Annual Report of Vector-borne Diseases Pathogens and Vector Surveillance 2022

November 2023

MINISTRY OF HEALTH, LABOUR, AND WELFARE
Public Health Bureau
Department of Infectious Disease Prevention and Control
Policy Planning and Quarantine Division

YOKOHAMA QUARANTINE STATION
Officer for Analysis on Sanitation Control

Contents

Preface

The World Health Organization (WHO) announced that the "Public Health Emergency of International Concern (PHEIC)" for Coronavirus disease 2019 (COVID-19) would end on May 5, 2023. The termination came almost 3 years and 3 months after the pandemic was declared to correspond to PHEIC on January 30, 2020.

In Japan, on May 8, 2023, the position of the new coronavirus infection (limited to those in which the pathogen is coronavirus of the betacoronavirus genus (limited to those newly reported by the People's Republic of China to the WHO in January 2020 as having the ability to be transmitted to humans), hereinafter referred to as "COVID-19") was changed in the "Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases (The Infectious Diseases Control Law)", and it is now classified as a Category 5 infectious disease.

Due to the change in its status under the Infectious Disease Control Law, COVID-19 is no longer a quarantinable infectious disease under the Quarantine Act, and the seaport and airport operations pertaining to COVID-19 have been terminated.

Currently, international flights are increasing at airports in Japan, and international flights are gradually resuming at local airports. In addition, the number of international cruise ships visiting and calling at seaports is returning to the number before the expansion of COVID-19 infection, and according to the Japan National Tourism Organization (JNTO), the number of foreign visitors to Japan by June 2023 was approximately 10 million, showing a more than 20-fold increase compared with the same period in the previous year.[1]

While the resumption of international traffic in earnest with an increase in the number of tourists and other visitors to Japan is desirable for the Japanese economy, it also increases the risk of infectious diseases entering from regions including endemic countries.

And patients with mosquito-borne infections, such as Zika virus infection, chikungunya fever, dengue fever, and malaria, and rodent-borne infections, such as plague, Lassa fever, and hemorrhagic fever with renal syndrome (HFRS), have continued to appear in epidemic areas.

In particular, malaria and dengue fever are together estimated to affect 300 million people worldwide with 440,000 deaths,[2] and the WHO is continuing its surveillance activities.

Currently, dengue fever patients are increasing in Southeast Asian countries, and 19 malaria cases and 100 dengue fever cases[3] have been reportedly imported to Japan as of week 38, 2023.

In addition, since 2017, the quarantine station's port sanitation surveys have not confirmed any entrance of *Aedes aegypti*, an invasive species that can transmit dengue fever and other diseases. However, adults were collected by aircraft surveys in May this year (2023), and larvae were confirmed by routine surveys in July. Furthermore, although sporadic, there have been reports of detection of invasive rodents that transmit infectious diseases, such as *Peromyscus maniculatus*, in ocean-going containers and aircrafts.

Therefore, the implementation of surveys of inhabitation, entry, and pathogen carrier state of mosquitoes and rodents, which are vectors of quarantinable infectious diseases, by the quarantine stations at points of entry such as quarantine airports and seaports, and prompt implementation of measures such as prevention of entry/settlement of vectors based on the results, have become even more important.

In this report, the results of surveys (vector surveillance) conducted at quarantine stations in Japan in 2022 are presented, while fulfilling the obligation as a member of the United Nations and in compliance with the International Health Regulation (2005).

November 2023

1 Vector borne quarantinable infectious diseases reported in Japan (2022)

1.1 Mosquito borne diseases

The status in 2022 of mosquito-borne disease outbreaks covered by the quarantine program in Japan will be discussed using data from the National Epidemiological Surveillance of Infectious Diseases conducted on the basis of the "The Infectious Diseases Control Law" (hereinafter called "the trend survey").

In 2022, 99 cases of dengue fever (8 in 2021), 6 cases of chikungunya fever (no cases reported in 2021), 31 cases of malaria (30 in 2021), and 5 cases of Japanese encephalitis (3 in 2021) were reported.[4,5] Only the cases of Japanese encephalitis were domestic; all the others were imported cases (confirmed or speculated).[5] There were no reported cases of Zika virus infection or West Nile fever.[5]

The 99 reported cases of dengue fever were about 12 times more than those reported in 2021.[4,5] Thirteen countries were estimated areas of infection: 11 in Asia, including Vietnam, Nepal, and the Philippines, and 2 in South America, i.e., Brazil and Peru.[5] The number of cases of malaria, 31, was similar to the number reported in 2021.[4,5] Sixteen countries were estimated areas of infection: 14 in Africa including Ghana and Guinea, Brazil in South America, and India in Asia.[5] Six cases of chikungunya fever were reported, and 3 countries: Philippines, Indonesia, and Malaysia, were estimated of infection.[5] Of the 5 cases of Japanese encephalitis, 1 was reported from Hiroshima Prefecture, 3 from Kumamoto Prefecture, and 1 from Chiba Prefecture, and 2 elderly patients died.[5]

In Japan, infection trends of Japanese encephalitis virus are monitored by measuring the serum HI antibody level in swine, which are amplifiers, by the National Epidemiological Surveillance of vaccine-Preventable, Diseases.[6] Of the 23 prefectures in which the survey was conducted in 2022, antibodies to Japanese encephalitis virus were confirmed in 16 prefectures (Akita, Ibaraki, Gunma, Chiba, Kanagawa, Shizuoka, Mie, Shimane, Tokushima, Kagawa, Ehime, Kochi, Fukuoka, Saga, Nagasaki, and Kumamoto), and in 14 of the 22 prefectures surveyed in 2021. In the 1960s, during which there were a large number of Japanese encephalitis cases, the appearance of patients with Japanese encephalitis was preceded by increases in HI antibodies to Japanese encephalitis virus in swine. Presently, however, because of the spread of vaccination against Japanese encephalitis, changes in living environment, etc., the state of swine infection and the occurrence of patients are not necessarily parallel, and the annual number of reported Japanese encephalitis patients has recently been about 10.[6]

1.2 Rodent borne diseases

The trend survey in 2022 identified no reported case of plague (transmitted by rodents and insects such as fleas) or Lassa fever, South American hemorrhagic fever or hemorrhagic fever with renal syndrome (HFRS) or hantavirus pulmonary syndrome (HPS) (transmitted directly by infected rodents). The absence of any reported case allows us to estimate that none of these diseases developed in Japan during the survey period.[5]

2 Vector borne quarantinable infectious diseases reported in the World 2022

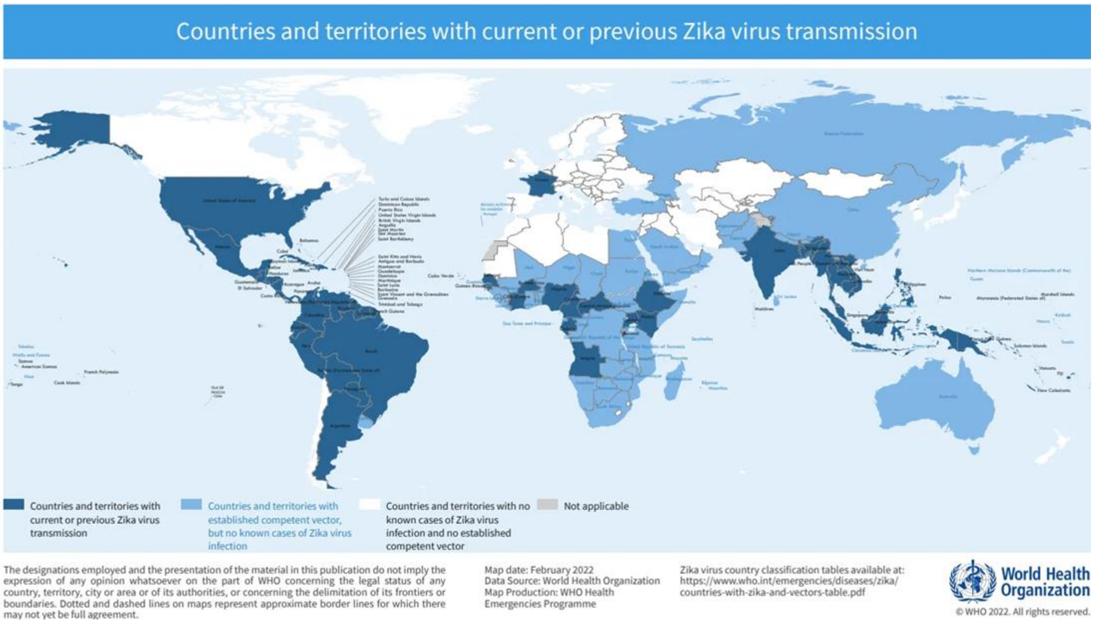
2.1 Mosquito borne diseases

○ Zika virus disease

The WHO declared a public health emergency of international concern from February to November 2016 due to an outbreak of Zika virus infection, but the number of cases has declined globally since 2017.[7] However, cases of Zika virus infection continue to be reported in several countries and endemic areas of the Americas, and vectors carrying Zika virus have been confirmed in a total of 89 countries and regions to date.[7]

In 2022, 40,249 cases were reported in the Americas as a whole. Although, of 5 South American countries (Brazil, Paraguay, Uruguay, Argentina, and Chile), no cases were reported from Argentina, Chile, and Uruguay, 35,270 cases, representing approximately 88% of the total for the Americas, were reported from Brazil and Paraguay, and 4,598 cases were reported from 8 Central American countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama).[8]

Particularly, in Brazil, there were reports of 34,176 cases, representing about 84% of the total number of cases in the Americas.[8]



Source: WHO Home page

Countries and territories with current or previous Zika virus transmission, by WHO regional office

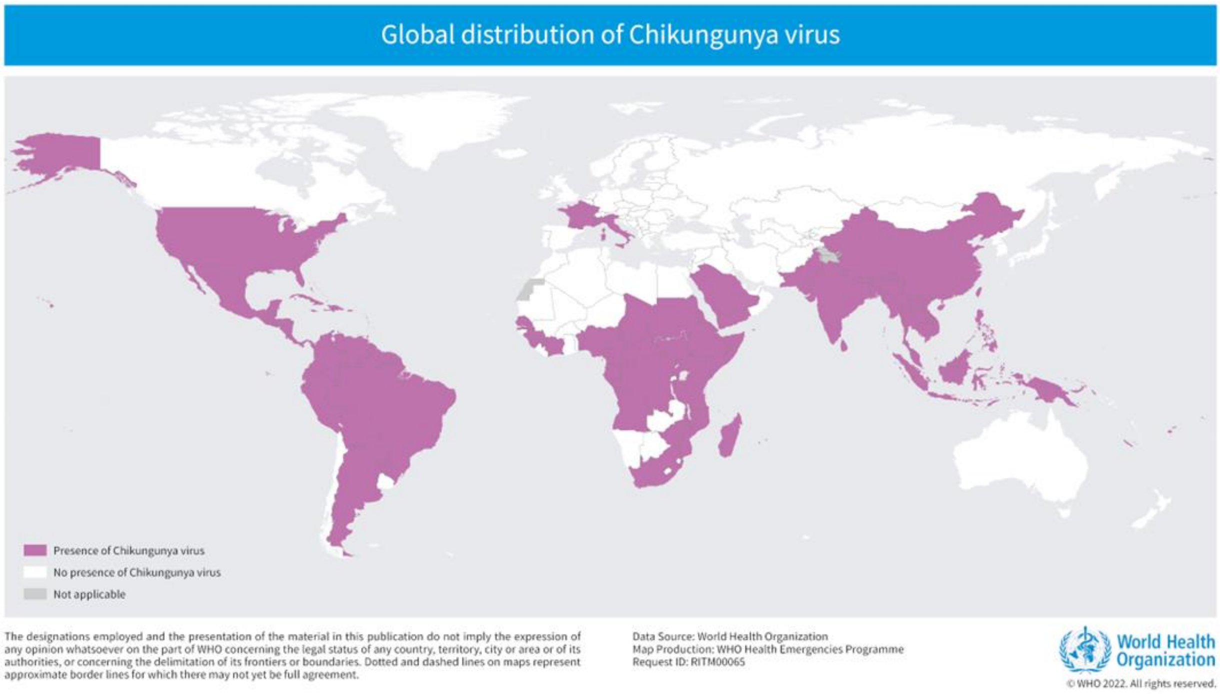
WHO Regional Office	Country / territory	Total
AFRO	Angola; Burkina Faso; Burundi; Cabo Verde; Cameroon; Central African Republic; Côte d'Ivoire; Ethiopia; Gabon; Guinea-Bissau; Kenya; Nigeria; Senegal; Uganda	14
AMRO/PAHO	Anguilla; Antigua and Barbuda; Argentina; Aruba; Bahamas; Barbados; Belize; Bolivia (Plurinational State of); Bonaire, Sint Eustatius and Saba; Brazil; British Virgin Islands; Cayman Islands; Colombia; Costa Rica; Cuba; Curaçao; Dominica; Dominican Republic; Ecuador; El Salvador; French Guiana; Grenada; Guadeloupe; Guatemala; Guyana; Haiti; Honduras; Easter Island– Chile; Jamaica; Martinique; Mexico; Montserrat; Nicaragua; Panama; Paraguay; Peru; Puerto Rico; Saint Barthélemy; Saint Kitts and Nevis; Saint Lucia; Saint Martin; Saint Vincent and the Grenadines; Saint Maarten; Suriname; Trinidad and Tobago; Turks and Caicos; United States of America; United States Virgin Islands; Venezuela (Bolivarian Republic of)	49
SEARO	Bangladesh; India; Indonesia; Maldives; Myanmar; Thailand	6
WPRO	American Samoa; Cambodia; Cook Islands; Fiji; French Polynesia; Lao People's Democratic Republic; Marshall Islands; Malaysia; Micronesia (Federated States of); New Caledonia; Palau; Papua New Guinea; Philippines; Samoa; Singapore; Solomon Islands; Tonga; Vanuatu; Viet Nam	19
EURO	France (Var department)	1
Total		89

AFRO: Regional Office for Africa. AMRO/PAHO: Regional Office for the Americas / Pan American Health Organization. EMRO: Regional Office for the Eastern Mediterranean. EURO: Regional Office for Europe.
SEARO: Regional Office for South-East Asia. WPRO: Regional Office for Western Pacific
(Source: WHO Countries and territories with current previous Zika virus transmission (Data as of February 2023))

○ Chikungunya fever

Chikungunya fever was first identified in Tanzania in 1952, followed by other countries in Africa and Asia. Urban outbreaks were first documented in Thailand in 1967 and in India in the 1970s. It is now confirmed in more than 110 countries in Asia, Africa, Europe, and the Americas.[9]

In 2022 (as of December 19, 2022), 363,206 cases and 76 deaths were reported worldwide, with Brazil reporting the most cases (247,537), followed by India (108,957), Guatemala (1,800), and Thailand (1,109) with 75 deaths in Brazil and 1 death in Kenya. No cases were reported in Europe.[10]



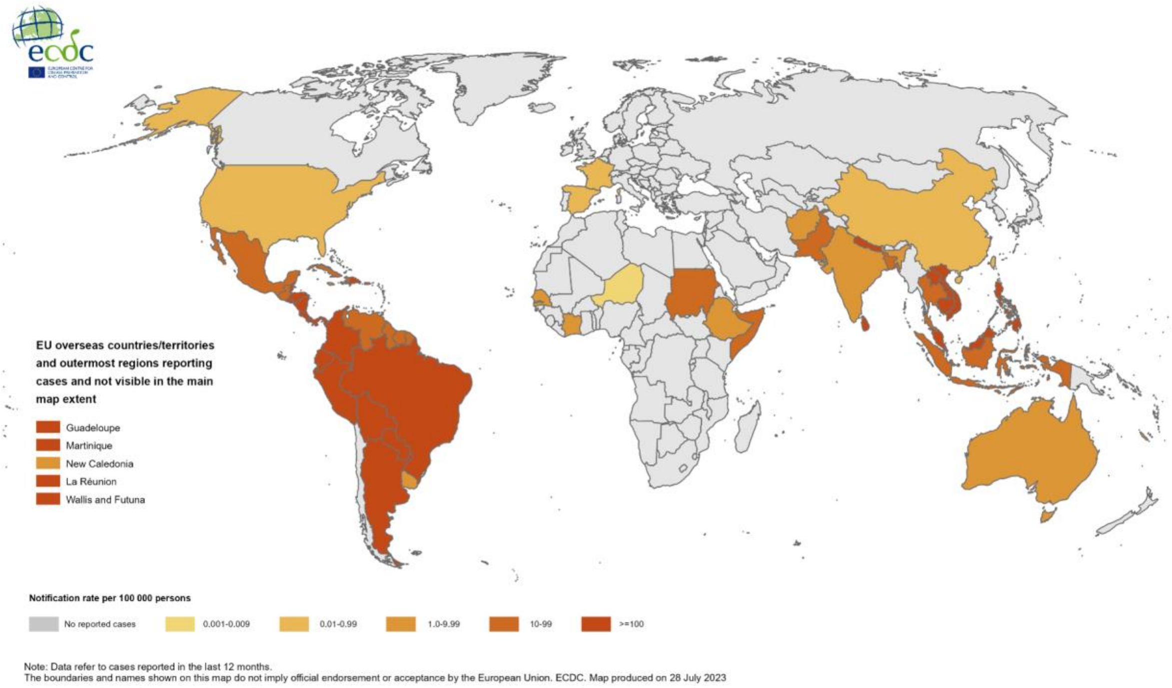
Source: WHO Home page

○ Dengue fever

Dengue fever is now endemic in more than 100 countries, and, of the WHO regions, the Americas, Southeast Asia, and Western Pacific are the most severely affected. Especially, Asia accounts for about 70% of all cases in the world.[11] In addition, the first domestic cases were reported in France and Croatia in 2010, and imported cases have been confirmed in 3 other European countries. It has spread to previously unaffected regions including Europe, and major outbreaks are occurring.[11]

In 2019, the largest ever number of dengue fever cases was reported.[11] All regions are threatened by the risk of infection, with Afghanistan reporting its first case of dengue fever.[11] In the Americas, 3,100,000 cases were reported, with more than 25,000 cases exhibiting severe symptoms.[11] In Asia, large numbers of cases were reported in Bangladesh (101,000), Malaysia (131,000), the Philippines (420,000), and Vietnam (320,000).[11]

12-month Dengue virus disease case notification rate per 100 000 population, July 2022 - Jun 2023

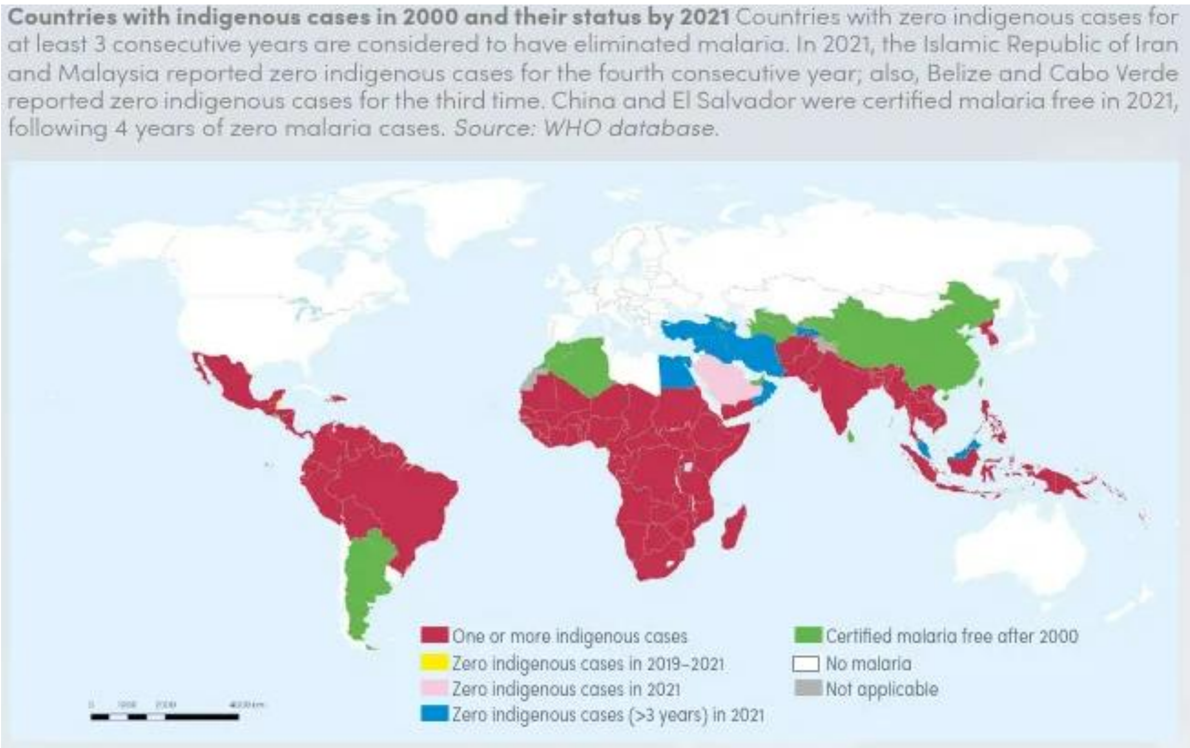


Source: European Centre for Disease Prevention and Control

○ Malaria

In 2021, 247 million cases of malaria were reported, with an estimated increase of 2 million compared to 2020 (245 million cases).[12] Between 2019 and 2020, the largest ever annual increase of 13 million cases was observed.[12] The estimated number of deaths had been declining since 2000, but began to increase in 2020.[12] In 2021, there were 619,000 deaths, showing a slight decrease compared to 2020 (625,000).[12]

Of all malaria-related cases and deaths in 2021, the African region accounted for about 95% of cases (234 million) and 96% of deaths (593,000).[12] In this region, Nigeria (31.3%), Democratic Republic of the Congo (12.6%), Tanzania (4.1%), and Niger (3.9%) together accounted for about 52% of all deaths in the world, and Nigeria accounted for 38.4% of the global total of deaths of children under 5 years old due to malaria.[12]

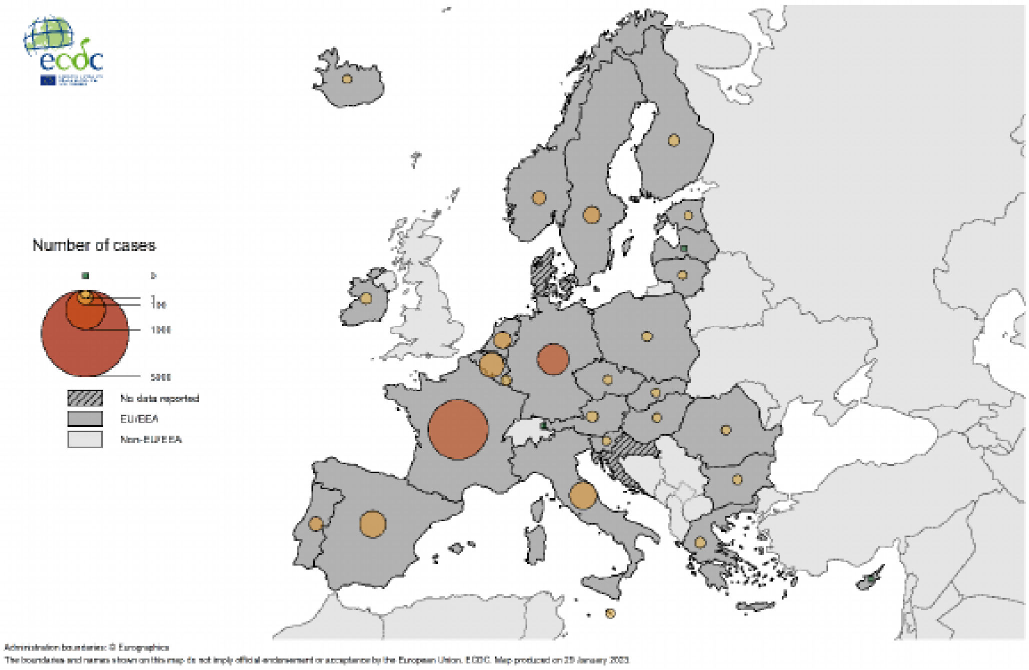


Source: WHO World Malaria Report 2022

【Europe】

In 2021, 4,855 cases were reported in Europe, of which 4,257 (87.7%) were imported cases.[13] By country, the highest number of cases 2,322 （48% of the total) was reported from France, followed by Germany 605 （12% of the total） .[13]

Number of confirmed malaria cases by country, EU/EEA 2021



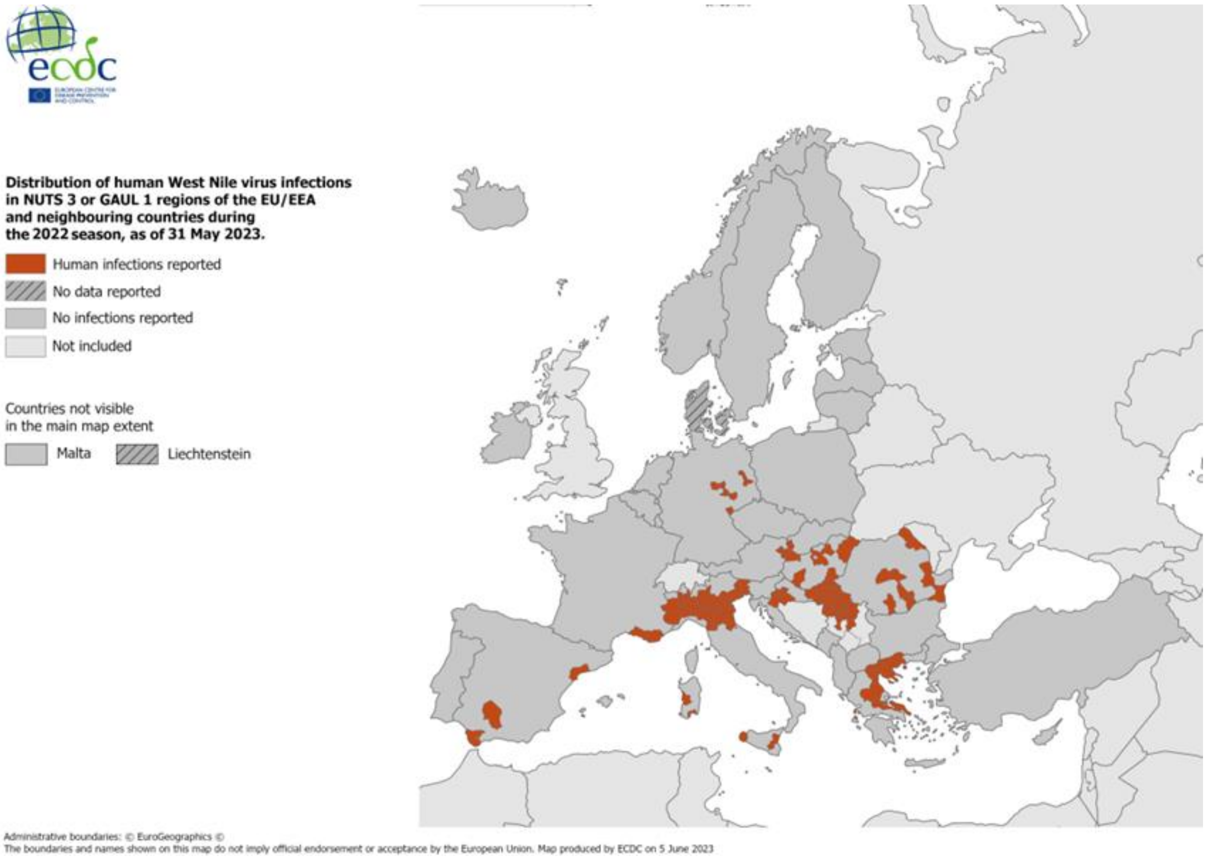
Source: ECDE SURVEILLANCE REPORT Malaria Annual Epidemiological Report for 2021

○ West Nile fever

【Europe】

In 2022, 1,113 domestic cases of West Nile fever, including 92 deaths, 17 imported cases, and 3 cases of unknown route of infection were reported from countries in the European Union (EU) and European Economic Area (EEA). By country, the largest number of domestic cases were reported from Italy with 723 cases, followed by Greece with 283 cases.[14] In addition, cases reported in neighboring EU countries included 226 cases in Serbia (all were domestic cases) and 2 cases in North Macedonia (1 domestic and 1 imported cases).[14]

West Nile virus infections in human, 2022 transmission season

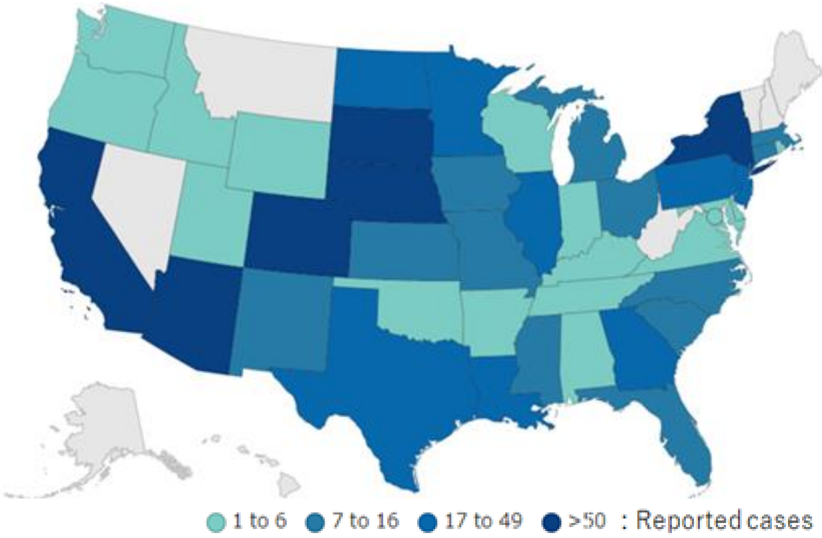


Source：ECDC Historical data by year - West Nile virus seasonal surveillance

【America】

In 2022, 1,126 cases of West Nile fever and 90 deaths were reported in the United States.[15] The state with the most reported cases was California with 206 cases, followed by Colorado with 205 cases.[15]

West Nile virus human disease cases reported by state of residence, 2022, All disease cases



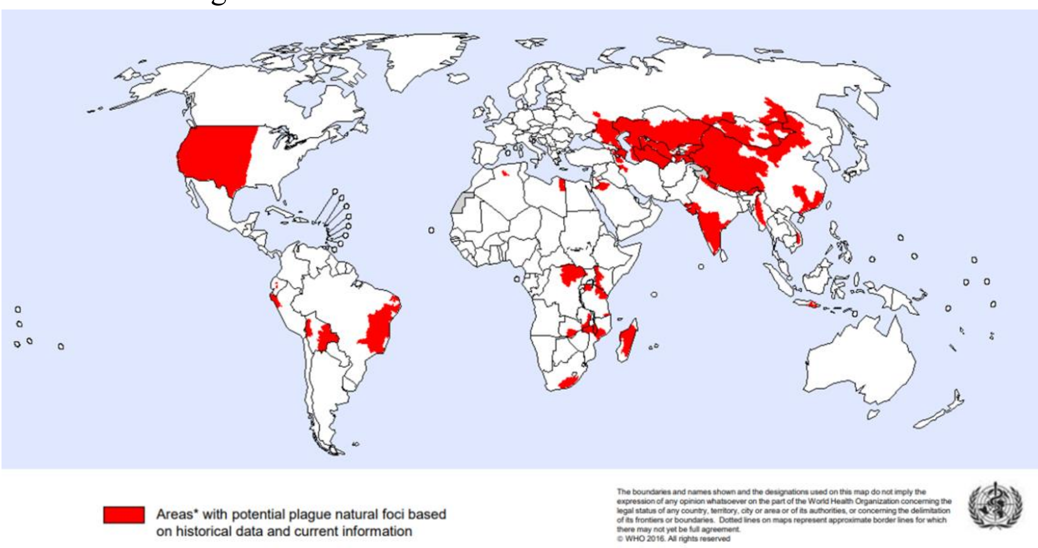
Source: CDC West Nile virus Historic Data (1999-2022)

