Annual Report of Vector-borne Diseases Pathogens and Vector Surveillance 2023

October 2024

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

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Preface

The global resumption of economic activities has been underway following the end of the World Health Organization's (WHO) declaration of a "Public Health Emergency of International Concern (PHEIC)" regarding the coronavirus disease (COVID-19). COVID-19, which emerged at the end of 2019 and led to a worldwide outbreak, is caused by a coronavirus belonging to the Betacoronavirus genus. This is limited to cases where the pathogen was newly reported to have the ability to transmit between humans, as notified by the People's Republic of China to the WHO in January 2020.

According to the WHO, while the global threat posed by COVID-19 has declined, the outbreak status of infectious diseases abroad remains concerning. Cholera continues to pose a global threat to public health, with an estimated 1.3 million to 4 million cases and 21,000 to 143,000 deaths occurring worldwide each year. Furthermore, vector-borne diseases account for more than 17% of all infectious diseases, with over 700,000 deaths reported annually. In 2023, the number of cases of dengue fever, a mosquito-borne disease, exceeded 6.5 million, with over 7,300 dengue fever-related deaths, marking a record high. These figures highlight that the threat of infectious diseases remains persistent.[1,2,3]

Currently, the number of dengue fever cases is increasing in Southeast Asian countries as well, and in 2023, 175 cases of imported dengue fever were reported in Japan.[4]

By week 20 of 2024, 69 dengue fever cases had been reported, which is 2.7 times the number of cases (24 cases) reported during the same period in 2022, exceeding the number of cases reported last year.[4,5]

In Japan, the legal status of COVID-19 has been revised, and border control measures at airports and seaports have returned to normal peacetime levels. As a result, the number of incoming flights at international airports and the number of international cruise ship calls at seaports are gradually returning to pre-COVID-19 levels. According to the Japan National Tourism Organization (JNTO), the number of inbound visitors to Japan from overseas recovered to approximately 79% of 2019 levels by 2023, indicating that the domestic tourism industry is also on the path to recovery.[6]

At the same time, during the 2023 port sanitation investigation, larvae of the *Aedes aegypti* mosquito, an invasive species known to transmit diseases such as dengue fever, were collected twice at Tokyo International Airport, and the results suggest an increased risk of the invasion and establishment of infectious diseases from endemic countries.

Therefore, it has become increasingly important for quarantine stations to conduct habitat surveys, invasion monitoring, and pathogen examination for vectors, such as mosquitoes and rodents, that transmit quarantinable infectious diseases at points of entry, including quarantine ports and airports. Based on the results of these activities, prompt measures to prevent the invasion and establishment of such vectors must be implemented. Furthermore, surveillance activities during peacetime are essential to enable a swift response to emerging infectious diseases, as experienced during the COVID-19 pandemic.

This report aims to fulfill the obligations of United Nations member states under the World Health Organization's International Health Regulations (2005) and presents the results of vector surveillance conducted at quarantine stations nationwide in 2023.

October 2024

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1 Vector borne quarantinable infectious diseases reported in Japan (2023)

1.1 Mosquito borne diseases

The occurrence of mosquito-borne diseases related to quarantinable infectious diseases in Japan in 2023 was examined with reference to the Infectious Disease Surveillance System (surveillance system) based on the "Act on the Prevention of Infectious Diseases and Medical Care for Patients Suffering Infectious Diseases."

In 2023, a total of 175 cases of dengue fever were reported, representing an approximately 1.8-fold increase compared to the 99 cases reported in 2022.[4,7] The estimated regions of infection included 16 countries in Asia, such as Vietnam, Nepal, and the Philippines; 4 countries in Latin America, including Mexico, Brazil, Cuba, and Costa Rica; 2 countries in the Pacific Islands, namely Brunei and the Maldives; 1 country in the Caribbean, specifically Guadeloupe (a French overseas region); and 1 country in Africa, Malawi.[4,7]

In 2023, a total of 36 cases of malaria were reported, an increase compared to the 31 cases reported in 2022.[4,7] The estimated regions of infection included 15 countries in Africa, such as Ghana, Guinea, and Nigeria; 3 countries in Asia, namely Pakistan, Singapore, and Cambodia; 1 country in the Americas, specifically Brazil; and 1 country in the South Pacific region, the Solomon Islands.[4,7]

In 2023, a total of 7 cases of chikungunya fever were reported, an increase from the 6 cases reported in 2022. The estimated regions of infection included 4 countries in Asia: India, the Philippines, Indonesia, and Thailand.[4,7]

For Zika virus infection, 2 cases were reported in 2023, whereas no cases were reported in 2022. The estimated regions of infection were Thailand and India.[4,7]

In 2023, all 6 reported cases of Japanese encephalitis were domestically acquired, representing an increase from the 5 cases reported in 2022. The cases were reported in Ibaraki (2 cases), Kumamoto (2 cases), Shizuoka (1 case), and Osaka (1 case). No fatalities were reported.[4,7]

In Japan, the trends of the Japanese encephalitis virus are monitored through the Infectious Disease Outbreak Prediction Survey Project, which involves measuring the hemagglutination inhibition (HI) antibody titers in the serum of pigs, the amplification hosts of the virus. From May to October 2023, antibodies against the Japanese encephalitis virus were detected in 21 of the 26 surveyed prefectures, including Miyagi, Ibaraki, Gunma, Chiba, Kanagawa, Niigata, Ishikawa, Shizuoka, Mie, Shimane, Hiroshima, Tokushima, Kagawa, Ehime, Kochi, Fukuoka, Saga, Nagasaki, Kumamoto, Oita, and Miyazaki (compared to 16 of the 23 surveyed prefectures in 2022).[8] In the 1960s, when large outbreaks of Japanese encephalitis occurred, an increase in HI antibodies against the virus in pigs was observed before human cases were reported. However, due to the widespread use of Japanese encephalitis vaccines and changes in living environments, the relationship between pig infection status and human cases is no longer consistent. In recent years, the number of reported human cases of Japanese encephalitis has remained at around 10 cases annually.[8]

Notably, no cases of West Nile fever were reported in 2023.[4]

1.2 Rodent borne diseases

The 2023 trend survey reported no cases of plague (transmitted by rodents and insects such as fleas), and Lassa fever, South American hemorrhagic fever, hemorrhagic fever with renal syndrome (HFRS), or hantavirus pulmonary syndrome (HPS) which are transmitted directly by infected rodents.[4]

2 Vector borne quarantinable infectious diseases reported in the World (2023)

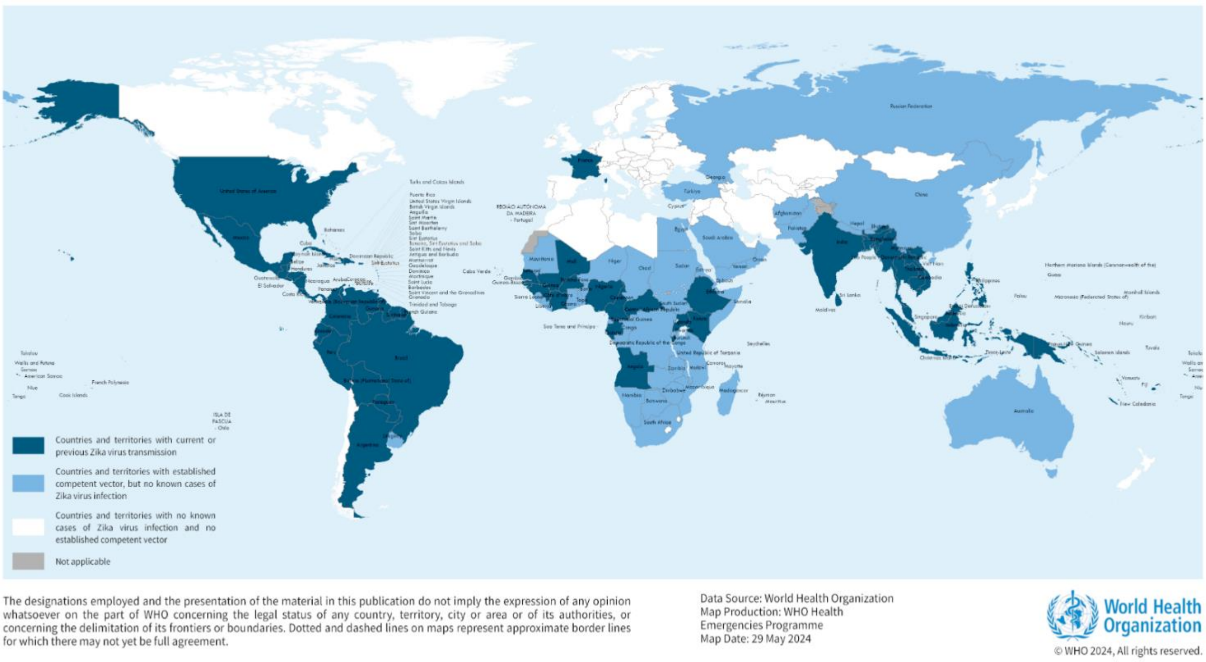
2.1 Mosquito-borne diseases

○ Zika virus infection

The WHO declared a Public Health Emergency of International Concern (PHEIC) from February to November 2016 in response to the outbreak of Zika virus infection. Since 2017, however, the number of cases has declined globally.[9] Nevertheless, cases of Zika virus infection continue to be reported in somecountries and endemic areas within the Americas. To date, a total of 92 countries and regions have reported cases of Zika virus infection.[9]

In 2023, a total of 55,813 cases of Zika virus infection, including 4 deaths, were reported in the Americas, representing a 1.4-fold increase compared to 40,528 cases (including 4 deaths) reported in 2022. The top five countries with the highest number of cases were Brazil (54,116 cases, including 4 deaths), Bolivia (881 cases), Belize (281 cases), Colombia (116 cases), and Guatemala (112 cases), with Brazil accounting for 97.0% of all reported cases in the Americas.[10]

Countries and territories with current or previous Zika virus transmission



Source: WHO, Map of countries Zika transmission

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; Guinea-Bissau; Kenya; Mali; Nigeria; Senegal; Uganda	16
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; Sri Lanka; Thailand	7
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		92

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 May 2024))

○ Chikungunya fever

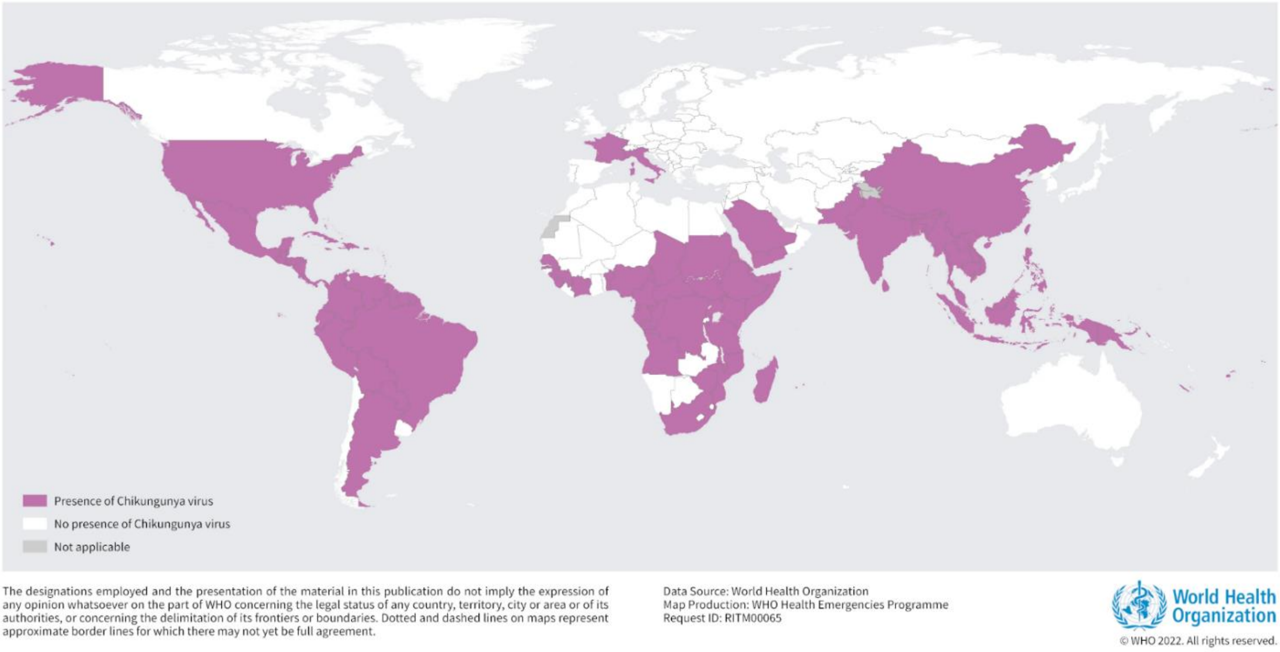
Chikungunya fever was first reported in the United Republic of Tanzania in 1952, and it was subsequently identified in other countries in Africa and Asia.[11] Urban outbreaks were first recorded in Thailand in 1967 and in India in the 1970s.[11] It has since been reported in more than 110 countries across Asia, Africa, Europe, and the Americas.[11]

As of November 30, 2023, a total of 460,000 cases and over 360 deaths have been reported from 26 countries, including 16 countries in the Americas, 5 in Africa, and 5 in Asia.[12]

In the Americas, 411,086 cases (including 420 deaths) were reported in 2023, representing a 1.5-fold increase in cases and a 4.8-fold increase in deaths compared to 273,841 cases (including 87 deaths) reported in 2022. The top five countries with the highest number of cases were Brazil (265,835 cases, including 123 deaths), Paraguay (140,905 cases, including 297 deaths), Argentina (1,746 cases), Bolivia (1,468 cases), and Belize (272 cases), with Brazil and Paraguay accounting for 98.9% of all reported cases in the Americas.[13]

In the African region, 889 cases (including 240 suspected cases) were reported in 2023. These cases were reported from three countries: Burkina Faso (545 cases), Senegal (337 cases), and Mali (7 cases).[14]

Global distribution of chikungunya virus



Source: WHO Global distribution of chikungunya virus

○ Dengue fever

In 2023, dengue fever recorded the highest number of cases in history, affecting more than 80 countries across all WHO regions.[15] Since the beginning of 2023, outbreaks have continued, with the total number of cases exceeding 6.5 million and more than 7,300 dengue-fever-related deaths reported, marking an all-time high.[15]

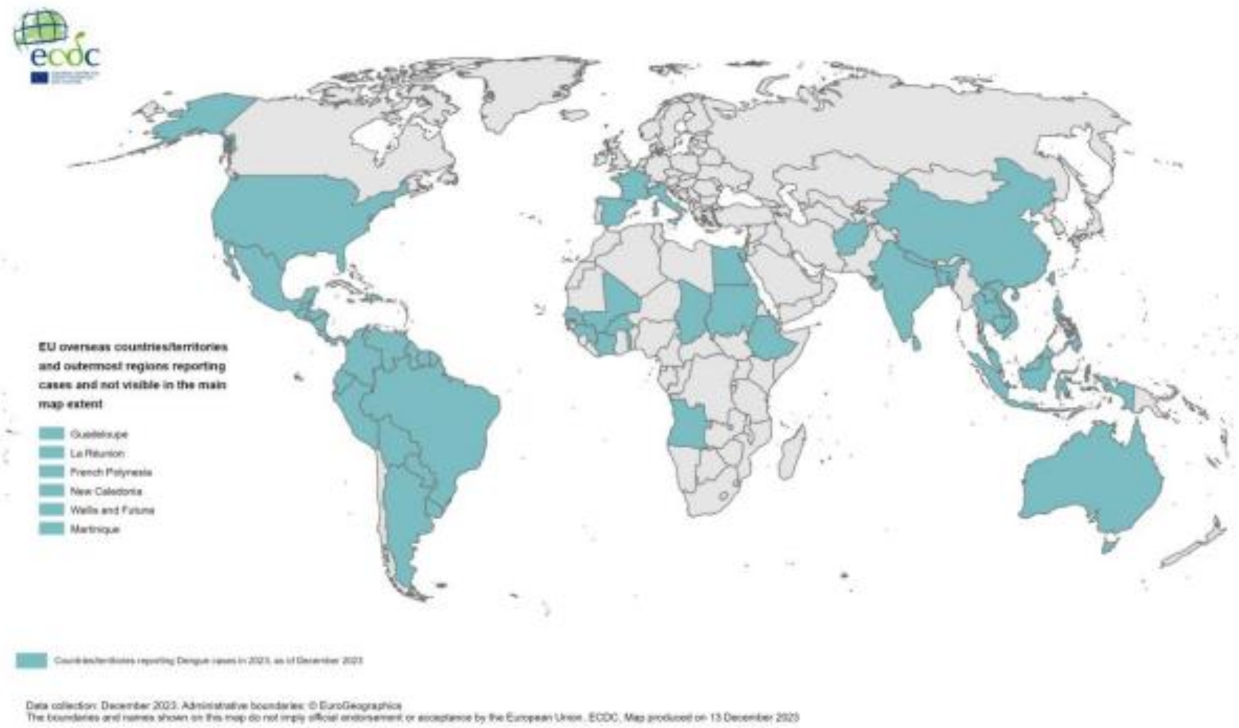
Dengue fever is endemic in over 100 countries across the WHO regions of Africa, the Americas, the Eastern Mediterranean, Southeast Asia, and the Western Pacific.[15] The Americas, Southeast Asia, and the Western Pacific are the most severely affected regions. Notably, the Asian region accounts for approximately 70% of the world's dengue fever cases.[15]

In 2023, a total of 4,617,108 cases of dengue fever, including 2,423 deaths, were reported in the Americas. Compared to 2022, which recorded 2,812,311 cases (including 1,290 deaths), the number of cases increased by 1.6 times, and the number of deaths rose by 1.9 times.[16] The country with the highest number of reported cases was Brazil, with 3,088,723 cases (including 1,184 deaths), followed by Mexico with 277,963 cases (including 203 deaths), Peru with 274,227 cases (including 441 deaths), Nicaragua with 181,096 cases (including 4 deaths), and Bolivia with 156,774 cases (including 88 deaths).[16]

In 2023, the African region reported a total of 270,901 dengue fever cases, including 179,492 suspected cases and 768 deaths. The country with the highest number of reported cases was Burkina Faso, with 237,992 cases (including 701 deaths), followed by Ethiopia with 21,486 cases (including 17 deaths), Mali with 5,567 cases (including 30 deaths), Sudan with 1,671 cases (including 7 deaths), and Chad with 1,582 cases (including 1 death).[14]

In the Asian region, Bangladesh reported 321,179 cases (including 1,705 deaths), Sri Lanka reported 88,658 cases, and Thailand reported 156,264 cases (including 167 deaths) in 2023.[17] Thailand's number of cases in 2023 marked the highest since 2018, surpassing the 131,299 cases (including 142 deaths) reported in 2019.[17]

Countries/territories reporting dengue cases since the beginning of 2023 and as of December 2023



