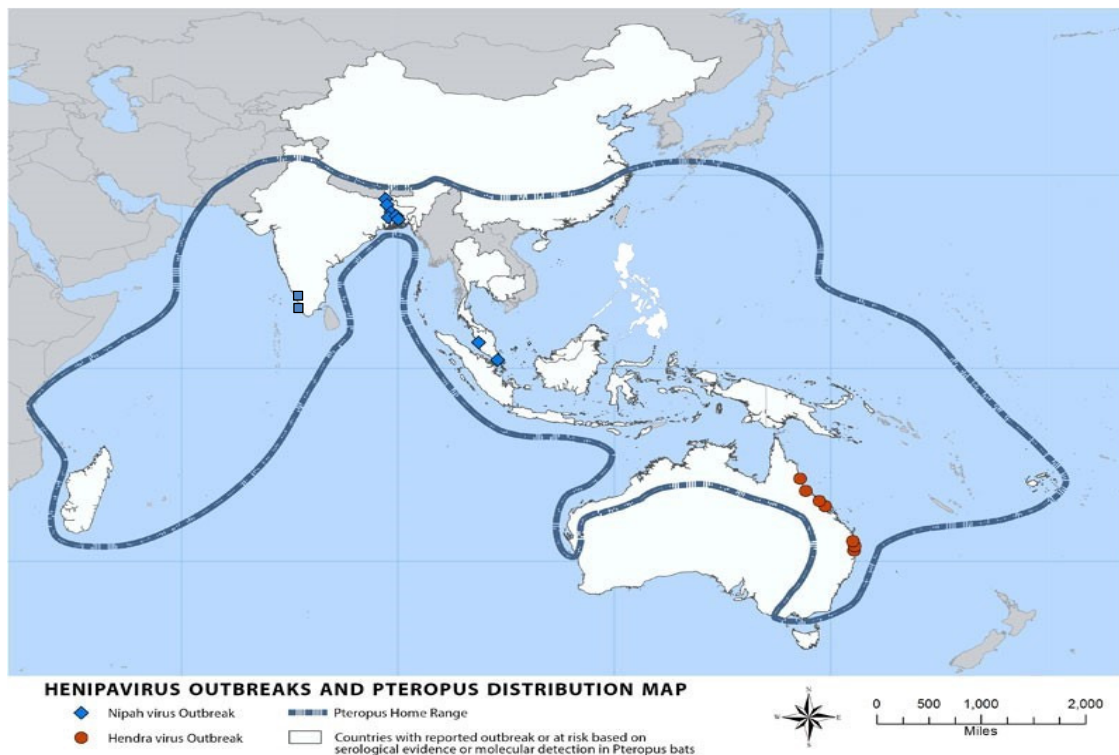


Fig 5: Geographic distribution of *Pteropus* and *Henipavirus* outbreak locations [Source: CDC, 2021]

Fruit bats of the family *Pteropodidae*, particularly species belonging to the *Pteropus* genus are the natural hosts for Nipah virus. Nipah virus is known to cause infection in pigs and other domestic animals such as horses, goats, sheep, cats and dogs. The virus is highly contagious in pigs.

Outbreaks occur almost annually in parts of Asia, primarily Bangladesh and India. Human cases have continued to occur sporadically in Bangladesh and India since 2003. In 2021, India and Bangladesh saw five and two outbreaks respectively in humans. Although, Bhutan did not record any Nipa virus outbreaks in the country, it is at risk as the natural host of the virus is prevalent in the country.

### **2.12 Avian influenza H5N2**

H5N2 is a subtype of the species Influenza virus A. The subtype infects a wide variety of birds, including chickens, ducks, turkeys, falcons, and ostriches. Affected birds usually do not appear ill, and the disease is often mild. Some variants of the subtype are much more pathogenic than others. People can become infected with the virus but do not develop severe illness.