2.2 Rodent borne diseases

○ Plague

Epidemics of the plague have been confirmed in Africa, Asia, and South America, but since the 1990s, most cases have been reported in Africa, with the three most endemic countries being the Democratic Republic of the Congo, Madagascar, and Peru. Particularly, in Madagascar, cases of bubonic plague have been reported almost every year during the epidemic season (from September to April).[16] Madagascar accounts for most of the plague cases worldwide, with 250-680 cases reported annually between 2010 and 2015.[17] Also, from August 1 to November 26, 2017, 2,417 plague cases, including 209 deaths (fatality rate of 9%), were reported from 57 of Madagascar's 114 districts.[17]

Plague Global Distribution of Natural Foci as of March 2016



Source: WHO Home page

【Democratic Republic of the Congo】

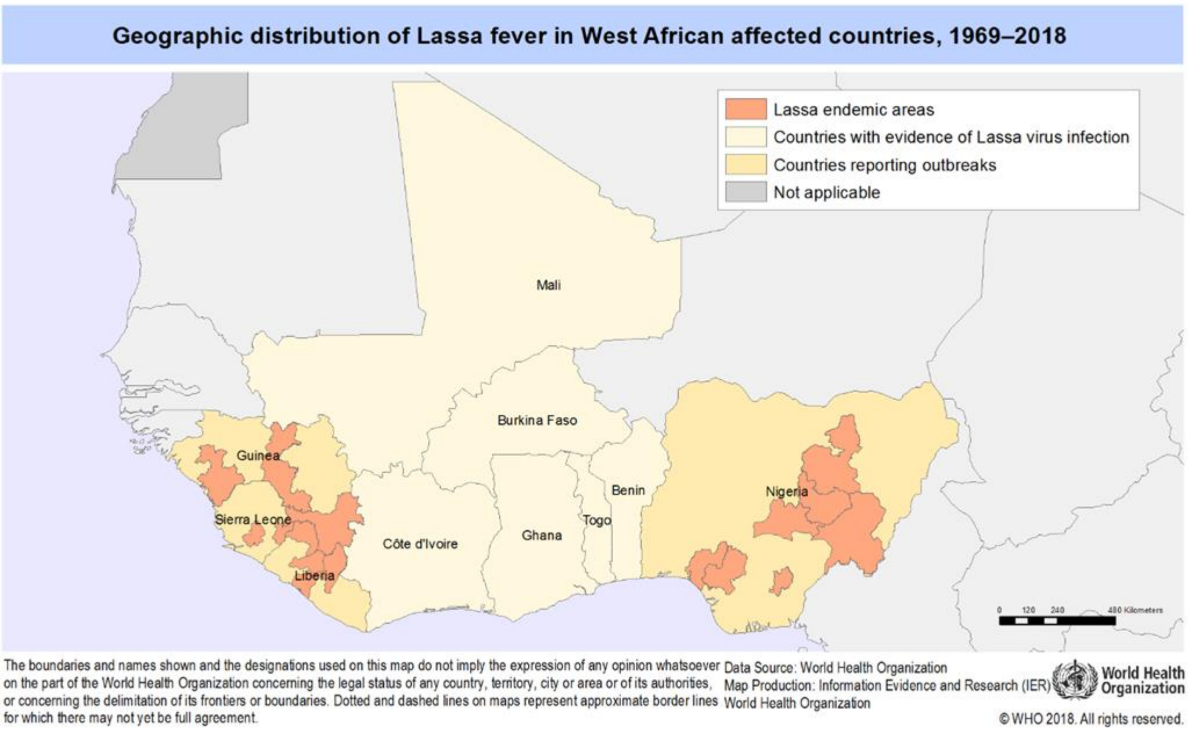
In the Democratic Republic of the Congo, from January 1 to June 20, 2021, outbreaks of plague occurred in 7 health districts in the northeastern province of Ituri, with 117 suspected cases including 13 cases of death (fatality rate of 11.1%).[18] Of these cases, 28 suspected cases observed between April 22 and May 28, 2021, were diagnosed with pneumonic plague.[18]

[Madagascar]

In Madagascar, 35 cases of pneumonic plague were reported from August 29 to September 6, 2021, with 11 deaths (fatality rate of 31.4%) being confirmed.[19]

○ Lassa fever

Lassa fever is occurring in parts of West Africa, including Sierra Leone, Liberia, Guinea, and Nigeria, and because vector rodents are present throughout the region, neighboring countries are also at risk of outbreaks.[20] About 100,000 to 300,000 people are infected with Lassa fever each year, and about 5,000 deaths have been reported. In some areas of Sierra Leone and Liberia, about 10-16% of patients admitted to hospitals each year are infected by Lassa fever.[20] Lassa fever is known to be endemic in Benin (first case diagnosed in November 2014), Ghana (first case confirmed in October 2011), Guinea, Liberia, Mali (first case diagnosed in February 2009), Sierra Leone, and Nigeria, and is also speculated to be present in other West African countries.[21]

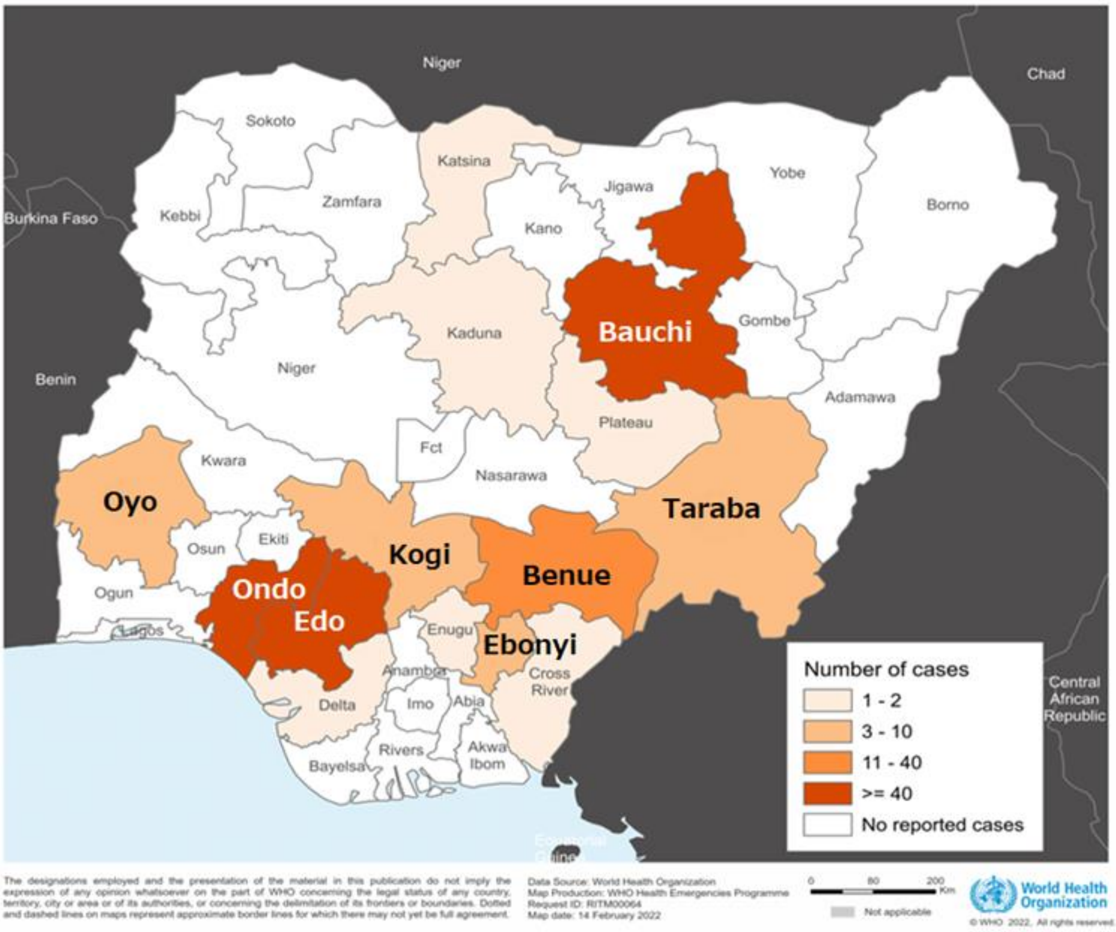


Source: WHO Home page

【Nigeria】

In Nigeria, 211 cases, including 40 deaths, were reported from 14 of 36 states and the Federal Capital Territory from January 3-30, 2022 (fatality rate of 19%).[22] Of the confirmed cases, 82% were reported from Ondo State (63 cases), Edo State (57 cases), and Bauchi State (53 cases).[22]

Confirmed cases of Lassa fever by States reported
in Nigeria from 3 – 30 January 2022



Source: WHO/Disease Outbreak News/Lassa Fever – Nigeria

【England (imported cases, secondary infection cases)】

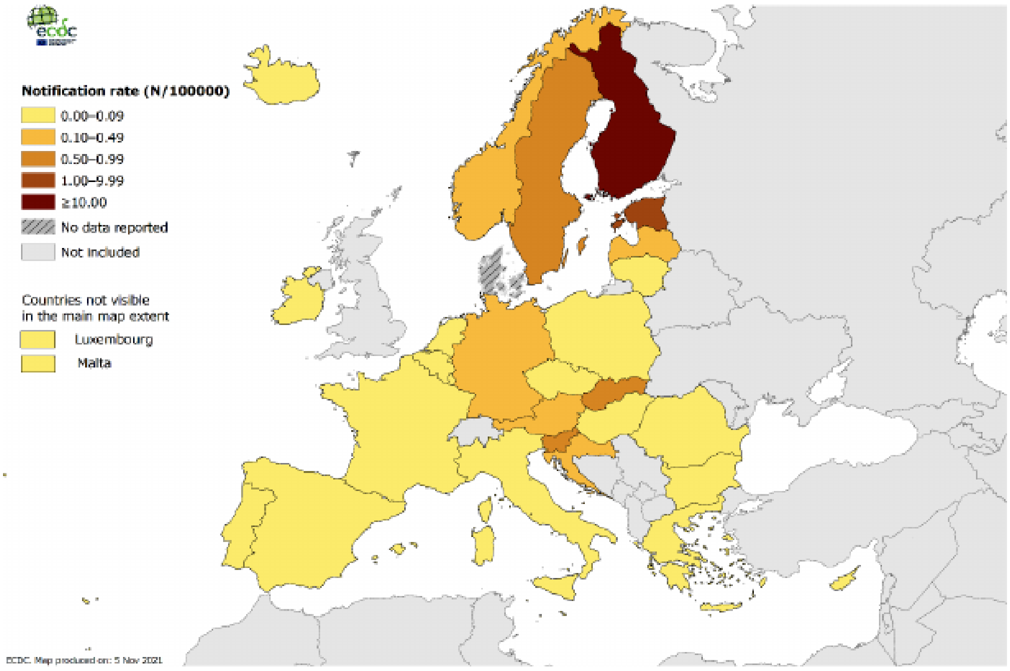
On February 9, 2022, the UK Health Security Agency reported 3 cases of Lassa fever, including a suspected case, in eastern England, one of which was fatal .[23] The first case had a history of travelling to Mali, and the second and third cases were family members of the first case with no history of travelling to Mali. In the UK, there have been 8 imported cases since 1980, with the last 2 cases reported in 2009.[23,24]

○ Hantavirus infection

【Europe】

In 2020, 1,647 cases of HFRS (0.4 cases/100,000 population) were reported in 28 countries in Europe.[25] Among hantavirus infections, HFRS caused by Seoul, Pumara, and Dobrava viruses is prevalent in Europe, and among the 1,225 cases confirmed by testing, about 98% were caused by Pumara virus.[25] The largest number of cases, 1,164, were reported from Finland, accounting for about 71% of the total cases, followed by 229 from Germany.[25]

Distribution of hantavirus infection rates per 100,000 population by country, EU/EEA, 2020

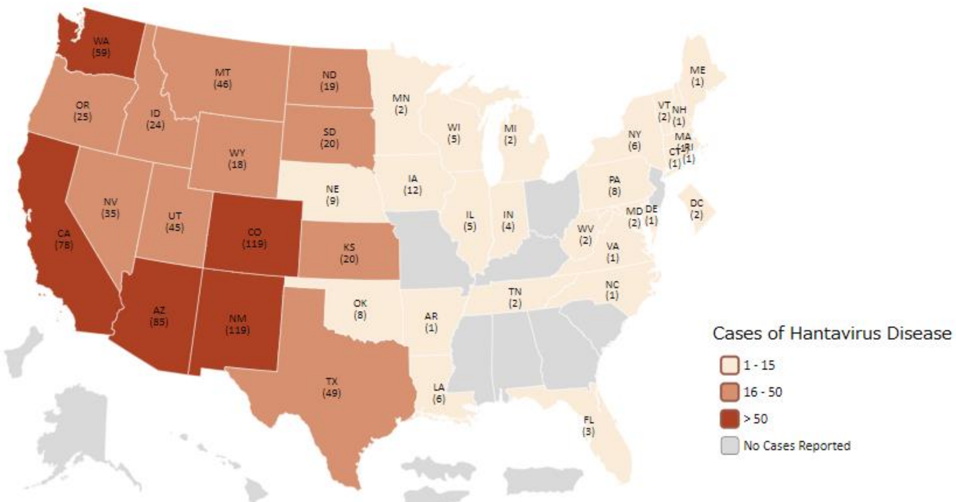


Source: ECDC Hantavirus infection Annual Epidemiological Report for 2020

【North America】

In North America, 850 cases of hantavirus infection were reported from 1993 to 2021, of which 821 were HPS.[26]

Map of US Cumulative Cases of Hantavirus by State through 2021



All cases were confirmed between 1993-2021 and met the NNDSS case definition applicable at the time of reporting. Included in the sum total are 31 historical cases that occurred prior to 1993, but were confirmed retrospectively. Five cases had presumed exposure outside the United States.

Source: CDC Reported Cases of Hantavirus Disease

3 Outline of vector surveillance conducted in 2022

3.1 A list of Quarantine ports and Quarantine airports investigated in 2022

Of the seaports and airports specified in Article 1-2 of the Quarantine Act Enforcement Order (Cabinet Order No. 377, December 14, 1951), the quarantine seaports and quarantine airports reported to the Yokohama Quarantine Station Officer for Analysis on Sanitation Control in accordance with the "Guide to Port Area Sanitation Control" (final amendment: Jun 20, 2019; hereinafter called "the Sanitation Control Guide") were covered by the surveillance (the survey data on the radio quarantine ports were excluded from the surveillance).

Quarantine Ports: 92

Otaru Port, Ishikariwan Port, Wakkanai Port, Rumoi Port, Monbetsu Port, Abashiri Port, Hanasaki Port, Kushiro Port, Tomakomai Port, Muroran Port, Hakodate Port, Aomori Port, Hachinohe Port, Miyako Port, Kamaishi Port, Ofunato Port, Kesennuma Port, Ishinomaki Port, Sendaishiogama Port, Akita Funakawa Port, Sakata Port, Onahama port, Hitachi Port, Kashima Port, Kisarazu Port, Chiba Port, Futami Port, Keihin Port (Tokyo), Keihin Port (Kawasaki), Keihin Port (Yokohama), Yokosuka Port, Misaki port, Naoetsu Port, Niigata Port, Fushiki Tomaya Port, Kanazawa Port, Nanao Port, Uchiura Port, Tsuruga Port, Shimizu Port, Yaizu Port, Fukue Port, Mikawa Port (Gamagohri), Mikawa Port (Toyohashi), Kinuura Port, Nagoya Port, Yokkaichi Port, Owase Port, Maizuru Port, Katsuura Port, Wakayama Shimotsu Port, Hanshin Port (Osaka), Hannan Port, Hanshin Port (Kobe), Mizushima Port, Sakai Port, Hamada Port, Fukuyama Port, Kure Port, Hiroshima Port, Iwakuni Port,Ube Port, Tokushima Komatsushima Port, Sakaide Port, Matsuyama Port, Niihama Port, Mishimakawanoe Port, Kochi Port, Kanmon Port, Hakata Port, Miike Port, Karatsu Port, Imari Port, Sasebo Port, Nagasaki Port, Hitakatsu Port, Izuhara Port, Oita Port, Saganoseki Port, Saeki Port, Minamata Port, Yatsushiro Port, Misumi Port, Hososhima Port, Shibushi Port, Kagoshima Port, Kiire Port, Kushikino Port, Kinnakagusuku Port, Naha Port, Hirara Port, Ishigaki Port

Quarantine Airports: 29

New Chitose Airport, Asahikawa Airport, Hakodate Airport, Aomori Airport, Sendai Airport, Akita Airport, Fukushima Airport, Narita International Airport, Tokyo International Airport, Hyakuri Airport (Ibaraki Airport), Niigata Airport, Komatsu Airport, Chubu Centrair International Airport, Shizuoka Airport, Kansai International Airport, Okayama Airport, Miho Airport (Yonago Airport), Hiroshima Airport, Matsuyama Airport, Takamatsu Airport, Fukuoka Airport, Kitakyushu Airport, Oita Airport, Nagasaki Airport, Kumamoto Airport, Miyazaki Airport, Kagoshima Airport, Saga Airport, Naha Airport

Total: 121 quarantine port/airports (Table 1, Fig. 1-1 & -2)

3.2 Infectious diseases examined in 2022 and the methods used for the investigation

The infectious diseases covered by the surveillance included Zika virus disease, Chikungunya fever, dengue fever, malaria, West Nile fever, Japanese encephalitis, rodent- or flea-borne South American hemorrhagic fever, plague, Lassa fever, HFRS, and HPS.

The surveillance was conducted in accordance with the "Rodent Surveillance Manual" (Appendix 2) and "Mosquito Surveillance Manual" (Appendix 3) of the "Guide to Sanitation Control."

3.3 Period of surveillance

January 1 through December 31, 2022

3.4 Summarization of the results

The Yokohama Quarantine Station Officer for Analysis on Sanitation Control summarized the data in electronic forms 1 through 11 (Microsoft® Excel) listed in Attachment 1 submitted from the quarantine ports and quarantine airports in accordance with "Handling of Surveillance Results in Connection with 'Guide to Port Area Sanitation Control'.

4 Results of investigations targeting invasive vectors in 2022

4.1 Investigation of mosquitoes

To assess the extent of the spread of mosquito-borne infections and to estimate their prevalence in Japan, investigation of the mosquito invasion/colonization status and a check of pathogens carried by mosquitoes were conducted in aircraft arriving from overseas and in the Cabinet Order-specified areas.

4.1.1 Mosquito collections in international aircrafts on arrival

The investigation was carried out according to the Mosquito Surveillance Manual for mosquitoes on aircrafts arriving from overseas by visual examination and using an insect net at 6 airports concerning 254 aircrafts (154 aircrafts in 2021) of 28 airlines from 15 countries/regions (5 airports, 12 countries/regions, 16 airlines in 2021). By country/region of origin, the largest number of aircrafts, 68, departed from Thailand, followed by 55 from the Philippines, 38 from Malaysia, 16 from Indonesia, 15 from Taiwan, 11 from China, 11 from the United States (excluding Guam), 10 from Vietnam, and 10 from India. Asian countries ranked high in the list.

By region, 192 (75.6%) and 37 (14.6%) aircrafts from Southeast Asia and East Asia, respectively, with a total of 229 (90.2%), were surveyed, followed by 11 (4.3%) from North America. Of the aircrafts surveyed, 9 mosquitos including 1 of unidentifiable species were collected in 5 aircrafts (2.0%) (2 individuals on 1 aircraft (0.6%) in 2021) of 4 airlines from 3 countries (1 airline from 1 country in 2021) (Table 3, Table 4-1, Table 4-2).

Regarding the airlines with high collection rates (last departure airports), mosquitoes were collected in 1 (100%) out of 1 aircraft from Chhatrapati Shivaji Maharaj International Airport, India, followed by 2 (22.2%) of 9 aircrafts from Indira Gandhi International Airport, India, and in 1 (16.7%) of 6 aircrafts from Anchorage International Airport, USA (Table 3, Table 4-1, Table 4-2, Fig. 2).

The species of the mosquitos collected was *Culex pipiens quinquefaciatus*, a vector species (primary species) of West Nile fever, in 2 individuals collected in 2 aircrafts (2021: no records), and their final departure points were Chhatrapati Shivaji Maharaj International Airport and Indira Gandhi International Airport. Similarly, 5 individuals collected in 1 aircraft were the *Culex pipiens* complex, a vector species (primary species) of West Nile fever (2021: 2 individuals in 1 aircraft), and the last departure point was Indira Gandhi International Airport. Although the species could not be identified, 1 individual of the genera *Culex* was collected in 1 aircraft that last departed from Suvarnabhumi International Airport (no records in 2021), and 1 individual of unidentifiable species was collected in 1 aircraft that last departed from Anchorage International Airport (2021: 2 individuals in 1 aircraft).

The results of the pathogen tests of the collected mosquitoes (flavivirus) were all negative (Table 3, Table 4-1, Table 4-2, Fig. 2).

4.1.2 Surveillance of adult and larval mosquitoes at ports and airports

In the survey areas set with the use of the standard regional mesh of the Statistics Bureau of the Ministry of Internal Affairs and Communications in accordance with the "Port Sanitation Control Guidelines" (hereinafter called "the tertiary mesh"), mosquito traps (light traps) containing dry ice were placed to examine the status of invasive mosquito invasion and emergence (hereinafter called "adult mosquito survey"). In addition, premature/larval mosquito traps (belt traps) were placed in the survey areas to examine the status of invasive mosquito invasion and colonization of vector mosquitoes, accompanied by investigation of the distribution of larval mosquitos in ditches and catch basins (hereinafter called "larval mosquito survey").

○ Surveillance of adult mosquitoes

The survey was conducted in a total of 1,249 survey areas (1,334 survey areas in 2021) of 121 ports consisting of 92 seaports and 29 airports (118 ports consisting of 89 seaports and 29 airports in 2021). As a result, mosquitoes were collected at 108 ports (89.3%) (106 ports (89.8%) in 2021) consisting of 82 seaports (89.1%) (82 seaports (92.1%) in 2021) and 26 airports (89.7%) (24 airports, 82.8%, in 2021). In total, 16,833 mosquitoes of 8 genera and 24 species (26,017 individuals of 9 genera and 30 species in 2021) were collected. By species, the largest number of individuals of *Culex pipiens* complex (7,927) were collected, followed by 3,460 individuals of *Aedes albopictus* and 3,326 individuals of *Culex tritaeniorhynchus*. A total of 16,789 individuals of 14 species of 4 genera were collected, of which 99.7% were vectors of mosquito-borne infectious diseases (primary, secondary, or possible species) (25,985 individuals of 19 species of 5 genera, 99.9%, in 2021). The *Aedes aegypti,* an invasive species, the entry of which was confirmed in previous surveys, was not detected (Table 5-1 through-3).

○ Surveillance of larval mosquitoes

Larval mosquito surveillance was conducted in a total of 1,504 survey areas (1,353 survey areas in 2021) at 90 seaports and 29 airports with a total of 119 ports (87 seaports and 29 airports with a total of 116 ports in 2021). As a result, inhabitation of larval mosquitoes was confirmed at 76 seaports (84.4%) (70 seaports, 80.5%, in 2021) and 23 airports (79.3%) (22 airports, 75.9%, in 2021), with a total of 99 ports (83.2%) (92 ports, 79.3%, in 2021). Larvae of 21 species of 7 genera and unidentifiable species (22 species of 7 genera and unidentifiable species in 2021) were confirmed to inhabit, of which 12 species of 4 genera (13 species of 4 genera in 2021) were vectors of mosquito-borne infections (primary, secondary, or possible species). Inhabitation of native species was confirmed by the larval surveys.

A total of 115 seaports and airports (95.0%) (112 seaports and airports, 96.6%, in 2021) were confirmed to be inhabited by mosquito species as a result of adult or larval surveys. (Table 5-1 through-3, Table 6-1 through-3).

○ **Zika virus disease and Chikungunya fever**

Adults or larvae of *Aedes albopictus*, a primary vector species inhabiting Japan, were confirmed at a total of 87 seaports and airports (71.9%) (83 seaports and airports, 58.2%, in 2021), with Aomori Prefecture as the northern limit of their habitat. The number of adult *Aedes albopictus* collected was 3,460, accounting for 20.6% (4,070, 15.6%, in 2021) of the total number of mosquitoes collected (Table 5-1 through-3, Fig. 3).

○ **Dengue fever**

Adults or larvae of *Aedes albopictus*, a primary vector species inhabiting Japan, were confirmed over a wide area with Aomori Prefecture as the northern limit. Adults or larvae of other possible vector species such as *Culex triaeniorhynchus*, *Aedes dorsalis*, and *Aedes flavopictus*, were collected. Vector species of dengue fever were confirmed in 95 seaports and airports (78.5%) (89 seaports and airports, 75.4%, in 2021) (Table 5-1 through-3, Fig. 4).

○ **Malaria**

Adults or larvae of *Anopheles sinensis,* a primary species for tertian malaria, were confirmed to inhabit 13 seaports and airports (10.7%) (10 seaports and airports, 8.5%, in 2021), and 31 adults (0.18%) were collected. At New Chitose Airport, 1 individual of *Anopheles lesteri*, a secondary vector species, was collected (Table 5-1 through-3, Fig. 5).

○ **West Nile fever**

Adults or larvae of *Culex pipiens* complex, a primary vector species of West Nile fever, were confirmed to inhabit 103 seaports and airports (85.1%), and adults or larvae of *Culex quinquefasciatus* were confirmed to inhabit 5 seaports and airports (4.1%). There were 7,927 adults of *Culex pipiens* complex and 679 adults of *Culex quinquefasciatus*, together accounting for 51.1% of all adults collected.

Regarding secondary vector species, inhabitation of 10 species including *Aedes albopictus*, *Culex triaeniorhynchus*, *Aedes japonicus*, and *Aedes togoi* was confirmed.

Many of the primary and secondary vector species of West Nile fever were widely distributed from Hokkaido to Okinawa Prefecture because they include regular inhabitants of Japan (Table 5-1 through-3, Fig. 6).

○ **Japanese encephalitis**

Adults or larvae of *Culex triaeniorhynchus*, the primary vector species of Japanese encephalitis, were confirmed at 53 seaports and airports (43.8%) (97 seaports and airports, 82.2%, in 2021). The number of adults collected was 3,326, which accounted for 19.8% of the total number of mosquitoes collected. Among possible vectors, inhabitation of 6 species, including *Aedes albopictus*, *Aedes japonicus*, and *Culex quinquefasciatus*, was confirmed (Table 5-1 through-3, Fig. 7).

Results of pathogen tests of quarantinable infectious diseases, etc

Of the 16,833 adult mosquitoes collected by the survey, 16,377 were tested for pathogens including those of quarantinable infectious diseases (1,322 samples (pooled) for flavivirus, 294 samples (pooled) for chikungunya virus, and 18 samples (pooled) for malaria parasites). As a result, the common gene for flavivirus was confirmed in 2 pools (69 individuals) of samples collected at Okayama Airport, and the Japanese encephalitis virus type I gene was detected in the subsequent genetic test, but the virus could not be isolated.

All other pathogen tests were negative (Table 5-1 through-3).

4.2 Investigation of rodents

In order to determine the degree of infestation of rodent-borne infectious diseases and to estimate the prevalence of such diseases, we conducted surveys on the invasion and inhabitation of rodents and parasitic fleas and pathogen tests in government ordinance areas. As in the mosquito surveillance, survey areas were set up within government ordinance areas. By placing cages and Sherman traps to capture rodents in a total of 759 survey areas (677 survey areas in 2021), the surveys were carried out at 107 ports consisting of 81 seaports and 26 airports (110 ports consisting of 84 seaports and 26 airports in 2021) (Table 7-1 through-3).

Status of capture of rodents

At a total of 65 ports (60.7%) consisting of 47 seaports and 18 airports (64 ports, 58.2%, consisting of 49 seaports and 15 airports in 2021), 373 rodents of 7 species and of 5 genera and unidentifiable species (395 rodents of 8 species of 6 genera and unidentifiable species in 2021) were captured. *Mus musculus* was captured in the largest number (146), followed by *Rattus norvegicus* (79), *Rattus rattus* (77), *Apodemus speciosus* (53), *Microtus montebelli* (10), *Apodemus argenteus* (4), and *Clethrionomys rufocanus bedfordiae* (2), and there were 2 rodents of unidentifiable species.

The capture rate per survey area was 0.49 individual (0.58 in 2021) and was highest at Fukushima Airport (4.50), followed by Futami Port (4.25). The largest number of rodents (32) were captured at Naha Airport (Table 7-1 through-3).

Status of collection of parasitic fleas and mites

Regarding parasitic fleas, 4 individuals of *Nosopsyllus fasciatus*, a secondary vector species of the plague, were collected. In addition, 2 individuals of *Ctenophthalmus Kolenati* were collected, although it is not a vector of quarantinable infectious diseases.

Concerning parasitic mites, 343 individuals were collected, including those of unidentifiable species, with *Laelaps nuttalli* accounting for the largest number (150 individuals) (Table 7-1 through-3).

Rodents captured by investigations carried out according to detection reports from the authorities concerned

○ Plague

Among secondary vector species, 371 individuals of 7 species of 5 genera were captured at 65 seaports and airports (60.7%), and rodents were widely distributed in port areas in Japan. In addition, 1 individual of *Nosopsyllus fasciatus*, which is not a primary vector but is a secondary vector that transmits plague bacillus, was collected at each of Muroran, Hachinohe, Ofunato, and Sendai-Shiogama Ports. Of the captured rodents, 359 were tested for plague pathogens (plague specific antibody test), and all were negative (Table 7-1 through-3, Fig. 8).

○ HFRS

Rattus norvegicus and *Rattus rattus*, which are secondary vector species, were captured at 33 seaports and airports (30.8%) and tested for pathogens (HFRS specific antibody test). Furthermore, together with *Mus musculus*, *Apodemus speciosus*, and *Clethrionomys rufocanus bedfordiae*, which are reported as hosts in the literature, 357 rodents were captured, of which 330 were tested for HFRS pathogens and were all negative (Table 7-1 through-3, Fig. 9).

○ **South American hemorrhagic fever, Lassa fever and HPS**

No vector species for South American hemorrhagic fever, Lassa fever, or HPS were captured (Table 7-1 through-3).

Rodents captured by investigations carried out according to detection reports from the authorities concerned

As a case reported to be confirmed as an invasive species by the authorities concerned, *Peromyscus leucopus*, a primary vector species for HPS, was captured in the cargo space of a cargo flight departing from Anchorage, USA, and arriving at the Chubu International Airport. Pathogen tests for plague, HFRS, and HPS were all negative.

The following table summarizes the 16 cases of infestation presumed to have come from overseas as a result of the quarantine station's responses to reports of detection of rodents by the authorities concerned.