Source: ECDC, Communicable Disease Threats Report Week 50, 10 - 16 December 2023

○ Malaria

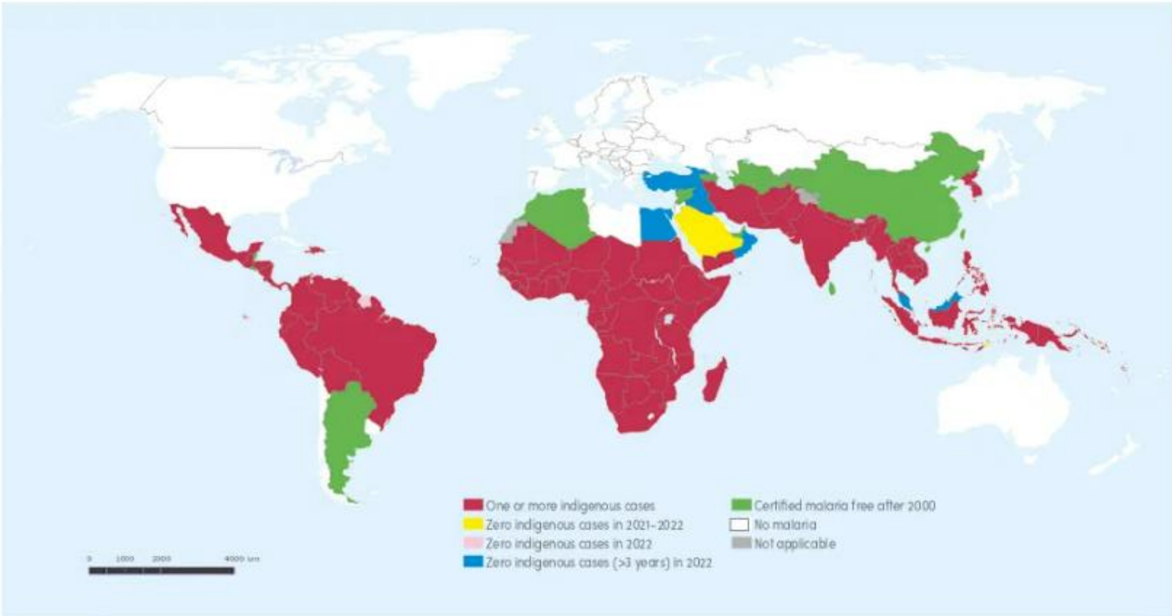
The global incidence of malaria over the past decade showed a declining trend after peaking at 237 million cases in 2017. However, since 2020, the number of cases has been on the rise. In 2022, a total of 249 million malaria cases and 608,000 deaths were reported from 85 countries, with approximately 80% of the deaths occurring in children under the age of five.[18] While the number of deaths decreased by 2,000 compared to the previous year, the number of cases increased by 5 million.[18,19]

In 2022, the African region accounted for 93.6% (233 million cases) of the world's malaria cases and 95.4% (580,000 deaths) of the total malaria-related deaths.[19]

On the other hand, in the Americas, both the number of malaria cases and deaths have been declining since 2017. In 2022, a total of 552,000 cases and 343 deaths were reported, marking a decrease compared to the previous year.[19] The number of cases in 2022 was the second lowest since 2010, following 2014, which recorded 475,000 cases and 346 deaths.[19] Additionally, Paraguay, Argentina, El Salvador, and Belize were certified as malaria-free countries by the WHO in 2018, 2019, 2021, and 2023, respectively.[19]

In the Southeast Asian region, the number of malaria cases had been on a declining trend between 2018 and 2022, remaining below 10 million annually. However, the number of deaths has remained at around 10,000 per year. In 2022, a total of 5.2 million cases and 8,000 deaths were reported from 9 countries. Of these, India accounted for approximately 65.7% of the total cases, with 3,389,400 cases reported, followed by Indonesia with 1,156,000 cases.[19]

Countries with indigenous cases in 2000 and their status by 2022



WHO: World Health Organization.

[a] Malaysia has a significant number of indigenous malaria cases caused by *Plasmodium knowlesi* infection.

[b] Countries with zero indigenous cases for at least 3 consecutive years are considered to have eliminated malaria. In 2022, Malaysia reported zero indigenous cases caused by human *Plasmodium species*[a] for the fifth consecutive year and Cabo Verde reported zero indigenous cases for the fourth year. Belize was certified malaria free in 2023, following 4 years of zero malaria cases.

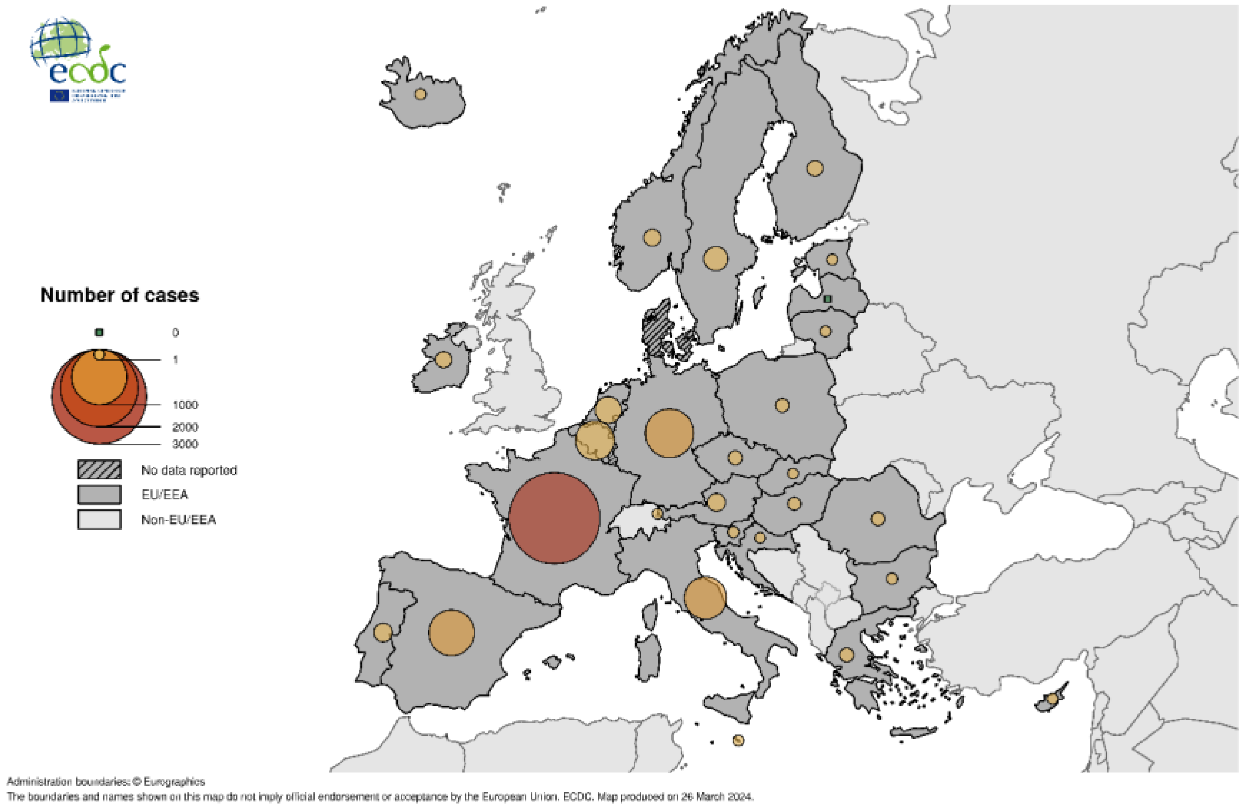
Source: WHO, World Malaria Report 2023

【Europe】

In 2022, a total of 6,131 malaria cases were reported from 27 countries within the European Union (EU) and the European Economic Area (EEA). Of these, 5,388 were imported cases, 99.8% of which were travel-related.[20] Among the imported cases, 76.5% were linked to infections acquired in West Africa.[20] By country, France reported the highest number of cases (2,783 cases), followed by Germany (768 cases), Spain (669 cases), Italy (571 cases), and Belgium (491 cases).[20]

In terms of incidence per 100,000 population in 2022, Liechtenstein had the highest rate, with 2.5 cases per 100,000 population (from a single reported case), followed by Sweden (1.5 cases per 100,000), Spain (1.4 cases per 100,000), and Iceland (1.3 cases per 100,000).[20]

Confirmed malaria cases by country, EU/EEA, 2022



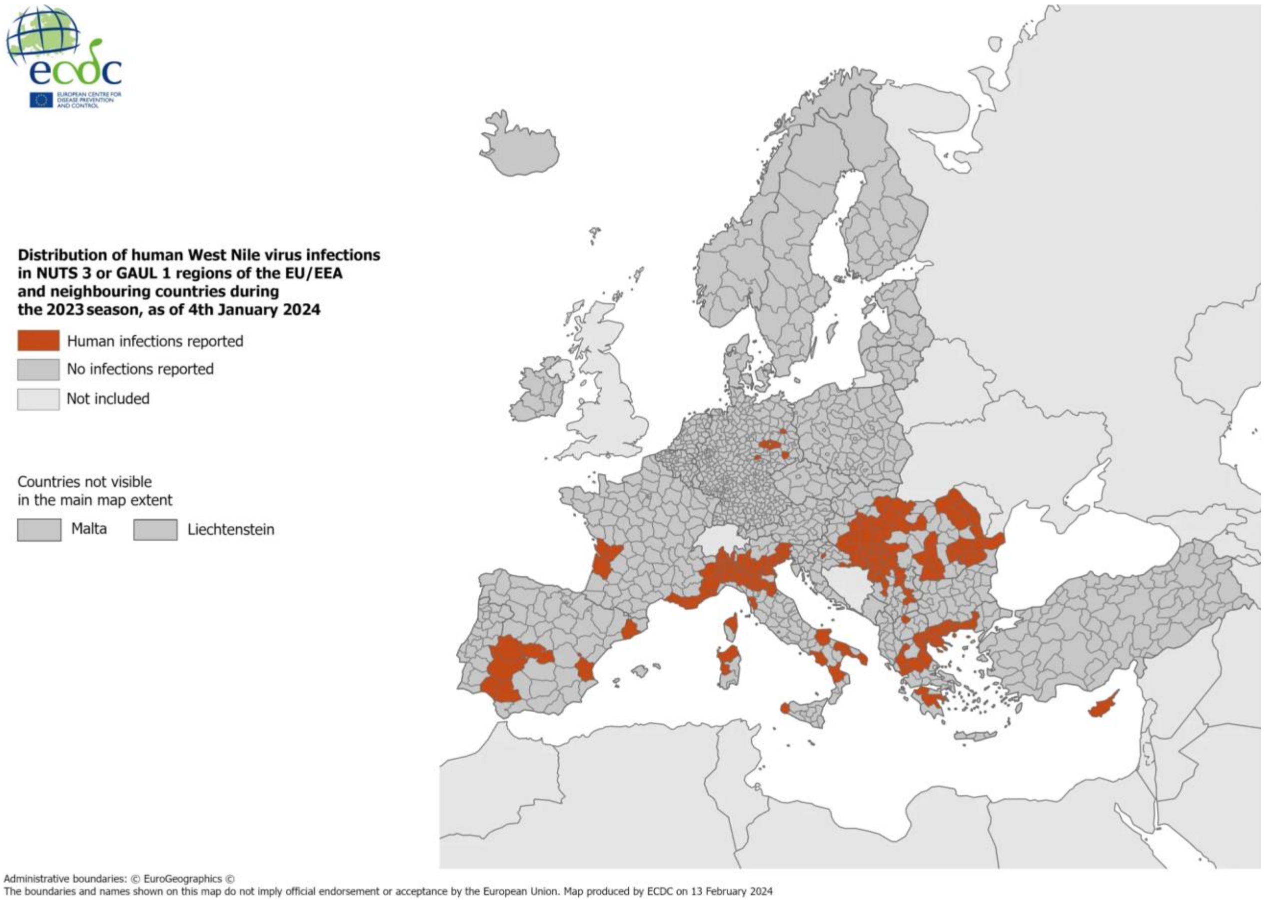
Source: ECDC SURVEILLANCE REPORT Malaria Annual Epidemiological Report for 2022

○ West Nile fever

【Europe】

In 2023, a total of 728 cases of West Nile fever were reported in the European Union (EU) and European Economic Area (EEA) countries. Of these, 709 were domestically acquired cases, while 19 were imported cases.[21] Domestically acquired cases were reported from 9 EU member countries: Italy (336 cases), Greece (162 cases), Romania (103 cases), France (43 cases), Hungary (29 cases), Spain (19 cases), Germany (6 cases), Croatia (6 cases), and Cyprus (5 cases).[21] Fatalities were reported by Italy (29 cases), Greece (23 cases), Romania (12 cases) and Spain (3 cases). This season marked the highest number of domestically acquired cases reported, following the peak years of 2018 (1,549 casese) and 2022 (1,116 cases)[21].

West Nile virus - distribution of human infections, 2023

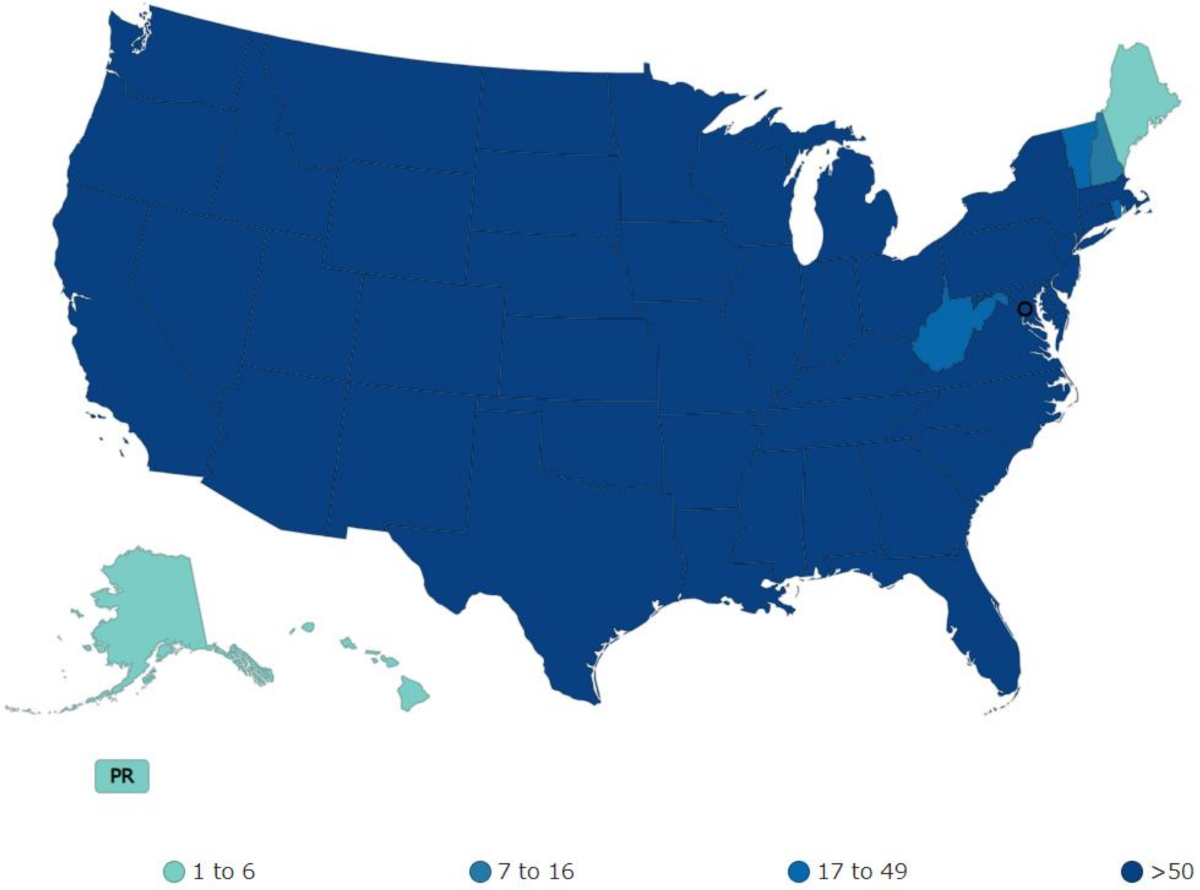


Source: ECDC West Nile virus - distribution of human infections, 2023

【United States of America】

In 2023, a total of 2,566 cases of West Nile fever were reported in the United States, representing a 2.1-fold increase compared to 1,132 cases reported in 2022.[22] The state with the highest number of reported cases was Colorado, with 634 cases, a 3.1-fold increase from the 206 cases reported in 2022. This was followed by California, which reported 409 cases, a 2.0-fold increase compared to 207 cases in 2022.[22]

West Nile virus human disease cases reported
by state of residence, 1999-2023, All disease cases



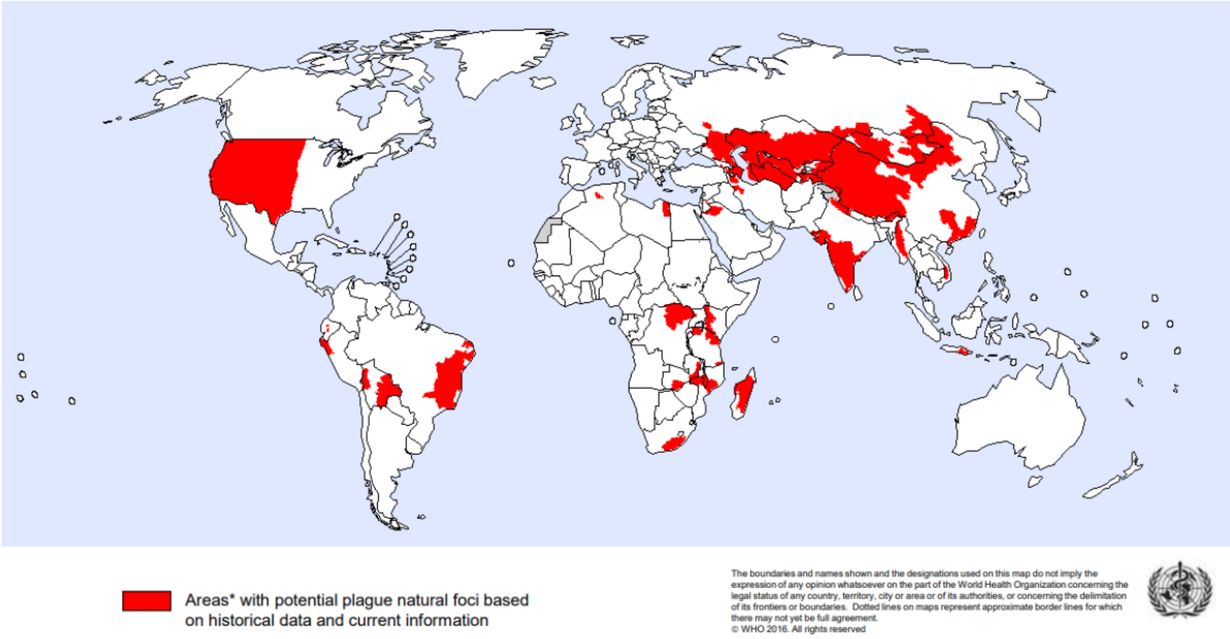
Source: CDC West Nile virus Current Year Data (2023)

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.[24] Particularly, in Madagascar, cases of bubonic plague have been reported almost every year during the epidemic season (from September to April).[23] Madagascar accounts for most of the plague cases worldwide, with 250-680 cases reported annually between 2010 and 2015.[24] 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.[24]

Plague Global Distribution of Natural Foci as of March 2016



Source: WHO Global distribution of plague foci as of March 2016

【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%).[25] Of these cases, 28 suspected cases observed between April 22 and May 28, 2021, were diagnosed with pneumonic plague.[25]