China reported the outbreak in Yunlin, Taiwan province in August 2021 in a duck population. The surrounding poultry farms within 3 km radius of the infected region were put under intensified surveillance for three months and biosecurity heightened. Other countries in the region did not report this disease outbreak during July 2021 - June 2022.

### **2.13 Avian influenza H5N8**

H5N8 is a subtype of the influenza virus A and is highly lethal to wild birds and poultry. H5N8 is also known to infect people. The virus manifests itself in various ways, from asymptomatic and sub-clinical to highly lethal in some populations of birds.

In September 2021, four states of India [Punjab, Madhya Pradesh, Uttar Pradesh and Chattisgarh] reported the outbreak of the disease. Four reports covering ten outbreaks of the disease in poultry were confirmed in multiple dates where a total of 69458 birds were infected and died while 173572 birds were culled. The source of the infection is reported as unknown or inconclusive. The state of Madhya Pradesh reported yet another outbreak from Agar Malwa district in December 2021, where crows were affected and have died.

Pakistan reported the disease outbreak in a commercial farm with poultry of Rhode Island Red in August 2021 at Multan, Punjab. The outbreak killed around 3000 birds in a poultry farm. Necessary biosecurity measures were implemented at nearby poultry farms and the disease subsided.

### **2.14 Avian influenza H7N9**

H7N9 is a subtype of the influenza virus A. H7 viruses normally circulate amongst avian populations with some variants known to occasionally infect humans. It is a zoonotic disease and in between

February 2013 to April 2022, as many as 1568 human infections were confirmed in China. Humans become infected from close contact with the infected poultry populations. Since 10<sup>th</sup> January 2017, H7N9 virus was detected in a total of 66 poultry or environmental samples from as many as 14 provinces in China as of 2<sup>nd</sup> February 2022.

### **2.15 Avian influenza H5N1**

H5N1 is a subtype of the influenza A virus which can cause illness in humans and many other animal species. A bird-adapted strain of H5N1 is the highly pathogenic causative agent of H5N1 flu, commonly known as avian influenza [bird flu]. It is maintained in the population in many bird populations, especially in South-east Asia. The disease is highly contagious among birds, and can be deadly, especially in domestic poultry.

Since December 2003, H5N1 virus has resulted in high mortality in poultry and wild birds in Asia, the Middle East, Europe, and Africa. The H5N1 virus infections among domestic poultry have become common in certain countries of the world. As of 2011, the Food and Agriculture Organization considered six countries [Bangladesh, China, Egypt, India, Indonesia, and Vietnam] to be endemic for H5N1 virus in poultry.

Many places in India, Nepal, China and Pakistan reported the disease outbreaks during the period July 2021 - June 2022. Bhutan saw its last outbreak during the first half of 2019 and did not see the outbreak since then.

## **3 Conclusion**

Given the volume and the speed with which animals, animal products and other risk goods are moved across national borders, the risk of introduction, establishment and spread of exotic transboundary animal diseases has increased by many folds. Hence, everyday monitoring of animal biosecurity situation in countries in the region especially in the trading partner countries is an essential component of the overall biosecurity management for the country. Countries in the region reported 68 outbreaks of 15 different animal diseases that are exotic to Bhutan during the period, July 2021 to June 2022. During the same year, BAFRA implemented biosecurity measures including biosecurity risk assessment, prescribing import conditions, conducting import inspection, animal quarantine, on-farm biosecurity monitoring etc. worth about Nu. 1.50 million which contributed towards preventing these diseases from spreading into the country. However, incursion by African swine fever into Sampheling Gewog of Chukha Dzongkhag in April 2022 with catastrophic consequence was inevitable as the event occurred due to movement of infected pig or pork products through an unguarded and unofficial entry point of the Gewog.

There are countless unofficial entry points to the country especially in the south that are not or minimally manned by the law enforcement agencies. This long porous border poses a major biosecurity challenge to the country leading to outbreaks of animal diseases in the country despite lot of efforts put in by the biosecurity managers in the country.

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