Rodents Estimated to Have Invaded Japan from Overseas：2022

Seaport or Airport	Place of detection	Species captured	Number (condition)	Estimated place of origin (seaport,district or airport of origin)	Commodity type
Hanshin port (Kobe)	Ocean-going ship container	*Mus musculus*	1(dead)	Barcelona (Spain)	Dry hay
Keihin port(Tokyo)	Ocean-going ship container	*Rattus norvegicus*	1(dead)	Kaohsung(Taiwan)	Automobile parts
Shibushi port	Ocean-going ship container	*Rattus rattus*	1(dead)	Adelaide(Australia)	Dry hay
Hakata port	Ocean-going ship container	*Mus musculus*	1(dead)	Adelaide(Australia)	Dry hay
Hakata port	Ocean-going ship container	*Mus musculus*	1(dead)	Adelaide(Australia)	Oats
Naha port	Ocean-going ship container	Unknown	1(dead)	Melbourne(Australia)	Dry hay
Chubu international airpot	Aircraft cargo hold	*Peromyscus leucopus*	1(live)	Chicao(USA)	Automobile parts
Hanshin port (Osaka)	Ocean-going ship container	Unknown	1(dead)	Semarang(Indonesia)	Plywood
Hanshin port (Osaka)	Ocean-going ship container	Unknown	1(dead)	Taipei(Taiwan)台北	Nylon chip
Hakata port	Ocean-going ship container	*Mus musculus*	1(dead)	Adelaide(Australia)	Dry hay
Naha port	Ocean-going ship container	*Rattus rattus*	2(dead)	Melbourne(Australia)	Dry hay
Keihin port(Yokohama)	Ocean-going ship container	*Rattus rattus*	10(dead)	Unknown(Burkina Faso)	Sesame
Kochi port	Ocean-going ship container	Unknown	1(dead)	Shanghai(China)上海	Ferro Silicon
Naria international airpot	Ocean-going ship container	*Mus musculus*	1(dead)	Shanghai(China)上海	Food
Takamatu port(Not Quarantine port))	Ocean-going ship container	Unknown	1(dead)	Busan(Korea)釜山	Ship materials
Chubu international airpot	Aircraft cabin	*Mus musculus*	1(live)	Manila (Phillipine)	–

5 Risk assessment of vector-borne diseases at ports and airports (2022)

5.1 Mosquito-borne diseases

Aircraft surveys were conducted mainly on scheduled return flights that departed from airports in Southeast Asia, 2 individuals of *Culex quinquefasciatus* were collected in 2 aircrafts, 5 individuals of *Culex pipiens* complex in 1 aircraft, 1 individual of the genus Culex in 1 aircraft, and 1 mosquito of unknown (unidentifiable) species in 1 aircraft in 4 routes from 3 countries (1 route from 1 country in 2021).

The collection rate against the number of aircrafts surveyed in 2022 was 2.0%, which is not particularly high compared to previous years, but regarding the countries from which the aircrafts departed, the collection rate in aircrafts from India was high at 30.0% (3 out of 10 aircraft surveyed), and primary vector species of West Nile fever (*Culex quinquefasciatus*, *Culex pipiens* complex) were collected. In an aircraft from Thailand, 1 individual of unidentifiable species of the genus *Culex*, to which many vectors of the West Nile fever belong, was collected, 1 individual of unidentifiable species that could not be identified was collected in an aircraft arriving from the mainland U.S. Seven of the 9 individuals collected tested negative for the pathogen (flavivirus).

Although the aircraft survey was not intended for risk assessment, because it was conducted prior to the entry into the government ordinance area, continued investigation is necessary in light of the confirmed risk of entry of mosquitos via aircraft.

As a result of surveys of the government ordinance area at each quarantine port and quarantine airport, no invasive species, such as *Aedes aegypti*, were identified by adult surveys, but *Aedes albopictus*, which is a primary vector species of dengue fever, Zika virus infection, and chikungunya fever, *Anopheles sinensis*, which is a primary vector species of malaria, *Culex quinquefasciatus* and *Culex pipiens* complex , which are primary vector species of West Nile fever, and *Culex tritaeniorhynchus*, which is a primary vector species of Japanese encephalitis, were identified. In addition, inhabitation of many species that are secondary or possible vector species of mosquito-borne infectious diseases was confirmed.

As a result of pathogen tests of adult mosquitoes collected, the Japanese encephalitis virus type I gene was confirmed in the *Culex tritaeniorhynchus* collected at Okayama Airport, but Japanese encephalitis virus was not isolated. Subsequently, an emergency survey was conducted in cooperation with the local government, but no *Culex tritaeniorhynchus* was collected.

By larval surveys, as in the adult survey, no inhabitant invasive species were confirmed, but *Aedes albopictus*, which is a primary vector species of dengue fever, Zika virus infection, and chikungunya fever, *Anopheles sinensis*, which is a primary vector species of malaria, *Culex quinquefasciatus* and *Culex pipiens* complex, which are primary vector species of West Nile fever, and *Culex tritaeniorhynchus*, which is a primary vector species of Japanese encephalitis, were identified. In addition, inhabitation of many species that are secondary or possible vector species of mosquito-borne infectious diseases was confirmed.

For each quarantine seaport and airport, the risk of outbreaks of quarantinable infectious diseases, etc., was rated from A to D based on the survey results in accordance with the “the Sanitation Control Guide”. The risk was assessed in each month of the survey, and the highest risk was regarded as the risk of the year (Table 8).

A（very low）: No vector mosquito (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. or no mosquito is captured during permanent surveillance, etc. in the Cabinet Order-specified areas.

B（low）: Vector mosquitos (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured do not possess any pathogen or gene of pathogen for quarantinable infectious disease or the like.

C（moderate）: Adults or larvae of invasive vector mosquitos (primary species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured do not possess any pathogen or gene of pathogen for quarantinable infectious disease or the like.

D（high） : Adults of vector mosquitos (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured possess the pathogen or gene of pathogen for quarantinable infectious disease or the like.

○ **Dengue fever**

Twenty-six seaports and airports (21.5%) were rated as A with a very low risk, and 95 seaports and airports (78.5%) were rated as B with a low risk.

○ **Japanese encephalitis**

Eighteen seaports and airports (14.9%) were rated as A with a very low risk, 102 seaports and airports (84.3%) were rated as B with a low risk, and 1 airport (0.8%) was rated as D with a high risk, because the Japanese encephalitis virus gene was identified in *Culex tritaeniorhynchus*.

○ **West Nile fever**

Six seaports and airports (5.0%) were rated as A with a very low risk, and 115 seaports and airports (95.0%) were rated as B with a low risk.

○ **Malaria**

One hundred and seven seaports and airports (88.4%) were rated as A with a very low risk, and 14 seaports and airports (11.6%) were rated as B with a low risk.

○ **Chikungunya fever**

Thirty-four seaports and airports (28.1%) were rated as A with a very low risk, and 87 seaports and airports (71.9%) were rated as B with a low risk.

○ **Zika virus disease**

Thirty-four seaports and airports (28.1%) were rated as A with a very low risk, and 87 seaports and airports (71.9%) were rated as B with a low risk.

5.2 Rodent-borne diseases

As a result of the survey of the government ordinance area of each quarantine seaport and airport, 373 rodents including those of 7 species of 5 genera and unidentifiable species were captured. They were all secondary vectors of the plague. *Xenopsylla cheopis*, a primary vector of the plague, was not collected, but *Nosopsylla fasciatus*, a secondary vector of the plague, was detected in the captured rodents.

Concerning HFRS, *Rattus norvegicus* and *Rattus rattus*, which are secondary vectors, were captured at 33 seaports and airports.

However, *Peromyscus leucopus* which is a primary vector species of HPS was captured on a cargo flight arriving at Chubu International Airport by the surveys based on a report from the authorities concerned. But captures in ocean-going containers or in arriving aircraft are not included in the risk assessment, because they are not intrusions into the Cabinet Order-specified areas.

The risk of outbreaks of quarantinable infectious diseases, etc., was rated as in the mosquito survey (A to

D), it was assessed in each month of the survey, and the highest monthly risk was regarded as the risk of the year (Table 8).

A（very low） : No rodent is captured during permanent surveillance, etc. in the Cabinet Order specified areas.

B（low） : Indigenous rodents (primary or secondary species) or fleas/mites (primary or secondary species) known to transmit quarantinable infectious diseases or the like are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. None of them possesses any antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like.

C（moderate）: Invasive rodents (primary or secondary species) or fleas/mites (primary or secondary species) known to transmit quarantinable infectious diseases or the like are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. None of them possesses any antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like.

D（high） : An antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious disease or the like is detected in the rodents (primary or secondary species) or fleas/mites known to transmit quarantinable infectious diseases or the like (dominant or secondary species) captured during the permanent surveillance, etc. in the Cabinet Order-specified areas.

○ **Plague**

Forty-two seaports and airports (39.3%) were rated as A with a very low risk, and 65 seaports and airports (60.7%) were rated as B with a low risk.

○ **HFRS**

Seventy-four seaports and airports (69.2%) were rated as A with a very low risk, and 33 seaports and airports (30.8%) were rated as B with a low risk.

○ **South American hemorrhagic fever ,Lassa fever and HPS**

All 107 seaports and airports surveyed were rated as A with a very low risk.

5.3 Discussion

State of implementation of vector surveillance

The status of vector surveillance implementation in 2022 was that port control against COVID-19 had been eased in stages based on the status of infection overseas, vaccination in Japan, analysis of mutant strains, and economic conditions, etc. However, Japan continued taking strict measures, which made it difficult to conduct port sanitation operations at quarantine ports and quarantine airports as before the outbreak of COVID-19.

Rodent surveys were conducted at a total of 107 seaports and airports in 2022 (110 seaports and airports in 2021) with a slight decrease compared to 2021, but the numbers of ports surveyed for adult and larval mosquitoes were 121 and 119, respectively, with slight increases from 118 and 116, respectively, in 2021. The total number of survey areas for adult mosquitos was 1,249, with a decrease compared with 1,334 in

2021, but the number of survey areas for larval mosquitos was 1,504, increasing from 1,353 in 2021. Rodent surveys were conducted in 759 survey areas, with an increase from 677 in 2021.

When the implementation of aircraft surveys in 2022 is compared with that in 2021, it was not possible to significantly increase the number of quarantine airports due to the concentration of arrival flights at particular airports, but 28 routes from 15 countries/regions were surveyed at 6 airports in 2022, increasing from 16 routes from 12 countries/regions at 5 airports in 2021. In addition, the number of aircrafts surveyed in 2022 was 254, with a significant increase from 154 in 2021.

Compared with the figures in 2019 before the COVID-19 pandemic, the number of aircrafts surveyed was 23.1%, the number of adult mosquito surveys (total number of survey areas) was 64.9%, the number of larval mosquito surveys (total number of survey areas) was 79.3%, and the number of rodent surveys (total number of survey areas) was 74.3% in 2022.

Investigation of mosquitoes

In 2022, aircraft surveys for mosquitoes were mainly targeted to Southeast Asia, and the number of surveyed aircrafts increased significantly compared to 2021, resulting in the collection of 9 mosquitos from 5 aircrafts, including 1 mosquito of unknown (unidentifiable) species from 1 aircraft. The collected mosquitoes consisted of *Culex quinquefasciatus* (2 individuals from 2 aircrafts), *Culex pipiens* complex (5 individuals from 1 aircraft), which are primary vectors of West Nile fever, and the genus *Culex* (1 individual from 1 aircraft), a possible vector. Although their pathogen tests (flavivirus) were all negative, the possibility of entry of vector species and pathogens via aircrafts continued to be suggested.

Regarding the routine adult mosquito surveys at seaports and airports in 2022, 16,833 individuals of 24 species of 8 genera (26,017 individuals of 30 species of 9 genera in 2021) were collected, and they included *Culex pipiens* complex (7,927 individuals), *Aedes albopictus* (3,460 individuals), and *Culex tritaeniorhynchus* (3,326 individuals), which are major vector species of mosquito-borne infections. Among the mosquitoes collected, 16,789 (99.7%) of 14 species of 4 genera belonged to (primary, secondary, or possible) vector species of mosquito-borne infectious diseases (25,985 individuals (98.9%) of 19 species of 5 genera in 2021), showing a similar tendency of species and genera compared to 2021.

The number of individuals collected in 2022 was significantly lower than in 2021, due in part to the decrease of the number of *Culex tritaeniorhynchus*, which accounted for 45.6% of all mosquitoes collected in 2021 (11,855), to 3,326.

In contrast, it is noteworthy that 614 individuals of *Cuex sitiens* (a possible vector species of Japanese encephalitis and West Nile fever) were collected at Kinnakagusuku Port in 2022 compared to only 1 in 2021.

The species that were not collected in 2022 were those collected only in small numbers in the past, and we consider that there were no major overall changes.

In 2022, routine larval surveys at seaports and airports revealed inhabitation of larvae of 21 species of 7 genera and unidentifiable species (22 species of 7 genera and unidentifiable species in 2021), of which 12 species of 4 genera (13 species of 4 genera in 2021) were (primary, secondary, or possible) vectors of mosquito-borne diseases. There were no significant changes in the species or genera of the larvae confirmed to inhabit the ports compared to 2021.

No adult or larvae of invasive species, including *Aedes aegypti*, which had been confirmed in previous airport surveys, were identified.

On pathogen tests, the Japanese encephalitis virus type I gene was detected in two pools of *Culex tritaeniorhynchus*, a primary vector of Japanese encephalitis virus, collected at Okayama Airport. *Culex tritaeniorhynchus* was not collected during an emergency survey conducted by sharing information with the local government, but it is necessary to continue careful monitoring.

In 2022, a total of 5 cases of Japanese encephalitis were reported in Japan: 3 in Kumamoto Prefecture, 1 in Hiroshima Prefecture, and 1 in Chiba Prefecture, with no cases reported in Okayama Prefecture.[5] Although Okayama Prefecture was not included in the 2022 NESVPD（National Epidemiological Surveillance of vaccine-Preventable, Diseases） survey conducted by the National Institute of Infectious Diseases (prevalence of Japanese encephalitis antibodies in swine during the summer), the prevalence of antibodies in nearby Shimane Prefecture was over 80%, and western Japan tends to have a high prevalence of antibodies.[6]

Furthermore, given that Okayama Airport was closed to regular international flights during the survey period due to seaport and airport operations against COVID-19, there is little possibility that the Japanese encephalitis virus entered from overseas via Okayama Airport.

No pathogens of other mosquito-borne infectious diseases, such as dengue fever, chikungunya fever, Zika virus infection, or malaria, were identified. However, in consideration of confirmation of the inhabitation of vector species by surveys of arriving aircrafts and basic surveys, appropriate monitoring needs to be continued.

Investigation of rodents

In 2022, 373 rodents of 7 species of 5 genera and unknown (unidentifiable) species (395 rodents of 8 species of 6 genera and unidentifiable species in 2021) were captured in the routine surveys of seaports and airports. The captured rodents included *Mus musculus*, *Rattus norvegicus*, *Rattus rattus*, *Apodemus speciosus*, and *Microtus montebelli*. The number of rodents captured was 0.49 per survey area (0.58 in 2021), with no significant change from 2021, and inhabitation of invasive species or rodents carrying pathogens were not confirmed.

In addition, in the survey for external parasites, *Xenopsylla cheopis*, a primary vector of the plague, was not confirmed, but *Nosopsyllus fasciatus* (4 individuals), a secondary vector of the plague, was confirmed. Therefore, appropriate monitoring should be continued.

In 2022, 16 cases of rodents were reported to have been detected by the agencies concerned, of which, 13 were confirmed dead in ocean-going containers (vessels) and 3 were confirmed in aircrafts. Of the 3 rodents confirmed in aircrafts, 2 were captured alive in the cargo space or passenger cabin, and 1 of them was *Peromyscus leucopus*, an invasive primary vector of HPS. Although the pathogen tests for plague, HPS, and HFRS were negative, close collaboration with the authorities concerned will continue to be necessary to appropriately respond to cases reported from them, which cannot be covered by routine surveys.

Future vector surveillance

In Japan, there were major changes in the measures taken against COVID-19 infection under the Quarantine Act after May 8, 2023, with a change in the classification of the disease by the Infectious Diseases Control Law to Category 5. In association, the situation is expected to rapidly return to that before the COVID-19 infection such as the resumption of suspended flights at 5 major airports that were in operation even after the outbreak of COVID-19 infection including Narita International Airport and

Kansai International Airport, and flights at local airports that had been closed. This inevitably increases the risk of entry of infectious diseases.

Meanwhile, the threat of mosquito-borne infectious diseases, such as dengue fever and malaria, continues to increase overseas, and the WHO has strengthened its vigilance.

Also, as the experience of the recent global pandemic of COVID-19 has prompted re-recognition of the importance of immigration control of humans and surveillance for vectors by the quarantine stations at international airports and seaports, which are major gateways from foreign countries, to prevent similar situations or to minimize damage from them, it is necessary for each quarantine station to implement surveillance in a systematic and effective manner.

6 Informing activities

The data from the surveillance conducted by quarantine stations across Japan have been summarized for each quarter of the year, and the sanitation activities taken at each quarantine station have been listed in the "Vector Surveillance Information Correspondence" delivered to all quarantine stations once a quarter (No. 76 through 79).

Examples of sanitation activities including special surveys implemented in the investigation are shown below.

[Cases of detection of Japanese encephalitis virus gene from *Culex tritaeniorhynchus* collected by routine surveys: Okayama Airport]

In September 2022, Japanese encephalitis virus type I genes were detected in two pools of 69 individuals of *Culex tritaeniorhynchus* collected at Okayama Airport. The Okayama Airport branch of the Hiroshima Quarantine Station provided information on the investigation status to the Okayama Airport Area Sanitation Liaison Committee and simultaneously issued an alert by explaining the point of attention in infection prevention (insect control measures).

Also, the Health Promotion Division of the Health and Welfare Department of Okayama Prefecture was informed of the status of Japanese encephalitis vaccination of pigs at swine farms in the prefecture, the location of swine farms and wholesale meat markets near the airport, and the status of the occurrence of Japanese encephalitis patients. The Okayama Airport branch of the Hiroshima Quarantine Station conducted a reinforced survey in October, with no cases of *Culex tritaeniorhynchus* being collected, and the survey was terminated as the temperature dropped.

Since no *Culex tritaeniorhynchus* was collected in the reinforced survey, and since the source of its proliferation could not be identified due to its wide activity range, no source control measures, such as the use of insecticides, have been taken. The Okayama Airport branch of the Hiroshima Quarantine Station plans to conduct more frequent surveys for adults and larvae in 2023 and provide information on the results to the authorities concerned.

[Case of detection of invasive *Peromyscus leucopus* in an aircraft: Chubu International Airport]

In July 2022, *Peromyscus leucopus*, an invasive host of the pathogenic virus of HPS, was captured in an aircraft at Chubu International Airport. The aircraft in question was a cargo aircraft carrying auto parts, etc., which departed from Chicago, refueled in Anchorage, and arrived at Chubu International Airport. After cargo handling operation, the rodent was confirmed in the cargo space, the airline company reported the case to Chubu Airport Quarantine Branch of the Nagoya Quarantine Station, the quarantine officers confirmed that there was no inhabitation of other rodents or its evidence on the aircraft, and they received the rodent captured by the cargo handling staff.

The results of pathogen tests for plague antibody, HFRS antibody, and HFRS and HPS genes conducted at the Kobe Quarantine Station Imported Food and Quarantine Inspection Center were all negative.

As a result of examination at the Chubu Airport Quarantine Branch, the rodent was considered likely to belong to the invasive genus *Peromyscus* from its external morphology, etc., and, after confirming negative pathogen tests, a detailed species identification was requested to an outside specialist. As a result, the animal was identified as invasive *Peromyscus leucopus*.

In this case, health observation was conducted on the cargo handling staff until the results of pathogen tests were obtained, and the absence of abnormalities was confirmed.

7 Appendix

Notification No. 0324-3 (MHLW Department of Food Safety, March 24, 2014) "Guide to Port Sanitation Control" (Finally Amended Jun 20, 2019) (Issued from Manager of the Office of Quarantine Station Administration to Chief of Each Quarantine Station)

(Excerpts from main text)

Appendix 1 "Port Sanitation Control Guidelines"

Appendix 2 "Rodent Surveillance Manual"

Appendix 3 "Mosquito Surveillance Manual"

Appendix 4 "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."

8 References

1. Japan National Tourism Organization (JNTO). Statistics on Outbound Visitors to Japan - Chronological transition: Nationality/Month, Number of Outbound Visitors to Japan (2003-2023)
   https://www.jnto.go.jp/statistics/data/since2003_visitor_arrivals_July_2023.pdf （2023/7/20 access）
2. WHO Fact sheet Vector-borne diseases
   https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases （2023/7/24 access）
3. National Institute of Infectious Diseases. Infectious Disease Outbreak Surveillance Weekly Report (IDWR), Volume 25, Number 38
   https://www.niid.go.jp/niid/images/idsc/idwr/IDWR2023/idwr2023-38.pdf （2023/10/10 access）
4. National Institute of Infectious Diseases. Annual List of Infectious Disease Outbreak Trend Surveillance - 2021
   https://www.niid.go.jp/niid/ja/ydata/11649-ydata2021-1.html （2023/7/31 access）
5. National Institute of Infectious Diseases. Infectious Disease Outbreak Surveillance Weekly Report (IDWR), Volume 24, Weeks 1-52
   https://www.niid.go.jp/niid/ja/idwr-dl/2022.html （2023/7/31 access）
6. National Institute of Infectious Diseases. Porcine Japanese encephalitis antibody positive state survey - Preliminary Report 12 for FY2022
   https://www.niid.go.jp/niid/ja/je-m/2075-idsc/yosoku/sokuhou/11590-je-yosoku-rapid2022-12.html

（2023/7/31 access）
7. WHO Zika virus disease
https://www.who.int/health-topics/zika-virus-disease#tab=tab_1 （2023/8/1～11 access）
8. Pan American Health Organization（PAHO） Zika in the Americas and subregions
https://www3.paho.org/data/index.php/en/mnu-topics/zika-weekly-en/ （2023/8/1～11 access）
9. WHO Chikungunya Distribution and Outbreaks
https://www.who.int/health-topics/chikungunya#tab=tab_1 （2023/8/1～11 access）
10. European Centre for Disease Prevention and Control, Chikungunya virus disease Communicable Disease Threats ReportWeek 51, 18 - 24 December 2022
https://www.ecdc.europa.eu/en/chikungunya-virus-disease （2023/8/1～11 access）
11. WHO Dengue Overview & Global burden
https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue (2023/7/31 access)
12. WHO World Malaria Report 2022, WHO Malaria Disease burden
https://www.who.int/publications/i/item/9789240064898 （2023/8/1～11 access）
13. ECDC Malaria Annual Epidemiological Report for 2021
https://www.ecdc.europa.eu/en/publications-data/malaria-annual-epidemiological-report-2021 （2023/8/1～11 access）
14. ECDC Epidemiological update: West Nile virus transmission season in Europe, 2022
https://www.ecdc.europa.eu/en/news-events/epidemiological-update-west-nile-virus-transmission-season-europe-2022 （2023/8/1～11 access）
15. CDC West Nile Virus Home
https://www.cdc.gov/westnile/statsmaps/historic-data.html （2023/8/1～11 access）
16. WHO Plague fact sheets
https://www.who.int/news-room/fact-sheets/detail/plague （2023/8/1～11 access）
17. ECDC SURVEILLANCE REPORT Plague Annual Epidemiological Report for 2017
https://www.ecdc.europa.eu/en/publications-data/plague-annual-epidemiological-report-2017 （2023/8/1～11 access）
18. ECDC COMMUNICABLE DISEASE THREATS REPORT Week 28 2021
https://www.ecdc.europa.eu/en/publications-data/communicable-disease-threats-report-11-17-july-2021-week-28 （2023/8/1～11 access）
19. ECDC COMMUNICABLE DISEASE THREATS REPORT Week 37 2021
https://www.ecdc.europa.eu/en/publications-data/communicable-disease-threats-report-12-18-september-2021-week-37 （2023/8/1～11 access）
20. CDC Lassa Fever
https://www.cdc.gov/vhf/lassa/ （2023/8/1～11 access）
21. WHO Lassa Fever fact sheet, Background
https://www.who.int/en/news-room/fact-sheets/detail/lassa-fever （2023/8/1～11 access）
22. WHO Disease Outbreak news (DONs)
https://www.who.int/emergencies/disease-outbreak-news/item/lassa-fever---nigeria （2023/8/1～11 access）
23. ECDC COMMUNICABLE DISEASE THREATS REPORT Week6,7 2022
https://www.ecdc.europa.eu/en/publications-data/communicable-disease-threats-report-6-12-february-2022-

week-6　（2023/8/1～11 access）
https://www.ecdc.europa.eu/en/publications-data/communicable-disease-threats-report-13-19-february-2022-week-7　（2023/8/1～11 access）

24. WHO Disease Outbreak news (DONs)
https://www.who.int/emergencies/disease-outbreak-news/item/lassa-fever-united-kingdom-of-great-britain-and-northern-ireland　（2023/8/1～11 access）

25. ECDC SURVEILLANCE REPORT（Hantavirus infection Annual Epidemiological Report for 2020）
https://www.ecdc.europa.eu/en/hantavirus-infection　（2023/8/1～11 access）

26. CDC Reported Cases of Hantavirus Disease
https://www.cdc.gov/hantavirus/surveillance/index.html　（2023/8/1～11 access）

9 Tables and Figures

Table 1. A list of code number, name and location of quarantine ports and airports investigated in 2022

	Code number and Name	Prefecture
1	001 Otaru	Hokkaido
2	002 Ishikariwan	Hokkaido
3	003 Wakkanai	Hokkaido
4	004 Rumoi	Hokkaido
5	005 Monbetsu	Hokkaido
6	006 Abashiri	Hokkaido
7	007 Hanasaki	Hokkaido
8	008 Kushiro	Hokkaido
9	009 Tomakomai	Hokkaido
10	010 Muroran	Hokkaido
11	011 Hakodate	Hokkaido
12	012 Aomori	Aomori
13	013 Hachinohe	Aomori
14	014 Miyako	Iwate
15	015 Kamaishi	Iwate
16	016 Ofunato	Iwate
17	017 Kesennuma	Miyagi
18	018 Ishinomaki	Miyagi
19	019 Sendaishiogama	Miyagi
20	020 Akitafunakawa	Akita
21	021 Sakata	Yamagata
22	022 Onahama	Fukushima
23	023 Hitachi	Ibaraki
24	024 Kashima	Ibaraki
25	025 Kisarazu	Chiba
26	026 Chiba	Chiba
27	027 Futami	Tokyo
28	028 Tokyo（Keihin)	Tokyo
29	029 Kawasaki（Keihin)	Kanagawa
30	030 Yokohama（Keihin)	Kanagawa
31	031 Yokosuka	Kanagawa
32	032 Misaki	Kanagawa
33	033 Naoetsu	Niigata
34	034 Niigata	Niigata
35	035 Fushikitoyama	Toyama
36	036 Kanazawa	Ishikawa
37	037 Nanao	Ishikawa
38	038 Uchiura	Fukui
39	039 Tsuruga	Fukui
40	041 Shimizu	Shizuoka
41	042 Yaizu	Shizuoka
42	044 Fukue	Aichi
43	045 Gamagori（Mikawa)	Aichi
44	046 Toyohashi（Mikawa)	Aichi
45	047 Kinuura	Aichi
46	048 Nagoya	Aichi
47	049 Yokkaichi	Mie
48	050 Owase	Mie
49	051 Maizuru	Kyoto
50	053 Katsuura	Wakayama
51	054 Wakayamashimotsu	Wakayama
52	055 Osaka（Hanshin)	Osaka
53	056 Hannan	Osaka
54	057 Kobe(Hanshin)	Hyogo
55	058 Mizushima	Okayama
56	059 Sakai	Tottori/Shimane
57	060 Hamada	Shimane
58	061 Fukuyama	Hiroshima
59	062 Kure	Hiroshima
60	063 Hiroshima	Hiroshima
61	064 Iwakuni	Yamaguchi
62	066 Ube	Yamaguchi
63	067 Tokushimakomatsushima	Tokushima
64	068 Sakaide	Kagawa
65	069 Matsuyama	Ehime
66	070 Niihama	Ehime
67	071 Mishimakawanoe	Ehime
68	072 Kochi	Kochi
69	073 Kanmon	Yamaguchi/Fukuoka
70	074 Hakata	Fukuoka
71	075 Miike	Fukuoka
72	076 Karatsu	Saga
73	077 Imari	Saga/Nagasaki
74	078 Sasebo	Nagasaki
75	079 Nagasaki	Nagasaki)
76	080 Hitakatsu	Nagasaki)
77	081 Izuhara	Nagasaki)
78	082 Oita	Oita
79	083 Saganoseki	Oita
80	084 Saiki	Oita
81	085 Minamata	Kumamoto
82	086 Yatsushiro	Kumamoto
83	087 Misumi	Kumamoto
84	088 Hososhima	Miyazaki
85	089 Shibushi	Kagoshima
86	090 Kagoshima	Kagoshima
87	091 Kiire	Kagoshima
88	092 Kushikino	Kagoshima
89	093 Kinnakagusuku	Okinawa
90	094 Naha	Okinawa
91	095 Hirara	Okinawa
92	096 Ishigaki	Okinawa
93	193 New Chitose AP	Hokkaido
94	194 Asahikawa AP	Hokkaido
95	195 Hakodate AP	Hokkaido
96	196 Aomori AP	Aomori
97	197 Sendai AP	Miyagi
98	198 Akita AP	Akita
99	199 Fukushima AP	Fukushima
100	200 Narita International AP	Chiba
101	201 Tokyo International AP	Tokyo
102	202 Niigata AP	Niigata
103	204 Komatsu AP	Ishikawa
104	205 Chubu Centrair International AP	Aichi
105	206 Kansai International AP	Osaka
106	207 Okayama AP	Okayama
107	208 Miho AP	Tottori
108	209 Hiroshima AP	Hiroshima
109	211 Matsuyama AP	Ehime
110	212 Fukuoka AP	Fukuoka
111	213 Kitakyushu AP	Fukuoka
112	214 Oita AP	Oita
113	215 Nagasaki AP	Nagasaki
114	216 Kumamoto AP	Kumamoto
115	217 Miyazaki AP	Miyazaki
116	218 Kagoshima AP	Kagoshima
117	219 Naha AP	Okinawa
118	222 Shizuoka AP	Shizuoka
119	223 Hyakuri AP	Ibaraki
120	225 Saga AP	Saga
121	226 Takamatsu AP	Kagawa

Table 2. Monthly investigation for vector surveillance at Japanese Quarantine ports and airports in 2022

Seaport（1）

Month/ Quarantine port	Otaru Quarantine Station																							
	001 Otaru				002 Ishikariwan				003 Wakkanai				004 Rumoi				005 Monbetsu				006 Abashiri			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May																								
Jun.												1												
Jul.		2	2							2	2							1	1	1		1	1	1
Aug.		2	2	2						4	2													
Sep.		2	2			2	2	2			2			1		1								
Oct.				2				2																
Nov.																								
Dec.																								
Total		6	6	4		2	2	4		6	6	1		1		1		1	1	1		1	1	1

Month/ Quarantine port	Otaru Quarantine Station																				Sendai Quarantine Station			
	007 Hanasaki				008 Kushiro				009 Tomakomai				010 Muroran				011 Hakodate				012 Aomori			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May																								
Jun.		1	1	1		2	2	2		2	2	2						1	1	2		1	1	1
Jul.																		1	1			1	1	1
Aug.						2	2	2							1	1		1	1			1	1	1
Sep.										2	2	2		1				1	1			2	1	1
Oct.																		1	1	2		1	1	1
Nov.																								
Dec.																								
Total		1	1	1		4	4	4		4	4	4		1	1	1		5	5	4		6	5	5