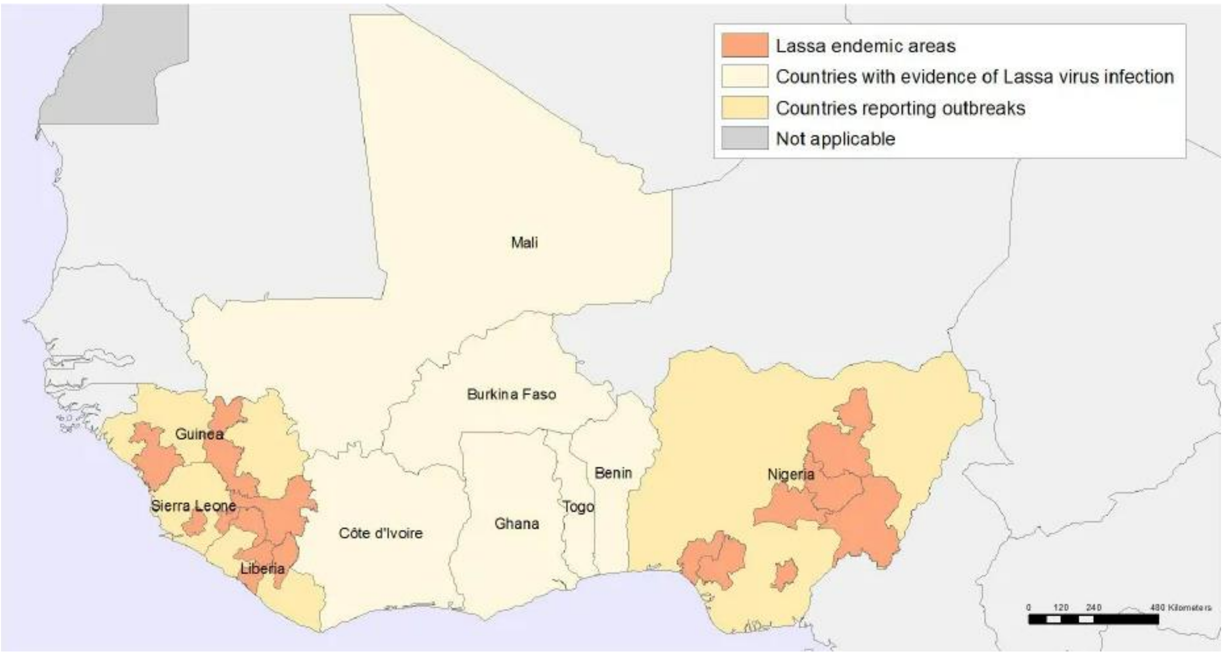
[Madagascar]

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.[26]

○ Lassa fever

In the African region, from January 27 to December 15, 2023, a total of 10,574 cases of Lassa fever, including 9,087 suspected cases and 221 deaths, were reported. The country with the highest number of reported cases was Nigeria, with 10,211 cases (including 210 deaths), followed by Liberia with 191 cases (including 5 deaths), Guinea with 136 cases (including 3 deaths), Ghana with 28 cases (including 1 death), and Sierra Leone with 8 cases (including 2 deaths).[27]

Geographic distribution of Lassa fever

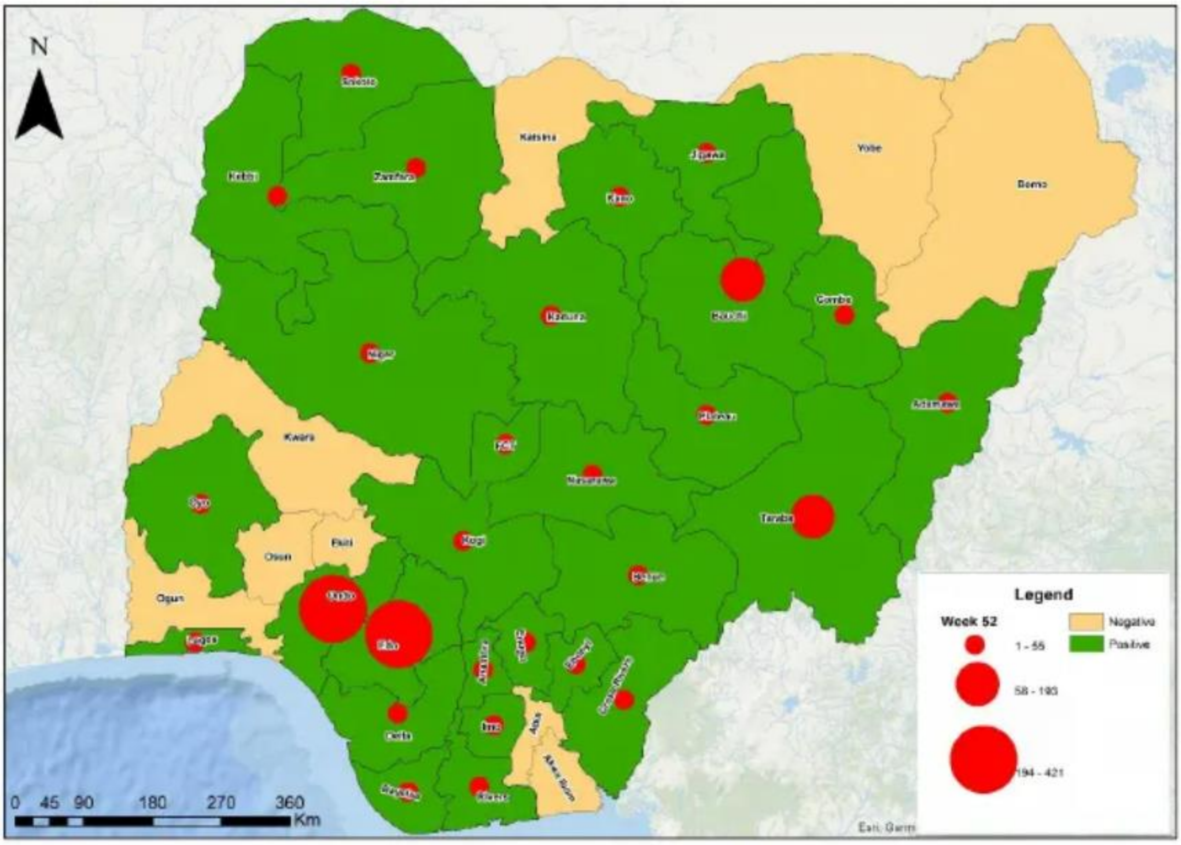


Source: WHO, Introduction to Lassa fever

【Nigeria】

In Nigeria, during week 52 of 2023, a total of 43 confirmed cases of Lassa fever, including 11 deaths,were reported from 8 states. Since January 2023, 1,270 confirmed cases (including 227 deaths) have been reported from 28 states, with a case fatality rate of 17.9%.[29] Of the confirmed cases reported from the 28 states, 76.9% were concentrated in 3 states: Ondo (433 confirmed cases), Edo (349 confirmed cases), and Bauchi (194 confirmed cases).[28]

Confirmed Lassa fever cases by States in Nigeria,
week 52, 2023



Source: NCDC, Lassa fever Situation Report Epi Week 52：25# - 31st December 2023

【Ghana】

On February 26, 2023, the Ghana Health Service reported two cases of Lassa fever, including one death, in the Accra region.[29] As of May 6, 2023, a total of 27 confirmed cases and 1 death had been reported, resulting in a case fatality rate of 3%.[29]

○ Hantavirus infection

【United States of America】

In 2023, a total of 19 cases of HPS were reported from 7 states in the United States, representing a 1.7-fold increase compared to the 11 cases reported in 2022.[30] The state with the highest number of reported cases was New Mexico, with 7 cases, followed by Arizona with 5 cases, Nevada with 3 cases, and Louisiana, Idaho, Utah, and California, each reporting 1 case.[30]

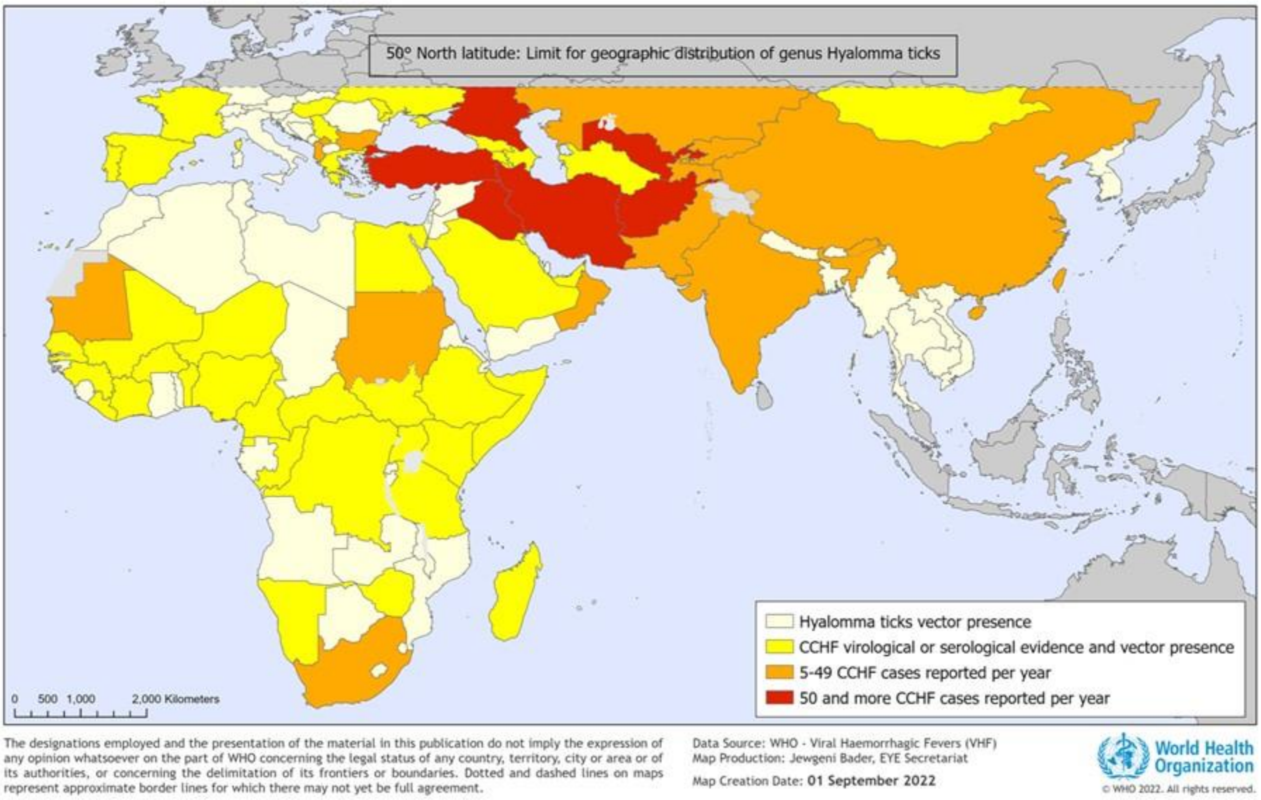
On April 13, 2023, the New Mexico Department of Health (DOH) Scientific Laboratory Division reported 3 HPS cases within a 2-week period, bringing the total number of cases in New Mexico for 2023 to 5, including 1 death. The 5 cases were unrelated and occurred in different locations within the same region.[31]

2.3 Tick-borne Diseases

○ Crimean-Congo hemorrhagic fever

Each year, 10,000 to 15,000 cases of Crimean-Congo hemorrhagic fever, including 500 deaths, are reported from more than 30 countries across the African, Asian, and European regions. It is estimated that 3 billion people worldwide are at risk of infection.[33] Nosocomial infections of Crimean-Congo hemorrhagic fever have been reported in various countries, with a notably high fatality rate.[32]

Geographic distribution of Crimean-Congo Haemorrhagic Fever (2022)



Source: WHO, Vector-borne diseases Crimean-Congo haemorrhagic fever

【Europe】

From 2018 to 2022, a total of 21 cases of Crimean-Congo hemorrhagic fever were reported in the European region.[33] The cases were reported in 3 countries: Bulgaria (11 cases), Spain (9 cases), and Greece (1 case).[33]

【Afghanistan】

In 2023, a total of 1,236 cases of Crimean-Congo hemorrhagic fever, including suspected cases, and 114 related deaths were reported in Afghanistan.[34] Of the deaths reported from 15 provinces, Kabul Province accounted for 52 deaths and Balkh Province for 16 deaths, together comprising 59.6% of the total deaths.[34]

3 Outline of vector surveillance conducted in 2023

3.1 A list of Quarantine seaports and Quarantine airports investigated in 2023

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" (March 24, 2014; Notification No. 0324, Food Safety Inspection Division, hereinafter referred to as "the Sanitation Control Guide") were subject to surveillance. (Survey data on ports subject to radio quarantine were excluded.)

Quarantine Port (Seaport): 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, Akitafunakawa 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, Fushikitoyama Port, Kanazawa Port, Nanao Port, Uchiura Port, Tsuruga Port, Shimizu Port, Yaizu Port, Fukue Port, Mikawa Port, Kinuura Port, Nagoya Port, Yokkaichi Port, Owase Port, Maizuru Port, Katsuura Port, Wakayamashimotsu Port,Hanshin Port (Osaka), Hannan Port, Hanshin Port (Kobe), Mizushima Port, Sakai Port, Hamada Port, Fukuyama Port, Kure Port,Hiroshima Port,Iwakuni Port,Tokuyamakudamatsu Port, Ube Port, Tokushimakomatsushima 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 airport (Airport): 30

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

Total: 122 quarantine ports / airports (Table 1, Fig. 1-1～2)

3.2 Infectious diseases examined in 2023 and the methods used for the investigation (2023)

The infectious diseases subject to surveillance include mosquito-borne diseases, such as Zika virus infection, chikungunya fever, dengue fever, malaria, West Nile fever, Japanese encephalitis, as well as rodent- or flea-borne diseases such as 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 “The Sanitation Control Guide.”

3.3 Period of surveillance

January 1 through December 31, 2023

3.4 Summarization of the results

The Yokohama Quarantine Station Officer for Analysis on Sanitation Control compiled the data from electronic forms 1 to 11 (Microsoft® Excel) listed in Attachment 1, which were submitted from quarantine seaports and airports in accordance with the “Handling of Surveillance Results in Connection with the ‘Guide to Port Area Sanitation Control’” (March 24, 2014; Notification No. 0324, Food Safety Inspection Division).

4 Results of investigations targeting invasive vectors in 2023

4.1 Investigation of mosquitoes

To assess the extent of mosquito-borne infections and estimate their prevalence in Japan, an investigation was conducted on the invasion and habitation status of mosquitoes, as well as pathogen testing, in aircraft arriving from overseas and in the areas specified in Separate Table 3 of the Quarantine Act Enforcement Order (hereinafter called “Cabinet Order”).

4.1.1 Mosquito collections in international aircraft on arrival

Aircraft surveys were conducted in accordance with the Mosquito Surveillance Manual. The inspections targeted aircraft arriving from overseas, using visual observation and insect nets. Inspections were carried out at 25 quarantine airports covering 18 countries/regions and 33 routes, involving a total of 652 aircraft (compared to 6 airports, 15 countries/regions, 28 routes, and 254 aircraft in 2022). By country/region of origin, the largest number of inspected aircraft came from Taiwan (155 aircraft), followed by the Philippines (118 aircraft), Vietnam (98 aircraft), Thailand (76 aircraft), South Korea (64 aircraft), India (26 aircraft), China (excluding Hong Kong and Macau) (26 aircraft), Hong Kong (18 aircraft), Indonesia (17 aircraft), Singapore (16 aircraft), the United States (excluding Guam) (10 aircraft), Malaysia (10 aircraft), Bangladesh (5 aircraft), Nepal (4 aircraft), Guam (4 aircraft), Sri Lanka (3 aircraft), the United Arab Emirates (1 aircraft), and Qatar (1 aircraft).

By region, the Southeast Asia region accounted for 335 aircraft (51.4%) and the East Asia region for 263 aircraft (40.3%), together comprising 91.7% (598 aircraft) of the total. This was followed by the South Asia region with 38 aircraft (5.8%), the North America region with 10 aircraft (1.5%), the South Pacific region with 4 aircraft (0.6%), and the Middle East region with 2 aircraft (0.3%). Among the inspected aircraft, 6 aircraft (0.9%) from 3 countries/regions and 3 routes were found to have mosquito vectors on board, with a total of 7 mosquitoes collected, compared to 5 aircraft (2.0%) from 3 countries and 4 routes with 9 mosquitoes in 2022 (Table 3, Table 4, Table 4-1, and Table 4-2).

The routes with the highest mosquito collection rates (based on the final point of departure) were Indira Gandhi International Airport (India), where mosquitoes were collected from 4 of 22 aircraft (18.2%), followed by Ninoy Aquino International Airport (Philippines) with 1 of 109 aircraft (0.9%), and Taoyuan International Airport (Taiwan) with 1 of 138 aircraft (0.7%) (Table 3, Table 4-1, Table 4-2, and Fig. 2).

Among the collected mosquitoes, 1 *Aedes aegypti* (an invasive species) was collected from 1 aircraft (with no previous cases in 2022), 1 *Anopheles sinensis* was collected from 1 aircraft (also with no previous cases in 2022), and 5 *Culex pipiens* complex mosquitoes were collected from 4 aircraft (compared to 5 specimens from 1 aircraft in 2022).

Pathogen examination was conducted on the 7 collected vector species for the presence of flaviviruses, chikungunya virus, and Plasmodium (the malaria parasite), and all test–results were negative (Table 3, Table 4, Table 4-1, Table 4-2, and Fig. 2).

4.1.2 Surveillance of adult and larval mosquitoes at airports and seaports

The survey areas were established using the standard regional mesh (hereinafter called "tertiary mesh") of the Statistics Bureau of the Ministry of Internal Affairs and Communications, in accordance with the "Port Sanitation Control Guidelines" (Appendix 1). To monitor the invasion and emergence of invasive mosquito species, mosquito collection devices (light traps) containing dry ice were placed within the survey areas (hereinafter called "adult mosquito survey").

In addition, to monitor the invasion of invasive mosquito species and the establishment of vector species, larval collection devices (ovitraps) were placed within the survey areas. Surveys of larval habitats were also conducted to investigate the presence of mosquito larvae in water bodies such as ditches and catch basins (hereinafter called the "larval mosquito survey").

Surveillance of adult mosquitoes

Surveillance of adult mosquitoes was conducted at a total of 122 seaports and airports (comprising 92 seaports and 30 airports, compared to 92 seaports and 29 airports for a total of 121 seaports and airports in 2022) across 1,424 survey areas (compared to 1,249 survey areas in 2022). As a result, mosquitoes were collected from 84 seaports (91.3%) (compared to 82 seaports, 89.1% in 2022), 26 airports (86.7%) (compared to 26 airports, 89.7% in 2022), and a total of 110 seaports and airports (90.2%) (compared to 108 seaports and airports, 89.3% in 2022). The collected mosquitoes comprised 7 genera and 29 species groups, totaling 18,857 (compared to 8 genera and 24 species groups, totaling 16,833 in 2022). The most-collected species was the *Culex tritaeniorhynchus* with 7,200, followed by the *Culex pipiens* complex with 6,518 and the *Aedes albopictus* with 2,481. Of the collected mosquitoes, a total of 18,731 belonging to 4 genera and 18 species groups (compared to 16,789 from 4 genera and 14 species groups in 2022) were identified as vector species for mosquito-borne diseases (primary vectors, secondary vectors, and possible vectors), accounting for 99.3% of the total collected mosquitoes (Table 5-1～3).

Surveillance of larval mosquitoes

Surveillance of larval mosquitoes was conducted at a total of 121 seaports and airports (comprising 91 seaports and 30 airports, compared to 90 seaports and 29 airports for a total of 119 seaports and airports in 2022) across 1,467 survey areas (compared to 1,504 survey areas in 2022). As a result, mosquito larvae were collected at a total of 105 seaports and airports (86.8%), comprising 80 seaports (87.9%) and 25 airports (83.3%), compared to 99 seaports and airports (83.2%) in 2022, which included 76 seaports (84.4%) and 23 airports (79.3%). The collected larvae belonged to 7 genera and 24 species groups (compared to 7 genera, 22 species groups, and unidentified species in 2022). Among them, 4 genera and 13 species groups (compared to 4 genera and 12 species groups in 2022) were identified as vector species for infectious diseases, including primary, secondary, and possible vectors. Notably, during surveillances conducted in July and October at Tokyo International Airport, larvae of *Aedes aegypti*, an invasive species and a primary vector for dengue fever, chikungunya fever, and Zika virus infection, were collected.

As a result of surveillance of adult and larval mosquitoes, adult and larval mosquitoes were collected at a total of 115 seaports and airports (94.3%), compared to 115 seaports and airports (95.0%) in 2022 (Table 5-1～3, Table 6-1～3).

Collection status of vector species for each mosquito-borne disease

○ Dengue fever

At Tokyo International Airport, larvae of *Aedes aegypti*, an invasive species and primary vector, were collected during surveillances conducted in July and October.

At 96 seaports and airports (78.7%), compared to 95 seaports and airports (78.5%) in 2022, primary vectors, such as *Aedes albopictus*, and possible vectors, such as *Culex tritaeniorhynchus*, *Aedes dorsalis*, *Aedes flavopictus*, and *Aedes riversi*, were collected (Table 5-1～3, Table 6-1～3, and Fig. 4).

○ Japanese encephalitis

At 60 seaports and airports (49.2%), compared to 53 seaports and airports (43.8%) in 2022, adult and larvae of the primary vector *Culex tritaeniorhynchus* were collected. Additionally, at 2 seaports (0.8%), adult and larvae of the primary vector *Culex pseudovishnui* were collected. A total of 7,200 adult *Culex tritaeniorhynchus* and 1 adult *Culex pseudovishnui* were collected, accounting for 38.2% of all collected mosquitoes. A total of 6 possible vectors, including *Aedes albopictus*, *Aedes japonicus*, and *Culex quinquefasciatus*, were collected (Table 5-1～3, Table 6-1～3, and Fig. 7).

○ West Nile fever

At 100 seaports and airports (82.0%), compared to 103 seaports and airports (85.1%) in 2022, adult or larvae of the primary vector *Culex pipiens* complex were collected. Additionally, at 5 seaports and airports (4.1%), *Culex quinquefasciatus* was collected as either adult or larvae, consistent with the 5 seaports and airports (4.1%) reported in 2022. A total of 6,518 adult *Culex pipiens* complex mosquitoes and 522 adult *Culex quinquefasciatus* mosquitoes were collected. Combined, these 2 species accounted for 37.3% of all collected adult mosquitoes.

A total of 11 secondary vectors were collected, including *Aedes albopictus*, *Culex tritaeniorhynchus*, *Aedes japonicus*, and *Aedes togoi*.

Many of the primary and secondary vectors for West Nile fever are native species in Japan and are widely distributed across the country, from Hokkaido to Okinawa (Table 5-1～3, Table 6-1～3, and Fig.6).

○ Malaria

At 9 seaports and airports (7.3%), compared to 13 seaports and airports (10.7%) in 2022, a total of 52 adult *Anopheles sinensis* mosquitoes, a primary vector for tertian malaria, were collected, accounting for 0.28% of all collected mosquitoes. Additionally, at New Chitose Airport, 1 adult *Anopheles lesteri*, a secondary vector, was collected, while at Hiroshima Airport, 2 adult *Anopheles koreicus*, a possible vector, were collected（Table 5-1～3, Fig. 5).

○ Chikungunya fever and Zika virus infection

At Tokyo International Airport, larvae of *Aedes aegypti*, an invasive species and primary vector, were collected during surveillances conducted in July and October.

Adult or larvae of *Aedes albopictus*, a primary vector, were collected at a total of 91 seaports and airports (74.6%), compared to 87 seaports and airports (71.9%) in 2022, with Aomori marking the northernmost limit of its distribution. A total of 2,481 adult *Aedes albopictus* mosquitoes were collected, accounting for 13.2% of all collected mosquitoes (compared to 3,460 specimens, 20.6% in 2022) (Table 5-1～3, Table 6-1～3, and Fig.3).

Results of pathogen examination for quarantinable infectious diseases and related conditions

Of the collected vectors, a total of 18,482 were subjected to pathogen examination for quarantinable Infectious diseases. The tests included 1,569 pools for flaviviruses, 304 pools for chikungunya virus, and 21 pools for malaria parasite. As a result, in August, Japanese encephalitis virus genotype I was detected in *Culex tritaeniorhynchus* collected at Narita International Airport and Saga Airport. All other pathogen examinations yielded negative results (Table 5-1～3).

4.2 Investigation of rodents

To assess the infestation level of rodent-borne diseases and estimate potential outbreaks, a survey was conducted to monitor the invasion and habitation status of rodents and parasitic fleas and to perform pathogen examination within designated areas specified by Cabinet Order. Similar to mosquito surveillance, survey areas were established within the areas specified by Cabinet Order. Rodent capture devices, including cage traps and Sherman traps, were installed at a total of 122 seaports and airports (comprising 92 seaports and 30 airports) compared to 107 seaports and airports (81 seaports and 26 airports) in 2022. The survey was conducted across 891 survey areas (compared to 759 survey areas in 2022) (Table 7-1～3).

Capture status of rodent species

At a total of 82 seaports and airports (67.2%), comprising 61 seaports and 21 airports, 507 rodents from 6 genera and 9 species, along with unidentified species, compared to 65 seaports and airports (60.7%), comprising 47 seaports and 18 airports, in 2022, where 373 rodents from 5 genera and 7 species, plus unidentified species, were captured. In terms of the number of rodents captured, the most common species was *Rattus norvegicus* with 175 individuals, followed by *Mus musculus* with 151 individuals, *Rattus rattus* with 73 individuals, *Apodemus speciosus* with 65 individuals, *Clethrionomys rufocanus bedfordiae* with 16 individuals, *Microtus montebelli* with 12 individuals, *Apodemus argenteus* and *Apodemus speciosus ainu* with 5 individuals each, *Microtus montebelli* with 1 individual, and 4 unidentified individuals.

The capture rate per survey area was 0.57 rodents per area, compared to 0.49 rodents per area in 2022. The highest capture rate per survey area was recorded at Muroran Port, with 7.00 rodents per area, followed by Ishikariwan Port and Hirara Port, both with 3.50 rodents per area. The port with the highest total number of rodents captured was Keihin Port (Yokohama), where 28 rodents were collected（Table 7-1～3）.

Collection Status of Parasitic Fleas and Mites.

A total of 2 *Nosopsyllus fasciatus*, a secondary vector for plague, were collected. In addition, although not vectors of quarantinable infectious diseases, 11 *Ctenophthalmus kolenati*, 4 *Stivalius aestivalis*, and 1 *Monopsyllus anisus* were also collected.

A total of 316 parasitic mites, including unidentified species, were collected. The most collected species was *Laelaps nuttalli*, with 197 specimens (Table 7-1～3).

Capture status of rodent vector species and pathogen examination results for rodent-borne infectious diseases

○ Plague

At 82 seaports and airports (67.2%), a total of 507 rodents belonging to 6 genera and 9 species, including 4 unidentified specimens, were captured, indicating a wide distribution of secondary vectors within domestic port areas. In addition, 1 *Nosopsyllus fasciatus*, a secondary vector for *Yersinia pestis*, was collected at both Tomakomai Port and Keihin Port (Kawasaki). Pathogen examination for plague bacterium was conducted on 471 rodents, and all test results were negative (Table 7-1～3, Fig. 8).

○ HFRS

A total of 480 rodents, including the secondary vectors *Rattus norvegicus*, *Rattus rattus*, and species reported in the literature as potential hosts, such as *Mus musculus*, *Apodemus speciosus*, and *Clethrionomys rufocanus bedfordiae*, were captured at 82 seaports and airports (67.2%). Pathogen examination for HFRS was conducted on 465 rodents, and all test results were negative (Table 7-1～3, Fig. 9).

○ South American hemorrhagic fevers, Lassa fever and HPS

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

Capture of Rodents Reported by Related Agencies

The following table summarizes 16 cases of rodent infestation presumed to have originated from overseas, based on the quarantine station’s response to detection reports from related agencies.

There have been no cases of invasive rodents being captured as a result of reports from related agencies.

Cases of capturing invasive rodents suspected from overseas in 2023 (Reports from related agencies)

Seaport or Airport	Place of captured	Species captured	Number (condition)	Estimated invade place	Type of cargo
Hanshin port (Kobe)	Ocean-going ship container	*Rattus norvegicus*	1(dead)	Xiamen（China）	Stone
Hanshin port (Kobe)	Storage area	Unknown	1(dead)	Qingdao（China）	Sand
Tokyo international airport	Airport terminal	*Rattus norvegicus*	1(dead)	Shanghai（China）	Unknown
Kanmon port	Storage area	Unknown	1(dead)	Unknown (China)	Ceramic raw powder
Narita international airport	Cleaning vehicle for aircraft	*Mus musculus*	1(live))	Unknown (China)	—
Keihin port (Yokohama)	Ocean-going ship container	*Mus musculus*	1(live))	Oregon (U.S.A)	Dry hay
Hanshin port (Kobe)	Ocean-going ship container	Unknown	1(dead)	Adelaide (Australia)	Dry hay（Wheat）
Keihin port (Yokohama)	Ocean-going ship container	*Rattus rattus*	1(dead)	Laem Chabang (Thailand)	Corn in paper pack
Nagoya port	Ocean-going ship cargo	*Rattus rattus*	1(dead)	Port Klang (Malaysia)	PE materials
Keihin port (Kawasaki)	Ocean-going ship container	*Rattus rattus*	1(live)	Bangkok (Thailand)	General cargo
Narita international airport	Storage area	Unknown	1(dead)	Los Angeles (U.S.A)	Clothes
Naha port	Ocean-going ship container	*Mus musculus*	1(dead)	Adelaide (Australia)	Dry hay
Naha airport	Airport terminal	*Rattus rattus*	1(live))	Unknown	Unknown
Narita international airport	CIQ facility	*Mus musculus*	1(live)	Unknown	—
Tokyo international airport	CIQ facility	*Mus musculus*	4（Live1, Dead3）	Unknown	—
Keihin port (Tokyo)	Ocean-going ship container	*Rattus norvegicus*	1(dead)	Nhava Sheva (India)	Cereals

5 Risk assessment of vector- borne diseases (2023)

5.1 Mosquito-borne diseases

For each quarantine port and airport, the risk of incursion of quarantinable infectious diseases and related conditions was assessed on a scale from A to D, based on the survey results in accordance with the Sanitation Control Guide. The risk was evaluated for each month of the survey, and the highest monthly risk was regarded as the annual risk (Table 8).

A (very low): No vector mosquito (primary, secondary, or species of concern) that transmits quarantinable infectious diseases is collected, or no mosquitoes are collected at all during permanent surveillance or similar activities in the areas specified by the

Cabinet Order.

B (low): Vector mosquitoes (primary, secondary, or species of concern) that transmit quarantinable infectious diseases are collected during permanent surveillance or similar activities in the areas specified by the Cabinet Order. However, no pathogens or pathogen genes associated with quarantinable infectious diseases are detected in the collected mosquitoes.

C (Moderate): Adults or larvae of invasive vector mosquitoes (primary species) that transmit quarantinable infectious diseases are collected during permanent surveillance or similar activities in the areas specified by the Cabinet Order. However, no pathogens or pathogen genes associated with quarantinable infectious diseases are detected in the collected mosquitoes.

D (High): Adult vector mosquitoes (primary, secondary, or species of concern) that transmit quarantinable infectious diseases are collected during permanent surveillance or similar activities in the areas specified by the Cabinet Order. The collected mosquitoes are found to possess pathogens or pathogen genes associated with quarantinable infectious diseases.

○ Dengue fever

At 26 seaports and airports (21.3%), the risk of vector invasion was rated as “A” (very low risk). At 95 seaports and airports (77.9%), the risk was rated as “B” (low risk). At 1 airport (0.8%), the collection of *Aedes aegypti* larvae, an invasive species and primary vector, resulted in a “C” rating (moderate risk) for vector invasion.

○ Japanese encephalitis

At 12 seaports and airports (9.8%), the risk of vector invasion was rated as “A” (very low risk). At 108 seaports and airports (88.5%), the risk was rated as “B” (low risk). At 2 airports (1.6%), the detection of Japanese encephalitis virus genotype I in *Culex tritaeniorhynchus* resulted in a “D” rating (high risk) for vector invasion.

○ West Nile fever

At 7 seaports and airports (5.7%), the risk of vector invasion was rated as “A” (very low risk), while at 115 seaports and airports (94.3%), the risk was rated as “B” (low risk).

○ Malaria

At 109 seaports and airports (89.3%), the risk of vector invasion was rated as “A” (very low risk), while at 13 seaports and airports (10.7%), the risk was rated as “B” (low risk).

○ Chikungunya fever

At 31 seaports and airports (25.4%), the risk of vector invasion was rated as “A” (very low risk). At 90 seaports and airports (73.8%), the risk was rated as “B” (low risk). At 1 airport (0.8%), the collection of *Aedes aegypti* larvae, an invasive species and primary vector, resulted in a “C” rating (moderate risk) for vector invasion.

○ Zika virus infection

At 31 seaports and airports (25.4%), the risk of vector invasion was rated as “A” (very low risk). At 90 seaports and airports (73.8%), the risk was rated as “B” (low risk). At 1 airport

(0.8%), the collection of *Aedes aegypti* larvae, an invasive species and primary vector, resulted in a “C” rating (moderate risk) for vector invasion.

5.2 Rodent-borne diseases

As with the mosquito survey, the risk of incursion of quarantinable infectious diseases and related conditions was assessed on a scale from A to D, based on the survey results. The risk was evaluated for each month of the survey, and the highest monthly risk was regarded as the annual risk (Table 8).

A (very low): No rodents are captured during permanent surveillance or similar activities in the areas specified by the Cabinet Order.

B (Low): Indigenous rodents (primary or secondary vector) or fleas/ticks (primary or Secondary vector) known to transmit quarantinable infectious diseases or related conditions are captured during permanent surveillance or similar activities in the areas specified by the Cabinet Order. However, no antibodies, pathogens, or genes suggestive of pathogens for quarantinable infectious diseases or related conditions are detected in the captured specimens.

C (Moderate): Invasive rodents (primary or secondary vector) or fleas/ticks (primary or secondary vector) known to transmit quarantinable infectious diseases or related conditions are captured during permanent surveillance or similar activities in the areas specified by the Cabinet Order. However, no antibodies, pathogens, or genes suggestive of pathogens for quarantinable infectious diseases or related conditions are detected in the captured specimens.

D (High): Antibodies, pathogens, or genes suggestive of pathogens for quarantinable infectious diseases or related conditions are detected in rodents (primary or secondary vector) or fleas/ticks (primary or secondary vector) captured during permanent surveillance or similar activities in the areas specified by the Cabinet Order.

○ Plague

At 40 seaports and airports (32.8%), the risk of vector invasion was rated as “A” (very low risk), while at 82 seaports and airports (67.2%), the risk was rated as “B” (low risk).

○ HFRS

At 40 seaports and airports (32.8%), the risk of vector invasion was rated as “A” (very low risk), while at 82 seaports and airports (67.2%), the risk was rated as “B” (low risk).

○ HPS、Lassa fever and South American hemorrhagic fever

At 122 seaports and airports, the risk of vector invasion was rated as “A” (very low risk).

5.3 Discussion

Status of implementation of vector surveillance

In 2023, aircraft survey were conducted at 25 quarantine airports covering 18 countries/regions and 33 routes (compared to 6 airports, 15 countries/regions, and 28 routes in 2022). This represents a significant increase from 2022, driven in part by the resumption of international scheduled flights at regional airports, which had been suspended due to the global outbreak of COVID-19.

In 2023, mosquito surveillance was conducted at 122 seaports and airports for surveillance of adult mosquitoes (compared to 121 seaports and airports in 2022) and at 121 seaports and airports for surveillance of larval mosquitoes (compared to 119 seaports and airports in 2022), with both exceeding the number of areas surveyed in 2022. The total number of survey areas for surveillance of adult mosquitoes was 1,424 sites (compared to 1,249 areas in 2022), reflecting an increase from the previous year. While, for surveillance of larval mosquitoes, the total number of survey areas was 1,467 areas, which was slightly lower than the 1,504 areas surveyed in 2022.

In 2023, rodent surveillance was conducted at 122 seaports and airports (compared to 107 seaports and airports in 2022), and the total number of survey areas was 891 areas (compared to 759 areas in 2022), with both the number of surveyed locations and survey areas, exceeding number of implementations in the previous year.

Regarding the implementation status of vector surveillance, the legal classification of COVID-19 was changed to a Category 5 infectious disease in May 2023, leading to the termination of border control measures. As a result, permanent surveillances conducted after May 2023 have gradually returned to pre-pandemic levels. In particular, aircraft survey saw a significant increase in the number of target aircraft due to the resumption of international scheduled flights, resulting in a substantial increase in survey activities compared to the previous year.

Investigation of mosquitoes

Aircraft survey were primarily conducted in Southeast Asia, and with a significant increase in the number of target aircraft compared to 2022, a total of 7 mosquitoes were collected from 6 aircraft. The collected mosquitoes included *Aedes aegypti* (1 specimen from 1 aircraft), an invasive species and primary vector known to transmit dengue fever, chikungunya fever, and Zika virus infection; *Anopheles sinensis* (1 specimen from 1 aircraft), a primary vector for malaria; and *Culex pipiens* complex (5 specimens from 4 aircraft), a primary vector for West Nile fever. Although pathogen examination for Flaviviruses, chikungunya virus, and malaria did not detect any pathogens, the collection of a blood-fed *Aedes aegypti* inside the aircraft highlighted the potential risk of the invasion of vector and pathogens via aircraft. Given this, it is essential to continue guiding airlines on measures to prevent mosquito invasion into aircraft cabins and to conduct aircraft survey based on the status of mosquito-borne disease outbreaks overseas.

The surveillances of adult mosquitoes at seaports and airports resulted in the collection of 18,857 mosquitoes from 7 genera and 29 species groups. While no invasive species were collected, several primary vectors for mosquito-borne diseases were captured, including *Culex tritaeniorhynchus* (7,200 specimens), *Culex pipiens* complex (6,518 specimens), *Aedes albopictus* (2,481 specimens), *Culex quinquefasciatus* (522 specimens), and *Anopheles sinensis* (52 specimens). Among the collected mosquitoes, 18,482 mosquitoes (98.0%) belonged to 4 genera and 18 species groups classified as primary, secondary, or possible vectors. Given this, it remains essential to continue permanent surveillances at each seaport and airport to monitor for the invasion of invasive species and to track the pathogen carriage status of mosquitoes.