Month/ Quarantine port	Sendai Quarantine Station																							
	013 Hachinohe				014 Miyako				015 Kamaishi				016 Ofunato				017 Kesennuma				018 Ishinomaki			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May														1		1								
Jun.		1	1	2		1		1		1		1		1	1	1		1		1		2		2
Jul.		1	1	2			1				1			1	1	1			1				2	
Aug.		1	1	2		1		1		1		1		1	1	1		1		1		2	2	2
Sep.		1	2	2			1				1				1				1			2	2	2
Oct.		1		2										1	1	1								
Nov.																								
Dec.																								
Total		5	5	10		2	2	2		2	2	2		5	5	5		2	2	2		6	6	6

Month/ Quarantine port	Sendai Quarantine Station																Tokyo Quarantine Station							
	019 Sendaishiogama				020 Akitafunakawa				021 Sakata				022 Onahama				023 Hitachi				024 Kashima			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May																		3	3	3		3	3	3
Jun.		2	2	2		1	1	1		2	2	2		2	2	2		3	3	3		3	3	3
Jul.		2		2		1	1	1		3	3	3		2	2	2								
Aug.		3	2	2		1	1	1						2	2	2								
Sep.		2	2	2		1	1	1						2	2	2						3	3	3
Oct.		2	2	2		1	1	1						2	2	2						3	3	3
Nov.			2																					
Dec.																								
Total		11	10	10		5	5	5		5	5	5		10	10	10		6	6	6		12	12	12

(1)：Number of investigated aircraft,（2）：No. investigated areas for adult mosquitoes,（3）：No. investigated areas for mosquito larvae,（4）：No. investigated areas for rodents,

Seaport（2）

Month/Quarantine port	Tokyo Quarantine Station																				Yokohama Quarantine Station			
	025 Kisarazu				026 Chiba				027 Futami				028 Tokyo(Keihin)				029 Kawasaki(Keihin)				030 Yokohama(Keihin)			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.				3																2				
Feb.								3								2								
Mar.																2								3
Apr.														3	3	1								2
May		3	3	3										4	4	2				2		3		
Jun.						3	3	3						4	4	1		3	3	3		2	9	2
Jul.		3	3	3						2	4	2		4	4	2		3	3			5	20	
Aug.		3	3			3	3	3						4	4	2		3	4			5	25	
Sep.						3	3							4	4	2		3	3	2		3	20	3
Oct.		3	3	3		3	3							4	4	1				3		2	15	2
Nov.								3						3	3	2				2				3
Dec.										2	4	2												2
Total		12	12	12		12	12	12		4	8	4		30	30	17		12	13	14		20	89	17

Month/Quarantine port	Yokohama Quarantine Station								Niigata Quarantine Station															
	031 Yokosuka				032 Misaki				033 Naoetsu				034 Niigata				035 Fushikitoyama				036 Kanazawa			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May		1				1								4	4	5								
Jun.		1	1	1		1	1	1		2	2	2						4	4	4		2	2	2
Jul.		1	4			1	4			4	4	4		4	4	5		4	4	4				
Aug.		1	4			1	4															2	2	2
Sep.		1	4	1		1	4	1						4	4			4	4	4				
Oct.		1	4	1		1	4	1														2	2	2
Nov.				1																				
Dec.				1																				
Total		6	17	5		6	17	3		6	6	6		12	12	10		12	12	12		6	6	6

Month/Quarantine port	Niigata Quarantine Station				Nagoya Quarantine Station																			
	037 Nanao				041 Shimizu				042 Yaizu				044 Fukue				045 Gamagori(Mikawa)				046 Toyohashi(Mikawa)			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.								3																
Apr.																								
May				2		2	2	3														4	4	4
Jun.		2	2			2	2			2	3	2						1	1	1				
Jul.		2	2	2		2	2	3						2	1	2						4	4	4
Aug.						2	2			2	3	2												
Sep.		2	2	2		2	2											1	1					
Oct.										2	2													
Nov.								3												1				
Dec.																								
Total		6	6	6		10	10	12		6	8	4		2	1	2		2	2	2		8	8	8

Month/Quarantine port	Nagoya Quarantine Station																				Osaka Quarantine Station			
	047 Kinuura				048 Nagoya				049 Yokkaichi				050 Owase				053 Katsuura				038 Uchiura			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.								4																
Mar.																								
Apr.						3	5	3																
May						3	3	2		3	3	3												
Jun.		4	4	4		3	3	3														1	1	1
Jul.						2	2			3	3	3												
Aug.		4	4	4		2	3	2														1	1	1
Sep.		2	2			2	2	2		3	3	3												
Oct.						6	6	5						1	1	1		1		1		1	1	1
Nov.				2						3	3	3												
Dec.																								
Total		10	10	10		21	24	21		12	12	12		1	1	1		1		1		3	3	3

(1)：Number of investigated aircraft,（2）：No. investigated areas for adult mosquitoes,（3）：No. investigated areas for mosquito larvae,（4）：No. investigated areas for rodents,

Seaport（3）

Month/ Quarantine port	Osaka Quarantine Station																				Kobe Quarantine Station			
	039 Tsuruga				051 Maizuru				054 Wakayamashimotsu				055 Osaka(Hanshin)				056 Hannan				057 Kobe(Hanshin)			
Investi-gation	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷
Jan.																								1
Feb.												2				1				1				
Mar.																								
Apr.																4								
May												2		5	5	1				1		4		
Jun.		2	2	2		2	2	2		2	2							1	1			3		2
Jul.										2	2	2		5	5	4		1	1	1		3		3
Aug.		2	2	2		2	2	2		2	2							1	1			3		3
Sep.										2	2			5	5			1	1			3		1
Oct.		2	2	2		2	2	2		2	2	2				1		1	1	1		3	3	3
Nov.																4								3
Dec.												2								1				4
Total		6	6	6		6	6	6		10	10	10		15	15	15		5	5	5		19	3	20

Month/ Quarantine port	Hiroshima Quarantine Station																							
	058 Mizushima				059 Sakai				060 Hamada				061 Fukuyama				062 Kure				063 Hiroshima			
Investi-gation	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷
Jan.																								
Feb.																								
Mar.																								
Apr.								1																
May		1	1	1		1	1	1		2	2			2	2	2								
Jun.		2	2	2		1	1	1						2	2	2						5	5	
Jul.		2	2	2		1	1											5	5					
Aug.		1	1																					
Sep.		2	2			1	1			2	2			2	2							5	5	
Oct.		2	2	2		1	1	1		2	2			2	2	2								
Nov.								1																
Dec.																								
Total		10	10	7		5	5	5		6	6			8	8	6		5	5			10	10	

Month/ Quarantine port	Hiroshima Quarantine Station																							
	064 Iwakuni				066 Ube				067 Tokushimakomatsushima				068 Sakaide				69 Matsuyama				70 Niihama			
Investi-gation	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May										1	1			2	2	2								
Jun.														2	2			2	4			2	2	
Jul.										1	1			2	2									
Aug.						2	2			1	1							2	4					
Sep.		1	1											2	2							2	2	
Oct.																2								
Nov.																								
Dec.																								
Total		1	1			2	2			3	3			8	8	4		4	8			4	4	

Month/ Quarantine port	Hiroshima Quarantine Station								Fukuoka Quarantine Station															
	71 Mishimakawanoe				072 Kochi				073 Kanmon				074 Hakata				075 Miike				076 Karatsu			
Investi-gation	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷	⑴	⑵	⑶	⑷
Jan.																								
Feb.																								
Mar.																								
Apr.						2	2													1				
May										3	3	3		2	2	5								1
Jun.						2	2			2	2	2		10	10			1	1					
Jul.		2	2							2	2	2		10	10			2	2			1	1	
Aug.										3	3	3		13	13			2	2			3	3	
Sep.										2	2	2				2								
Oct.		2	2			2	2			3	3	3				3				1				
Nov.																2								1
Dec.																3								
Total		4	4			6	6			15	15	15		35	35	15		5	5	2		4	4	2

(1)：Number of investigated aircraft,　(2)：No. investigated areas for adult mosquitoes, (3)：No. investigated areas for mosquito larvae,　(4)：No. investigated areas for rodents,

Seaport（4）

Month/ Quarantine port	Fukuoka Quarantine Station																							
	077 Imari				078 Sasebo				079 Nagasaki				080 Hitakatsu				081 Izuhara				082 Oita			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.				2																				
May						1	1	1		2	2	2										3	3	3
Jun.		4	4			1	1	1		2	2	2						2	4	2		3	3	3
Jul.		4	4			1	1			2	2							2	2	2				
Aug.		2	2			1	1			2	2								2					
Sep.						1	1	1		2	2	2										3	3	3
Oct.				2				1				2												
Nov.								1				2		1	1			2	4	2				
Dec.																								
Total		10	10	4		5	5	5		10	10	10		1	1			6	12	6		9	9	9

Month/ Quarantine port	Fukuoka Quarantine Station																							
	Saganoseki				084 Saiki				085 Minamata				086 Yatsushiro				087 Misumi				088 Hososhima			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																1								
Feb.																								
Mar.												1												
Apr.																								
May										1	1	1		1	1	1						1	1	1
Jun.		1	1	1		1	1	1		1	1			1	1	1		1		1		1	1	1
Jul.		1	1	1		1	1	1		1	1	1		1	1				1			1	1	1
Aug.										1	1			1	1									
Sep.										1	1	1		1	1	1						1	2	
Oct.		1	1	1		1	1	1																
Nov.												1				1						1	1	1
Dec.																								1
Total		3	3	3		3	3	3		5	5	5		5	5	5		1	1	1		5	6	5

Month/ Quarantine port	Fukuoka Quarantine Station																Naha Quarantine Station							
	089 Shibushi				090 Kagoshima				091 Kiire				092 Kushikino				093 Kinnakagusuku				094 Naha			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								1
May										1	1	1						2		2		2	2	4
Jun.		3	3	3		2	2	2		1	1	1						2	3	2		2	2	2
Jul.										1	1	1						1	2	1		2	2	3
Aug.		3	3	3		2	2	2		1	1	1							1			2	2	2
Sep.														1	1	1						2	2	2
Oct.						1	1	1		1	1	1						4	4	4				
Nov.																						2	2	2
Dec.																								
Total		6	6	6		5	5	5		5	5	5		1	1	1		9	10	9		12	12	16

Month/ Quarantine port	Naha Quarantine Station							
	095 Hirara				096 Ishigaki			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.						2	2	
Feb.								
Mar.								
Apr.						2	2	
May		2	2	2		2	2	
Jun.		2	2	2		2	2	2
Jul.						2	2	
Aug.						2	2	
Sep.						2	2	
Oct.		2	2	2		2	2	1
Nov.						2	2	1
Dec.						2	2	
Total		6	6	6		20	20	4

(1)：Number of investigated aircraft,（2)：No. investigated areas for adult mosquitoes, (3)：No. investigated areas for mosquito larvae,（4)：No. investigated areas for rodents,

Airport（1）

Month/Quarantine airport	Otaru Quarantine Station												Sendai Quarantine Station											
	193 New Chitose AP				194 Asahikawa AP				195 Hakodate AP				196 Aomori AP				197 Sendai AP				198 Akita AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																								
May				2														3	6	2				
Jun.		4	4	2						2	2	2		2	2	2		3	6	2		1	1	1
Jul.		4	4	3		2	2	1		2	2			2	2	2		3	6	2		1	1	1
Aug.	1	4	4			2	2			2	2			2	2	2		4	6	2		1	1	1
Sep.	1	5	4			1	1	1		2	2			2	2	2		3	6	3		1	1	1
Oct.	1	1								2	2	2		2	2	2		3	6	4		1	1	1
Nov.	4	1															1			2				
Dec.	6	1																						
Total	13	20	16	7		5	5	2		10	10	4		10	10	10	1	19	36	17		5	5	5

Month/Quarantine airport	Sendai Quarantine Station				Narita Airport Quarantine Station				Tokyo Quarantine Station								Niigata Quarantine Station							
	199 Fukushima AP				200 Narita International AP				201 Tokyo Internatinal AP				223 Hyakuri AP				202 Niigata AP				204 Komatsu AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.					16		10																	
Feb.					16		8																	
Mar.					11	1	8	5		1	3	2												
Apr.					13		10			3	6	2												
May					10	35	45	2		3	9	3						1	1	1				
Jun.					16	27	45			2	6	2										2	2	2
Jul.		1	1	2	12	27	47			3	6	2		2	2	2		1	1	1				
Aug.					11	43	53		2	3	6	2		1	1	1		2	2	2		2	2	2
Sep.					16	35	45	5	2	3	6			1	1	1		1	1	1				
Oct.					15	35	47	5	5	2	6	2		1	1	1						2	2	2
Nov.					17	37	29	2	7	2	9	2								1				
Dec.					31		10	5				2												
Total		1	1	2	184	240	357	24	16	22	57	19		5	5	5		5	5	6		6	6	6

Month/Quarantine airport	Nagoya Quarantine Station								Kansai Airport Quarantine Station				Hiroshina Quaratine Station											
	205 Chubu Centrair Internationa AP				222 Shizuoka AP				206 Kansai International AP				207 Okayama AP				208 Miho AP				209 Hiroshima AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.	1																							
Mar.	1								2															
Apr.		4							2											1				
May	1	4	4	3					2	10	8	5		2	2	2		1	1	1				
Jun.	1	5	4	2					2	19	16	4		2	2	2		1	1	1				
Jul.	2	4	4	2		1	1	1	2	16	16			2	2	2		1	1					
Aug.	2	4	4				1		2	18	16							1	1					
Sep.	2	4	3						2	16	24	5		2	2	2		1	1					
Oct.	3	4	4	4					2	16	16	4		4	2	2				1		2	2	
Nov.	4	5	3	2					2	16	8	5								1				
Dec.	3			2					2			4												
Total	20	34	26	15		1	2	1	20	111	104	27		12	10	10		5	5	5		2	2	

Month/Quarantine airport	Hiroshina Quaratine Station								Fukuoka Quarantine Station															
	211 Matsuyama AP				226 Takamatsu AP				212 Fukuoka AP				213 Kitakyushu AP				214 Oita AP				215 Nagasaki AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																								
Feb.																								
Mar.																								
Apr.																		1	1	1				
May						1	1			6	12	3				2						1	1	1
Jun.		1	2			1				3	9	2		2	2	2						1	1	1
Jul.		1	2							3	9			2	2	2						1	1	
Aug.		1	2							3	3			2	2			1	1	1		1	1	
Sep.		1	2							3	3											1	1	1
Oct.										4	1	3												1
Nov.												3												1
Dec.												4												
Total		4	8			2	1			22	37	15		6	6	6		2	2	2		5	5	5

(1)：Number of investigated aircraft, (2)：No. investigated areas for adult mosquitoes, (3)：No. investigated areas for mosquito larvae, (4)：No. investigated areas for rodents,

Airport（2）

Month/ Quarantine airport	Fukuoka Quarantine Station																Naha Quarantine Station			
	216 Kumamoto AP				217 Miyazaki AP				218 Kagoshima AP				225 Saga AP				219 Naha AP			
Investi-gation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan.																				
Feb.				1												2		1	1	1
Mar.																		1	1	1
Apr.																				
May		2	1	1		2	2	2										1	1	1
Jun.		2	1			2	2	2						2				1	1	1
Jul.		1	1	1		2	2	2		2	2	2		4	4			1	1	1
Aug.		1	1											4	4			1	1	1
Sep.		1	1			2	2	2		2	2	2		2	2	2		1	1	1
Oct.				1		2	2	2										1	1	2
Nov.																		1	1	1
Dec.				1														1	1	1
Total		7	5	5		10	10	10		4	4	4		12	10	4		10	10	11

(1)：Number of investigated aircraft, (2)：No. investigated areas for adult mosquitoes, (3)：No. investigated areas for mosquito larvae, (4)：No. investigated areas for rodents,

Table 3. Results of mosquito inspection on international aircraft at Japanese Quarantine airports in 2022

Quarantine Airport			No. of aircraft inspected (No. of aircraft with mosquito)													Examination of pathogen (Flavivirus, Chikungunya virus and Malaria parasite by RT-PCR or PCR)			
Name of Airport	3-Letter Code (IATA)	Quarantine Code	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	Positive	Pools	Samples	Last Airport of deperture (No. of Aircraft)
New Chitose AP	SPK	193	( )	( )	( )	( )	( )	( )	( )	1 (0)	1 (0)	1 (0)	4 (0)	6 (0)	13 (0)				
Sendai AP	SDJ	197	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	1 (0)	( )	1 (0)				
Narita Int'l AP	NRT	200	16 (0)	16 (1)	11 (0)	13 (0)	10 (0)	16 (0)	12 (0)	11 (0)	16 (0)	15 (0)	17 (1)	31 (1)	184 (3)	0	2	2	BKK(1),DEL(1)
Tokyo Int'l AP	HND	201	( )	( )	( )	( )	( )	( )	( )	2 (0)	2 (0)	5 (0)	7 (1)	( )	16 (1)	0	1	5	DEL(1)
Chubu Int'l AP	NGA	205	( )	1 (0)	1 (0)	( )	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	3 (0)	4 (0)	3 (0)	20 (0)				
Kansai Int'l AP	KIX	206	( )	( )	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (1)	2 (0)	2 (0)	2 (0)	20 (1)				
Total			16 (0)	17 (1)	14 (0)	15 (0)	13 (0)	19 (0)	16 (0)	18 (0)	23 (1)	26 (0)	35 (2)	42 (1)	254 (5)	0	3	7	

Table 4-1. Results of mosquito inspection on international aircraft by the origin of the flights in 2022

Last Airport of departure			No. of aircraft inspection													Results of collection				
																Number of Mosquitoes /Number of aircraft with mosquitoes				Total
Departure Country		3-letter code(IATA)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	*Culex pipens quinquefasciatus*	*Culex pipiens* complex	*Culex*	Un-known	Number of mosquitoes / aircraft with mosquitoes
Australia	Sydney Airport	SYD										1			1					
Turkey	Ataturk International Airport	IST											1		1					
Korea	Gimhae International Airport	PUS												2	2					
Korea	Gimpo International Airport	GMP									1	1			2					
Korea	Incheon International Airport	ICN								1	1		1	1	4					
China	Guangzhou Baiyun International Airport	CAN			1				2	1	1				5					
China	Jinan Yaoqiang International Airport	TNA											1		1					
China	Shanghai Pudong International Airport	PVG				1							1	1	3					
China	Shenzhen Baoan International Airport	SZX					1					1			2					
Indonesia	Jakarta International Soekarno-Hatta Airport	CGK					2	1	1	3	3	2	1	2	15					
Indonesia	Ngurah Rai International Airport	DPS											1		1					
Singapore	Singapore Changi International Airport	SIN							1			1	2	1	5					
Thailand	Suvarnabhumi Airport	BKK	9	7	5	6	2	4	4	2	5	6	5	13	68			1 / 1		1 / 1
Philippines	Mactan-Cebu International Airport	CEB											1		1					
Philippines	Ninoy Aquino International Airport	MNL	2	4	3	5	3	5	4	6	6	7	4	5	54					
Viet Nam	Noi Bai International Airport	HAN			1		1				1			1	4					
Viet Nam	Tansonnhat International Airport	SGN					1	1	1		1	1	1		6					
Malayia	Kuala Lumpur International Airport	KUL	5	5	4	2	2	6	2	2	2	1	2	5	38					
Hong Kong	Hong Kong International Airport	HKG						1					1	1	3					
Taiwan	Taiwan Taoyuan International Airport	TPE					1			2		2	5	5	15					
India	Chhatrapati Shivaji International Airport	BOM		1											1	1 / 1				1 / 1
India	Indira Gandhi International Airport	DEL											5	4	9	1 / 1	5 / 1			6 / 2
Guam	Guam International Airport	GUM									1		1		2					
U.S.A	Dallas/Fort Worth International Airport	DFW										1			1					
U.S.A	Detroit Metropolitan Wayne County Airport	DTW							1						1					
U.S.A	Honolulu International Airport	HNL										1	1		2					
U.S.A	Memphis International Airport	MEM				1									1					
U.S.A	Ted Stevens Anchorage International Airport	ANC						1		1	1	1	1	1	6				1 / 1	1 / 1
Total			16	17	14	15	13	19	16	18	23	26	35	42	254	2 / 2	5 / 1	1 / 1	1 / 1	9 / 5

Table 4-2. Results of mosquito inspection on international aircraft by the origin of the flights in 2022

Area	Depature Country	Last departure of airport	3-letter code(IATA), UN-CODEI	Number of aircraft inspected	Number of aircraft with adult mosquitoes	Number of collected adult mosquito/ Number of aircraft captured adult mosquito: *Culex*: *Culex pipens quinquefasciatus*	*Culex*: *Culex pipiens* complex	*Culex*: *Culex*	Unidentfied mosquitoes	Total	Examination of pathogen (Flavivirus, Chikungunya virus and Malaria parasite by RT-PCR or PCR): Positive	Pools	Samples
Primary vector						W	W						
Secondary vector													
Possible vector						J							
Oceania	Australia	Sydney Airport	SYD	1						0 / 0			
Middle East	Turkey	Ataturk International Airport	IST	1						0 / 0			
East Asia	Korea	Gimhae International Airport	PUS	2						0 / 0			
East Asia	Korea	Gimpo International Airport	GMP	2						0 / 0			
East Asia	Korea	Incheon International Airport	ICN	4						0 / 0			
East Asia	China	Guangzhou Baiyun International Airport	CAN	5						0 / 0			
East Asia	China	Jinan Yaoqiang International Airport	TNA	1						0 / 0			
East Asia	China	Shanghai Pudong International Airport	PVG	3						0 / 0			
East Asia	China	Shenzhen Baoan International Airport	SZX	2						0 / 0			
East Asia	Hong Kong	Hong Kong International Airport	HKG	6						0 / 0			
East Asia	Taiwan	Taiwan Taoyuan International Airport	TPE	38						0 / 0			
Southeast Asia	Indonesia	Jakarta International Soekarno-Hatta Airport	CGK	3						0 / 0			
Southeast Asia	Indonesia	Ngurah Rai International Airport	DPS	15						0 / 0			
Southeast Asia	Singapore	Singapore Changi International Airport	SIN	15						0 / 0			
Southeast Asia	Thailand	Suvarnabhumi Airport	BKK	1						0 / 0			
Southeast Asia	Philippines	Mactan-Cebu International Airport	CEB	5						0 / 0			
Southeast Asia	Philippines	Ninoy Aquino International Airport	MNL	68	1			1 / 1		1 / 1	0	1	1
Southeast Asia	Viet Nam	Noi Bai International Airport	HAN	1						0 / 0			
Southeast Asia	Viet Nam	Tansonnhat International Airport	SGN	54						0 / 0			
Southeast Asia	Malayia	Kuala Lumpur International Airport	KUL	4						0 / 0			
South Asia	India	Chhatrapati Shivaji International Airport	BOM	1	1	1 / 1				1 / 1	-	-	-
South Asia	India	Indira Gandhi International Airport	DEL	9	2	1 / 1	5 / 1			6 / 2	0	2	6
South Pacific	Guam	Guam International Airport	GUM	2						0 / 0			
North America	U.S.A	Dallas/Fort Worth International Airport	DFW	1						0 / 0			
North America	U.S.A	Detroit Metropolitan Wayne County Airport	DTW	1						0 / 0			
North America	U.S.A	Honolulu International Airport	HNL	2						0 / 0			
North America	U.S.A	Memphis International Airport	MEM	1						0 / 0			
North America	U.S.A	Ted Stevens Anchorage International Airport	ANC	6	1				1 / 1	1 / 1	-	-	-
		Total		254	5	2 / 2	5 / 1	1 / 1	1 / 1	9 / 5	0	3	7

Vector - borne disease： W：West Nile fever, J：Japanese encephalitis, D：Dengue fever, M：Malaria , C：Chikungunya fever , Z：Zika virus disease
※「-」：Examination of pathogen was not tested because it was male mosquitoes or unidentifiable species.

Table 5-1. Results of adult mosquito inspection by CO2 light-traps at Japanese Quarantine ports and examination of mosquito-borne disease in 2022

Mosquito taxa: *Anopheles*, *Aedes*, *Armigeres*

Quarantine port	CODE: UN	CODE: Quarantine code	No. of meshes (1km mesh)	*Anopheles sinensis*	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles sineroides*	*Anopheles*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes sasai*	*Aedes bekkui*	*Aedes excrucians*	*Aedes nipponicus*	*Aedes riversi*	*Aedes hatorii*	*Armigeres subalbatus*
Invasive species									●														
Primary vector				M					C,D,Z	C,D,Z													
Secondary vector				W		M	M	M	W	W	W	W	W		W	W			W				W
Possible vector					M					J		J	D		D	J					D		
Otaru	OTR	1	6									8											
Ishikariwan	ISW	2	2																				
Wakkanai	WKJ	3	6									1											
Rumoi	RMI	4	1																				
Monbetsu	MBE	5	1																				
Abashiri	ABA	6	1																				
Hanasaki	HNK	7	1																				
Kushiro	KUH	8	4																				
Tomakomai	TMK	9	4								38	11											
Muroran	MUR	10	1								6	3											
Hakodate	HKP	11	5																				
Aomori	AOM	12	6							1													
Hachinohe	HHE	13	5								3												
Miyako	MYK	14	2								3												
Kamaishi	KIS	15	2																				
Ofunato	OFT	16	5																				
Kesennuma	KSN	17	2							1		1											
Ishinomaki	ISM	18	6							1						2		1					
Sendaishiogama	SGM	19	11							58													
Akitafunakawa	AXT	20	5							31													
Sakata	SKT	21	5							5													
Onahama	ONA	22	10							2													
Hitachi	HTC	23	6																				
Kashima	KSM	24	12																				
Kisarazu	KZU	25	12							4													
Chiba	CHB	26	12							31													
Futami	HTM	27	4							1													
Tokyo（Keihin）	TYO	28	30							878													
Kawasaki（Keihin）	KWS	29	12							40													
Yokohama（Keihin）	YOK	30	20							273													
Yokosuka	YOS	31	6																				
Misaki	MIK	32	6																				
Naoetsu	NAO	33	6							82													
Niigata	NIH	34	12	1						108	2												
Fushikitoyama	FSK	35	12							11													
Kanazawa	KNZ	36	6																				
Nanao	NNO	37	6							1													
Uchiura	UCU	38	3																				
Tsuruga	TRG	39	6							23													
Shimizu	SMZ	41	10	1						13													1
Yaizu	YZU	42	6							15													
Fukue	FKE	44	2							15													
Gamagori（Mikawa）	GAM	45	2							19	1												
Toyohashi（Mikawa）	THS	46	8							70	437	1						3					
Kinuura	KNU	47	10							34	3												
Nagoya	NGO	48	21							135													1
Yokkaichi	YKK	49	12							5													
Owase	OWA	50	1																				
Maizuru	MAI	51	6							4													
Katsuura	KAT	53	1																				
Wakayamashimotsu	SMT	54	10							112		1											
Osaka（Hanshin）	OSA	55	15							395													
Hannan	HAN	56	5							85													
Kobe(Hanshin)	UKB	57	19							19													
Mizushima	MIZ	58	10							6													
Sakai	SMN	59	5																				
Hamada	HMD	60	6							5			1			1							
Fukuyama	FKY	61	8									1											
Kure	KRE	62	5							10													
Hiroshima	HIJ	63	10							133		3											1
Iwakuni	IWK	64	1																				
Ube	UBJ	66	2							28													
Tokushimakomatsushima	TKX	67	3							1													
Sakaide	SKD	68	8																				
Matsuyama	MYJ	69	4																				

Mosquito taxa: *Culex*

Quarantine port	*Culex inatomii*	*Culex pipiens pallens*	*Culex pipiens molestus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex rubithoracis*	*Culex whitmorei*	*Culex rubensis sp. nov.*	*Culex boninensis*	*Culex vagans*	*Culex (Culiciomyia) sasai*	*Culex Culiciomyia*	*Culex pallidothorax*	*Culex infantulus*	*Culex hayashii*	*Culex kyotoensis*	*Culex ryukyensis*	*Culex*
Invasive species																							
Primary vector		W	W	W	W	J	J																
Secondary vector	W						W																
Possible vector		J		J			D	J		J,W		J											
Otaru					53																		
Ishikariwan																							
Wakkanai					9																		
Rumoi					1																		
Monbetsu																							
Abashiri					6																		
Hanasaki																							
Kushiro																							
Tomakomai					20																		
Muroran					39																		
Hakodate																							
Aomori					9																		
Hachinohe					26		2																
Miyako					7																		
Kamaishi																							
Ofunato					3																		
Kesennuma					17																		
Ishinomaki	6				36																		
Sendaishiogama					113		1																
Akitafunakawa					93																		
Sakata					42																		
Onahama					77		1																
Hitachi																							
Kashima					50		11																
Kisarazu					167		1																
Chiba					1,329		18																
Futami					3									1									
Tokyo（Keihin）					240		17																
Kawasaki（Keihin）					17																		
Yokohama（Keihin）					1,305																		
Yokosuka					21																		
Misaki					145																		
Naoetsu					13																		
Niigata					9																		
Fushikitoyama					12		4																
Kanazawa					10																		
Nanao					16		16																
Uchiura																							
Tsuruga					27																		
Shimizu					33																		
Yaizu					35																		
Fukue					2		7	1															
Gamagori（Mikawa）					10		1																
Toyohashi（Mikawa）					117		311																
Kinuura					268		37																
Nagoya					285		59	1															
Yokkaichi					183		3										1						
Owase					30																		
Maizuru					4																		
Katsuura					6																		
Wakayamashimotsu					69																		
Osaka（Hanshin）					162																		
Hannan					6																		
Kobe(Hanshin)					224																		
Mizushima					75		20																
Sakai					8																		
Hamada					59																		
Fukuyama					47		1																
Kure					151		1																
Hiroshima					45		4																
Iwakuni					3																		
Ube					85																		
Tokushimakomatsushima					77		3																
Sakaide					121		13																
Matsuyama					47																		

Mosquito taxa: *Tripteroides*, *Lutzia*, *Coquillettidia*, *Mansonia*, *Uranotaenia*, *Verrallina*, *Orthopodomyia*, *Culiseta*; Examinatin of pathogen（Flavivirus , Chikungunya virus and Malaria parasite by RT-PCR or PCR） No.of positive samples pool / No. of samples pool