In the pathogen examination of collected mosquitoes, Japanese encephalitis virus genotype I was detected in two pools of *Culex tritaeniorhynchus*, a primary vector for Japanese encephalitis, collected at Narita International Airport and Saga Airport. In response, an emergency survey was conducted in collaboration with local governments. Although no further detection of Japanese encephalitis virus genotype I was reported during the subsequent emergency surveys, it was noted that, despite no reported cases of Japanese encephalitis in Chiba or Saga in 2023, the Infectious Disease Outbreak Prediction Survey conducted by the National Institute of Infectious Diseases revealed that more than 80% of pigs in Chiba and Saga tested positive for Japanese encephalitis virus antibodies. Given this, it remains necessary to continue monitoring the situation closely.

The surveillances of larval mosquitoes at seaports and airports identified 24 species groups from 7 genera (compared to 22 species groups from 7 genera plus unidentified species in 2022). Of these, 13 species groups from 4 genera (compared to 12 species groups from 4 genera in 2022) were classified as vector species for mosquito-borne diseases, including primary, secondary, and possible vectors. Compared to 2022, there was no significant change in the composition of collected species.

However, at Tokyo International Airport, during surveillances of larval mosquitoes conducted in July and October, which coincide with the mosquito activity period, *Aedes aegypti*, an invasive species, was collected. In response, targeted surveillance measures were implemented, including an increase in the number of traps and the use of insecticides or insect growth regulators (IGRs). Although no further collection of *Aedes aegypti* has been reported since then, it is crucial to continue preventive measures to avoid the invasion and establishment of invasive species. This includes environmental management and control measures at all seaports and airports.

Investigation of rodents

The rodent surveillance resulted in the capture of 507 rodents from 6 genera and 9 species, including unidentified species (compared to 373 rodents from 5 genera and 7 species, plus unidentified species, in 2022). The captured rodents included *Mus musculus*, *Rattus norvegicus*, *Rattus rattus*, *Apodemus speciosus*, and *Microtus montebelli*, among others. The total number of captured rodents increased 1.4 times compared to 2022, and the capture rate per survey area rose to 0.57 rodents per area (compared to 0.49 rodents per area in 2022). No invasive rodent species or rodents carrying pathogens were captured. While the survey of external parasites did not detect *Xenopsylla cheopis*, which is a primary vector for plague, 2 *Nosopsyllus fasciatus*, a secondary vector, were collected. Given these findings, it remains essential to continue routine surveillance at seaports and airports to monitor the invasion of invasive species and track the pathogen carriage status of captured rodents.

In 2023, there were 16 reports of rodents from relevant organizations, of which 8 cases involved the presence of rodents inside international shipping containers and cargo. A total of 2 live rodents and 6 dead rodents were discovered. Notably, there were no reported incidents involving aircraft.

Given this, it is essential to maintain close collaboration with relevant organizations to ensure prompt and appropriate responses to reported cases, as such cases cannot be fully addressed through permanent surveillances alone.

Future vector surveillance

The implementation status of vector surveillance in 2023 was affected by the continuation of COVID-19 border control measures until May 8, 2023. When compared to the 2019 pre-COVID-19 survey status on a survey area basis, the survey coverage for mosquito surveillance (adults and larvae) was approximately 75%, while rodent surveillance reached approximately 87%. In terms of aircraft inspections, the number of aircraft survey was only approximately 60% of the 2019 level. For 2024, vector surveillance at each quarantine port and quarantine airport is being conducted in accordance with an annual plan, similar to the implementation methods used prior to the COVID-19 outbreak.

Globally, dengue fever remains a significant threat, with the number of cases and dengue fever-related deaths in 2023 reaching an all-time high. This highlights the ongoing risk posed by infectious diseases. Given the collection of *Aedes aegypti* larvae during the 2023 surveillance, it is essential for quarantine ports and quarantine airports to continue efforts to prevent the invasion and establishment of vector-borne diseases that are spreading overseas. Additionally, to enable the early detection of emerging infectious diseases, similar to COVID-19, it is crucial to conduct planned and effective vector surveillance.

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. 80 through 83).

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

【Case of *Aedes aegypti* detection during aircraft survey (Chubu Centrair International Airport)】

On May 29, during an aircraft survey conducted by the Chubu Airport Quarantine Branch, a blood-fed live *Aedes aegypti*, an invasive species, was collected from the overhead compartment (luggage shelf) inside the passenger cabin of a flight that had arrived from Manila, Philippines.

Based on the operational history of the aircraft over the past 10 days, it was found that the flight had traveled between Southeast Asia (including the Philippines) and East Asia, including Japan, and the collected *Ades agypti* had sucked blood. For this reason, at pathogen examination, the collected *Ades agypti* was dissected into its head, thorax, abdomen, wings, and legs, and each part was subjected to real-time PCR testing for dengue virus, chikungunya virus, and Zika virus, and the results for all parts were negative.

The quarantine office issued a notice of caution to the airline operating the aircraft to prevent the invasion and establishment of vector mosquitoes that transmit quarantinable infectious diseases. Additionally, the quarantine office requested the airline's cooperation in implementing routine insecticide treatment inside the aircraft.

Based on previous aircraft inspection results conducted by the quarantine office, similar cases of *Aedes aegypti* collection were recorded on flights from Manila to Narita Airport in 2009 and 2012. As a focused surveys, inspections were conducted on Manila-bound flights arriving during daytime hours. During June, aircraft inspections were carried out at a frequency of one flight per week per airline, and in July, the frequency was reduced to one flight every two weeks, resulting in a total of 12 aircraft inspections. However, no *Aedes aegypti* were collected during these inspections. From August onward, the inspection frequency was aligned with the standard schedule used for other flight routes, and routine surveillance was continued.

【Case of *Aedes aegypti* detection during surveillance of larval mosquitoes (Tokyo International Airport)】

On July 11, during a routine surveillance of larval mosquitoes conducted by the Haneda Airport Quarantine Branch, a single *Aedes aegypti* larva was collected from one of the 29 ovitraps that had been set up. From July 12 onward, an additional 5 larvae were collected from the same ovitrap, and 4 of these larvae were identified as *Aedes aegypti*, an invasive species. Given the collection of *Aedes aegypti*, the following focused surveys were implemented.

【Surveillance of adult mosquitoes】

Focusing on a 100-meter radius around the ovitrap where *Aedes aegypti* larvae were detected, a focused survey was conducted from July 12 to July 18. During this period, 6 CO_2 traps were installed daily within the designated area. During the surveillance, a total of 11 *Culex pipiens* complex were collected. In addition, the use of insect nets resulted in the collection of 3 *Culex pipiens* complex (including 1 male), 2 *Culex tritaeniorhynchus* (including 1 male), and 1 *Uranotaenia novobscura*. However, no *Aedes aegypti* were collected.

Pathogen examination for flaviviruses was conducted on the collected *Culex pipiens* complex and *Culex tritaeniorhynchus*. The results for all specimens were negative.

【Surveillance of larval mosquitoes】

Focusing on a 400-meter radius around the ovitrap where *Aedes aegypti* larvae were collected, a focused surveys were conducted from July 12 to August 13. A total of 44 ovitraps using paper towels as oviposition substrates were installed, with 24 traps placed within a 100-meter radius on the first day. During the surveillance period, *Aedes albopictus* was collected from 3 fixed observation points, but no *Aedes aegypti* were collected. Additionally, from July 18 to August 15, a larval habitat survey was conducted on the water trays of planters inside Terminal 3 of the airport. However, no mosquito larvae were collected from the water trays during this period.

【Aircraft survey】

From July 19 to August 18, aircraft surveys were conducted on flights arriving from countries and regions where *Aedes aegypti* is endemic. As a general rule, surveillances were conducted on one flight per weekday. During the period, a total of 19 aircraft inspections were conducted on flights arriving from 9 countries and regions, but no mosquitoes were collected.

【Measures to prevent the spread and establishment of *Aedes aegypti*】

Focusing on a 400-meter radius around the ovitrap where *Aedes aegypti* larvae were detected, control measures were implemented to prevent the spread and establishment of *Aedes aegypti*. Sumithion (insecticide) was applied during the initial treatment, and for subsequent treatments, Sumilarv (Insect Growth Regulator, IGR) was introduced into rainwater catch basins. Considering that no further *Aedes aegypti* were collected during the surveys, the drop in temperature creating a less favorable habitat for *Aedes aegypti,* and the fact that 3 months had passed since the last collection of larvae, the treatme, nt period was set to end on October 20.

【Information sharing with relevant organizations】

The information was shared with airlines and the Tokyo International Airport Health and Hygiene Management Counci, along with a notice of caution to raise awareness.

【Detection of Japanese encephalitis virus gene in *Culex tritaeniorhynchus* collected during a routine survey: Saga Airport】

On August 4, during surveillance of adult mosquitoes, as a routine survey, at Saga Airport using CO_2 light traps at two fixed points, a total of 508 *Culex tritaeniorhynchus* were collected from one point along the southern coastal area of the airport, grouped into 11 pools for pathogen examination for flaviviruses, and 1 pool detected-for Japanese encephalitis virus genotype I.

【Strengthening of fixed-point surveys】

At Saga Airport, Japanese encephalitis virus genotype I was detected in *Culex tritaeniorhynchus* during 2017 routine survey at the fixed survey point along the southern coastal area of the airport, for this reason, the frequency of routine surveys at two fixed points have been increased to biweekly survey since 2017. Since Japanese encephalitis virus genotype, I was detected on August 4, a total of 364 *Culex tritaeniorhynchus* were collected and grouped into 9 pools for pathogen examination for flaviviruses, and the results for all pools were negative.

【Collaboration with relevant organizations】

Information was shared with Saga Airport Terminal Building Co., Ltd. and the Saga Prefectural Airport Office through the issuance of official notifications. Additionally, awareness posters were displayed inside Saga Airport to raise public awareness of infection prevention measures.

【Detection of Japanese encephalitis virus gene in *Culex tritaeniorhynchus* collected during a routine survey: Narita International Airport】

On August 24, during a routine surveillance of adult mosquitoes conducted by the Narita Airport Quarantine Station, 64 *Culex tritaeniorhynchus* were collected using a CO_2 light trap at one fixed point in the southern cargo area. Pathogen examination revealed the presence of Japanese encephalitis virus genotype I in the collected mosquitoes.

The fixed survey point in the southern cargo area where Japanese encephalitis virus genotype I was detected in *Culex tritaeniorhynchus* during the recent survey had previously recorded the detection of Japanese encephalitis virus genes in *Culex tritaeniorhynchus* during routine surveys in 2013 and 2021.

【Emergency Survey】

From August 28 to 31, CO_2 light traps were set up daily at the fixed survey point where the detection of Japanese encephalitis virus genotype I in *Culex tritaeniorhynchus*, as well as at four surrounding locations.

During this period, a total of 85 *Culex tritaeniorhynchus* were collected and subjected to pathogen examination. The test results for all specimens were negative. Based on the results, from the second week of September to the first week of October, CO_2 light traps were installed at five locations once per week.

During this period, a total of 580 Culex tritaeniorhynchus were collected and subjected to pathogen examination, with all test results being negative.

Based on the pathogen examination results, from the second week to the third week of October, CO_2 light traps were installed at three locations with a frequency of once per week. During this period, a total of 21 *Culex tritaeniorhynchus* were collected and subjected to pathogen examination, with all test results being negative.

As of the third week of October, the total number of *Culex tritaeniorhynchus* collected through both routine and emergency surveys had significantly decreased. Additionally, all pathogen examination results were negative. Based on these findings, the surveillance activities were returned to the normal monitoring system from the fourth week of October.

【Collaboration with relevant organizations】

Information was shared with relevant organizations, including the airport management company, airlines, and relevant departments of Chiba Prefecture. Additionally, infection prevention advisories were issued through the Narita Airport Quarantine Station website.

【Detection of *Aedes aegypti* larvae during surveillance of larval mosquitoes (Tokyo International Airport)】

On October 17, during a routine surveillance of larval mosquitoes conducted by the Haneda Airport Quarantine Branch, 3 *Aedes aegypti* larvae were collected from an ovitrap installed at a cargo handling area. Subsequently, an additional 2 *Aedes aegypti* larvae were collected from the same ovitrap.

This marks the second detection of *Aedes aegypti* larvae at Tokyo International Airport this season,following the previous detection in July. Given the detection of this invasive species, the following focused surveys measures were implemented.

【Surveillance of adult mosquitoes】

Focusing on a 100-meter radius around the ovitrap where *Aedes aegypti* larvae were collected, 6 CO_2 traps (4 traps on the first day) and 1 BG-Sentinel trap (starting from October 18) were installed and operated daily from October 17 to October 24. During the investigation, a total of 8 *Culex pipiens* complex were collected, but no *Aedes aegypti* were collected. Pathogen examination for flaviviruses was conducted on the female *Culex pipiens* complex, and the results for all specimens were negative.

【Surveillance of larval mosquitoes】

Focusing on a 400-meter radius around the ovitrap where *Aedes aegypti* larvae were collected, from October 18 to November 17, 44 ovitraps using paper towels as oviposition substrates were installed, and on October 20, the number of traps was increased to 49 ovitraps. Given that the larvae were collected from a cargo handling area (possibly container-derived) and considering the expected drop in temperature, the ovitraps were primarily installed in semi-indoor areas, such as cargo handling areas. Throughout the survey period, no mosquito larvae were collected, including *Aedes aegypti*.

Additionally, from October 18 to November 15, a larval habitat survey was conducted on the water trays of planters inside Terminal 3. However, no mosquito larvae were collected during this period.

【Aircraft survey】

From October 23 to November 16, aircraft surveys were conducted on flights arriving from countries and regions where *Aedes aegypti* is endemic. As a general rule, inspections were conducted on one flight per weekday. During this period, a total of 16 aircraft inspections were conducted on flights arriving from 7 countries and regions, but no mosquitoes were collected.

【Measures to prevent the spread and establishment of *Aedes aegypti*】

The area where *Aedes aegypti* larvae were collected this time was not far from the area where larvae were collected in July. Since preventive measures to control the spread and establishment were already being implemented as part of the July investigation, it was decided not to change the locations where treatments were being applied. Initially, the treatment period was scheduled to end on October 20, but it was extended to November 20. During this extended period, Sumilarv (Insect Growth Regulator, IGR) was applied a total of three times to the designated areas.

【Information sharing with relevant organizations】

The information was shared with airlines and the Tokyo International Airport Health and Hygiene Management Council, along with a notice of caution to raise awareness.

7 Appendix

Notification No. 0324-3 (MHLW Department of Food Safety, March 24, 2014) "Guide to Port Sanitation Control" (Finally Amended Dec 26, 2022) (Issued from Section Chief of Quarantine Station division 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."

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9 Tables and Figures

Table 1. A list of code number, name and location of quarantine ports and airports investigated in 2023

Code number and Name	Prefecture	Code number and Name	Prefecture	Code number and Name	Prefecture
001 Otaru	Hokkaido	044 Fukue	Aichi	087 Misumi	Kumamoto
002 Ishikariwan	Hokkaido	045 Mikawa	Aichi	088 Hososhima	Miyazaki
003 Wakkanai	Hokkaido	047 Kinuura	Aichi	089 Shibushi	Kagoshima
004 Rumoi	Hokkaido	048 Nagoya	Aichi	090 Kagoshima	Kagoshima
005 Monbetsu	Hokkaido	049 Yokkaichi	Mie	091 Kiire	Kagoshima
006Abashiri	Hokkaido	050 Owase	Mie	092 Kushikino	Kagoshima
007Hanasaki	Hokkaido	051 Maizuru	kyoto	093 Kinnakagusuku	Okinawa
008 Kushiro	Hokkaido	053 Katsuura	Wakayama	094 Naha	Okinawa
009 Tomakomai	Hokkaido	054 Wakayamashimotsu	Wakayama	095 Hirara	Okinawa
010 Muroran	Hokkaido	055 Hanshin（Osaka)	Osaka	096 Ishigaki	Okinawa
011 Hakodate	Hokkaido	056 Hannan	Osaka	193 New Chitose AP	Hokkaido
012 Aomori	Aomori	057 Hanshin(Kobe)	Hyogo	194 Asahikawa AP	Hokkaido
013 Hachinohe	Aomori	058 Mizushima	Okayama	195 Hakodate AP	Hokkaido
014 Miyako	Iwate	059 Sakai	Tottori/Shimane	196 Aomori AP	Aomori
015 Kamaishi	Iwate	060 Hamada	Shimane	197 Sendai AP	Miyagi
016 Ofunato	Iwate	061 Fukuyama	Hiroshima	198 Akita AP	Akita
017 Kesennuma	Miyagi	062 Kure	Hiroshima	199 Fukushima AP	Fukushima
018 Ishinomaki	Miyagi	063 Hiroshima	Hiroshima	200 Narita International AP	Chiba
019 Sendaishiogama	Miyagi	064 Iwakuni	Yamaguchi	201 Tokyo International AP	Tokyo
020 Akitafunakawa	Akita	065 Tokuyamakudamatsu	Yamaguchi	202 Niigata AP	Niigata
021 Sakata	Yamagata	066 Ube	Yamaguchi	203 Toyama AP	Toyama
022 Onahama	Fukushima	067 Tokushimakomatsushima	Tokushima	204 Komatsu AP	Ishikawa
023 Hitachi	Ibaraki	068 Sakaide	Kagawa	205 Chubu Centrair International AP	Aichi
024 Kashima	Ibaraki	069 Matsuyama	Ehime	206 Kansai International AP	Osaka
025 Kisarazu	Chiba	070 Niihama	Ehime	207 Okayama AP	Okayama
026 Chiba	Chiba	071 Mishimakawanoe	Ehime	208 Miho AP	Tottori
027 Futami	Tokyo	072 Kochi	Kochi	209 Hiroshima AP	Hiroshima
028 Keihin（Tokyo)	Tokyo	073 Kanmon	Yamaguchi/Fukuoka	211 Matsuyama AP	Ehime
029 Keihin（Kawasaki)	Kanagawa	074 Hakata	Fukuoka	212 Fukuoka AP	Fukuoka
030 Keihin（Yokohama)	Kanagawa	075 Miike	Fukuoka	213 Kitakyushu AP	Fukuoka
031 Yokosuka	Kanagawa	076 Karatsu	Saga	214 Oita AP	Oita
032 Misaki	Kanagawa	077 Imari	Saga/Nagasaki	215 Nagasaki AP	Nagasaki
033 Naoetsu	Niigata	078 Sasebo	Nagasaki	216 Kumamoto AP	Kumamoto
034 Niigata	Niigata	079 Nagasaki	Nagasaki	217 Miyazaki AP	Miyazaki
035 Fushikitoyama	Toyama	080 Hitakatsu	Nagasaki	218 Kagoshima AP	Kagoshima
036 Kanazawa	Ishikawa	081 Izuhara	Nagasaki	219 Naha AP	Okinawa
037 Nanao	Ishikawa	082 Oita	Oita	222 Shizuoka AP	Shizuoka
038 Uchiura	Fukui	083 Saganoseki	Oita	223 Hyakuri AP	Ibaraki
039 Tsuruga	Fukui	084 Saiki	Oita	225 Saga AP	Saga
041 Shimizu	Shizuoka	085 Minamata	Kumamoto	226 Takamatsu AP	Kagawa
042 Yaizu	Shizuoka	086 Yatsushiro	Kumamoto		

Table 2. Monthly investigation for vector surveillance at quarantine ports and airports in 2023
Seaport（1）

Month/ Quarantine port	Otaru Quarantine Station																			
	001 Otaru				002 Ishikariwan				003 Wakkanai				004 Rumoi				005 Monbetsu			
Investigation	(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												
Jun												2		1	1	1				
Jul		2	4	2		2	2			2	2									
Aug		2	4	2						4	4	2		1	1	1				
Sep		2				2	2											1	1	1
Oct			2	1				2												
Nov																				
Dec																				
Total		6	10	5		4	4	4		6	6	4		2	2	2		1	1	1

Month/ Quarantine port	Otaru Quarantine Station																			
	006 Abashiri				007 Hanasaki				008 Kushiro				009 Tomakomai				010 Muroran			
Investigation	(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				
Jul		1	1	1																
Aug						1	1	1		2	2	2						1	1	1
Sep																				
Oct																				
Nov																				
Dec																				
Total		1	1	1		2	2	2		4	4	4		2	2	2		1	1	1

Month/ Quarantine port	Otaru Quarantine Station				Sendai Quarantine Station															
	011 Hakodate				012 Aomori				013 Hachinohe				014 Miyako				015 Kamaishi			
Investigation	(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	2						1	1	1		1		1		1		1
Jul		1	1							1	1	1			1				1	
Aug		1	1			1		1		1	1	1								
Sep		1	1				1			1	1	1								
Oct		1	1							1	1	1		1		1		1		1
Nov				2											1				1	
Dec																				
Total		5	5	4		1	1	1		5	5	5		2	2	2		2	2	2

Month/ Quarantine port	Sendai Quarantine Station																			
	016 Ofunato				017 Kesennuma				018 Ishinomaki				019 Sendaishiogama				020 Akitafunakawa			
Investigation	(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										2		2				
Jun		1	1	1		1		1		2		2			2			2	2	2
Jul		1	1	1			1			2	2	2		2	2	2				
Aug		1	2	1		1	1	1			2			2		2		2	2	2
Sep										2	2	2		2	2	2				
Oct		1	1	1										2	2	2		2	2	
Nov															2					
Dec																				1
Total		5	5	5		2	2	2		6	6	6		10	10	10		6	6	5

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

Seaport（2）

Month/ Quarantine port	Sendai Quarantine Station								Tokyo Quarantine Station											
	021 Sakata				022 Onahama				023 Hitachi				024 Kashima				025 Kisarazu			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				
Feb																				3
Mar																				
Apr																				
May										3	3	3						3	3	
Jun						2	2	2		3	3	3								3
Jul		3	3	3		2	2	2						3	3	3		3	3	
Aug						2	2	2						3	3	3				3
Sep		3	3	3										3	3	3		3	3	
Oct														3	3	3		3	3	
Nov																				3
Dec																				
Total		6	6	6		6	6	6		6	6	6		12	12	12		12	12	12

Month/ Quarantine port	Tokyo Quarantine Station																Yokohama Quarantine Station			
	026 Chiba				027 Futami				028 Keihin（Tokyo）				029 Keihin（Kawasaki）				030 Keihin（Yokohama）			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan				3								1				2				
Feb												2								
Mar												2								2
Apr		3	3							4	4	1								1
May				3						4	4	2				3		3		3
Jun		3	3							4	4	2		3	3	2		2	2	2
Jul				3		2	2	2		4	4	1		3	3			3	3	
Aug		3	3							4	4			3	3			3	6	
Sep		3	3							7	4	3		3	3	2				
Oct				3						3	4	2				3				
Nov						2				2	4	2				3				3
Dec							2	2				2								2
Total		12	12	12		4	4	4		32	32	20		12	12	15		11	11	13

Month/ Quarantine port	Yokohama Quarantine Station								Niigata Quarantine Station											
	031 Yokosuka				032 Misaki				033 Naoetsu				034 Niigata				035 Fushikitoyama			
Investigation	(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														4		4
Jun		1	1	1		1	1	1										4	8	4
Jul		2	2			1	1							4	4	5		4	4	4
Aug		1	2											8	8	5				
Sep										4	4	4								
Oct										2	2	2								
Nov				1				1												
Dec				1																
Total		5	5	5		2	2	2		6	6	6		12	12	10		12	12	12

Month/ Quarantine port	Niigata Quarantine Station								Nagoya Quarantine Station											
	036 Kanazawa				037 Nanao				041 Shimizu				042 Yaizu				044 Fukue			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				
Feb												3								
Mar																				
Apr												3								
May						2	2	2		2	2			2	2	2				
Jun		2	2	2						2	2	3								
Jul				2		2	2	2		2	2			2	2	2		2	1	2
Aug		2	2					2		2	2	3								
Sep		2	2	2		2	2			2	2			2	2	2				
Oct																				
Nov																				
Dec																				
Total		6	6	6		6	6	6		10	10	12		6	6	6		2	1	2

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

Seaport（3）

Month/Quarantine port	Nagoya Quarantine Station																			
	045 Mikawa				047 Kinuura				048 Nagoya				049 Yokkaichi				050 Owase			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				
Feb																				
Mar																				
Apr										3	4	3								
May						4	4	4		2	2	2		3	3	3				
Jun		4	4	4						2	2	1								
Jul										2	2	2		3	3	3				
Aug						4	4	4		1	1	1								
Sep		1	2	1						2	2	1		3	3	3				
Oct		4	4	4						3	3	3						1	1	1
Nov						2	2	2		1	1	1		3	3	3				
Dec																				
Total		9	10	9		10	10	10		16	17	14		12	12	12		1	1	1

Month/Quarantine port	Nagoya Quarantine Station				Osaka Quarantine Station															
	053 Katsuura				038 Uchiura				039 Tsuruga				051 Maizuru				054 Wakayamashimotsu			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				
Feb																				2
Mar																				
Apr																				
May																				2
Jun						1	1	1		2	2	2		2	2	2		2	2	
Jul																		2	2	
Aug						1	1	1		2	2	2		2	2	2		2	2	2
Sep																		2	2	
Oct		1		1		1	1	1		2	2	2		2	2	2		2	2	
Nov																				2
Dec																				2
Total		1		1		3	3	3		6	6	6		6	6	6		10	10	10

Month/Quarantine port	Osaka Quarantine Station								Kobe Quarantine Station				Hiroshima Quarantine Station							
	055 Hanshin（Osaka）				056 Hannan				057 Hanshin（Kobe）				058 Mizushima				059 Sakai			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan												4								
Feb				1				1				4								
Mar												4								
Apr				4								3								1
May		5	5	1				1		6	6	3		1	1	1		1	1	1
Jun						1	1			7	7	3		2	2	2		1	1	1
Jul		5	5	4		1	1			6	6	4		2	2	2		1	1	
Aug						1	1	1		6	6	4		1	1					
Sep		5	5			1	1			7	7	3		2	2	2		1	1	1
Oct						1	1			6	6	3		2	2	2		1	1	
Nov				5				1				3				1				1
Dec								1				3								
Total		15	15	15		5	5	5		38	38	41		10	10	10		5	5	5

Month/Quarantine port	Hiroshima Quarantine Station																			
	060 Hamada				061 Fukuyama				062 Kure				063 Hiroshima				064 Iwakuni			
Investigation	(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	2			2	2	2								2				
Jun						2	2	2				2		5	5	3				
Jul						1	1	2		5	5	3						2	1	
Aug		2	2	2		2	2	1												1
Sep						2	2							5	5			2	2	
Oct		2	2	2				2								3		1	1	
Nov																2				1
Dec				2																1
Total		6	6	6		9	9	9		5	5	5		10	10	10		5	4	3

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

Seaport（4）

Month/Quarantine port	Hiroshima Quarantine Station																			
	065 Tokuyamakudamatsu				066 Ube				067 Tokushimakomatsushima				068 Sakaide				069 Matsuyama			
Investigation	(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	2	2		2	2	2
Jun		4	1							1	1	1						2	2	
Jul		1	1			2	2							2	2	2				2
Aug		1	1	1		2	2	1		1	1	1								
Sep		1	1							1	1	1		2	2	2				
Oct		1	1			2	2													2
Nov				1				1										2	2	
Dec				1				1												
Total		8	5	3		6	6	3		3	3	3		6	6	6		6	6	6

Month/Quarantine port	Hiroshima Quarantine Station												Fukuoka Quarantine Station							
	070 Niihama				071 Mishimakawanoe				072 Kochi				073 Kanmon				074 Hakata			
Investigation	(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	2									
May				2										2	2	2		2	2	5
Jun						2	2	2						3	3	3		10	10	
Jul		2	2	2						2	2	2		2	2	2		13	13	
Aug		2	2											2	2	2		10	10	
Sep		4	4	2		2	2	2						3	3	3				2
Oct		2	2	2		2	2			2	2	2		3	3	3				3
Nov				2				2												2
Dec																				3
Total		10	10	10		6	6	6		6	6	4		15	15	15		35	35	15

Month/Quarantine port	Fukuoka Quarantine Station																			
	075 Miike				076 Karatsu				077 Imari				078 Sasebo				079 Nagasaki			
Investigation	(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								2								
May								1						1	1	1		2	2	2
Jun		1	1							4	4			1	1	1		2	2	2
Jul		2	2			1	1			4	4			1	1			2	2	2
Aug		1	2			3	3			2	2			1	1			2	2	
Sep														1	1	1		2	2	
Oct				1								2				1				2
Nov								1								1				2
Dec																				
Total		4	5	2		4	4	2		10	10	4		5	5	5		10	10	10

Month/Quarantine port	Fukuoka Quarantine Station																			
	080 Hitakatsu				081 Izuhara				082 Oita				083 Saganoseki				084 Saiki			
Investigation	(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								
Jun						2	2	2		3	3	3		1	1	1		1	1	1
Jul		1	1	1		2	2	2						1	1	1		1	1	1
Aug						2	2	2												
Sep										3	3	3								
Oct														1	1	1		1	1	1
Nov																				
Dec																				
Total		1	1	1		6	6	6		9	9	9		3	3	3		3	3	3

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

Seaport（5）

Month/ Quarantine port	Fukuoka Quarantine Station																			
	085 Minamata				086 Yatsushiro				087 Misumi				088 Hososhima				089 Shibushi			
Investigation	(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		1		1		1	1	1				
Jun		1	1			1	1				1			1	1	1		3	3	3
Jul		1	1	1		1	1	1						1	1	1				
Aug		1	1	1		1	1											3	3	3
Sep		1	1	1		1	1							1	1	1				
Oct		1	1	1				1						1	1	1				
Nov				1				1												
Dec																				
Total		5	5	5		5	5	5		1	1	1		5	5	5		6	6	6

Month/ Quarantine port	Fukuoka Quarantine Station												Naha Quarantine Station							
	090 Kagoshima				091 Kiire				092 Kushikino				093 Kinnakagusuku				094 Naha			
Investigation	(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	1							2			2	2	2
Jun		2	4	2		1	1	1						3	2	3		2	2	2
Jul						1	1	1						2	1	2		2	2	2
Aug		2	2	2		1	1	1										2	2	2
Sep										2	1	1		2	2	2		2	2	2
Oct		1	1	1		1	1	1						2	2	2				1
Nov																		2	2	2
Dec														1	1	1		1	1	1
Total		5	7	5		5	5	5		2	1	1		10	10	10		13	13	14

Month/ Quarantine port	Naha Quarantine Station							
	095 Hirara				096 Ishigaki			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan								
Feb								
Mar								
Apr						2	2	1
May		2	2			2	2	1
Jun		2		2		2	2	1
Jul			2	2		2	2	
Aug								
Sep						2	2	
Oct		2	2	2		2	2	1
Nov						2	2	1
Dec						2	2	
Total		6	6	6		16	16	5

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

Airport（1）

Month/ Quarantine port	Otaru Quarantine Station												Sendai Quarantine Station							
	193 New Chitose AP				194 Asahikawa AP				195 Hakodate AP				196 Aomori AP				197 Sendai AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				1
Feb																				1
Mar																	2			1
Apr		1															4			1
May		1		2													6	3	6	2
Jun	4	5	4	2					1	2	2	2		2	2	2	9	3	6	2
Jul	4	5	4	3	1	2	2	1	1	2	2			2	2	2	9	3	6	1
Aug	5	5	4	2	2	2	2		1	2	2			2		2	12	3	6	1
Sep	4	5	4	1	2	1	1	1	1	2	2			2	4	2	9	3	6	2
Oct		1							1	2	2		4	2	2	2	7	3	6	2
Nov		1										2	1				3			1
Dec		1															3			1
Total	17	25	16	10	5	5	5	2	5	10	10	4	5	10	10	10	64	18	36	16

Month/ Quarantine port	Sendai Quarantine Station								Narita International Quarantine Station				Tokyo Quarantine Station							
	198 Akita AP				199 Fukushima AP				200 Narita International AP				201 Tokyo International AP				223 Hyakuri AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan									32		8									
Feb									40		8									
Mar									42		8	5	1	1		3				
Apr									36	11	2			2	8	3				
May									17	35	39	2		4	12	2				
Jun									18	47	39	6	2	3	8	3	1	1	1	1
Jul									16	48	47		10	17	18	2	1	1	1	1
Aug		1	1	1					14	56	39		13	4	14	3	1	1	1	1
Sep						1	1		14	48	39	1	1	4	8	2	1	1	1	1
Oct								2	16	51	47	7	7	10	15	3	1	1	1	1
Nov									12	43	23	3	9	3	12	3				
Dec									21	11	2	5	1							
Total		1	1	1		1	1	2	278	350	301	29	44	48	95	24	5	5	5	5

Month/ Quarantine port	Niigata Quarantine Station												Nagoya Quarantine Station							
	202 Niigata AP				203 Toyama AP				204 Komatsu AP				205 Chubu Centrair Internationa AP				222 Shizuoka AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan													2							
Feb													2			1				
Mar													2			2				
Apr														1	1					
May		2	2	2	1								4	3	4	2				
Jun		4	4	4		2	2	3	1	2	2	2	10	4	5	2				
Jul								3	1			2	11	4	5	2	1	1		1
Aug						2	2		1	2	2		8	5	9	1			1	
Sep					3	2	2		1	2	2	2	5	5	5	1				
Oct									1				4	4	5	2				
Nov													4	5	5	3				
Dec	5												2	1						
Total	5	6	6	6	4	6	6	6	5	6	6	6	54	32	39	16	1	1	1	1

Month/ Quarantine port	Kansai Quarantine Station				Hiroshima Quarantine Station															
	206 Kansai International AP				207 Okayama AP				208 Miho AP				209 Hiroshima AP				211 Matsuyama AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan																				
Feb																				2
Mar	2												1							
Apr	2	4		4					1			1								
May	4	16	14	3	2	2	2	2		1	1	1						1	1	2
Jun	4	18	14	4	2	2	2	2		1	1	1	1	2	2	2		1	1	
Jul	4	15	21		2	4	4	2	1	1	1			2	2	2	2	1	1	2
Aug	6	15	28			2	2			1	1		1	2	2	2	2	2	2	2
Sep	6	15	14		2	4	4	2		1	1	1	1	2	2		3	2	2	2
Oct	6	10	14	3	2	2	2	2					2	2	2	2	3	2	2	
Nov	6	7	7	4					1			1	4			2		1	1	
Dec	2			3																
Total	42	100	112	21	10	16	16	10	3	5	5	5	10	10	10	10	10	10	10	10

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

Airport（2）

Month/ Quarantine port	Hiroshima Quarantine Station				Fukuoka Quarantine Station															
	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)
Jan																				
Feb																				
Mar																				
Apr						3	9	1						1	1	1				
May		1	1	1	11	3	6	3				2								
Jun		2	1	1	6	4	12	4	1	2	2	2								
Jul	2	1	1	1	5	3	6	4	1	2	2	2						1	1	1
Aug	3	1	1	1	6	6	2	2	1	2	2							1	1	
Sep	1	1	1	1	6	4	3	2	1					1	1	1		1	1	
Oct	2	1	1	2	2	1	2	6	1											1
Nov				1	2	1		4									4			1
Dec	2			1	2			4									1			
Total	10	7	6	9	40	25	40	30	5	6	6	6		2	2	2	5	3	3	3

Month/ Quarantine port	Fukuoka Quarantine Station																Naha Quarantine Station			
	216 Kumamoto AP				217 Miyazaki AP				218 Kagoshima AP				225 Saga AP				219 Naha AP			
Investigation	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Jan				1														1	1	2
Feb				1													2	2	2	2
Mar																		1	1	1
Apr																2		1	1	1
May		1	1			2	2	2									1	2	2	1
Jun		1	1	1		2	2	2						2	2			1	1	1
Jul		1	1			2	2	2		2	2	3		4	4		2	1	1	2
Aug		1	1											6	6		2	1	1	2
Sep	1	1	1	1		2	2	2	3	2	2	2				2	2	1	1	1
Oct	1					2	2	2	2								2	2	2	1
Nov	2			1													2	1	2	2
Dec	1																2	1	1	1
Total	5	5	5	5		10	10	10	5	4	4	5		12	12	4	15	15	16	17

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

Table 3. Results of mosquitoes surveillance on international aircraft at quarantine airports in 2023

Quarantine airport			No. of aircraft survey (No. of aircrafts with mosquitoes collected)													Examination of pathogen (Flavivirus, Chikungunya fever, Malaria parasite)			
Name of quarantine airport	IATA code	Quarantine code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Positive	Pools	Samples	Last airport (No.of aircraft)
New Chitose AP	SPK	193	( )	( )	( )	( )	( )	4 (0)	4 (0)	5 (0)	4 (0)	( )	( )	( )	17 (0)				
Asahikawa AP	AKJ	194	( )	( )	( )	( )	( )	( )	1 (0)	2 (0)	2 (0)	( )	( )	( )	5 (0)				
Hakodate AP	HKD	195	( )	( )	( )	( )	( )	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	( )	( )	5 (0)				
Aomori AP	AOJ	196	( )	( )	( )	( )	( )	( )	( )	( )	( )	4 (0)	1 (0)	( )	5 (0)				
Sendai AP	SDJ	197	( )	( )	2 (0)	4 (0)	6 (0)	9 (0)	9 (0)	12 (0)	9 (0)	7 (0)	3 (0)	3 (0)	64 (0)				
Narita International AP	NRT	200	32 (0)	40 (0)	42 (2)	36 (1)	17 (0)	18 (0)	16 (0)	14 (0)	14 (0)	16 (0)	12 (0)	21 (1)	278 (4)	0	5	5	DEL(4)
Tokyo International Ap	HND	201	( )	( )	1 (0)	( )	( )	2 (0)	10 (0)	13 (0)	1 (0)	7 (0)	9 (0)	1 (0)	44 (0)				
Niigata Ap	NII	202	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	5 (0)	5 (0)				
Toyama AP	TOY	203	( )	( )	( )	( )	1 (0)	( )	( )	( )	3 (0)	( )	( )	( )	4 (0)				
Komatsu AP	KMQ	204	( )	( )	( )	( )	( )	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	( )	( )	5 (0)				
Chubu Centrair International AP	NGA	205	2 (0)	2 (0)	2 (0)	( )	4 (1)	10 (0)	11 (0)	8 (0)	5 (0)	4 (0)	4 (0)	2 (0)	54 (1)	0	10	1	MNL(1) ※1
Kansai International AP	KIX	206	( )	( )	2 (0)	2 (0)	4 (0)	4 (0)	4 (0)	6 (0)	6 (0)	6 (0)	6 (0)	2 (0)	42 (0)				
Okayama AP	OKJ	207	( )	( )	( )	( )	2 (0)	2 (0)	2 (0)	( )	2 (0)	2 (0)	( )	( )	10 (0)				
Miho AP	YGJ	208	( )	( )	( )	1 (0)	( )	( )	1 (0)	( )	( )	( )	1 (0)	( )	3 (0)				
HiroshimaAP	HIT	209	( )	( )	1 (0)	( )	( )	1 (0)	( )	1 (0)	1 (0)	2 (0)	4 (0)	( )	10 (0)				
Matsuyama AP	MAY	211	( )	( )	( )	( )	( )	( )	2 (0)	2 (0)	3 (0)	3 (0)	( )	( )	10 (0)				
Fukuoka AP	FUK	212	( )	( )	( )	( )	11 (0)	6 (0)	5 (0)	6 (0)	6 (0)	2 (0)	2 (0)	2 (0)	40 (0)				
Kitakyushu AP	KKJ	213	( )	( )	( )	( )	( )	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	( )	( )	5 (0)				
Nagasaki AP	NGS	215	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	4 (0)	1 (0)	5 (0)				
Kumamoto AP	KMJ	216	( )	( )	( )	( )	( )	( )	( )	( )	1 (0)	1 (0)	2 (0)	1 (0)	5 (0)				
KagoshimaAP	KOP	218	( )	( )	( )	( )	( )	( )	( )	( )	3 (0)	2 (0)	( )	( )	5 (0)				
Naha AP	NAP	219	( )	2 (0)	( )	( )	1 (0)	( )	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	15 (0)				
Shizuoka AP	FSZ	222	( )	( )	( )	( )	( )	( )	1 (0)	( )	( )	( )	( )	( )	1 (0)				
Hyakuri AP	IBK	223	( )	( )	( )	( )	( )	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	( )	( )	5 (0)				
Takamatsu AP	TAK	226	( )	( )	( )	( )	( )	( )	2 (0)	3 (0)	1 (0)	2 (0)	( )	2 (1)	10 (1)	0	1	1	TPE(1)
合	計		34 (0)	44 (0)	50 (2)	43 (1)	46 (1)	60 (0)	74 (0)	78 (0)	67 (0)	64 (0)	50 (0)	42 (2)	652 (6)	0	16	7	

※1 The sample was divided into five pools each for the head, thorax, abdomen, wings, and legs, and examinated for flavivirus and chikungunya virus.