Quarantine port	*Tripteroides bambusa*	*Lutzia vorax*	*Lutzia*	*Coquillettidia crassipes*	*Mansonia uniformis*	*Mansonia ochracea*	*Uranotaenia novobscura*	*Verrallina nobukonis*	*Orthopodomyia anopheloides*	*Culiseta (Culicella) nipponica*	Unidentified mosquitoes	Total	No. of samples	Flavivirus	Chikungunya fever	Malaria
Invasive species																
Primary vector																
Secondary vector					W											
Possible vector					C,D,J											
Otaru												61	61	0 / 8		
Ishikariwan												0	0			
Wakkanai												10	10	0 / 3		
Rumoi												1	1	0 / 1		
Monbetsu												0	0			
Abashiri												6	6	0 / 1		
Hanasaki												0	0			
Kushiro												0	0			
Tomakomai												69	69	0 / 4		
Muroran												48	48	0 / 3		
Hakodate												0	0			
Aomori												10	10	0 / 4	0 / 1	
Hachinohe												31	31	0 / 8		
Miyako												10	10	0 / 3		
Kamaishi												0	0			
Ofunato												3	3	0 / 2		
Kesennuma												19	19	0 / 4	0 / 1	
Ishinomaki												46	46	0 / 9	0 / 1	
Sendaishiogama												172	171	0 / 12	0 / 5	
Akitafunakawa												124	123	0 / 5	0 / 2	
Sakata												47	46	0 / 4	0 / 1	
Onahama												80	79	0 / 12	0 / 2	
Hitachi												0	0			
Kashima												61	61	0 / 8		
Kisarazu												172	172	0 / 12	0 / 2	
Chiba												1,378	1,375	0 / 41	0 / 4	
Futami												5	3	0 / 3	0 / 1	
Tokyo（Keihin）												1,135	999	0 / 55	0 / 25	
Kawasaki（Keihin）												57	56	0 / 13	0 / 8	
Yokohama（Keihin）												1,578	1,569	0 / 56	0 / 18	
Yokosuka												21	21	0 / 3		
Misaki												145	145	0 / 7		
Naoetsu												95	95	0 / 8	0 / 5	
Niigata												120	120	0 / 10	0 / 6	0 / 1
Fushikitoyama												27	27	0 / 11	0 / 2	
Kanazawa												10	10	0 / 4		
Nanao												33	33	0 / 8	0 / 1	
Uchiura												0	0			
Tsuruga												50	46	0 / 8	0 / 4	
Shimizu												48	46	0 / 11	0 / 4	0 / 1
Yaizu												50	50	0 / 7	0 / 2	
Fukue												25	25	0 / 6	0 / 2	
Gamagori（Mikawa）								3				34	28	0 / 6	0 / 2	
Toyohashi（Mikawa）												939	933	0 / 36	0 / 5	
Kinuura												342	335	0 / 27	0 / 6	
Nagoya												481	473	0 / 48	0 / 10	
Yokkaichi												192	191	0 / 12	0 / 2	
Owase												30	30	0 / 1		
Maizuru												8	8	0 / 6	0 / 3	
Katsuura												6	6	0 / 1		
Wakayamashimotsu												182	160	0 / 21	0 / 9	
Osaka（Hanshin）												557	468	0 / 28	0 / 14	
Hannan												91	84	0 / 9	0 / 5	
Kobe(Hanshin)												243	242	0 / 23	0 / 5	
Mizushima												101	101	0 / 13	0 / 2	
Sakai												8	8	0 / 4		
Hamada												66	66	0 / 9	0 / 2	
Fukuyama	1											50	47	0 / 4		
Kure												162	162	0 / 9	0 / 4	
Hiroshima												186	175	0 / 15	0 / 4	
Iwakuni												3	3	0 / 1		
Ube												113	113	0 / 3	0 / 1	
Tokushimakomatsushima												81	81	0 / 7	0 / 1	
Sakaide												134	133	0 / 11		
Matsuyama												47	47	0 / 4		

Niihama	IHA	70	4																									313																														313	306	0 / 4		
Mishimakawanoe	MKX	71	4																									3																														3	3	0 / 3		
Kochi	KCZ	72	6							1																		70		1																												72	71	0 / 7	0 / 1	
Kanmon	MOJ	73	15																									11																														11	11	0 / 2		
Hakata	HKT	74	35							200																		406		2																												608	590	0 / 47	0 / 22	
Miike	MII	75	5							2																				1																												3	3	0 / 3	0 / 2	
Karatsu	KAR	76	4							5													2					4		31																												42	40	0 / 7	0 / 2	
Imari	IMI	77	10	2						7																		41		33	1																											84	83	0 / 18	0 / 4	0 / 2
Sasebo	SSB	78	5							21													1					17																														39	30	0 / 8	0 / 3	
Nagasaki	NMX	79	10							12																		44		2																												58	58	0 / 13	0 / 4	
Hitakatsu	HTK	80	1																																																									0	0			
Izuhara	IZH	81	6							10													11					14																				1											36	35	0 / 6	0 / 2	
Oita	OIP	82	9							2																		20																														22	22	0 / 6	0 / 1	
Saganoseki	SAG	83	3																									8																														8	8	0 / 2		
Saiki	SAE	84	3							1													1					8		1																												11	4	0 / 4	0 / 1	
Minamata	MIN	85	5							14																		57		9										1																		81	80	0 / 9	0 / 3	
Yatsushiro	YAT	86	5							4																		33		1																												38	38	0 / 7	0 / 2	
Misumi	MIS	87	1							3																		8		2																												13	13	0 / 3	0 / 1	
Hososhima	HSM	88	5							3													1					25																														29	29	0 / 7	0 / 2	
Shibushi	SBS	89	6							1																		26		13																												40	40	0 / 8	0 / 1	
Kagoshima	KOJ	90	5							2																		2		6																												10	10	0 / 5	0 / 1	
Kiire	KII	91	5	2																								2		78																												82	82	0 / 5		0 / 1
Kushikino	KSO	92	1																																																									0	0			
Kinnakagusuku	KNX	93	9							6	10																45						614															1										676	673	0 / 24	0 / 2	
Naha	NAH	94	12							75																	440						11																									526	517	0 / 24	0 / 8	
Hirara	HRR	95	6							28													1				14						1																									44	41	0 / 7	0 / 4	
Ishigaki	ISG	96	20							310																	140			2			1																									453	431	0 / 39	0 / 20	
Total			652	6	0	0	0	0	0	3,362	503	30	1	0	0	3	0	4	0	0	0	0	20	6	0	0	639	7,179	0	713	3	0	627	0	0	0	1	0	0	2	0	0	0	0	0	0	2	1	0	0	0	0	0	3	0	0	0	13,105	12,698	0 / 920	0 / 258	0 / 5

Vector-borne disease : C ; Chikungunya fever, D ; Dengue fever, J ; Japanese encephalitis, M ; Malaria , W ; West Nile fever, Z ; Zika virus infection

Table 5-2. Results of adult mosquitoes inspection by CO_2 light-traps at Japanese Quarantine airports and examination of mosquito-borne disease in 2022

Quarantine port	CODE		No. of meshes (1km mesh)	Mosquito taxa																																																						Total	No. of samples	Examinatin of pathogen (Flavivirus , Chikungunya virus and Malaria parasite by RT-PCR or PCR) No.of positive samples pool / No. of samples pool		
				Anopheles					Aedes														Armigeres	Culex																							Tripteroides	Lutzia		Coquillettidia	Mansonia		Uranotaenia	Verrallina	Orthopodomyia	Culiseta						
	UN	Quarantine code		Anopheles sinensis	Anopheles koreicus	Anopheles lesteri	Anopheles sineroides	Anopheles	Aedes aegypti	Aedes albopictus	Aedes vexans nipponii	Aedes japonicus	Aedes dorsalis	Aedes esoensis	Aedes flavopictus	Aedes togoi	Aedes sasai	Aedes bekkui	Aedes excrucians	Aedes nipponicus	Aedes riversi	Aedes hatorii	Armigeres subalbatus	Culex inatomii	Culex pipiens pallens	Culex pipiens molestus	Culex pipiens quinquefasciatus	Culex pipiens complex	Culex pseudovishnui	Culex tritaeniorhynchus	Culex bitaeniorhynchus	Culex orientalis	Culex sitiens	Culex rubithoracis	Culex whitmorei	Culex rubensis sp. nov.	Culex boninensis	Culex vagans	Culex (Culiciomyia) sasai	Culex Culiciomyia	Culex pallidothorax	Culex infantulus	Culex hayashii	Culex kyotoensis	Culex ryukyensis	Culex	Tripteroides bambusa	Lutzia vorax	Lutzia	Coquillettidia crassipes	Mansonia uniformis	Mansonia ochracea	Uranotaenia novobscura	Verrallina nobukonis	Orthopodomyia anopheloides	Culiseta (Culicella) nipponica	Unidentified mosquitoes			Flavivirus	Chikungunya fever	Malaria
Invasive species									●																																																					
Primary vector				M					C,D,Z	C,D,Z															W	W	W	W	J	J																																
Secondary vector				W		M	M	M	W	W	W	W	W		W	W			W				W	W						W																					W											
Possible vector					M					J		J	D		D	J					D				J		J			D	J		J,W		J																C,D,J											
New Chitose AP	SPK	193	20			1					14	5		9														3				3						2																		1		38	23	0 / 9		0 / 1
Asahikawa AP	AKJ	194	5	1							3																					1																										5	4	0 / 2		0 / 1
Hakodate AP	HKD	195	10									1																32																														33	33	0 / 6		
Aomori AP	AOJ	196	10							1	29	1																1		1		7																										40	33	0 / 6	0 / 1	
Sendai AP	SDJ	197	19	6						2														29				88		3	10	3																										141	138	0 / 30	0 / 2	0 / 4
Akita AP	AKP	198	5							1		1																																														2	2	0 / 2	0 / 1	
Fukushima AP	FKS	199	1																																																								0	0			
Narita International AP	NRT	200	240	1						57	1																	76		481																	2											618	614	0 / 111	0 / 16	0 / 1
Tokyo International AP	HND	201	22																									38		6																												44	43	0 / 15		
Niigata AP	NII	202	5																									12																														12	12	0 / 2		
Komatsu AP	KMQ	204	6																									14		3																		2										19	17	0 / 4		
Chubu Centrair International AP	NGA	205	34							1																		78		2																												81	78	0 / 30		
Kansai International AP	KIX	206	111							16													1					241		12																												270	263	0 / 66	0 / 6	
Okayama AP	OKJ	207	12	13							15																	10		236	48																											322	322	2 / 17		0 / 3
Miho AP	YGJ	208	5							5																		8																														13	13	0 / 3	0 / 1	
Hiroshima AP	HIT	209	2																																																								0	0			
Matsuyama AP	MAY	211	4																									10																														10	10	0 / 2		
Fukuoka AP	FUK	212	22							6																		79		5																												90	90	0 / 18	0 / 4	
Kitakyushu AP	KKJ	213	6																									7																														7	7	0 / 3		
Oita AP	OIT	214	2																																																								0	0			
Nagasaki AP	NGS	215	5							1																		14		2																												17	17	0 / 6	0 / 1	
Kumamoto AP	KMJ	216	7	1						1		1											3							3																												9	8	0 / 3		0 / 1
Miyazaki AP	MZA	217	10							2	1																	15		3																												21	21	0 / 7	0 / 1	
Kagoshima AP	KOP	218	4																									11		1																												12	12	0 / 3		
Naha AP	NAP	219	10							1	1																40				5		3																									50	49	0 / 7		
Shizuoka AP	FSZ	222	1																											7																												7	7	0 / 1		
Hyakuri AP	IBK	223	5	1																								9		4																												14	14	0 / 4		0 / 1
Saga AP	QSG	225	12	2						4																		2		1,842										1																		1,851	1,847	0 / 44	0 / 3	0 / 1
Takamatsu AP	TKG	226	2																											2																												2	2	0 / 1		
Total			597	25	0	1	0	0	0	98	64	9	0	9	0	0	0	0	0	0	0	0	4	29	0	0	40	748	0	2,613	63	14	3	0	0	0	0	2	0	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	3,728	3,679	2 / 402	0 / 36	0 / 13

Vector-borne disease : C ; Chikungunya fever, D ; Dengue fever, J ; Japanese encephalitis, M ; Malaria, W ; West Nile feve, Z ; Zika virus infection

Table 5-3. Results of adult mosquito inspection by CO2 light-traps at Japanese Quarantine port and airports and examination of mosquito-borne disease in 2022

Quarantine port (CODE / UN)	No. of meshes (1km mesh)	*Anopheles*: *Anopheles sinensis*	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles sineroides*	*Anopheles*	*Aedes*: *Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes sasai*	*Aedes bekkui*	*Aedes excrucians*	*Aedes nipponicus*	*Aedes riversi*	*Aedes hatorii*	*Armigeres*: *Armigeres subalbatus*
Invasive species							●														
Primary vector		M					C,D,Z	C,D,Z													
Secondary vector		W		M	M	M	W	W	W	W	W		W	W			W				W
Possible vector			M					J		J	D		D	J					D		
Total	1,249	31	0	1	0	0	0	3,460	567	39	1	9	0	3	0	4	0	0	0	0	24

Quarantine port (CODE / UN)	*Culex*: *Culex inatomii*	*Culex pipiens pallens*	*Culex pipiens molestus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex rubithoracis*	*Culex whitmorei*	*Culex rubensis sp. nov.*	*Culex boninensis*	*Culex vagans*	*Culex (Culiciomyia) sasai*	*Culex Culiciomyia*	*Culex pallidothorax*	*Culex infantulus*	*Culex hayashii*	*Culex kyotoensis*	*Culex ryukyensis*	*Culex*
Invasive species																							
Primary vector		W	W	W	W	J	J																
Secondary vector	W						W																
Possible vector		J		J			D	J		J,W		J											
Total	35	0	0	679	7,927	0	3,326	66	14	630	0	0	0	1	2	0	3	0	0	0	0	0	0

Quarantine port (CODE / UN)	*Tripteroides*: *Tripteroides bambusa*	*Lutzia*: *Lutzia vorax*	*Lutzia*	*Coquillettidia*: *Coquillettidia crassipes*	*Mansonia*: *Mansonia uniformis*	*Mansonia ochracea*	*Uranotaenia*: *Uranotaenia novobscura*	*Verrallina*: *Verrallina nobukonis*	*Orthopodomyia*: *Orthopodomyia anopheloides*	*Culiseta*: *Culiseta (Culicella) nipponica*	Unidentfied mosquitoes	Total	No. of samples	Examinatin of pathogen (Flavivirus , Chikungunya virus and Malaria parasite by RT-PCR or PCR) No.of positive samples pool / No. of samples pool: Flavivirus	Chikungunya fever	Malaria
Invasive species																
Primary vector																
Secondary vector					W											
Possible vector					C,D,J											
Total	4	3	0	0	0	0	0	3	0	1	0	16,833	16,377	2 / 1,322	0 / 294	0 / 18

Vector-borne disease： C：Chikungunya fever, D：Dengue fever, J：Japanese encephaliti, M：Malaria , W：West Nile fever, Z：Zika virus infection

Table 6-1. Results of larval mosquito inspection by ovi-traps and basins at Japanese Quarantine ports in 2022

属，亜属及び種　Mosquito taxa

Quarantine port	CODE		No. of meshes (1km mesh)	*Anopheles*					*Aedes*														*Armigeres*
	UN	Quarantine code		*Anopheles sinensis*	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles sineroides*	*Anopheles*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes sasai*	*Aedes bekkui*	*Aedes excrucians*	*Aedes nipponicus*	*Aedes riversi*	*Aedes hatorii*	*Armigeres subalbatus*
Invasive species									●														
Primary vector				M					C,D,Z	C,D,Z													
Secondary vector				W		M	M	M	W	W	W	W	W		W	W			W				W
Possible vector					M					J		J	D		D	J					D		
Otaru	OTR	1	6									3											
Ishikariwan	ISW	2	2									1											
Wakkanai	WKJ	3	6									2											
Monbetsu	MBE	5	1																				
Abashiri	ABA	6	1									1											
Hanasaki	HNK	7	1																				
Kushiro	KUH	8	4																				
Tomakomai	TMK	9	4									3											
Muroran	MUR	10	1									1											
Hakodate	HKP	11	5																				
Aomori	AOM	12	5							1													
Hachinohe	HHE	13	5									1											
Miyako	MYK	14	2							1		1											
Kamaishi	KIS	15	2							1		2											
Ofunato	OFT	16	5							3		1											
Kesennuma	KSN	17	2							1													
Ishinomaki	ISM	18	6							5		1											
Sendaishiogama	SGM	19	10							4		2											
Akitafunakawa	AXT	20	5							3		1											
Sakata	SKT	21	5							2													
Onahama	ONA	22	10							3													
Hitachi	HTC	23	6							1													
Kashima	KSM	24	12																				
Kisarazu	KZU	25	12							9													
Chiba	CHB	26	12							6													
Futami	HTM	27	8							3													
Tokyo（Keihin）	TYO	28	30							19													
Kawasaki（Keihin）	KWS	29	13							6													
Yokohama（Keihin）	YOK	30	89							49													
Yokosuka	YOS	31	17							2													
Misaki	MIK	32	17							8						2							
Naoetsu	NAO	33	6							2													
Niigata	NIH	34	12							3													
Fushikitoyama	FSK	35	12							5		1											
Kanazawa	KNZ	36	6																				
Nanao	NNO	37	6							6		5											
Uchiura	UCU	38	3							3		3				2							
Tsuruga	TRG	39	6									5				2							
Shimizu	SMZ	41	10							9													
Yaizu	YZU	42	8							4													
Fukue	FKE	44	1																				
Gamagori（Mikawa）	GAM	45	2							2													
Toyohashi（Mikawa）	THS	46	8							1	1	1											
Kinuura	KNU	47	10							7													
Nagoya	NGO	48	24							8													
Yokkaichi	YKK	49	12							3													
Owase	OWA	50	1																				
Maizuru	MAI	51	6							1		1											
Wakayamashimotsu	SMT	54	10							3						1							
Osaka（Hanshin）	OSA	55	15							14													
Hannan	HAN	56	5							4													
Kobe(Hanshin)	UKB	57	3							1													
Mizushima	MIZ	58	10							4													
Sakai	SMN	59	5																				
Hamada	HMD	60	6							5		1				2							
Fukuyama	FKY	61	8																				
Kure	KRE	62	5							4													
Hiroshima	HIJ	63	10							5													
Iwakuni	IWK	64	1																				
Ube	UBJ	66	2							2													
Tokushimakomatsushima	TKX	67	3							1													
Sakaide	SKD	68	8							5													
Matsuyama	MYJ	69	8							3													
Niihama	IHA	70	4																				
Mishimakawanoe	MKX	71	4							1		1											
Kochi	KCZ	72	6							2						2							
Kanmon	MOJ	73	15																				
Hakata	HKT	74	35							24													
Miike	MII	75	5							5													
Karatsu	KAR	76	4							4													

Quarantine port	*Culex*																						
	Culex inatomii	*Culex pipiens pallens*	*Culex pipiens molestus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex rubithoracis*	*Culex whitmorei*	*Culex rubensis sp. nov.*	*Culex boninensis*	*Culex vagans*	*Culex (Culiciomyia) sasai*	*Culex Culiciomyia*	*Culex pallidothorax*	*Culex infantulus*	*Culex hayashii*	*Culex kyotoensis*	*Culex ryukyensis*	*Culex*
Invasive species																							
Primary vector		W	W	W	W	J	J																
Secondary vector	W						W																
Possible vector		J		J			D	J		J,W		J											
Otaru																							
Ishikariwan					1																		
Wakkanai																							
Monbetsu																							
Abashiri																							
Hanasaki																							
Kushiro																							
Tomakomai																							
Muroran																							
Hakodate																							
Aomori																							
Hachinohe																							
Miyako																							
Kamaishi																							
Ofunato																							
Kesennuma																							
Ishinomaki																1							
Sendaishiogama																							
Akitafunakawa																							
Sakata																							
Onahama																							
Hitachi					2																		
Kashima																							
Kisarazu																							
Chiba																							
Futami																							
Tokyo（Keihin）					2																		
Kawasaki（Keihin）					1																		
Yokohama（Keihin）					17																		
Yokosuka																							
Misaki					1																		
Naoetsu					1																		
Niigata					2																		
Fushikitoyama					2																		
Kanazawa																							
Nanao					1																		
Uchiura																							
Tsuruga					3																		
Shimizu																							
Yaizu																							
Fukue																							
Gamagori（Mikawa）							1																
Toyohashi（Mikawa）																							
Kinuura																1							
Nagoya					2		1																
Yokkaichi																							
Owase																							
Maizuru					1																		
Wakayamashimotsu																							
Osaka（Hanshin）					2																		
Hannan					1																		
Kobe(Hanshin)																							
Mizushima					3																		
Sakai					1																		
Hamada					1											1							
Fukuyama																							
Kure																							
Hiroshima					1																		
Iwakuni																							
Ube																							
Tokushimakomatsushima																							
Sakaide					3																		
Matsuyama					2																		
Niihama																							
Mishimakawanoe																							
Kochi					2																		
Kanmon																							
Hakata					6																		
Miike					2																		
Karatsu																							

Quarantine port	*Tripteroides*	*Lutzia*		*Coquillettidia*	*Mansonia*		*Uranotaenia*	*Verrallina*	*Orthopodomyia*	*Culiseta*	Unidentified mosquitoes
	Tripteroides bambusa	*Lutzia vorax*	*Lutzia*	*Coquillettidia crassipes*	*Mansonia uniformis*	*Mansonia ochracea*	*Uranotaenia novobscura*	*Verrallina nobukonis*	*Orthopodomyia anopheloides*	*Culiseta (Culicella) nipponica*	
Invasive species											
Primary vector											
Secondary vector					W						
Possible vector					C,D,J						
Otaru											
Ishikariwan											
Wakkanai											
Monbetsu											
Abashiri											
Hanasaki											
Kushiro											
Tomakomai											
Muroran											
Hakodate											
Aomori											
Hachinohe											
Miyako	1										
Kamaishi											
Ofunato											
Kesennuma											
Ishinomaki											
Sendaishiogama											
Akitafunakawa											
Sakata											
Onahama											
Hitachi											
Kashima											
Kisarazu	1										
Chiba											
Futami											
Tokyo（Keihin）											
Kawasaki（Keihin）											
Yokohama（Keihin）		1									
Yokosuka											
Misaki											
Naoetsu											
Niigata											
Fushikitoyama											
Kanazawa											
Nanao	2	1									
Uchiura	1	2									
Tsuruga											
Shimizu											
Yaizu											
Fukue											
Gamagori（Mikawa）											
Toyohashi（Mikawa）		1									
Kinuura											
Nagoya		1									
Yokkaichi		1									
Owase											
Maizuru											
Wakayamashimotsu											
Osaka（Hanshin）											
Hannan											
Kobe(Hanshin)											
Mizushima											
Sakai											
Hamada	1	2									
Fukuyama	1										
Kure											
Hiroshima											
Iwakuni											
Ube											
Tokushimakomatsushima		1									
Sakaide											
Matsuyama											
Niihama											
Mishimakawanoe											
Kochi		1									
Kanmon											
Hakata											
Miike											
Karatsu	2										

Imari	IMI	77	10							8		3																																			2										
Sasebo	SSB	78	5							4																		2																													
Nagasaki	NMX	79	10							6		3																																			1										
Hitakatsu	HTK	80	1																																																						
Izuhara	IZH	81	12							3		4			1																																1										
Oita	OIP	82	9																																																						
Saganoseki	SAG	83	3																																																						
Saiki	SAE	84	3							1																																															
Minamata	MIN	85	5									3																													1																
Yatsushiro	YAT	86	5							2																																															
Misumi	MIS	87	1							1																																					1										
Hososhima	HSM	88	6							1																																															
Shibushi	SBS	89	6							4						1												1		2																											
Kagoshima	KOJ	90	5							4																		2		1																											
Kiire	KII	91	5									2																3																													
Kushikino	KSO	92	1							1																																															
Kinnakagusuku	KNX	93	10							9																	2			1			1								2				2												
Naha	NAH	94	12							12																	2																														
Hirara	HRR	95	6							6																																															
Ishigaki	ISG	96	20							15																	4	1																													2
Total			744	0	0	0	0	0	0	345	1	53	0	0	1	12	0	0	0	0	0	0	0	0	0	0	8	69	0	6	0	0	1	0	0	0	0	0	3	0	3	0	0	0	2	0	14	11	0	0	0	0	0	0	0	0	2

Vector-borne disease： C：Chikungunya fever, D：Dengue fever, J：Japanese encephalitis, M：Malaria , W：West Nile fever, Z：Zika virus infection

Table 6-2 Results of larval mosquito inspection by ovi-traps or basins at Japanese Quarantine airports in 2022

Mosquito taxa

Quarantine port	CODE: UN	CODE: Quarantine code	No. of meshes (1km mesh)	*Anopheles sinensis*	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles sineroides*	*Anopheles*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes sasai*	*Aedes bekkui*	*Aedes excrucians*	*Aedes nipponicus*	*Aedes riversi*	*Aedes hatorii*	*Armigeres subalbatus*	*Culex inatomii*	*Culex pipiens pallens*	*Culex pipiens molestus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Culex sitiens*	*Culex rubithoracis*	*Culex whitmorei*	*Culex rubensis sp. nov.*	*Culex boninensis*	*Culex vagans*	*Culex (Culiciomyia) sasai*	*Culex Culiciomyia*	*Culex pallidothorax*	*Culex infantulus*	*Culex hayashii*	*Culex kyotoensis*	*Culex ryukyensis*	*Culex*	*Tripteroides bambusa*	*Lutzia vorax*	*Lutzia*	*Coquillettidia crassipes*	*Mansonia uniformis*	*Mansonia ochracea*	*Uranotaenia novobscura*	*Verrallina nobukonis*	*Orthopodomyia anopheloides*	*Culiseta (Culicella) nipponica*	Unidentified mosquitoes
				Anopheles					*Aedes*														*Armigeres*	*Culex*																							*Tripteroides*	*Lutzia*		*Coquillettidia*	*Mansonia*		*Uranotaenia*	*Verrallina*	*Orthopodomyia*	*Culiseta*	
Invasive species									●																																																
Primary vector				M					C,D,Z	C,D,Z															W	W	W	W	J	J																									
Secondary vector				W		M	M	M	W	W	W	W	W		W	W			W				W	W						W																				W						
Possible vector					M					J		J	D		D	J					D				J		J			D	J		J,W		J															C,D,J						
New Chitose AP	SPK	193	16									10			2																							3																			
Asahikawa AP	AKJ	194	5									3																																													
Hakodate AP	HKD	195	10									5																																													
Aomori AP	AOJ	196	10									3																1																													
Sendai AP	SDJ	197	36							21																		13			1																	3									
Akita AP	AKP	198	5																																																						
Fukushima AP	FKS	199	1							1																																															
Narita International AP	NRT	200	357							31		3			2													3		7									6			1		2			7	10					1				
Tokyo International AP	HND	201	57							6																																															
Niigata AP	NII	202	5																																																						
Komatsu AP	KMQ	204	6							4																		2																													
Chubu Centrair International AP	NGA	205	26																									2		2																											
Kansai International AP	KIX	206	104	1						22	1	6			2													10		2																		1									
Okayama AP	OKJ	207	10							4		8			1																																4										
Miho AP	YGJ	208	5																									1																													
Hiroshima AP	HIT	209	2							1		1											1					1																1													
Matsuyama AP	MAY	211	8																									1																													
Fukuoka AP	FUK	212	37							4																		6																													
Kitakyushu AP	KKJ	213	6																																																						
Oita AP	OIT	214	2																																																						
Nagasaki AP	NGS	215	5																																																						
Kumamoto AP	KMJ	216	5							4		4																2																			1										
Miyazaki AP	MZA	217	10							4																																															
Kagoshima AP	KOP	218	4	1								2																3																				1									
Naha AP	NAP	219	10							3																							1																								
Shizuoka AP	FSZ	222	2																																																						
Hyakuri AP	IBK	223	5							1																																															
Saga AP	QSG	225	10							8																																															
Takamatsu AP	TKG	226	1									1																																													
合 計	Total		760	2	0	0	0	0	0	114	1	46	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	45	0	11	1	0	1	0	0	0	0	3	6	0	0	1	0	3	0	0	12	15	0	0	0	0	1	0	0	0	0

Vector-borne disease： C：Chikungunya fever, D：Dengue fever, J：Japanese encephalitis, M：Malaria , W：West Nile fever, Z：Zika virus infection

Table 6-3. Results of larval mosquito inspection by ovi-traps and basins at Japanese Quarantine ports and airports in 2022

Mosquito taxa

Quarantine port (CODE / UN)	No. of meshes (1km mesh)	*Anopheles*: *Anopheles sinensis*	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles sineroides*	*Anopheles*	*Aedes*: *Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes sasai*	*Aedes bekkui*	*Aedes excrucians*	*Aedes nipponicus*	*Aedes riversi*	*Aedes hatorii*	*Armigeres*: *Armigeres subalbatus*
Invasive species							●														
Primary vector		M					C,D,Z	C,D,Z													
Secondary vector		W		M	M	M	W	W	W	W	W		W	W			W				W
Possible vector			M					J		J	D		D	J					D		
Total	1,504	2	0	0	0	0	0	459	2	99	0	0	8	12	0	0	0	0	0	0	1

Quarantine port (CODE / UN)	*Culex*: *Culex inatomii*	*Culex pipiens pallens*	*Culex pipiens molestus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Culex sitiens*	*Culex rubithoracis*	*Culex whitmorei*	*Culex rubensis sp. nov.*	*Culex boninensis*	*Culex vagans*	*Culex (Culiciomyia) sasai*	*Culex Culiciomyia*	*Culex pallidothorax*	*Culex infantulus*	*Culex hayashii*	*Culex kyotoensis*	*Culex ryukyensis*	*Culex*
Invasive species																							
Primary vector		W	W	W	W	J	J																
Secondary vector	W						W																
Possible vector		J		J			D	J		J,W		J											
Total	0	0	0	8	114	0	17	1	0	2	0	0	0	0	3	9	0	3	1	0	3	2	0

Quarantine port (CODE / UN)	*Tripteroides*: *Tripteroides bambusa*	*Lutzia*: *Lutzia vorax*	*Lutzia*	*Coquillettidia*: *Coquillettidia crassipes*	*Mansonia*: *Mansonia uniformis*	*Mansonia ochracea*	*Uranotaenia*: *Uranotaenia novobscura*	*Verrallina*: *Verrallina nobukonis*	*Orthopodomyia*: *Orthopodomyia anopheloides*	*Culiseta*: *Culiseta (Culicella) nipponica*	Unidentified mosquitoes
Invasive species											
Primary vector											
Secondary vector					W						
Possible vector					C,D,J						
Total	26	26	0	0	0	0	1	0	0	0	2

Vector-borne disease： C；Chikungunya fever, D；Dengue fever, J；Japanese encephalitis, M；Malaria, W；West Nile fever, Z；Zika virus infection

Table 7 -1. Results of rodent(including flea and tick) inspection by rat or mouse-trap at Japanese Quarantine ports in 2022