Table 4－1. Results of mosquitoes surveillance on international aircraft in 2023

Last airport of departure				No. of aircraft survey													No. of collected mosquitoes			
																	No.of collected mosquitoes / No. of aircrafts with mosquitoes collected			
Country /Area	Name of airport	IATA code IATA		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	*Aedes aegypti*	*Culex pipiens* complex	*Anopheles sinensis*	Total
			Invasive species Primary vector Secondary vector Possible vector														● C,D,Z W	W	M W	
UAE	Abu Dhabi International Airport※	AUH												1		1				
USA	Ted Stevens Anchorage International Airport	ANC						1				1				2				
USA	Detroit Metropolitan Wayne County Airport	DTW		1												1				
USA	Daniel K. Inouye International Airport	HNL								1	1		1	3		6				
USA	Dallas/Fort Worth International Airport	DFW												1		1				
India	Kempegowda International Airport	BLR					3	1								4				
India	Indira Gandhi International Airport	DEL		2	3	2	1	1	2	4	1			2	4	22		5 / 4		5 / 4
Indonesia	Jakarta Soekarno-Hatta International Airport	CGK		2	1	1	2		2	1	1			2		12				
Indonesia	Ngurah Rai International Airport	DPS				1			1	1	2					5				
Qatar	Hamad International Airport	DOH					1									1				
Singapore	Singapore Changi International Airport	SIN				1		4	1	2	4	1	2		1	16				
Sri Lanka	Bandaranaike International Airport	CMB			1	1									1	3				
Thailand	Suvarnabhumi International Airport	BKK		9	9	7	4	4	6	3	7	5	9	7	3	73				
Thailand	Don Mueang International Airport	DMK								1	1	1				3				
Nepal	Tribhuvan International Airport	KTM						1							3	4				
Philippines	Mactan-Cebu International Airport	CEB							1	1	2				1	5				
Philippines	Clark International Airport	CRK							1	1	1	1				4				
Philippines	Ninoy Aquino International Airport	MNL		7	9	15	9	9	18	10	8	9	6	6	3	109	1 / 1			1 / 1
Viet Nam	Noi Bai International Airport	HAN		5	1	3		1	1	7	7	3	3	2	3	36				
Viet Nam	Tan Son Nhat International Airport	SGN			13	10	11	5	4	6	2	2	6	1	2	62				
Malaysia	Kuala Lumpur International Airport	KUL		1	1	1	2	2		1			1	1		10				
Korea	Gimpo International Airport	GMP								1	1					2				
Korea	Incheon International Airport	ICN					2	5	7	9	12	11	8	2	4	60				
Korea	Gimhae International Airport	PUS					1				1					2				
Hong Kong	Hong Kong International Airport	HKG			1		1	1		2	2	3	4	3	1	18				
Taiwan	Kaohsiung International Airport	KHH						1	1			3	3	1	1	10				
Taiwan	Taiwan Taoyuan International Airport	TPE		7	5	8	6	9	14	21	16	19	15	8	10	138			1 / 1	1 / 1
Taiwan	Taipei Songshan Airport	TSA								1	5			1		7				
China	Beijing Capital International Airport	PEK									3		3			6				
China	Shanghai Pudong International Airport	PVG						1	1		1	6	1	6	3	19				
China	Beijing Daxing International Airport	PKX											1			1				
Bangladesh	Hazrat Shahjalal International Airport	DAC										1	1	2	1	5				
Guam	A.B Won Pat International Airport	GUM								1		1		1	1	4				
Total				34	44	50	43	46	60	74	78	67	64	50	42	652	1 / 1	5 / 4	1 / 1	7 / 6

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

※ The airport was renamed Zayed International Airport in February 2024

Table 4－2. Results of mosquitoes surveillance on international aircraft by the origin of the flights in 2023

Area	Country /Area	Last airport of departure	IATA code		No. of aircraft survey	No. of aircrafts with mosquitoes collected	No. of collected mosquitoes / No. of aircrafts with mosquitoes collected			Total	Examination of pathogen No.of positive samples pool / No. of samples pool			
							Aedes	*Culex*	*Anopheles*					
							Aedes aegypti	*Culex pipiens* complex	*Anopheles sinensis*		Flavivirus	Chikungunya virus	Malaria parasite	
				Invasive species			●							
				Primary vector Secondary vector Possible vector			C,D,Z W	W	M W					
East Asia	Korea	Gimpo International Airport	GMP		2									
East Asia	Korea	Incheon International Airport	ICN		60									
East Asia	Korea	Gimhae International Airport	PUS		2									
East Asia	Hong Kong	Hong Kong International Airport	HKG		18									
East Asia	Taiwan	Kaohsiung International Airport	KHH		10									
East Asia	Taiwan	Taiwan Taoyuan International Airport	TPE		138	1			1 / 1	1 / 1			0 / 1	
East Asia	Taiwan	Taipei Songshan Airport	TSA		7									
East Asia	China	Beijing Capital International Airport	PEK		6									
East Asia	China	Shanghai Pudong International Airport	PVG		19									
East Asia	China	Beijing Daxing International Airport	PKX		1									
Southeast Asia	Indonesia	Jakarta Soekarno-Hatta International Airport	CGK		12									
Southeast Asia	Indonesia	Ngurah Rai International Airport	DPS		5									
Southeast Asia	Singapore	Singapore Changi International Airport	SIN		16									
Southeast Asia	Thailand	Suvarnabhumi International Airport	BKK		73									
Southeast Asia	Thailand	Don Mueang International Airport	DMK		3									
Southeast Asia	Philippines	Mactan-Cebu International Airport	CEB		5									
Southeast Asia	Philippines	Clark International Airport	CRK		4									
Southeast Asia	Philippines	Ninoy Aquino International Airport	MNL		109	1	1 / 1			1 / 1	0 / 5	0 / 5		※1
Southeast Asia	Viet Nam	Noi Bai International Airport	HAN		36									
Southeast Asia	Viet Nam	Tan Son Nhat International Airport	SGN		62									
Southeast Asia	Malaysia	Kuala Lumpur International Airport	KUL		10									
South Asia	Bangladesh	Hazrat Shahjalal International Airport	DAC		5									
South Asia	India	Kempegowda International Airport	BLR		4									
South Asia	India	Indira Gandhi International Airport	DEL		22	4		5 / 4		5 / 4	0 / 5			

South Asia	Nepal	Tribhuvan International Airport	KTM		4								
South Asia	Sri Lanka	Bandaranaike International Airport	CMB		3								
Middle East	UAE	Abu Dhabi International Airport※2	AUH		1								
Middle East	Qatar	Hamad International Airport	DOH		1								
South Pacific	Guam	A.B Won Pat International Airport	GUM		4								
North America	USA	Ted Stevens Anchorage International Airport	ANC		2								
North America	USA	Detroit Metropolitan Wayne County Airport	DTW		1								
North America	USA	Daniel K. Inouye International Airport	HNL		6								
North America	USA	Dallas/Fort Worth International Airport	DFW		1								
Total					652	6	1 / 1	5 / 4	1 / 1	7 / 6	0 / 10	0 / 5	0 / 1

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

※1 The sample was divided into five pools each for the head, thorax, abdomen, wings, and legs, and tested for flavivirus and chikungunya virus.

※2 The airport was renamed Zayed International Airport in February 2024

Table 5－1. Results of adult mosquitoes surveillance by CO_2 light-traps at quarantine ports and examination of mosquito-borne diseases in 2023

Quarantine port	UN-LOCODE	Quarantine code		No. of survey area (1km mesh)	Mosquito taxa																														Total	No. of samples	Examination of pathogen No.of positive sample pools / No. of sample pools		
					Anopheles				*Aedes*										*Armigeres*	*Culex*											*Tripteroides*	*Lutzia*	*Mansonia*						
					Anopheles sinensis	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles lindesayi japonicus*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes bekkui*	*Aedes nipponicus*	*Aedes riversi*	*Armigeres subalbatus*	*Culex inatomii*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex Culiciomyia*	*Culex infantulus*	*Culex kyotoensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Mansonia ochracea*	Un-known			Flavivirus	Chikungunya virus	Malaria parasite
			Invasive species																																				
			Primary vector		M				C,D,Z												W	W	J	J															
			Secondary vector		W		M		W	W	W	W		W	W				W	W				W															
			Possible vector			M			J		J	D		D	J			D			J			D	J		J,W												
Otaru	OTR	1		6																		19													19	19	0 / 2		
Ishikariwan	ISW	2		4							3											11													14	14	0 / 3		
Wakkanai	WKJ	3		6							37											35													72	72	0 / 5		
Rumoi	RMI	4		2																															0				
Monbetsu	MBE	5		1																															0				
Abashiri	ABA	6		1																		1													1	1	0 / 1		
Hanasaki	HNK	7		2							16											1													17	17	0 / 2		
Kushiro	KUH	8		4							12																								12	12	0 / 2		
Tomakomai	TMK	9		2						2																									2	2	0 / 1		
Muroran	MUR	10		1																		1													1	1	0 / 1		
Hakodate	HKP	11		5																		46													46	46	0 / 4		
Aomori	AOM	12		1																															0				
Hachinohe	HHE	13		5																		14													14	14	0 / 4		
Miyako	MYK	14		2																															0				
Kamaishi	KIS	15		2																															0				
Ofunato	OFT	16		5																		1													1	1	0 / 1		
Kesennuma	KSN	17		2																															0				
Ishinomaki	ISM	18		6					1											3		6													10	10	0 / 3	0 / 1	
Sendaishiogama	SGM	19		10					15	1												69													85	84	0 / 10	0 / 4	
Akitafunakawa	AFG	20		6					6													34													40	40	0 / 4	0 / 2	
Sakata	SKT	21		6					18		1											352													371	371	0 / 14	0 / 2	
Onahama	ONA	22		6											1							40													41	41	0 / 4		
Hitachi	HTC	23		6																		8													8	8	0 / 2		
Kashima	KSM	24		12	2				1													14		56											73	73	0 / 11	0 / 1	0 / 2
Kisarazu	KZU	25		12	1				22										1			129		18											171	170	0 / 25	0 / 8	0 / 1
Chiba	CHB	26		12					50													475		11											536	535	0 / 28	0 / 6	
Futami	HTM	27		4					2																										2	1	0 / 1	0 / 1	
Keihin（Tokyo）	TYO	28		32					176													91													267	267	0 / 33	0 / 19	
Keihin（Kawasaki）	KWS	29		12					4													81		1											86	86	0 / 12	0 / 3	
Keihin（Yokohama）	YOK	30		11					51													454		2											507	504	0 / 21	0 / 6	
Yokosuka	YOS	31		5					1													27													28	28	0 / 5	0 / 1	
Misaki	MIK	32		2																		28													28	28	0 / 2		
Naoetu	NAO	33		6					29															2											31	31	0 / 6	0 / 4	
Niigata	NIH	34		12	2				31													13		5		1									52	51	0 / 14	0 / 7	0 / 1
Fushikitoyama	FSK	35		12					19													54													73	73	0 / 14	0 / 6	
Kanazawa	KNZ	36		6																				2											2	2	0 / 2		
Nanao	NNO	37		6					2											1		22		1											26	26	0 / 8	0 / 2	
Uchiura	UCU	38		3																															0				
Tsuruga	TRG	39		6					7													28													35	35	0 / 10	0 / 5	
Shimizu	SMZ	41		10					35										2			125		5											167	166	0 / 21	0 / 8	
Yaizu	YZU	42		6					10													118		1											129	129	0 / 10	0 / 3	

Fukue	FKE	44	2					8															15											23	22	0 / 2	0 / 1	
Mikawa	MKW	45	9					43	279						62						62		64	1										511	445	0 / 26	0 / 6	
Kinuura	KNU	47	10					8													128		10											146	146	0 / 14	0 / 2	
Nagoya	NGO	48	16	1				84											11		238		1,081	4								1		1,420	1,413	0 / 56	0 / 8	0 / 1
Yokkaichi	YKK	49	12																		100		7	2										109	108	0 / 13		
Owase	OWA	50	1																		8													8	8	0 / 1		
Maizuru	MAI	51	6					4													6													10	10	0 / 4	0 / 1	
Katsuura	KAT	53	1																		2													2	2	0 / 1		
Wakayamashimotsu	SMT	54	10					174													228													402	373	0 / 26	0 / 11	
Hanshin（Osaka）	OSA	55	15					198													105													303	281	0 / 26	0 / 12	
Hannan	HAN	56	5					55													33													88	83	0 / 9	0 / 5	
Hanshin（Kobe）	UKB	57	38					25													183		2											210	209	0 / 30	0 / 5	
Mizushima	MIZ	58	10					12													121		90											223	223	0 / 21	0 / 6	
Sakai	SMN	59	5																		19													19	19	0 / 5		
Hamada	HMD	60	6					8		2											22		2											34	33	0 / 10	0 / 3	
Fukuyama	FKY	61	9					5													69		5						14					93	78	0 / 9	0 / 1	
Kure	KRE	62	5					5													57		19											81	81	0 / 11	0 / 4	
Hiroshima	HIJ	63	10					39													37													76	73	0 / 11	0 / 4	
Iwakuni	IWK	64	5					2													87		1											90	90	0 / 7	0 / 2	
Tokuyamakudamatsu	TXD	65	8					117	6							1					92													216	215	0 / 14	0 / 6	
Ube	UBJ	66	6					32													167		4											203	203	0 / 9	0 / 2	
Tokushimakomatsushima	TKX	67	3					1													81		1											83	82	0 / 5	0 / 1	
Sakaide	SKD	68	6					3													79		142											224	224	0 / 12	0 / 2	
Matsuyama	MYJ	69	6																		79													79	79	0 / 4		
Niihama	IHA	70	10					28										3			349		1											381	377	0 / 21	0 / 5	
Mishimakawanoe	MKX	71	6																		5													5	5	0 / 3		
Kochi	KCZ	72	6	1				5						1				2			76		1											86	86	0 / 11	0 / 2	0 / 1
Kanmon	MOJ	73	15																		12		5											17	17	0 / 8		
Hakata	HKT	74	35					540			1							1			552		20											1,114	1,060	0 / 59	0 / 24	
Miike	MII	75	4					5													10		18											33	33	0 / 8	0 / 3	
Karatsu	KAR	76	4					41										14			9		1											65	63	0 / 5	0 / 2	
Imari	IMI	77	10	2				13			2										17		25	1										60	58	0 / 16	0 / 4	0 / 1
Sasebo	SSB	78	5																		8													8	8	0 / 2		
Nagasaki	NMX	79	10					5													25													30	30	0 / 9	0 / 3	
Hitakatsu	HTK	80	1																															0				
Izuhara	IZH	81	6					5										5			8													18	18	0 / 4	0 / 1	
Oita	OIP	82	9					12										1			61	1	1											76	75	0 / 12	0 / 3	
Saganoseki	SAG	83	3																		1													1	1	0 / 1		
Saiki	SAE	84	3																		65		2											67	67	0 / 3		
Minamata	MIN	85	5					6										1			9		1											17	15	0 / 9	0 / 4	
Yatsushiro	YAT	86	5					1													33		3				2							39	37	0 / 4	0 / 1	
Misumi	MIS	87	1							1											5						1							7	6	0 / 2		
Hososhima	HSM	88	5					1													18													19	19	0 / 5	0 / 1	
Shibushi	SBS	89	6																		17													17	17	0 / 1		
Kagoshima	KOJ	90	5					1															2											3	3	0 / 2	0 / 1	
Kiire	KII	91	5					1													1		6											8	8	0 / 5	0 / 1	
Kushikino	KSO	92	2					1																										1	1	0 / 1	0 / 1	
Kinnakagusuku	KNX	93	10					32	20											38			164			1,312								1,566	1,555	0 / 42	0 / 3	
Naha	NAH	94	13					35												145			1											181	181	0 / 17	0 / 6	
Hirara	HRR	95	6					136									3	1		6														146	132	0 / 12	0 / 7	
Ishigaki	ISG	96	16					101										2		273														376	332	0 / 29	0 / 11	
Total			670	9	0	0	0	2,272	308	72	3	0	0	2	62	1	3	33	15	462	5,581	1	1,798	8	1	1,312	3	0	14	0	0	1	0	11,961	11,662	0 / 903	0 / 254	0 / 7

Vector-borne diseases：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 surveillance by CO_2 light-traps at quarantine airports and examination of mosquito-borne diseases in 2023