					Species: Vector and reservoir or host — Fleas(No. of samples collected)							Ticks(No. of samples collected)																Rodents(No. of samples collected)														Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples/No.of samples		
Quarantine port	3-letter code(IATA), UN-CODE	Quarantine code	No. of meshes (1km mesh)	No. of traps	*Xenopsylla cheopis*	*Nosopsyllus fasciatus*	*Ctenophthalmus Kolenati*	*Leptopsylla segnis*	*C.congener truscus*	Unidentfied fleas	Total	*Ixodes*	*Laelaps nuttalli*	*Laelaps algericus*	*Laelaps echidninus*	*Laelaps jettmari*	*Laelaps microti*	*Haemaphysalis hystricis*	*Ixodes granulatus*	*Eulaelaps onoi*	*Ixodes monospinosus*	*Haemaphysalis longicornis*	*Haemaphysalis*	*Macrocheles*	*Laelapidae*	Unidentfied ticks	Total	*Rattus rattus*	*Rattus norvegicus*	*Mus musculus*	*Apodemus speciosus*	*Apodemus argenteus*	*Apodemus sylvaticus*	*Micromys minutus*	*Microtus montebelli*	*Clethrionomys rufocanus bedfordiae*	*Apodemus speciosus ainu*	*Peromyscus sp.*	*Peromyscus maniculatus*	Unidentfied rodents	Total	Plague	Hamorrhagic Fever with Renal Syndrome	Hantavirus Pulmonary Syndrome
Invasive species / Primary vector / Secondary vector					P	P																						HF,P	HF,P	P	P	P	P	P	P	P	P	● HP P	● HP P					
Otaru	OTR	1	4	280							0																0	1													1	0 / 1	0 / 1	
Ishikariwan	ISW	2	4	240							0																0		1												1	0 / 1	0 / 1	
Wakkanai	WKJ	3	1	80							0																0														0			
Rumoi	RMI	4	1	40							0																0									2					2	0 / 2	0 / 2	
Monbetsu	MBE	5	1	20							0																0														0			
Abashiri	ABA	6	1	20							0																0														0			
Hanasaki	HNK	7	1	20							0																0														0			
Kushiro	KUH	8	4	160							0																0	1	3												4	0 / 4	0 / 4	
Tomakomai	TMK	9	4	320							0																0														0			
Muroran	MUR	10	1	80		1					1																0		2												2	0 / 2	0 / 2	
Hakodate	HKP	11	4	160							0																0		2												2	0 / 2	0 / 2	
Aomori	AOM	12	5	400							0																0														0			
Hachinohe	HHE	13	10	400		1	2				3		2		69												71	1	14						4						19	0 / 19	0 / 19	
Miyako	MYK	14	2	40							0																0														0			
Kamaishi	KIS	15	2	40							0		9														9		1												1	0 / 1	0 / 1	
Ofunato	OFT	16	5	100		1					1																0		3												3	0 / 3	0 / 3	
Kesennuma	KSN	17	2	40							0																0														0			
Ishinomaki	ISM	18	6	480							0				3												3	3	1	3											7	0 / 7	0 / 7	
Sendaishiogama	SGM	19	10	800		1					1		7		4												11	1	8												9	0 / 9	0 / 9	
Akitafunakawa	AXT	20	5	400							0																0								1						1	0 / 1	0 / 1	
Sakata	SKT	21	5	100							0																0								1						1	0 / 1	0 / 1	
Onahama	ONA	22	10	200							0																0														0			
Hitachi	HTC	23	6	480							0																0														0			
Kashima	KSM	24	12	960							0			1		1				8				2			12			4	12										16	0 / 16	0 / 16	
Kisarazu	KZU	25	12	960							0																0	1		1											2	0 / 2	0 / 2	
Chiba	CHB	26	12	960							0																0														0			
Futami	HTM	27	4	320							0		22														22	17													17	0 / 17	0 / 17	
Tokyo（Keihin）	TYO	28	17	1,360							0		34														34		7	1											8	0 / 8	0 / 8	
Kawasaki（Keihin）	KWS	29	14	960							0		24														24	2	2	6											10	0 / 9	0 / 9	
Yokohama（Keihin）	YOK	30	17	1,200							0																0	13	3	2											18	0 / 16	0 / 15	
Yokosuka	YOS	31	5	200							0																0														0			
Misaki	MIK	32	3	120							0																0	2	2												4	0 / 4	0 / 4	
Naoetsu	NAO	33	6	480							0																0		1		1										2	0 / 2	0 / 2	
Niigata	NIH	34	10	800							0																0														0			
Fushikitoyama	FSK	35	12	960							0																0		1												1	0 / 1	0 / 1	
Kanazawa	KNZ	36	6	480							0																0			1		1			1						3	0 / 3	0 / 3	
Nanao	NNO	37	6	480							0																0			1	1										2	0 / 2	0 / 2	
Uchiura	UCU	38	3	120							0																0														0			
Tsuruga	TRG	39	6	156							0																0			1											1	0 / 1		
Shimizu	SMZ	41	12	840							0																0		7		1										8	0 / 8	0 / 8	
Yaizu	YZU	42	4	320							0																0			1											1	0 / 1	0 / 1	
Fukue	FKE	44	2	60							0																0														0			
Gamagori（Mikawa）	GAM	45	2	120							0																0			2											2	0 / 2	0 / 2	
Toyohashi（Mikawa）	THS	46	8	240							0																0			1	2										3	0 / 3	0 / 3	
Kinuura	KNU	47	10	450							0																0			5											5	0 / 5	0 / 5	

Nagoya	NGO	48	21	1,620							0																0	1		5											6	0 / 6	0 / 6	
Yokkaichi	YKK	49	12	960							0				2												2		4												4	0 / 4	0 / 4	
Owase	OWA	50	1	40							0																0														0			
Maizuru	MAI	51	6	192							0																0														0			
Katsuura	KAT	53	1	40							0																0														0			
Wakayamashimotsu	SMT	54	10	400							0																0			1											1	0 / 1		
Osaka（Hanshin)	OSA	55	15	540							0																0														0			
Hannan	HAN	56	5	200							0																0														0			
Kobe(Hanshin)	UKB	57	20	1,160							0																0			1											1			
Mizushima	MIZ	58	7	520							0																0			11											11	0 / 11	0 / 11	
Sakai	SMN	59	5	400							0																0				1										1	0 / 1	0 / 1	
Fukuyama	FKY	61	6	480							0		2													1	3		2	1	1										4	0 / 4	0 / 4	
Sakaide	SKD	68	4	320							0																0														0			
Kanmon	MOJ	73	15	1,200							0																0			4											4	0 / 4	0 / 4	
Hakata	HKT	74	15	1,152							0		9														9	1	2	6											9	0 / 8	0 / 3	
Miike	MII	75	2	40							0			3													3			7											7	0 / 7		
Karatsu	KAR	76	2	160							0			1													1			2											2	0 / 2		
Imari	IMI	77	4	80							0																0														0			
Sasebo	SSB	78	5	400							0																0														0			
Nagasaki	NMX	79	10	800							0																0														0			
Izuhara	IZH	81	6	480							0																0														0			
Oita	OIP	82	9	360							0			6													6			2											2	0 / 2		
Saganoseki	SAG	83	3	72							0																0														0			
Saiki	SAE	84	3	120							0																0														0			
Minamata	MIN	85	5	400							0																0														0			
Yatsushiro	YAT	86	5	400							0																0	1		3											4	0 / 4	0 / 1	
Misumi	MIS	87	1	80							0																0														0			
Hososhima	HSM	88	5	400							0																0														0			
Shibushi	SBS	89	6	480							0																0		1	1											2	0 / 2	0 / 2	
Kagoshima	KOJ	90	5	200							0																0														0			
Kiire	KII	91	5	200							0																0														0			
Kushikino	KSO	92	1	40							0																0														0			
Kinnakagusuku	KNX	93	9	720							0																0														0			
Naha	NAH	94	16	1,000							0		19														19	6	5											1	12	0 / 9	0 / 9	
Hirara	HRR	95	6	480							0	1															1	3		2											5	0 / 5	0 / 5	
Ishigaki	ISG	96	4	320							0																0	3													3	0 / 3	0 / 3	
合　計	Total		532	33,902	0	4	2	0	0	0	6	1	128	11	78	1	0	0	0	8	0	0	0	2	0	1	230	57	72	75	19	1	0	0	7	2	0	0	0	1	234	0 / 226	0 / 204	0 / 0

Vector-borne disease：**C**;Crimean-Congo Hemorrhagic Fever, **HF**;Hemorrhagic Fever with Renal Syndrom, **HP**;Hantavirus Pulmonary Syndrome, **L**;Lassa fever, **P**;Plague, **S**;South American Hemorrhagic Fevers

Table 7 -2. Results of rodent(including flea and tick) inspection by rat or mouse-trap at Japanese Quarantine airports in 2022

Quarantine port	3-letter code(IATA), UN-CODE	Quarantine code	No. of meshes (1km mesh)	No. of traps	Species / Vector and reservoir or host / Fleas(No. of samples collected)							Tticks(No. of samples collected)																Rodents(No. of samples collected)														Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples/No.of samples		
					Xenopsylla cheopis	*Nosopsyllus fasciatus*	*Ctenophthalmus Kolenati*	*Leptopsylla segnis*	*C.congener truscus*	Unidentfied fleas	Total	*Ixodes*	*Laelaps nuttalli*	*Laelaps algericus*	*Laelaps echidninus*	*Laelaps jettmari*	*Laelaps microti*	*Haemaphysalis hystricis*	*Ixodes granulatus*	*Eulaelaps onoi*	*Ixodes monospinosus*	*Haemaphysalis longicornis*	*Haemaphysalis*	*Macrocheles*	*Laelapidae*	Unidentfied ticks	Total	*Rattus rattus*	*Rattus norvegicus*	*Mus musculus*	*Apodemus speciosus*	*Apodemus argenteus*	*Apodemus sylvaticus*	*Micromys minutus*	*Microtus montebelli*	*Clethrionomys rufocanus bedfordiae*	*Apodemus speciosus ainu*	*Peromyscus sp.*	*Peromyscus maniculatus*	Unidentfied rodents	Total	Plague	HFRS(Hamorrhagic Fever with Renal Syndrome)	HPS(Hantavirus Pulmonary Syndrome)
Invasive species																																						●	●					
Primary vector					P																																	HP	HP					
Secondary vector						P																						HF,P	HF,P	P	P	P	P	P	P	P	P	P	P					
New Chitose AP	SPK	193	7	560							0																0														0			
Asahikawa AP	AKJ	194	2	160							0																0			1											1	0 / 1	0 / 1	
Hakodate AP	HKD	195	4	160							0																0														0			
Aomori AP	AOJ	196	10	800							0																0					1			2						3	0 / 3	0 / 3	
Sendai AP	SDJ	197	17	1,280							0				3	4											7			3	7										10	0 / 10	0 / 10	
Akita AP	AKP	198	5	400							0		5														5		1						1						2	0 / 2	0 / 2	
Fukushima AP	FKS	199	2	160							0					1											1				7	2									9	0 / 9	0 / 9	
Narita International AP	NRT	200	24	1,896							0									5							5	1		3	8										12	0 / 11	0 / 11	
Tokyo International AP	HND	201	19	1,312							0		14	23													37		5	15											20	0 / 18	0 / 18	
Niigata AP	NII	202	6	400							0																0				1										1	0 / 1	0 / 1	
Komatsu AP	KMQ	204	6	480							0																0		1												1	0 / 1	0 / 1	
Chubu Centrair International AP	NGA	205	15	180							0																0														0			
Kansai International AP	KIX	206	27	2,136							0																0			12											12	0 / 11	0 / 11	
Okayama AP	OKJ	207	10	800							0																0				1										1	0 / 1	0 / 1	
Miho AP	YGJ	208	5	400							0																0				5										5	0 / 5	0 / 5	
Fukuoka AP	FUK	212	15	1,200							0																0			5											5	0 / 5		
Kitakyushu AP	KKJ	213	6	480							0																0														0			
Oita AP	OIT	214	2	80							0																0														0			
Nagasaki AP	NGS	215	5	400							0																0			19											19	0 / 19	0 / 19	
Kumamoto AP	KMJ	216	5	400							0																0														0			
Miyazaki AP	MZA	217	10	800							0					24											24				2										2	0 / 2		
Kagoshima AP	KOP	218	4	320							0					19							3			3	25				3										3	0 / 3	0 / 3	
Naha AP	NAP	219	11	800							0		3						6								9	19		12										1	32	0 / 31	0 / 31	
Shizuoka AP	FSZ	222	1	80							0																0														0			
Hyakuri AP	IBK	223	5	400							0																0														0			
Saga AP	QSG	225	4	320							0																0			1											1			
合　計 Total			227	16,404	0	0	0	0	0	0	0	0	22	23	3	48	0	0	6	5	0	0	3	0	0	3	113	20	7	71	34	3	0	0	3	0	0	0	0	1	139	0 / 133	0 / 126	0 / 0

Vector-borne disease：**C**;Crimean-Congo Hemorrhagic Fever, **HF**;Hemorrhagic Fever with Renal Syndrom, **HP**;Hantavirus Pulmonary Syndrome, **L**;Lassa fever, **P**;Plague, **S**;South American Hemorrhagic Fevers

Table 7 -3. Species and number of rodents and rat fleas captured by mouse-trapsat Quarantine port and airports, Japan in 2022

Quarantine port	3-letter code(IATA), UN-CODE	No. of meshes (1km mesh)	No. of traps	Species / Vector and reservoir or host / Fleas(No. of samples collected)							Tticks(No. of samples collected)																Rodents(No. of samples collected)														Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples/No.of samples		
				Xenopsylla cheopis	*Nosopsyllus fasciatus*	*Ctenophthalmus Kolenati*	*Leptopsylla segnis*	*C.congener truscus*	Unidentfied fleas	Total	*Ixodes*	*Laelaps nuttalli*	*Laelaps algericus*	*Laelaps echidninus*	*Laelaps jettmari*	*Laelaps microti*	*Haemaphysalis hystricis*	*Ixodes granulatus*	*Eulaelaps onoi*	*Ixodes monospinosus*	*Haemaphysalis longicornis*	*Haemaphysalis*	*Macrocheles*	*Laelapidae*	Unidentfied ticks	Total	*Rattus rattus*	*Rattus norvegicus*	*Mus musculus*	*Apodemus speciosus*	*Apodemus argenteus*	*Apodemus sylvaticus*	*Micromys minutus*	*Microtus montebelli*	*Clethrionomys rufocanus bedfordiae*	*Apodemus speciosus ainu*	*Peromyscus sp.*	*Peromyscus maniculatus*	Unidentfied rodents	Total	Plague	HFRS(Hamorrhagic Fever with Renal Syndrome)	HPS(Hantavirus Pulmonary Syndrome)
Invasive species																																				●	●					
Primary vector				P																																HP	HP					
Secondary vector					P																						HF,P	HF,P	P	P	P	P	P	P	P	P	P	P					
Total		759	50,306	0	4	2	0	0	0	6	1	150	34	81	49	0	0	6	13	0	0	3	2	0	4	343	77	79	146	53	4	0	0	10	2	0	0	0	2	373	0 / 359	0 / 330	0 / 0

Vector-borne disease：**C**;Crimean-Congo Hemorrhagic Fever, **HF**;Hemorrhagic Fever with Renal Syndrom, **HP**;Hantavirus Pulmonary Syndrome, **L**;Lassa fever, **P**;Plague, **S**;South American Hemorrhagic Fevers

Table 8. Summary of risk assessment of vector - borne disease at Japanese Quarantine ports and airports in 2022

		Dengue	Japanese encephalitis	West nile fever	Malaria	Chikungunya fever	Zika virus disease	Plague	Hemorrhagic fever with renal syndrome	Hantavirus pulmonary syndrome	Lassa fever	South American hemorrhagic fever
		No. of ports and airports										
Primary, secondary, and possible vector or reservoir were found		95	103	115	14	87	87	65	33	0	0	0
Risk category	A	26	18	6	107	34	34	42	74	107	107	107
	B	95	102	115	14	87	87	65	33	0	0	0
	C	0	0	0	0	0	0	0	0	0	0	0
	D	0	1	0	0	0	0	0	0	0	0	0
合　計	Total	121	121	121	121	121	121	107	107	107	107	107

Risk category	Definition	
	Mosquitoes inspection	Rodents inspection
A：Very low	No vector mosquito (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. or no mosquito is captured during permanent surveillance, etc. in the Cabinet Order-specified areas.	No rodent is captured during permanent surveillance, etc. in the Cabinet Order specified areas.
B：Low	Vector mosquitos (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured do not possess any pathogen or gene of pathogen for quarantinable infectious disease or the like.	Indigenous rodents (primary or secondary species) or fleas/mites (primary or secondary species) known to transmit quarantinable infectious diseases or the like are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. None of them possesses any antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like.
C：Moderate	Adults or larvae of invasive vector mosquitos (primary species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured do not possess any pathogen or gene of pathogen for quarantinable infectious disease or the like.	Invasive rodents (primary or secondary species) or fleas/mites (primary or secondary species) known to transmit quarantinable infectious diseases or the like are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. None of them possesses any antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like.
D ：High	Adults of vector mosquitos (primary, secondary, or possible species) transmitting mosquito-borne infectious diseases, etc. are captured during permanent surveillance, etc. in the Cabinet Order-specified areas. The mosquitoes captured possess the pathogen or gene of pathogen for quarantinable infectious disease or the like.	An antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious disease or the like is detected in the rodents (primary or secondary species) or fleas/mites known to transmit quarantinable infectious diseases or the like (dominant or secondary species) captured during the permanent surveillance, etc. in the Cabinet Order-specified areas.

※ If any mosquito or rodent has been caught on a ship or aircraft, it is considered as a temporary invasion not covered by the risk evaluation program because the space inside ships or aircrafts is not included in the Cabinet Order-specified areas.

Figure 1-1　Quarantine seaports and airports investigated in 2022 (Quarantine CODE)

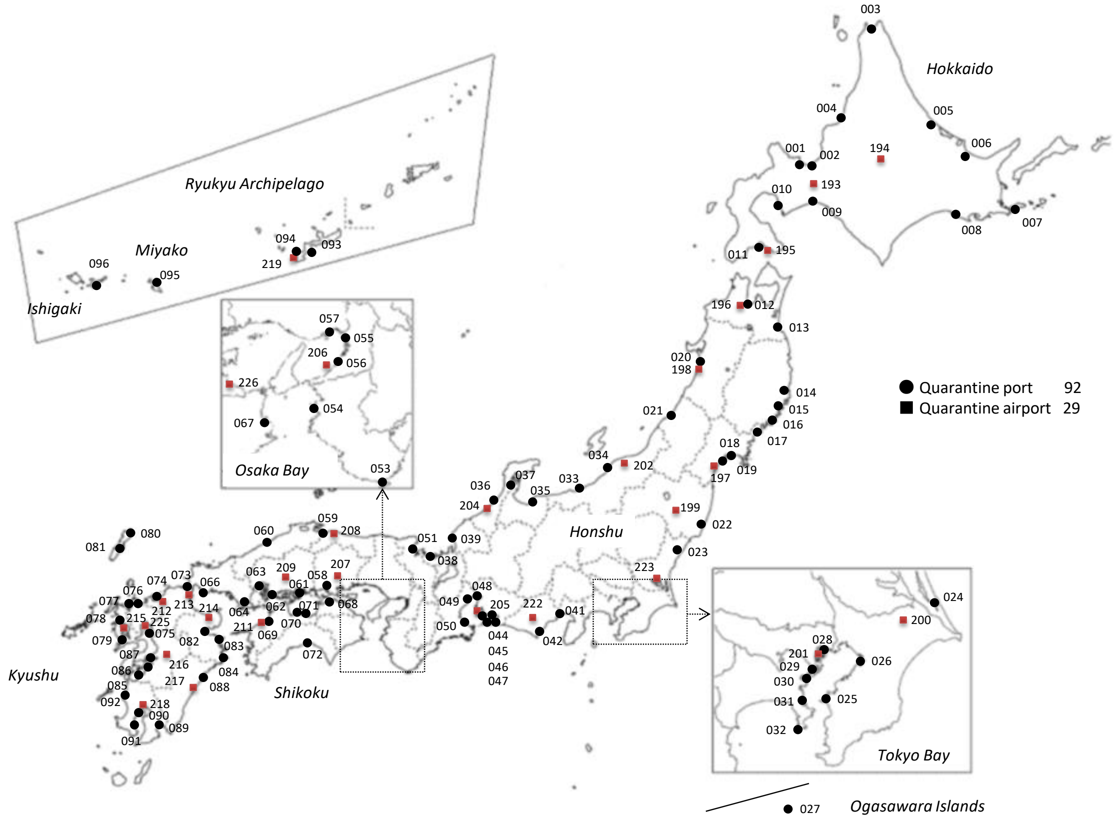


Figure 1-2　Quarantine seaports and airports investigated in 2022 (UN/LOCODE)

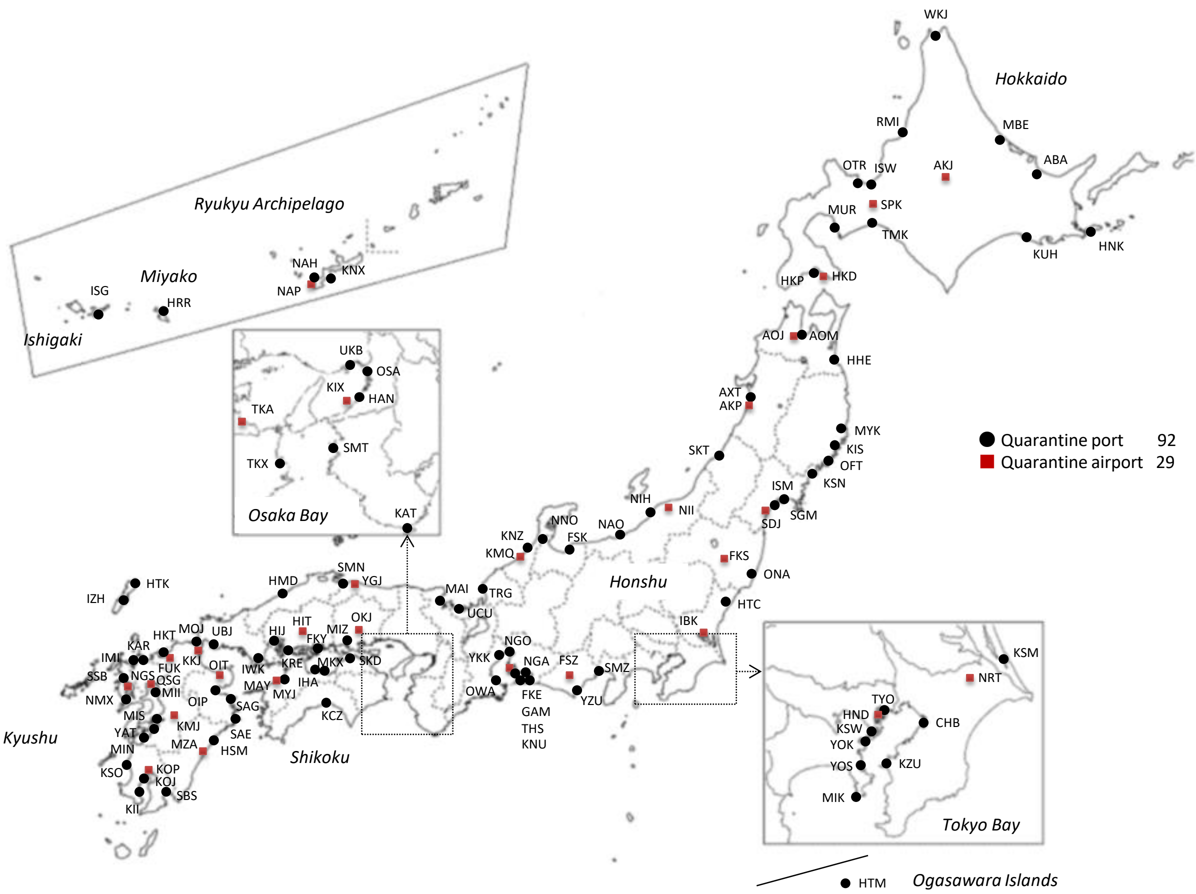


Figure2　Invasive mosquitoes found in international aircraft and the origin of the flights in 2022

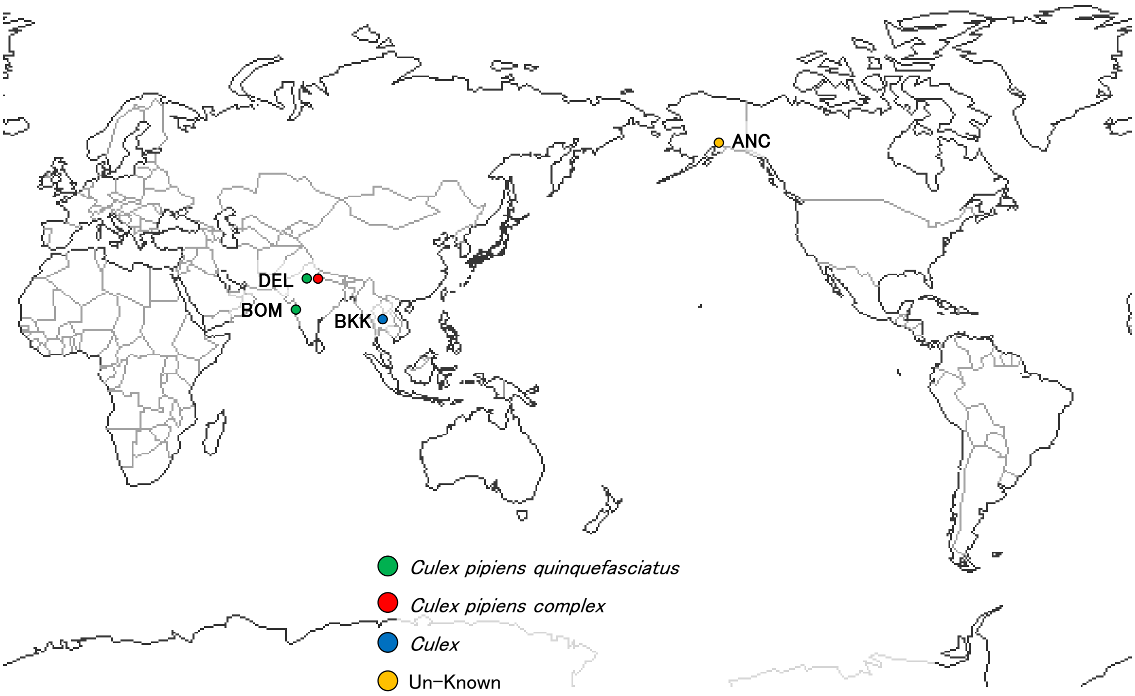


Figure3　Vector situations of chikungunya fever and zika virus disease at quarantine seaports and airports, Japan in 2022

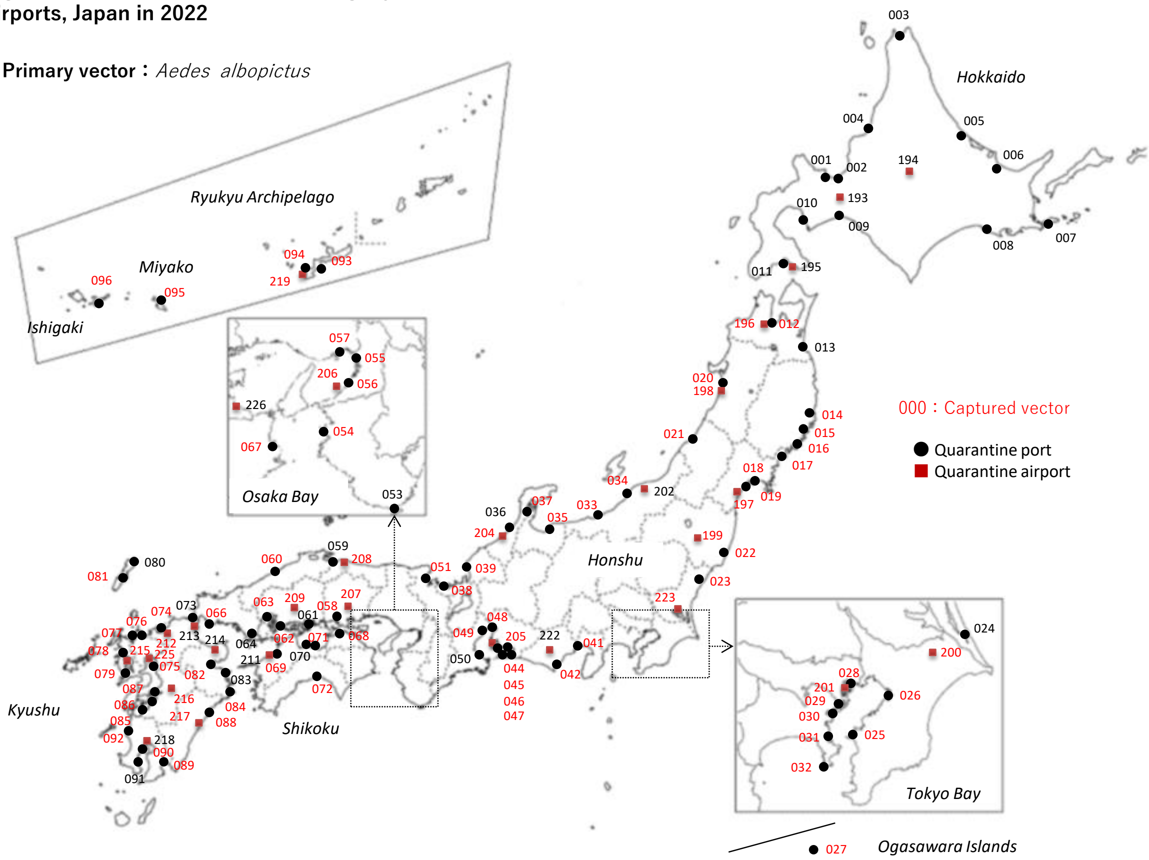


Figure4 Vector situations of dengue fever at quarantine seaports and airports, Japan in 2022.

Primary vector：*Aedes albopictus*
Possible vector：*Aedes dorsalis*、 *Aedes flavopictus*、 *Culex tritaeniorhynchus*

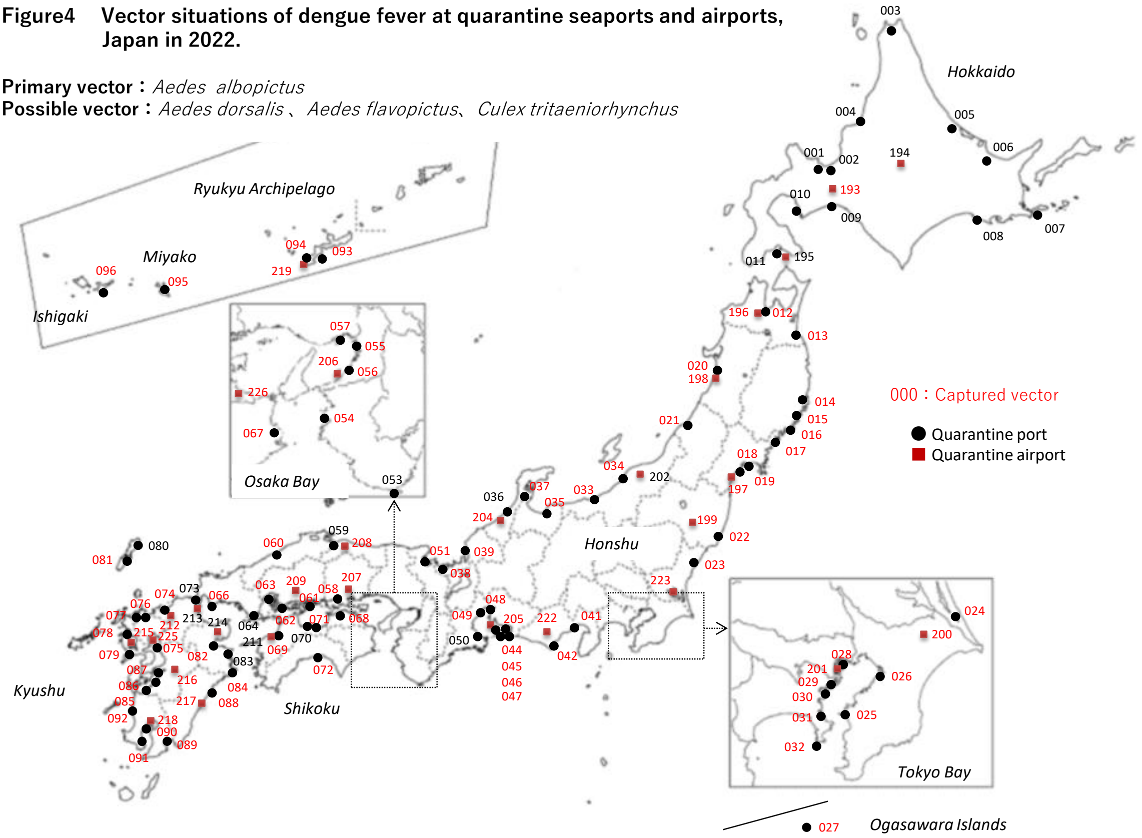


Figure5 Vector situations of malaria at quarantine seaports and airports, Japan in 2022

Primary vector：*Anopheles sinensis*
Secondary vector：*Anopheles lesteri*

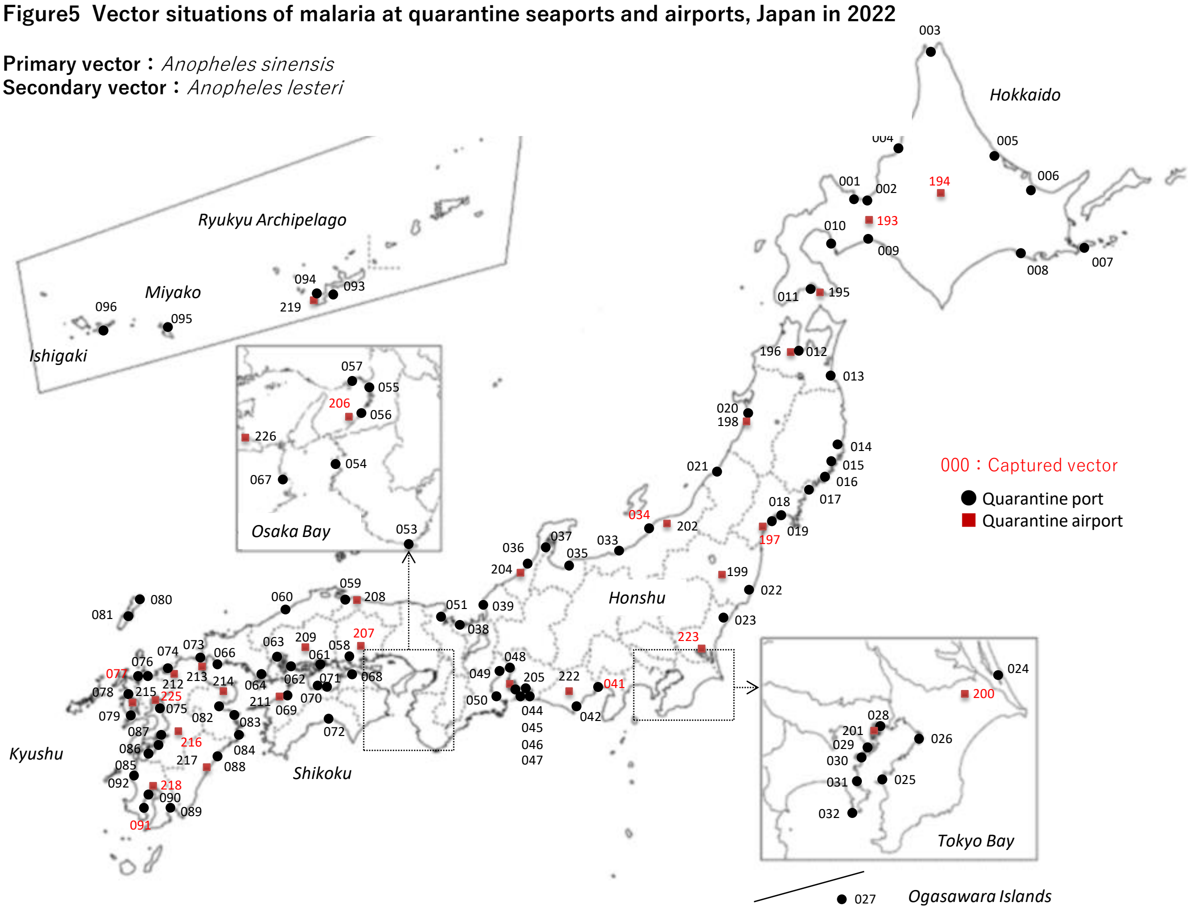


Figure6 Vector situations of West Nile fever at quarantine seaports and airports, Japan in 2022

Primary vector： *Culex pipiens quinquefasciatus*、 *Culex pipiens* Complex

Secondary vector： *Anopheles sinensis*、 *Aedes albopictus*、 *Aedes vexans nipponii*、 *Aedes japonicuse*、 *Aedes dorsalis*、 *Aedes togoi*、 *Aedes flavopictus*、 *Armigeres subalbatus*、 *Culex inatomii*、 *Culex tritaeniorhynchus*

Possible vector： *Cuex sitiens*

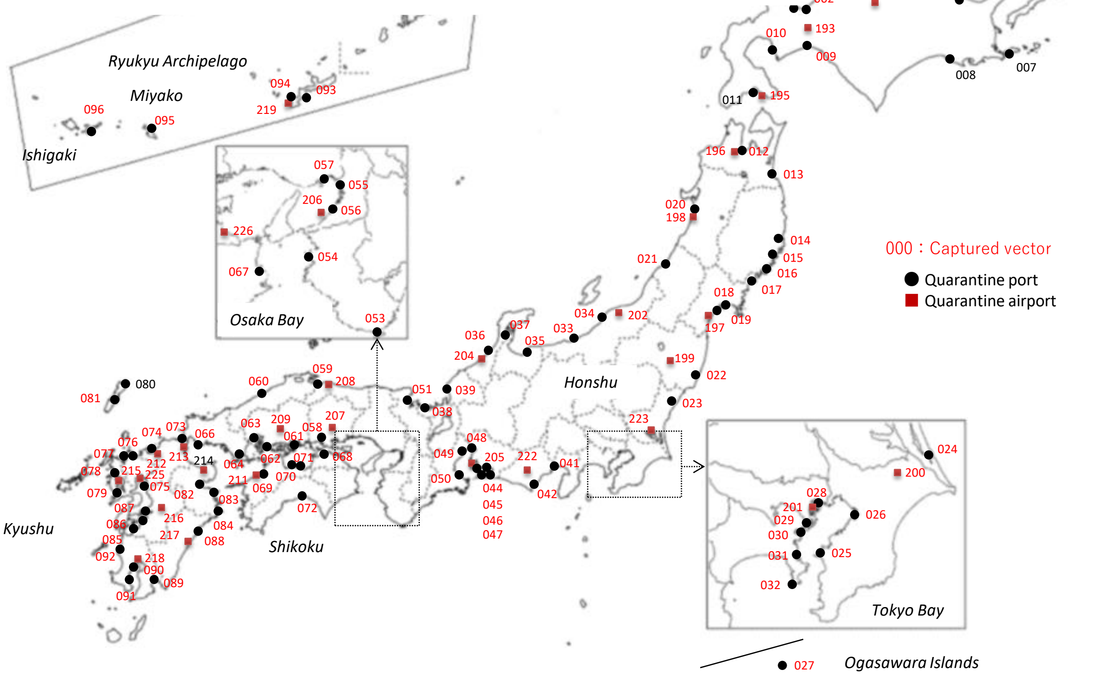


Figure7 Vector situations of Japanese encephalitis at quarantine seaports and airports, Japan in 2022

Primary vector： *Culex tritaeniorhynchus*

Possible vector： *Aedes albopictus*、 *Aedes japonicuse*、 *Aedes togoi*、 *Culex pipiens quinquefasciatus* *Culex bitaeniorhynchus*、 *Culex sitiens*

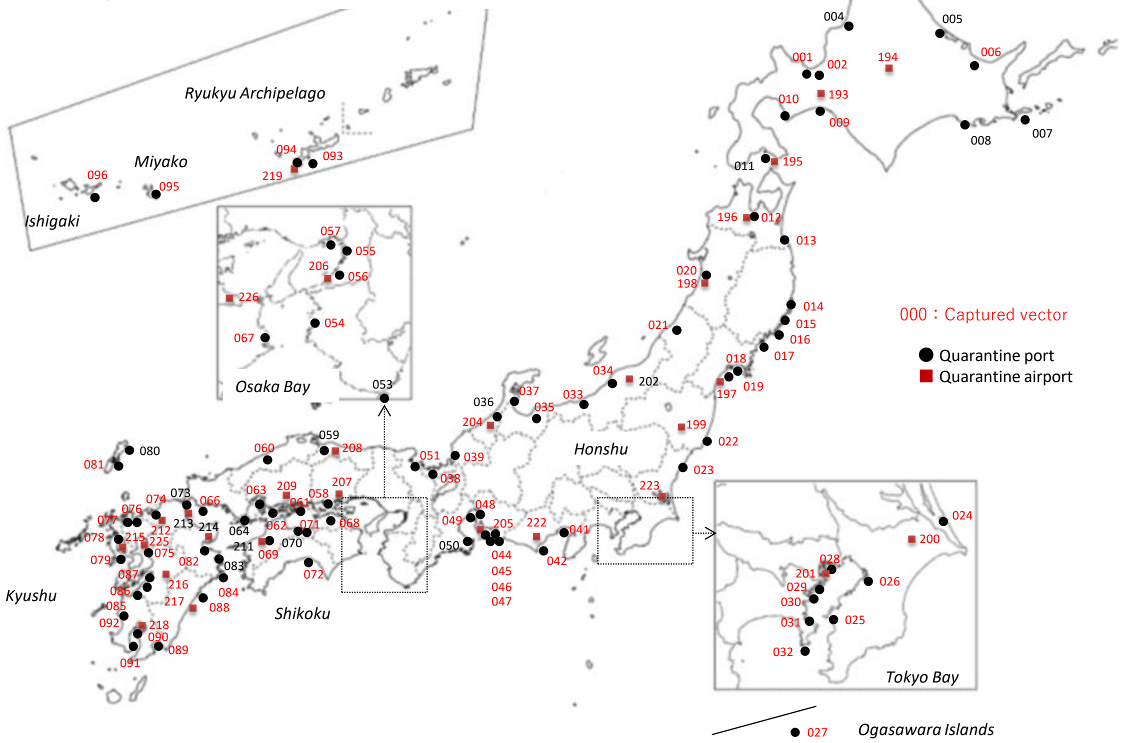


Figure8　Vector and host situations of Plague at quarantine seaports and airports, Japan in 2022

Secondary vector： *Nosopsyllus fasciatus*
Host： Rodents

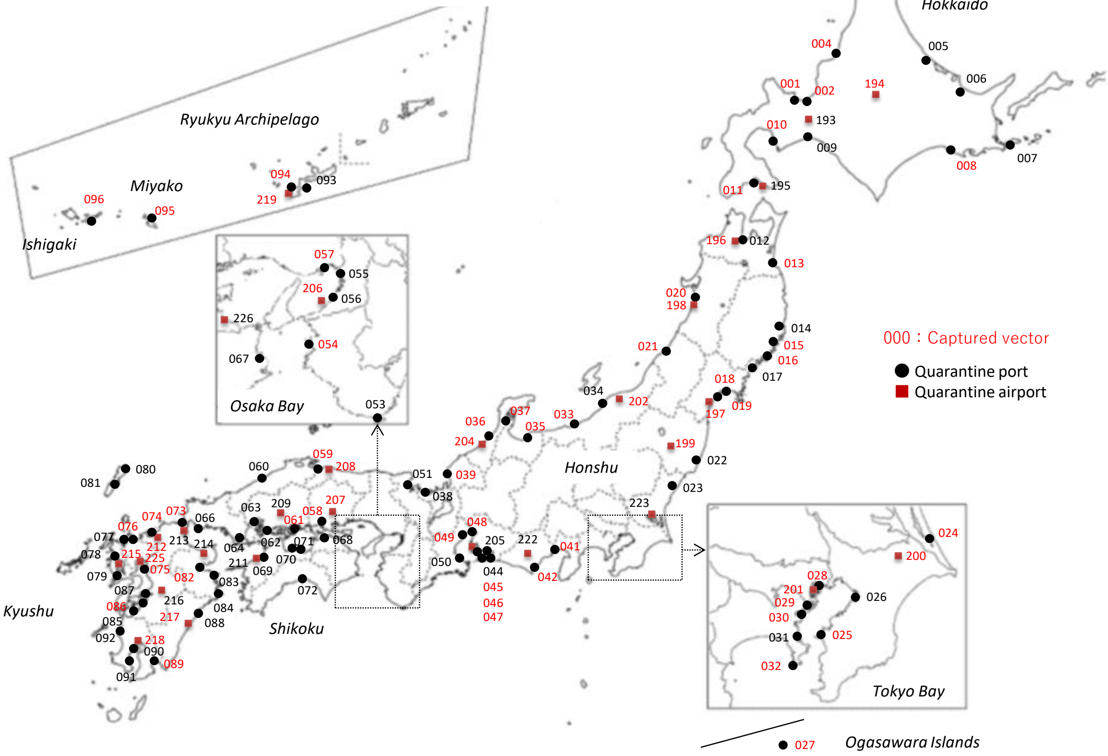


Figure9　Vector situations of hemorrhagic fever with renal syndrome at quarantine seaports and airports, Japan in 2022.

Secondary vector： *Rattus rattus*、 *Rattus norvegicus*

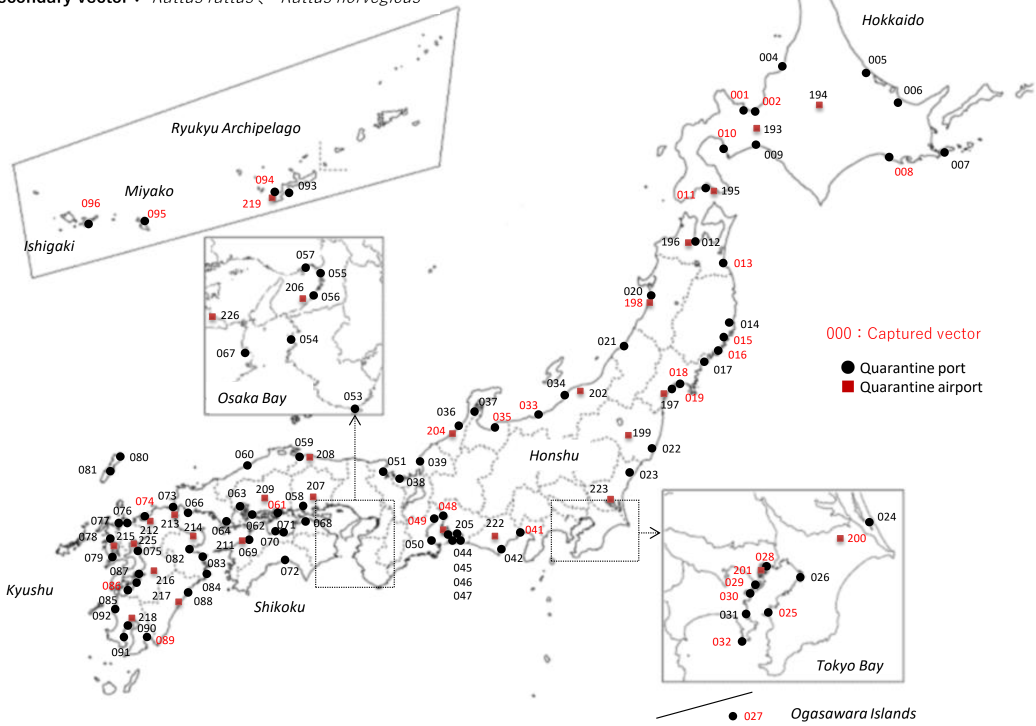


Figure10 Exotic mosquitoes and pathogens detected at points of entry in 2002-2022

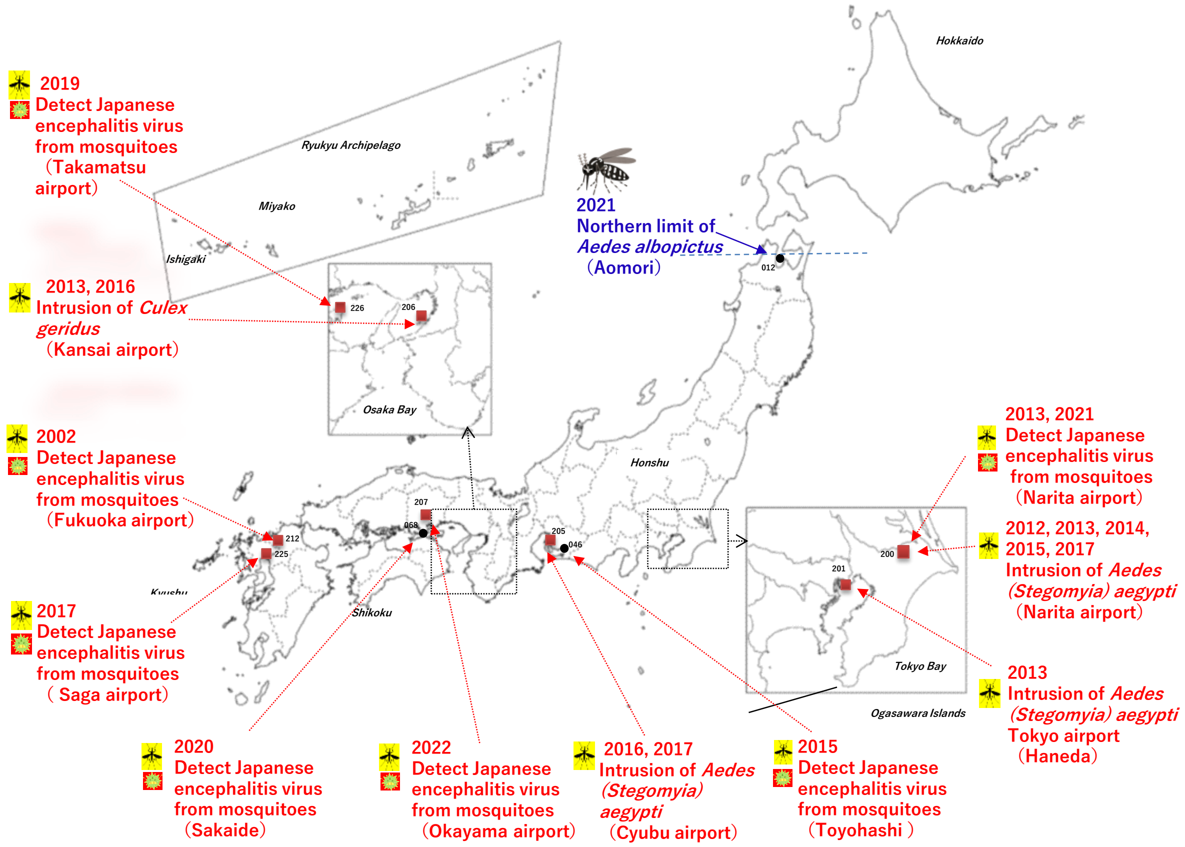
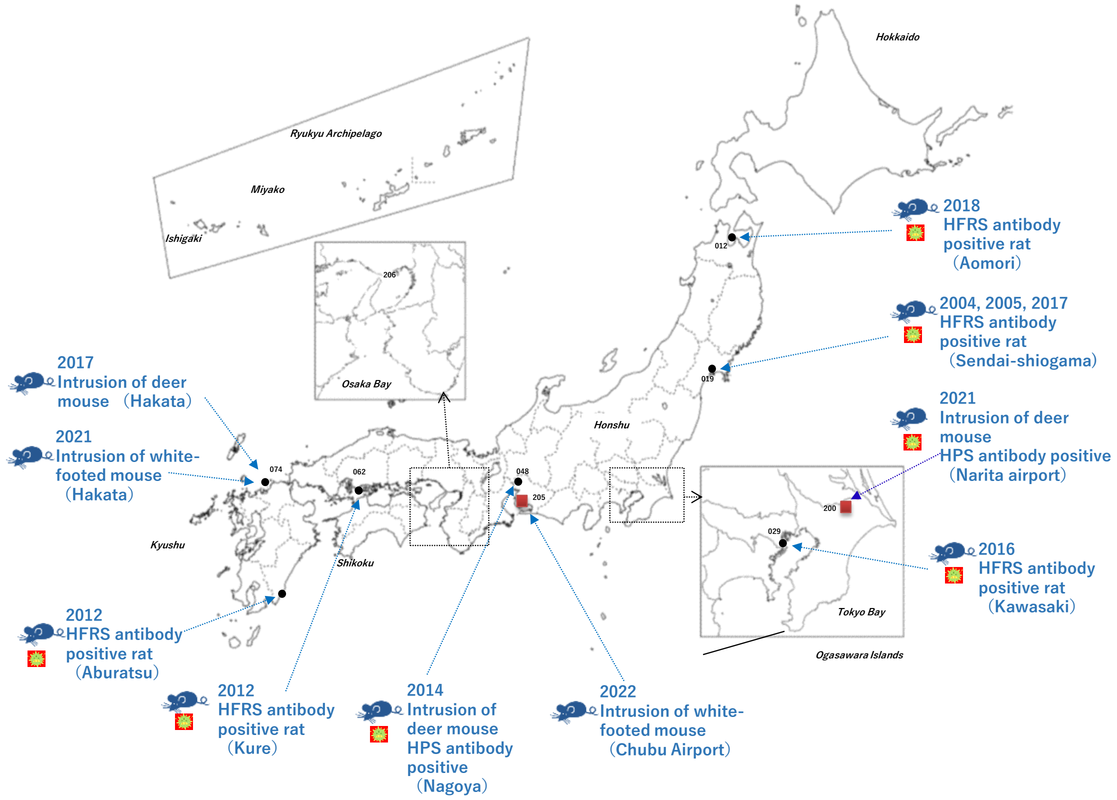


Figure11 Exotic rodents and pathogens detected at points of entry in 2002-2022



○**Quarantine Act** (excerpts) (Finally amended: Act No.96 December 9, 2022)

Chapter I General Provisions

(Purpose)

Article 1 The purpose of this Act is to prevent pathogens of infectious diseases that are not endemic in Japan from entering the country via vessels or aircrafts, as well as to take other necessary measures concerning vessels or aircrafts to prevent infectious diseases.

(Quarantinable Infectious Disease)

Article 2 The term "Quarantinable Infectious Diseases" as used in this Act means the following infectious diseases:

(i) class I infectious diseases specified in the Act on Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases (Act No. 114 of 1998);

(ii) infectious diseases such as novel influenza A specified in the Act on Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases; or

(iii) beyond the diseases listed in the previous two items, diseases specified by Cabinet Order as those which require inspection in order to prevent pathogens of infectious diseases not endemic to Japan from entering the country.

(Application of this Act to Suspected Carriers and Asymptomatic Carriers)

Article 2-2 In this Act, suspected carriers for infectious diseases listed in item 1 of the preceding Article are deemed patients with infectious diseases listed in the same item; therefore this Act applies to them.

(2) In this Act, suspected carriers for infectious diseases listed in item (ii) of the preceding Article that may be infected with pathogens of the infectious disease are deemed to be patients with infectious diseases listed in the same item; therefore this Act applies to them.

(3) Individuals possessing the pathogen for any of the infectious diseases listed in Item 1 or 2 of the preceding article but presenting with no symptom of the disease concerned shall be deemed as patients with the infectious diseases listed therein; therefore this Act applies to them.

(Quarantine Ports)

Article 3 The term "Quarantine Port" or "Quarantine Airport" as used in this Act means ports or airports specified by Cabinet Order respectively.

Chapter III Other Public Health Operations conducted by Quarantine Station Chiefs

(Investigation and Sanitation Measures to be carried out by the Quarantine Station Chief)

Article 27 A quarantine station chief may investigate food, drinking water, waste material, wastewater, rodents and insects in vessels or aircrafts within areas of Quarantine Ports or

Quarantine Airports provided the area is specified by Cabinet Order, or investigate sea water, waste material, wastewater, rodents and insects in facilities, buildings and other places located in the areas, in order to determine the existence of insects that are a vector of pathogens of a Quarantinable Infectious Disease or similar infectious diseases specified by Cabinet Order, and to clarify sanitation measures with respect to these diseases in a Quarantine Port or Quarantine Airport, or have a quarantine officer do it.

(2) If a quarantine station chief deems an infectious disease provided for in the preceding paragraph to be prevalent or finds there to be a risk of this, the quarantine station chief may, within the areas specified by Cabinet Order pursuant to the provisions of the preceding paragraph, exterminate rodents or insects, or clean or sterilize vessels or aircrafts in the areas, or facilities, buildings and other places located in the areas, or may perform health checks or exterminate insects with regard to persons engaging in work in the areas, or have a quarantine officer or other person deemed as appropriate do it.

(3) If measures are taken as set forth in the preceding paragraph, the quarantine station chief must give notification of this promptly to the chief of the relevant administrative body.

○Quarantine Act Enforcement Order (excerpts)(Finally amended: Cabinet Order No. 377, December 9, 2022)

(Quarantinable infectious diseases specified by the Cabinet Order)

Article 1 The Cabinet Order-specified infectious diseases mentioned in Article 2 Item 3 of the Quarantine Act (hereinafter simply called “the Act”) include Zika virus disease, Middle East respiratory syndrome (confined to the syndrome caused by MERS coronavirus of the genus *Betacoronavirus*; hereinafter called “MERS” in Separate Table 2), dengue fever, avian influenza (confined to the influenza caused by serotype H5N1 or H7N9 influenza A virus of genus *Influenzavirus A*; hereinafter called “avian influenza H5N1/H7N9” in the same table), and malaria.

(Infectious diseases equivalent to quarantinable infectious diseases)

Article 3 The Cabinet Order-specified infectious diseases mentioned in Article 27 Paragraph 1 of the Act include West Nile fever, hemorrhagic fever with renal syndrome, Japanese encephalitis, and hantavirus pulmonary syndrome.

○**Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases** (excerpts) (Finally amended: Act No.96, December 9, 2022)

Article 6 (1) The term "Infectious Disease" as used in this Act means a Class I Infectious Disease, a Class II Infectious Disease, a Class III Infectious Disease, a Class IV Infectious Disease, a Class V Infectious Disease, a Novel Influenza Infection, etc., a Designated Infectious Disease, or a New Infectious Disease.

(2) The term "Class I Infectious Disease" as used in this Act means any of the following

Infectious Diseases:
(i) Ebola haemorrhagic fever;
(ii) Crimean-Congo haemorrhagic fever;
(iii) smallpox;
(iv) South American haemorrhagic fever;
(v) plague;
(vi) Marburg virus disease;
(vii) Lassa fever.

○Notification No. 0324-3 (MHLW Department of Food Safety, March 24, 2014) "Guide to Port Sanitation Control" (Finally Amended June 20, 2019) (Issued from Manager of the Office of Quarantine Station Administration to Chief of Each Quarantine Station)

The surveillance and sanitation measures to be conducted by the quarantine station chief pursuant to Article 27 of the Quarantine Act have been implemented in accordance with "Sanitation Measures in Seaport and Airport Areas" (Notification No. Seiei-1415, Director of Environmental Health Bureau) and "Guide to Sanitation Control in Ports, etc." (Notification No. Seishokuken-0212-2, Manager of the Office of Quarantine Station Administration). Recently the amended International Health Regulations (IHR2005) came into full effect, requiring control of infectious disease vector animals, etc. at all cross-border entry points. In view of this situation and the necessity for efficient and valid surveillance and sanitation measures based on risk assessment, we have prepared "Port Sanitation Control Guidelines", "Rodent Surveillance Manual", "Mosquito Surveillance Manual", and "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted via Vector Animals, etc." as given in the appendices. We hereby request you to follow these guidelines and manuals when implementing sanitation control in port, etc.

Appendix 1 "Port Sanitation Control Guidelines"
Appendix 2 "Rodent Surveillance Manual"
Appendix 3 "Mosquito Surveillance Manual"
Appendix 4 "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."

Appendix 1

Port Sanitation Control Guidelines (excerpts)

1. Objectives

It has been reported that epidemics of emerging/remerging infections have broken out frequently in foreign countries, expanding rapidly to extensive areas under the trend of increasing speed, scale, etc. of the means of transportation. Under such a trend of globalization of infections, there is now a concern over the invasion and establishment of infectious diseases previously not indigenous in Japan.

Under such circumstances, it is critical to prevent the invasion and spread in Japan of quarantinable infectious diseases and infectious diseases equivalent to quarantinable infectious diseases (hereinafter collectively called “quarantinable infectious diseases or the like”) as well as the animals, etc. potentially serving as vectors for quarantinable infectious diseases or the like (“vector animals, etc.”).

This set of guidelines is aimed at facilitating rational and efficient surveillance of vector animals, etc. invading our country via the ships/aircraft arriving from countries with epidemics of quarantinable infectious diseases or the like and at ensuring appropriate port sanitation measures on the basis of the data from surveys of the status of colonization of vector animals, etc. in the seaport/airport areas defined in Separate Table 3 of the Quarantine Act Enforcement Regulations set forth pursuant to Article 27 Paragraph 1 of the Quarantine Act (Law No. 201, 1951). This objective will contribute to the securing of the sanitation and control of vector animals, etc. at the points of cross-border entry required under the International Health Regulations (IHR2005).

Port sanitation measures include: (1) risk assessment on the basis of the results of surveillance conducted at each quarantine station using the nationwide uniform procedure; (2) implementation of surveillance of vector animals, etc. invading our country via ships/aircraft on the basis of the risk assessment findings; and (3) implementation of surveys on the status of colonization of vector animals, etc. in port areas, etc. When these measures are taken, each quarantine station is required to ensure the efficiency and preciseness of the measures taken in a manner corresponding to the assessment level. The surveillance of drinking water, meals provided within aircraft, seawater, and waste water should be implemented as needed, for example, upon the outbreak of an infection cluster attributable to any of these factors.

2. Infections covered by surveillance

The infections covered by port sanitation control include the quarantinable infectious diseases transmitted by rodents and insects (Crimean/Congo hemorrhagic fever, South American hemorrhagic fever, plague, Lassa fever, Zika virus disease, Chikungunya fever, dengue fever, and malaria) and infectious diseases equivalent to quarantinable infectious diseases (West Nile fever, hemorrhagic fever with renal syndrome), Japanese encephalitis, and hantavirus pulmonary syndrome.

The vector animals or the like covered by the surveillance of these infectious diseases are listed below. A surveillance manual needs to be prepared for each of these surveillance targets.

(1) Rodents, etc.

- Rodents: South American hemorrhagic fever, plague, Lassa fever, hemorrhagic fever with renal syndrome, and hantavirus pulmonary syndrome
- Fleas: Plague
- Mites: Crimean/Congo hemorrhagic fever

*Surveillance of mites serving as vectors for Crimean/Congo hemorrhagic fever is implemented under instruction of the Office of Quarantine Station Administration on the basis of the overseas epidemic status.

(2) Mosquitoes

Zika virus disease, Chikungunya fever, dengue fever, malaria, West Nile fever, and Japanese encephalitis

3. Implementation of port sanitation control

If invasion or colonization of vector animals, etc. for quarantinable infectious diseases or the like occurs, the nation's health may be affected seriously. For this reason, vector surveillance is quite important as a port sanitation measure.

Each quarantine station is therefore required to conduct the surveillance of vector animals, etc. invading Japan from overseas in a well-planned manner throughout each year, corresponding to the risk of invasion, and to implement periodical surveys of the type, distribution, etc. of each species for assessment of the status of domestic colonization of invasive species.

For this kind of surveillance, the permanent survey points and the survey areas need to be set in accordance with Appendix 1-1 "Setup of Survey Areas for Surveillance" and the surveillance should be implemented on the basis of a preset annual plan. The frequency of survey needs to be set in accordance with "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."(Appendix 4).

The head office of each quarantine station is required to check the permanent survey points and the survey areas set by each branch/satellite office as well as the surveillance plan, method, evaluation, etc., and to provide supervision and advice objectively. At the same time, the information from the permanent survey points of each quarantine station needs to be submitted to the Officer for Analysis on Sanitation Control, to enable summarization and objective evaluation, supervision, and advice.

4. Utilization of surveillance data and provision of information

Summarization and analysis of results are necessary to enable effective utilization of the results of port sanitation surveillance. It is also important to summarize the thus obtained information as port area permanent survey point information.

(1) At each quarantine station, the status of colonization of vector animals, etc. needs to be assessed and analyzed on the basis of the results of port sanitation surveillance conducted. The results need to be registered with the Officer for Analysis on Sanitation Control.

(2) The Officer for Analysis on Sanitation Control is required to analyze the summarized data from nationwide quarantine stations and to submit a report to the Office of Quarantine Station Administration.

The same officer is additionally required to provide the obtained information to each quarantine station periodically with an appropriate method.

(3) At each quarantine station, a surveillance plan for the next year needs to be devised in accordance with the "Manual for Risk Assessment of Quarantinable Infectious Diseases or the

Like Transmitted by Vector Animals, etc."(Appendix 4), reflecting the results from the surveillance in a given year, and to implement the thus planned surveillance in the next year.

(4) The Office of Quarantine Station Administration is required to disseminate the required survey frequency and measures to each quarantine station and to provide the information related to the port sanitation surveillance results to the nation in an appropriate way.

5. Linkage to domestic infection control organizations, etc.

The port sanitation control is aimed at inspecting the invasion of quarantinable infectious diseases
or the like into Japan via vector animals, etc. and to prevent epidemics of such diseases in Japan.

To this end, linkage to the domestic infection control organizations (local government departments/bureaus in charge of infection control, local health stations, etc.: hereinafter called "related administrative organs") as well as airport administration companies, warehouse/port administration companies, airlines, shipping companies, shipping agents, etc. ("enterprises") is indispensable. Under cooperation with these administrative organs and enterprises, the inspection needs to be reinforced and infection control measures, such as pest control, should be taken.

To ensure such linkage, it is essential for each quarantine station to provide the information about surveillance results to the related administrative organs and enterprises and to reinforce linkage to these parties.

6. Infection-preventive measures during port sanitation control

(1) Preventive measures at the time of port sanitation surveillance

The surveyors are required to use an insect repellent and to wear appropriate clothing, gloves, safety shoes, etc. when conducting surveys so that they may not sustain health hazards.

(2) Preventive measures upon emergency

Upon emergency (e.g., upon detection of any vector animal, etc. possessing the pathogen for the infectious disease being surveyed), measures for prevention of exposure to the pathogen (e.g., wearing a mask, anti-dust goggles, boots, etc.) need to be taken, in addition to the ordinary preventive measures. If contact with the vector animal, etc. has occurred, the surveyor should receive prophylactic oral doses of antibiotics and follow-up of health condition as needed.

7. Utilization of a cooperative support system, etc.

The information about specific cases and the reference data, etc. collected at each quarantine station will be entered into the cooperative support system, etc. to facilitate the accumulation of relevant information.

The categories of information to be entered into the cooperative support system and the frequency of entry are specified below.

(1) Reports on focused surveys and measures taken upon emergency and reports on specific cases arisen within aircraft

(2) Table of the species of vectors for quarantinable infectious diseases or the like: To be updated by the Officer for Analysis on Sanitation Control, and each update to be entered into the cooperative support system by the Office of Quarantine Station Administration.

(3) Reference information such as identification/search table, papers and other documents: Gathered from each quarantine station and entered upon acquisition into the system by the Office of Quarantine Station Administration.

Appendix 2

Rodent Surveillance Manual (excerpts)

1. Introduction

Rodent surveillance is aimed at assessing the colonization of rodents and other species (including parasitic fleas serving as plague vectors) and detecting the presence of rodents and other species not indigenous in our country ("invasive vectors") in a well-planned manner in the port areas set for each quarantine seaport and airport ("quarantine ports") for the purpose of the prevention of invasion and epidemic of rodent-borne South American hemorrhagic fever, plague, Lassa fever, hemorrhagic fever with renal syndrome, and hantavirus pulmonary syndrome ("rodent-borne infectious diseases") among all quarantinable infectious diseases or the like.

The term "rodents" in this manual indicates primarily animals of the family *Muridae*.

2. Rodent surveillance

To check for the invasion of rodent-borne infectious diseases, permanent survey points are preferentially set at the following locations having a high risk for invasion in accordance with "Setup of permanent survey points and trap installment points for rodent surveillance" (Appendix 2-1): (1) around the piers and inside the buildings/warehouses/container yards, etc. accommodating international cargoes at ports visited by ocean-going ships; and (2) around the terminal buildings and inside the cargo unloading areas, international cargo-accommodating buildings, etc. at airports. Surveillance is conducted at these points/locations with a certain frequency and method.

Under normal circumstances, the permanent surveillance and, as needed, "questionnaire survey" (Appendix 2-4) are conducted. Under unusual circumstances (e.g., cases where invasion by invasive vectors is likely), a focused survey is conducted. Upon detection of the pathogen for any rodent-borne infectious disease or the antibody to its pathogen, sanitation measures need to be taken with reference to the "Rodent-related Emergency Measures Manual" (Appendix 2-5) and "Collection of Examples Related to Rodent Surveillance Reinforcement, Pest Control, etc." (Clerical Communication issued by the Office of Quarantine Station Administration).

(1) Survey by capture

Rodents are to be captured alive, as a rule, to enable assessment of the invasion of rodent-borne infectious diseases and the colonization/distribution of rodents, parasitic fleas, and mites. To enable the survey efficiency, permanent survey points are set and rodents are captured with a certain frequency and method. In view of the possibility that birds, unintended animals, etc. are captured by the traps, the traps need to be used appropriately in compliance with the "Act on Welfare and Management of Animals" (Law No. 105, October 1, 1973) and "Act on Ensuring Appropriate Protection and Hunting of Birds and Other Animals" (Law No. 88, July 12, 2002).

A. Survey frequency, permanent survey points, etc.

The survey frequency needs to be set in accordance with the "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."(Appendix 4). The permanent survey points need to be set in accordance with "Setup of permanent survey points and trap installment points for rodent surveillance" (Appendix 2-1). The information about the thus set permanent survey points needs to be entered into the "Rodent/Mosquito Surveillance Survey Point Recording Sheet" (Form 1-1) and stored in this form.

B. Survey method

The survey in each survey area is conducted in accordance with the "Method for Rodent Surveillance by Capture" (Appendix 2-2).

C. Recording

The information about the survey is entered into the "Rodent Surveillance Results Recording Table and Test Request Sheet" (Form 1-2) and stored in this form.

(2) Questionnaire survey

The questionnaire survey is conducted of warehouse companies, container handling offices, administrators of piers for ocean-going ships, and so on, to check the presence/absence of damage to the stored cargos, etc. and to collect information about the measures being taken, with the ultimate goal of efficiently assessing the distribution and colonization of rodents.

This survey is conducted in accordance with the "Questionnaire Surveys" (Appendix 2-).

(3) Measures taken upon the detection of signs of rodents during rodent surveillance in aircraft

If any sign of rodent colonization, etc. (e.g., feces) is confirmed in an aircraft, the airline concerned will be guided to take invasion-preventive measures, etc.

(4) Focused survey

If any invasive vector species has been confirmed during the permanent surveillance of Cabinet Order-specified areas, a focused survey will be carried out. This survey is accompanied by an extraordinary questionnaire survey of the enterprises concerned, as needed. If the vector detected in aircraft, ship, container, etc. is judged as a case of transient invasion, this does not require a focused survey in the Cabinet Order-specified areas. However, if multiple cases of similar detection have been reported, a focused survey needs to be conducted in the Cabinet Order-specified areas. The samples collected during such a survey need to be immediately subjected to the pathogen test.

(5) Measures taken upon emergency

If any vector species possessing the pathogen or antibody of rodent-borne infectious diseases or any patient with rodent-borne infectious disease having no history of overseas trip has been confirmed in the port area during permanent surveillance or a focused survey, posing a threat of disease transmission by the rodents having colonized in a given area, sanitation measures need to be taken in accordance with the “Rodent-related Emergency Measures Manual” (Appendix 2-5) after discussion with the Office of Quarantine Station Administration. When sanitation measures are taken, reference should be made to the “Collection of Examples Related to Rodent Surveillance Reinforcement, Pest Control, etc.” (Clerical Communication issued by the Office of Quarantine Station Administration). As needed, an emergency survey, health survey, pest control, environmental arrangement, or the like is carried out in linkage to the related organizations.

3. Species identification and rodent-borne infectious disease pathogen test

Identification of the species of captured rodents and plague-transmitting parasitic fleas and their pathogen test are carried out with reference to the “Methods for Species Identification, Pathogen Possession Check and Sample Dispatch during Rodent Surveillance” (Appendix 2-3). The pathogen check is carried out in accordance with the “Categories of Tests, etc. Based on the Quarantine Act” (Notification from Manager of the Office of Quarantine Station Administration), thereby issuing a test request using the filled-in “Rodent Surveillance Results Recording and Test Request Sheet” (Form 1-2) after the collection of testing materials and parasitic fleas by each Test Section and Laboratory. If species identification is difficult at the Test Section or the Laboratory, a request of species identification is issued in the same way.

4. Reporting

Regarding the survey results, the necessary information for each month is entered into the database file and then reported to the head office of each quarantine station. The head office of each quarantine station combines the data from the head office and all branch/satellite offices into a single reporting form and stores it. The data in this form need to be registered with the Officer for Analysis on Sanitation Control by the 10th day of the month following each quarter of the year (by the end of the month following the fourth quarter). If a focused survey or any emergency measure has been conducted, the relevant information needs to be shared with the Office of the Quarantine Station Administration and the Officer for Analysis on Sanitation Control.

5. Evaluation and countermeasures

The survey results need to be re-evaluated each year at each quarantine station in accordance with the "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."(Appendix 4), and sanitation measures are taken as needed.

6. Others

(1) Dealing with reports of rodent detection (information supply) and rodent capture by related organizations or enterprises

If a report (information supply) has been received about rodent detection (including the detection of a dead rodent) or the like from any of the related organizations or enterprises within the port area, the quarantine station is required to conduct a hearing and check of the site status, followed by capture of the animals if possible. If capture is judged to be difficult, advice about subsequent actions needs to be given to the related organizations and enterprises. If a dead rodent is confirmed, the rodent is collected, followed by implementation (or instruction) of disinfection or other measures. After returning of the quarantine staff member to the quarantine station, the captured or collected rodent needs to be subjected to species identification and a check for parasitic fleas. If the rodent is identified as a vector, the pathogen test needs to be carried out, as a rule.

Appendix 3

Mosquito Surveillance Manual (excerpts)

1. Introduction

Mosquito surveillance is aimed at assessing the presence of mosquitoes serving as the vectors for mosquito-borne infectious diseases and detecting the presence of mosquito species not indigenous in our country ("invasive vectors") in a well-planned manner in the port areas set for each quarantine seaport and airport ("quarantine ports") for the purpose of the prevention of invasion and epidemic of mosquito-borne Zika virus disease, Chikungunya fever, dengue fever, malaria, West Nile fever, and Japanese encephalitis ("mosquito-borne infectious diseases") among all quarantinable infectious diseases or the like.

The term "mosquitoes" in this manual indicates primarily the insects of family Culicidae.

2. Mosquito surveillance

Mosquito surveillance is carried out for the purpose of inspecting invasion by vector species.

Mosquito surveillance at airports consists of aircraft investigation (investigation of the aircraft, etc. having a high potential of mosquito invasion) and investigation of the species of mosquitoes having colonized in the port area and the status of their emergence.

Mosquito surveillance at ports assumes the form of mosquito colonization investigation aimed at examining the species of mosquitoes having colonized around the piers for ocean-going ships and the status of emergence of mosquitoes serving as vectors.

Under normal circumstances, the permanent surveillance and, as needed, "questionnaire survey" (Appendix 3-5) are conducted. Under unusual circumstances (e.g., cases where invasion by invasive vectors is likely), a focused survey is conducted. Upon detection of the pathogen for any mosquito-borne infectious disease from vector species, measures need to be taken in accordance with the "Mosquito-related Emergency Measures Manual" (Appendix 3-6). In addition, sanitation measures need to be taken with reference to the "Collection of Examples Related to Mosquito Surveillance Reinforcement, Pest Control, etc." (Clerical Communication issued by the Office of Quarantine Station Administration).

(1) Colonization survey (permanent surveillance)

Colonization surveys need to be carried out by setting the survey areas and points preferentially at the areas/points at elevated risk for invasion by mosquitoes, including the aprons, surrounding roads, boarding bridges, passenger flight arriving terminals, cargo flight arriving areas, and air cargo handling areas of airports accepting aircraft from foreign countries as well as the piers and container unloading areas of seaports accepting ocean-going ships. In addition, adult and larval mosquitoes need to be collected with a certain frequency and method to check for the invasion/colonization of invasive vector species of mosquito.

A. Survey frequency and points

The quarantine ports covered by the survey and the frequency and other details of the survey are decided in accordance with the "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc."(Appendix 4). Survey points are set in accordance with "Setup of survey points for mosquito surveillance" (Appendix 3-1). The necessary information about each survey point is entered into the "Rodent/Mosquito Survey Point Recording Sheet" (Form 2-1) and saved in this form.

B. Survey method

(1) Adult mosquito survey

The survey in each survey area is conducted in accordance with 2. Carbon Dioxide/Light Trap Method described in "Mosquito Collection Methods" (Appendix 3-2).

(2) Larval mosquito survey

The survey in each survey area is conducted in accordance with 3. Dipper/Pipette Method and 4. Ovitrap Method described in "Mosquito Collection Methods" (Appendix 3-3).

C. Recording

The necessary information about survey and test results is entered into the "Adult Mosquito Survey Results Sheet" (Form 2-3) and "Larval Mosquito Survey Results Sheet" (Form 2-4) and saved in these forms.

(2) Questionnaire survey

The status of mosquito colonization, etc. in port areas is investigated by the expert agent or the like assigned by each enterprise, followed by the implementation of pest control measures as needed. It is known that the status of mosquito colonization is affected by changes in physical factors and meteorological conditions. With these borne in mind, a questionnaire survey of port area enterprises, etc. is conducted, as needed, using the “Questionnaire for Mosquito Surveillance” (Form 2-6). The information thus collected will be utilized to facilitate the implementation of an efficient and valid survey within the framework of periodical mosquito surveillance, planning measures against sources of mosquito emergence, and conducting a focused survey and so on.

If mosquitoes collected at the time of unloading of cargo or the like from a foreign country have been provided by an enterprise or the like, the species needs to be identified. If they are identified as female mosquitoes of vector species, the pathogen test is conducted, as a rule. In addition, as needed, countermeasures against the origin of mosquito emergence are taken and the enterprise or the like is advised about pest control, etc.

(3) Aircraft survey

In view of the possibility that rodents invade our country via aircraft arriving from mosquito-borne infection epidemic territories, the survey of mosquito colonization in aircrafts and the check of pathogens are conducted in accordance with “Aircraft Surveys” (Appendix 3-2) to examine the status of mosquito invasion into aircraft, presence/absence of vector species, and the status of pathogen possession. This survey is conducted in a well-planned manner by devising a survey plan taking into consideration the status of mosquito-borne infection outbreak and meteorological conditions (temperature, rainfall, etc.) in the aircraft departing place, the flight schedule (starting time zone, etc.) and past survey results.

Survey items and results are entered into the “Aircraft Mosquito Survey Sheet & Test Results Sheet” (Form 2-2) and saved in this form.

(4) Focused survey

If any invasive vector species has been confirmed during the colonization survey (permanent surveillance) of Cabinet Order-specified areas, a focused survey will be carried out. This survey is accompanied by an extraordinary questionnaire survey of the enterprises concerned, as needed. If the vector detected in aircraft, ship, container, etc. is judged as a case of transient invasion, this does not require a focused survey in the Cabinet Order-specified areas. However, if multiple cases of similar detection have been reported, a focused survey needs to be conducted in the Cabinet Order-specified areas. The samples collected during such a survey need to be immediately subjected to the pathogen test. The survey items and results are entered into the “Aircraft Mosquito Survey & Survey Results Sheet” (Form 2-2) or “Ship Mosquito Survey & Survey Results Sheet” (Form 2-8) and saved in these forms.

(5) Measures taken upon emergency

If any vector species possessing the pathogen for mosquito-borne infectious diseases or any patient with rodent-borne infectious disease having no history of overseas trip has been confirmed in the port area during a colonization survey (permanent surveillance) or a focused survey, posing a threat of disease transmission by the mosquitoes having colonized in a given area, sanitation measures need to be taken in accordance with the "Mosquito-related Emergency Measures Manual" (Appendix 3-6) after discussion with the Office of Quarantine Station Administration. When sanitation measures are taken, reference should be made to the "Collection of Examples Related to Mosquito Surveillance Reinforcement, Pest Control, etc." (Clerical Communication issued by the Office of Quarantine Station Administration). As needed, an emergency survey, health survey, pest control, environmental arrangement, or the like is carried out in linkage to the related organizations.

3. Species identification and mosquito-borne infectious disease pathogen test

Identification of the species of captured mosquitoes and their pathogen test are carried out at each test section and laboratory with reference to "Methods for Species Identification, Pathogen Possession Check and Sample Dispatch during Mosquito Surveillance" (Appendix 3-4). If the identification of species (invasive vector species, etc.) is difficult, identification and pathogen test are requested to the Testing Center using a filled-in "Mosquito Test Request Form" (Form 2-5).

4. Reporting

Regarding the survey results, the necessary information for each month is entered into the database file and then reported to the head office of each quarantine station. The head office of each quarantine station combines the data from the head office and all branch/satellite offices into a single reporting form and manages it. The data in this form need to be registered with the Officer for Analysis on Sanitation Control by the 10^{th} day of the month following each quarter of the year (by the end of the month following the fourth quarter). If a focused survey or any emergency measure has been conducted, the relevant information needs to be shared with Office of Quarantine Station Administration and the Officer for Analysis on Sanitation Control.

5. Evaluation and countermeasures

The survey results need to be re-evaluated each year at each quarantine station in accordance with the "Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc." (Appendix 4), and sanitation measures are taken as needed. These data are referred to when the survey plan for the next year is devised.

6. Others

• Dealing with mosquitoes captured by related organizations or enterprises

If information has been received about mosquito detection or the like from any of the related organizations, etc. within the port area or from aircraft, etc., the site needs to be checked and the mosquitoes need to be recollected, followed by species identification. If any vector species has been identified, the pathogen test needs to be conducted, as a rule.

Appendix 4

Manual for Risk Assessment of Quarantinable Infectious Diseases or the Like Transmitted by Vector Animals, etc. (excerpts)

1. Introduction

Quarantine stations have been conducting the surveillance of vector animals, etc. in port areas to prevent the invasion and spread of quarantinable infectious diseases or the like via vector animals, etc. Following the recent diversification of international traffic flow of humans and commodities, the number of routes for entry from overseas to local ports/airports in Japan has increased, resulting in elevation of the risk for invasion of quarantinable infectious diseases or the like into Japan. Furthermore, following complete enforcement of the International Health Regulations (IHR2005), there is now a greater need than before to ensure the sanitary status at the points of cross-border entry such as international ports and airports. Under such circumstances, quarantine stations are now required to conduct efficient and valid surveillance. In this connection, it became more desirable to modify the Port Sanitation Control Guidelines issued in 2005, and the research and investigation conducted by quarantine stations in 2018 and 2019 included discussion over the creation of basic data/information for risk assessment about quarantinable infectious diseases or the like (invading Japan via the vector animals, etc. carried by ships/aircraft from foreign countries) at quarantine seaports/airports (hereinafter called "quarantine ports") and over the method for calculation of such risk.

Calculation of the risk for invasion of quarantinable infectious diseases or the like requires extraction of risk factors with diverse methods for subsequent analysis of individual risks at quarantine ports. Furthermore, from the viewpoint of preventing the invasion of quarantinable infectious diseases or the like, it is desirable to establish a method allowing simple calculation of the risk so that the risk calculated may be reflected rapidly into the surveillance plan, etc. for the next year.

If the risk of invasion is calculated through the numerical analysis of two risk factors (one related to the invasion of vector animals, etc. and the other related to the carry-in of pathogens by humans) using the past data of ship/aircraft arrival from foreign countries and if efficient and valid port sanitation surveillance is attempted with the thus-calculated risk, we may expect that the sanitary status of Cabinet Order-specified areas can be assessed satisfactorily. If any event possibly posing a threat to public health is predicted from the information collected during such surveillance (permanent surveillance), it is essential to conduct active surveillance, sanitation measures, etc. such as focused surveys and countermeasures against emergency to prevent the invasion and spread of quarantinable infectious diseases or the like in Japan.

2. Permanent surveillance

With reference to the opinions of experts, study reports, etc. in the field of mosquito-borne infections, the pathogens carried by vector animals invading Japan via foreign ships/aircraft were considered as a risk factor to be addressed in the permanent surveillance, thereby dividing the risk factor into risk factor A (past data on ship/aircraft arrival) and risk factor B (invasion of pathogens via humans).

3. Numerical analysis of risk factor

So that the details of the permanent surveillance might be designed in a manner corresponding to the risks involved, the risk factors were expressed numerically. The scores for each risk factor were defined by means of logarithm (a common technique adopted to this procedure).

4. Results of risk analysis for permanent surveillance

The scores for numerically expressed risk factors A and B were totaled, and their sum total was used in deciding the frequency of surveys conducted within the framework of permanent surveillance.

5. Permanent surveillance

The survey to be conducted routinely (permanent surveillance) is conducted, as a rule, at an annual frequency calculated by application of the value (calculated from risk factors A and B) to Table 2. This frequency is presented as a basic frequency of survey during a given year within the framework of permanent surveillance. It is acceptable to conduct the survey at a frequency higher than the presented level or in a number of survey areas larger than the planned one depending on the actual circumstances.

6. Risk assessment and sanitation measures based on permanent surveillance

The measures to be taken on the basis of permanent surveillance, etc. are listed in Table 3-1 and 3-2.

If any invasive species not indigenous in Japan but involved in the epidemic of any quarantinable infectious disease or the like has been confirmed, sanitation measures need to be conducted, taking into consideration the local circumstances, etc. and referring to the "Collection of Examples Related to Rodent/Mosquito Surveillance Reinforcement, Pest Control, etc." and so on.

As needed, additional sanitation measures are taken, such as continuing the surveillance at a higher frequency and including neighboring survey areas into surveillance.

It is quite important to conduct a focused survey or measures against emergency in addition to permanent surveillance for closer assessment of the sanitation status throughout the Cabinet Order-specified areas and to reduce the risk level to below a certain level through the implementation of sanitation measures (environmental arrangement, countermeasures against the origin of emergence, etc.) by the quarantine station chief pursuant to Article 27 of the Quarantine Act for the purpose of reducing the density of vector animal colonization.

The results of the aircraft survey, which pertains to the status before invasion into the Cabinet Order-specified areas, are not covered by risk assessment. Instead, the aircraft administrator or the like is advised about the prevention of invasion by vector animals (mosquitoes and rodents). Similar actions are taken also against the invasive vector species detected within containers. If quarantinable infectious diseases or the like are anticipated to be spread by the vector species, sanitation measures (e.g., pest control with insecticides, rodenticides, etc. and disinfection for prevention of expanded infection) are instructed or implemented.

7. Preparation of assessment maps

Assessment is conducted separately for ports and airports. Assessment maps prepared with different colors of mesh are advantageous in that the points having the risk in a given port can be readily identified.

Table 3-1 Countermeasures and assessment related to rodent survey results

Results of permanent surveillance, etc.	Risk assessment	Sanitation measures	Color of assessment map
Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has been detected from rodents (primary or secondary species)[1)] or vector fleas/mites (primary or econdary species)[1)] captured during permanent surveillance, etc. in Cabinet Order-specified areas.	D High risk for invasion of quarantinable infectious diseases or the like	① Take measures against emergency, set separately[2)]. Resume ordinary surveillance upon the disappearance of the pathogen-possessed animals. ② Continue surveillance at a higher frequency next year, accompanied as needed by sanitation measures to reduce the vector animal colonization density (environmental arrangement, measures against origin of emergence, etc.; in cooperation with related organizations as needed) ③ Instruct the administrator or the like about the prevention of rodent invasion. Perform disinfection as needed.	Red
Invasive rodents (primary species)[1)]or fleas/mites (primary species) [1)] known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in Cabinet Order-specified areas. Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has not been detected.	C Moderate risk for invasion of quarantinable infectious diseases or the like	① Implement a focused survey (active survey) set forth separately. Resume ordinary surveillance upon ceasing of the capture of invasive rodents or fleas. ② Perform permanent surveillance in the next year, as a rule, but continue surveillance of the survey area concerned at a higher frequency and a larger number of survey points than usual, accompanied by sanitation measures to reduce the density of vector animal colonization (environmental arrangement, measures against origin of emergence, etc.; in cooperation with related organizations as needed) as needed. Survey also the area neighboring the area concerned. ③ Instruct the administrator or the like about prevention of rodent invasion. Perform disinfection as needed.	Yellow

Indigenous rodents (primary or secondary species)[1] or fleas/mites(primary or secondary species)[1] known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in Cabinet Order-specified areas. Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has not been detected.	B Low risk for invasion of quarantinable infectious diseases or the like	① Continue permanent surveillance in the next year, accompanied by sanitation measures to reduce the density of vector animal colonization (environmental arrangement, measures against origin of emergence, etc.; in cooperation with related organizations as needed) as needed. ② Continue permanent surveillance in the next year, as a rule, but if the number of animals captured or the number of sites captured is larger than usual, increase the frequency of survey or the number of survey points in a given survey area as needed, accompanied by the effort to take sanitation measures for reducing the colonization density. ③ Instruct the administrator or the like about the prevention of rodent invasion.	Green
No rodent has been captured during permanent surveillance, etc. in Cabinet Order-specified areas.	A Very low risk for invasion of quarantinable infectious diseases or the like	① Continue permanent surveillance, monitor the species, and density of colonized animals and endeavor to maintain the sanitation level within the survey area in cooperation with related organizations and enterprises. ② Perform permanent surveillance in the next year.	Blue
If captured within aircraft, ships, etc.	Not included in the risk assessment	Continue permanent surveillance, monitor the species and density of colonized animals, and endeavor to maintain the sanitation level within the survey area in cooperation with related organizations and enterprises. Perform permanent surveillance in the next year. Reinforce the survey of the area concerned as needed. If possession of pathogen, etc. has been confirmed, take emergency measures (set forth separately)[2], as needed.	Not included in the risk assessment. The information about detection should be supplied to the Officer for Analysis on Sanitation Control immediately.

[1] Primary species, secondary species, etc. are defined in Attachment 2 "Vector species of rodents, etc. covered by data entry on each infectious disease (major rodents,

fleas, and ticks known as vectors for quarantinable infectious diseases and other equivalent infectious diseases).” If a new species has been detected, the reference document is revised (if needed, the new species is added urgently).

[2] Implemented with reference to the “Collection of Examples Related to Rodent Surveillance Reinforcement, Pest Control, etc.” issued by the Office of Quarantine Station Administration.

Permanent surveillance, etc. encompasses the cases detected within the Cabinet Order-specified areas by means of notification/reporting, etc. However, detection inside aircraft, ships, etc., which does not reflect invasion into the Cabinet Order-specified areas, is not included in the risk assessment, and only the outcome is reported about such detection.

Primary species means the species involved in past epidemic of quarantinable infectious diseases or the like.

Secondary species means the species involved in past outbreak of quarantinable infectious diseases or the like.

Table 3-2　Countermeasures and assessment related to mosquito survey results

Results of permanent surveillance, etc.	Risk assessment	Sanitation measures	Color of assessment map
Adult mosquitoes of species known as vectors for quarantinable infectious diseases or the like (primary, secondary, or possible species)[1] have been detected during permanent surveillance, etc. in Cabinet Order-specified areas. Possession of pathogen or gene of pathogen for quarantinable infectious diseases or the like has been detected.	D　High risk for invasion of quarantinable infectious diseases or the like	① Take measures against emergency, set separately[2]. Resume ordinary surveillance upon disappearance of the pathogen-possessed animals. ② Continue surveillance at a higher frequency next year, accompanied as needed by sanitation measures to reduce vector animal colonization density (environmental arrangement, measures against origin of emergence, etc.; in cooperation with the related organizations as needed) ③ Instruct the administrator or the like about the prevention of rodent invasion. Use insecticides as needed.	Red

Adult or larval mosquitoes of invasive species known as vectors for quarantinable infectious diseases or the like (primary species)[1)] have been detected during permanent surveillance, etc. in Cabinet Order-specified areas. Possession of pathogen or gene of pathogen for quarantinable infectious diseases or the like has not been detected.	C　Moderate risk for invasion of quarantinable infectious diseases or the like	① Implement a focused survey (active survey) set forth separately. Resume ordinary surveillance upon ceasing of the capture of invasive rodents or fleas. ② Perform permanent surveillance in the next year, as a rule, but continue surveillance of the survey area concerned at a higher frequency and a larger number of survey points than usual, accompanied by sanitation measures to reduce the density of vector animal colonization (environmental arrangement, measures against origin of emergence, etc.; in cooperation with related organizations as needed) as needed. ③ Instruct the administrator or the like about the prevention of rodent invasion. Use insecticides as needed.	Yellow
Mosquitoes (primary, secondary, or possible species)[1)] known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in Cabinet Order-specified areas. Pathogen or gene of pathogen for quarantinable infectious diseases or the like has not been detected.	B　Low risk for invasion of quarantinable infectious diseases or the like	① Continue permanent surveillance in the next year, accompanied by sanitation measures to reduce the density of vector animal colonization (environmental arrangement, measures against origin of emergence, etc.; in cooperation with related organizations as needed) as needed. Continue permanent surveillance in the next year, as a rule, while increasing the frequency of survey or the number of survey points in the survey area concerned, accompanied by the effort to take sanitation measures for reducing the colonization density, as needed.	Green

None of the mosquitoes captured during permanent surveillance, etc. in Cabinet Order-specified areas is known as a vector (primary, secondary, or possible species)[1], or no mosquito is captured.	A Very low risk for invasion of quarantinable infectious diseases or the like	① Continue permanent surveillance, monitor the species and density of colonized animals and endeavor to maintain the sanitation level within the survey area in cooperation with related organizations and enterprises. ② Perform permanent surveillance in the next year.	Blue
If captured within aircraft, ships, etc.	Not included in risk assessment	Continue permanent surveillance, monitor the species and density of colonies, and endeavor to maintain the sanitation level within the survey area in cooperation with the related organizations and enterprises. Perform permanent surveillance in the next year. Reinforce the survey of the area concerned as needed. If possession of pathogen, etc. has been confirmed, take emergency measures (set forth separately)[2], as needed.	Not included in risk assessment. The information about detection should be supplied to the Officer for Analysis on Sanitation Control immediately.

1) Primary species, secondary species, etc. are defined in Attachment 3 "Vector species of mosquitoes covered by data entry on each infectious disease (major mosquitoes known as vectors for quarantinable infectious diseases and other equivalent infectious diseases)." If a new species has been detected, the reference document is revised (if needed, the new species is added urgently).

2) Implemented with reference to the "Collection of Examples Related to Mosquito Surveillance Reinforcement, Pest Control, etc." issued by the Office of Quarantine Station Administration.

Permanent surveillance, etc. encompasses the cases detected within the Cabinet Order-specified areas by means of notification/reporting, etc. However, detection inside aircraft, ships, etc., which does not reflect invasion into the Cabinet Order-specified areas, is not included in the risk assessment, and only the outcome is reported about such detection.

Primary species means the species involved in a past epidemic of quarantinable infectious diseases or the like.

Secondary species means the species involved in a past outbreak of quarantinable infectious diseases or the like.