Quarantine airport	IATA code	Quarantine code		No. of survey area (1km mesh)	Mosquito taxa																														Total	No. of samples	Examination of pathogen No.of positive sample pools / No. of sample pools		
					Anopheles				*Aedes*										*Armigeres*	*Culex*											*Tripteroides*	*Lutzia*	*Mansonia*						
					Anopheles sinensis	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles lindesayi japonicus*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes bekkui*	*Aedes nipponicus*	*Aedes riversi*	*Armigeres subalbatus*	*Culex inatomii*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex Culiciomyia*	*Culex infantulus*	*Culex kyotoensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Mansonia ochracea*	Un-known			Flavivirus	Chikungunya virus	Malaria parasite
			Invasive species																																				
			Primary vector		M				C,D,Z												W	W	J	J															
			Secondary vector		W		M		W	W	W	W		W	W				W	W				W															
			Possible vector			M			J		J	D		D	J			D			J			D	J		J,W												
New Chitose AP	SPK	193		25			1			8	6		15	1			5					2													38	18	0 / 8		0 / 1
Asahikawa AP	AKJ	194		5						9																									9	9	0 / 1		
Hakodate AP	HKD	195		10							1											8													9	9	0 / 5		
Aomori AP	AOJ	196		10						5												2				9									16	7	0 / 4		
Sendai AP	SDJ	197		18																14		30		3	2										49	49	0 / 16		
Akita AP	AKP	198		1																															0				
Fukushima AP	FKS	199		1																															0				
Narita AP	NRT	200		350				1	179	76	3			1		6			1			174		2,229							6				2,676	2,658	1 / 311	0 / 31	
Tokyo International AP	HND	201		48					1													105		6								1			113	108	0 / 37	0 / 1	
Niigata AP	NII	202		6																		2													2	2	0 / 2		
Toyama AP	TOY	203		6					7															1											8	8	0 / 3	0 / 2	
Komatsu AP	KMQ	204		6																		1		5											6	6	0 / 2		
Chubu Centrair International AP	NGA	205		32					2													107		10											119	118	0 / 32	0 / 2	
Kansai International AP	KIX	206		100					13						2				1			320		4											340	339	0 / 72	0 / 7	
Okayama AP	OKJ	207		16	32					11												9		381	45										478	478	0 / 25		0 / 5
Miho AP	YGJ	208		5																		8													8	8	0 / 3		
Hiroshima AP	HIT	209		10		2				7												10		59					1						79	78	0 / 13		0 / 1
Matsuyama AP	MAY	211		10																		46		1											47	47	0 / 8		
Fukuoka AP	FUK	212		25					3													77		1											81	81	0 / 21	0 / 3	
Kitakyushu AP	KKJ	213		6																				1											1	1	0 / 1		
Oita AP	OIT	214		2																															0				
Nagasaki AP	NGS	215		3																															0				
Kumamoto AP	KMJ	216		5															1			5		1											7	7	0 / 5		
Miyazaki AP	MZA	217		10	1				3													4		12											20	19	0 / 10	0 / 3	0 / 1
Kagoshima AP	KOP	218		4						1												6													7	7	0 / 3		
Naha AP	NAP	219		15																	60														60	59	0 / 7		
Shizuoka AP	FSZ	222		1																				2											2	2	0 / 1		
Hyakuri AP	IBK	223		5																		14		4											18	18	0 / 4		
Saga AP	QSG	225		12	10				1													5		2,613	1										2,630	2,611	1 / 62	0 / 1	0 / 6
Takamatsu AP	TKG	226		7							1								1			2		69											73	73	0 / 10		
Total				754	43	2	1	1	209	117	11	0	15	2	2	6	5	0	4	14	60	937	0	5,402	48	9	0	0	1	0	6	1	0	0	6,896	6,820	2 / 666	0 / 50	0 / 14

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

Table 5－3. Results of adult mosquitoes surveillance by CO_2 light-traps at quarantine ports and airports and examination of mosquito-borne diseases in 2023

	No. of No. of survey area (1km mesh)	Mosquito taxa																														Total	No. of samples	Examination of pathogen No.of positive sample pools / No. of sample pools		
		Anopheles				*Aedes*										*Armigeres*	*Culex*											*Tripteroides*	*Lutzia*	*Mansonia*						
		Anopheles sinensis	*Anopheles koreicus*	*Anopheles lesteri*	*Anopheles lindesayi japonicus*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes dorsalis*	*Aedes esoensis*	*Aedes flavopictus*	*Aedes togoi*	*Aedes bekkui*	*Aedes nipponicus*	*Aedes riversi*	*Armigeres subalbatus*	*Culex inatomii*	*Culex pipiens quinquefasciatus*	*Culex pipiens* complex	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex bitaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex Culiciomyia*	*Culex infantulus*	*Culex kyotoensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Mansonia ochracea*	Un-known			Flavivirus	Chikungunya virus	Malaria parasite
Invasive species																																				
Primary vector		M				C,D,Z												W	W	J	J															
Secondary vector		W		M		W	W	W	W		W	W				W	W				W															
Possible vector			M			J		J	D		D	J			D			J			D	J		J,W												
Total	1,424	52	2	1	1	2,481	425	83	3	15	2	4	68	6	3	37	29	522	6,518	1	7,200	56	10	1,312	3	1	14	6	1	1	0	18,857	18,482	2 / 1,569	0 / 304	0 / 21

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

Table 6－1. Results of larval mosquitoes surveillance by ovitraps and basins at quarantine ports in 2023

Quarantine port	UN-LOCODE	Quarantine code		No. of survey area (1km mesh)	Mosquito taxa																									
					Anopheles		*Aedes*						*Armigeres*	*Culex*												*Tripteroides*	*Lutzia*		*Uranotaenia*	
					Anopheles sinensis	*Anopheles koreicus*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes flavopictus*	*Aedes togoi*	*Armigeres subalbatus*	*Culex pipiens quinquefasciatus*	*Culex pipiens* complex	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex boninensis*	*Culex (Culiciomyia) sasai*	*Culex pallidothorax*	*Culex infantulus*	*Culex kyotoensis*	*Culex ryukyensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Lutzia*	*Uranotaenia novobscura*	Un-known
			Invasive species				●																							
			Primary vector		M		C,D,Z	C,D,Z						W	W	J	J													
			Secondary vector		W		W	W	W	W	W	W	W				W													
			Possible vector			M		J		J	D	J		J			D		J,W											
Otaru	OTR	1		10						2																				
Ishikariwan	ISW	2		4						4					1															
Wakkanai	WKJ	3		6						1					1															
Rumoi	RMI	4		2																										
Monbetsu	MBE	5		1						1																				
Abashiri	ABA	6		1						1					1															
Hanasaki	HNK	7		2						1																				
Kushiro	KUH	8		4											1															
Tomakomai	TMK	9		2						1																				
Muroran	MUR	10		1						1																				
Hakodate	HKP	11		5																										
Aomori	AOM	12		1																										
Hachinohe	HHE	13		5				1		1																				
Miyako	MYK	14		2				1		1																				
Kamaishi	KIS	15		2						2																				
Ofunato	OFT	16		5				2		4					1															
Kesennuma	KSN	17		2				1		2																				
Ishinomaki	ISM	18		6				3							1		1													
Sendaishiogama	SGM	19		10				4		1																				
Akitafunakawa	AFG	20		6				4		1																				
Sakata	SKT	21		6				5																						
Onahama	ONA	22		6																										
Hitachi	HTC	23		6				2							2															
Kashima	KSM	24		12				3									1													
Kisarazu	KZU	25		12				8																						
Chiba	CHB	26		12				6							1															
Futami	HTM	27		4				4							1		1			1							2			
Keihin（Tokyo）	TYO	28		32				17							9															
Keihin（Kawasaki）	KWS	29		12				10								1	1										1			
Keihin（Yokohama）	YOK	30		11				10							3															
Yokosuka	YOS	31		5				2																						

Misaki	MIK	32		2		1			1											
Naoetsu	NAO	33		6		2														
Niigata	NIH	34		12		10					1									
Fushikitoyama	FSK	35		12		3	1													
Kanazawa	KNZ	36		6		1														
Nanao	NNO	37		6		5	5				1	1				1	1			
Uchiura	UCU	38		3			2		2		1						1	2		
Tsuruga	TRG	39		6		1	4		1		3							2		
Shimizu	SMZ	41		10		7														
Yaizu	YZU	42		6		5														
Fukue	FKE	44		1																
Mikawa	MKW	45		10		4	2													
Kinuura	KNU	47		10		5														
Nagoya	NGO	48		17		8		1			3	2						1		
Yokkaichi	YKK	49		12		2														
Owase	OWA	50		1																
Maizuru	MAI	51		6			4				1									
Wakayamashimotsu	SMT	54		10		4					1							1		
Hanshin（Osaka）	OSA	55		15		17														
Hannan	HAN	56		5		4					4									
Hanshin（Kobe）	UKB	57		38		14					3									
Mizushima	MIZ	58		10		4					3				1					
Sakai	SMN	59		5							1									
Hamada	HMD	60		6		6	2						1				2	1		
Fukuyama	FKY	61		9		3											1			
Kure	KRE	62		5		4														
Hiroshima	HIJ	63		10		10					4							1		
Iwakuni	IWK	64		4		2														
Tokuyamakudamatsu	TXD	65		5		2														
Ube	UBJ	66		6		2					1									
Tokushimakomatsushima	TKX	67		3		3					1									
Sakaide	SKD	68		6		3	1				1									
Matsuyama	MYJ	69		6		1					1									
Niihama	IHA	70		10		8														
Mishimakawanoe	MKX	71		6		1														
Kochi	KCZ	72		6		6			2		4				1					
Kanmon	MOJ	73		15																
Hakata	HKT	74		35		26			1		11									
Miike	MII	75		5		5					1									
Karatsu	KAR	76		4		4											1			
Imari	IMI	77		10		9	5					2					4			
Sasebo	SSB	78		5		4					1									
Nagasaki	NMX	79		10		6	2				1									
Hitakatsu	HTK	80		1																
Izuhara	IZH	81		6		5	2		1											
Oita	OIP	82		9																
Saganoseki	SAG	83		3																
Saiki	SAE	84		3																
Minamata	MIN	85		5		2	1				3			1				1		

Yatsushiro	YAT	86		5				4																						
Misumi	MIS	87		1				1		1																1				
Hososhima	HSM	88		5				2																						
Shibushi	SBS	89		6				1																						
Kagoshima	KOJ	90		7				4							3		1													
Kiire	KII	91		5						2																				
Kushikino	KSO	92		1				1																						
Kinnakagusuku	KNX	93		10				4						2					1			1			1					
Naha	NAH	94		13				8						5																
Hirara	HRR	95		6				6																						
Ishigaki	ISG	96		16				17							5															
Total				672	0	0	0	340	0	58	1	8	0	7	81	1	10	0	1	1	1	2	2	1	1	11	12	0	0	0

Vector-borne diseases：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 mosquitoes surveillance by ovitraps and basins at quarantine airports in 2023

Quarantine airport	IATA code	Quarantine code		No. of survey area (1km mesh)	Mosquito taxa: *Anopheles*		*Aedes*						*Armigeres*	*Culex*												*Tripteroides*	*Lutzia*		*Uranotaenia*	
					Anopheles sinensis	*Anopheles koreicus*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes flavopictus*	*Aedes togoi*	*Armigeres subalbatus*	*Culex pipiens quinquefasciatus*	*Culex pipiens complex*	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex boninensis*	*Culex (Culiciomyia) sasai*	*Culex pallidothorax*	*Culex infantulus*	*Culex kyotoensis*	*Culex ryukyensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Lutzia*	*Uranotaenia novobscura*	Un-known
			Invasive species				●																							
			Primary vector		M		C,D,Z	C,D,Z						W	W	J	J													
			Secondary vector		W		W	W	W	W	W	W	W				W													
			Possible vector			M		J		J	D	J		J			D		J,W											
New Chitose AP	SPK	193		16						10																				
Asahikawa AP	AKJ	194		5						2					3			1												
Hakodate AP	HKD	195		10						6																				
Aomori AP	AOJ	196		10				1		4	1				1											1				
Sendai AP	SDJ	197		36				31							14												1			
Akita AP	AKP	198		1																										
Fukushima AP	FKS	199		1																										
Narita international AP	NRT	200		301	3	1		44		8	1				8		7				7		1	1		2	17		1	
Tokyo International AP	HND	201		95			2	5																						
Niigata AP	NII	202		6				1																						
Toyama AP	TOY	203		6				8							2															
Komatsu AP	KMQ	204		6				3																			1			
Chubu Centrair International AP	NGA	205		39				2		1					4		2													
Kansai International AP	KIX	206		112	1			25	1	3					10		5				2						2			
Okayama AP	OKJ	207		16				14		13	7										1					11				
Miho AP	YGJ	208		5				1							2															
Hiroshima AP	HIT	209		10				6		5			2											2			4			
Matsuyama AP	MAY	211		10				4																						
Fukuoka AP	FUK	212		40				8							3															
Kitakyushu AP	KKJ	213		6																										
Oita AP	OIT	214		2																										
Nagasaki AP	NGS	215		3																										
Kumamoto AP	KMJ	216		5				3		2																1				
Miyazaki AP	MZA	217		10				4							1															
Kagoshima AP	KOP	218		4				1		1					2															
Naha AP	NAP	219		16				5						1					1									1		
Shizuoka AP	FSZ	222		1				1																						
Hyakuri AP	IBK	223		5											1															
Saga AP	QSG	225		12				10																						
Takamatsu AP	TKG	226		6				2		3												2	1			1	1			
Total				795	4	1	2	179	1	58	9	0	2	1	51	0	14	1	1	0	10	2	2	3	0	16	26	1	1	0

Vector-borne diseases：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 mosquitoes surveillance by ovitraps and basins at quarantine ports and airports in 2023

	No. of survey area (1km mesh)	Mosquito taxa																									
		Anopheles		*Aedes*						*Armigeres*	*Culex*												*Tripteroides*	*Lutzia*		*Uranotaenia*	
		Anopheles sinensis	*Anopheles koreicus*	*Aedes aegypti*	*Aedes albopictus*	*Aedes vexans nipponii*	*Aedes japonicus*	*Aedes flavopictus*	*Aedes togoi*	*Armigeres subalbatus*	*Culex pipiens quinquefasciatus*	*Culex pipiens* complex	*Culex pseudovishnui*	*Culex tritaeniorhynchus*	*Culex orientalis*	*Cuex sitiens*	*Culex boninensis*	*Culex (Culiciomyia) sasai*	*Culex pallidothorax*	*Culex infantulus*	*Culex kyotoensis*	*Culex ryukyensis*	*Tripteroides bambusa*	*Lutzia vorax*	*Lutzia*	*Uranotaenia novobscura*	Un-known
Invasive species				●																							
Primary vector		M		C,D,Z	C,D,Z						W	W	J	J													
Secondary vector		W		W	W	W	W	W	W	W				W													
Possible vector			M		J		J	D	J		J			D		J,W											
Total	1,467	4	1	2	519	1	116	10	8	2	8	132	1	24	1	2	1	11	4	4	4	1	27	38	1	1	0

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

Table 7－1. Results of rodents(including flea and tick) surveillance by rat or mouse-traps at quarantine ports in 2023

Quarantine port	UN-LOCODE	Quarantine code	No. of survey area (1km mesh)	No. of traps		Rodent(including flea and tick) taxa: Flea(No. of samples collected)							Tick(No. of samples collected)												Rodents(No. of samples captured)											Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples / No.of samples			
						Xenopsylla cheopis	Nosopsyllus fasciatus	Ctenophthalmus Kolenati	Monopsyllus anisus	Stivalius aestivalis	Un-known	Total	Laelaps nuttalli	Laelaps algericus	Laelaps echidninus	Laelaps jettmari	Laelaps microti	Ixodes granulatus	Eulaelaps onoi	Ornithonyssus bacoti	Ixodes ovatus	Hemaphysalis hystricis	Un-known	Total	Rattus rattus	Rattus norvegicus	Mus musculus	Apodemus speciosus	Apodemus argenteus	Microtus montebelli	Clethrionomys rufocanus bedfordiae	Apodemus speciosus ainu	Microtus montebelli	Un-known	Total				
					Invasive species																																		
					Primary vector	P																														Plague	HFRS	HPS	
					Secondary vector		P																		P,HF	P,HF	P,HF	P,HF	P	P	P,HF	P	P						
Otaru	OTR	1	5	400								0												0	3	3					4	2			12	0 / 11	0 / 9		
Ishikariwan	ISW	2	4	320								0												0		7					5	2			14	0 / 11	0 / 9		
Wakkanai	WKJ	3	4	240								0												0							5				5	0 / 2	0 / 2		
Rumoi	RMI	4	2	40								0												0		3									3	0 / 2	0 / 2		
Monbetsu	MBE	5	1	20								0												0		1									1				※1
Abashiri	ABA	6	1	20								0												0											0				
Hanasaki	HNK	7	2	40								0												0											0				
Kushiro	KUH	8	4	160								0												0		5									5	0 / 4	0 / 4		
Tomakomai	TMK	9	2	160			1					1												0							1				1	0 / 1	0 / 1		
Muroran	MUR	10	1	80								0												0		7									7	0 / 7	0 / 7		
Hakodate	HKP	11	4	160								0												0		1	2								3	0 / 2	0 / 2		
Aomori	AOM	12	1	80								0												0											0				
Hachinohe	HHE	13	5	100				1				1			22		3							25		11				3					14	0 / 14	0 / 14		
Miyako	MYK	14	2	40								0												0											0				
Kamaishi	KIS	15	2	40								0												0	1										1	0 / 1	0 / 1		
Ofunato	OFT	16	5	100								0												0											0				
Kesennuma	KSN	17	2	40								0												0											0				
Ishinomaki	ISM	18	6	480					1			1	1		10									11	1	16	1								18	0 / 18	0 / 18		
Sendaishiogama	SGM	19	10	800								0												0		2				1					3	0 / 3	0 / 3		
Akitafunakawa	AFG	20	5	400				1				1	1				1							2			2	2		2					6	0 / 6	0 / 6		
Sakata	SKT	21	6	120								0												0											0				
Onahama	ONA	22	6	120								0												0											0				
Hitachi	HTC	23	6	480								0												0	2										2	0 / 2	0 / 2		
Kashima	KSM	24	12	900								0												0			1	3							4	0 / 4	0 / 4		
Kisarazu	KZU	25	12	960								0												0			5	1							6	0 / 6	0 / 6		
Chiba	CHB	26	12	960								0												0											0				
Futami	HTM	27	4	320								0	1											1	9										9	0 / 9	0 / 9		
Keihin（Tokyo）	TYO	28	20	1,560								0	26											26		23									23	0 / 23	0 / 23		
Keihin（Kawasaki）	KWS	29	15	1,040			1					1	19							8				27	8	6	1								15	0 / 15	0 / 15		
Keihin（Yokohama）	YOK	30	13	940								0	8											8	7	16	5								28	0 / 28	0 / 28		
Yokosuka	YOS	31	5	200								0												0											0				
Misaki	MIK	32	2	80								0												0		1									1	0 / 1	0 / 1		
Naoetsu	NAO	33	6	120								0												0		2									2	0 / 2	0 / 2		
Niigata	NIH	34	10	200								0												0		10	4	1							15	0 / 15	0 / 15		
Fushikitoyama	FSK	35	12	960								0												0		4									4	0 / 4	0 / 4		
Kanazawa	KNZ	36	6	480								0												0		1									1	0 / 1	0 / 1		
Nanao	NNO	37	6	480								0												0											0				
Uchiura	UCU	38	3	120								0												0											0				
Tsuruga	TRG	39	6	156								0												0											0				
Shimizu	SMZ	41	12	840								0												0		11	2								13	0 / 11	0 / 11		
Yaizu	YZU	42	6	480								0												0			2								2	0 / 1	0 / 1		

Fukue	FKE	44	2	60								0												0				1							1	0 / 1	0 / 1	
Mikawa	MKW	45	9	300								0				3								3			2	9							11	0 / 11	0 / 11	
Kinuura	KNU	47	10	450								0	102											102		4	15								19	0 / 19	0 / 19	
Nagoya	NGO	48	14	1,120								0		1										1			6								6	0 / 6	0 / 6	
Yokkaichi	YKK	49	12	960								0	29											29		5									5	0 / 5	0 / 5	
Owase	OWA	50	1	40								0												0		1									1	0 / 1	0 / 1	
Maizuru	MAI	51	6	192								0												0											0			
Katsuura	KAT	53	1	40								0												0											0			
Wakayamashimotsu	SMT	54	10	720								0												0			1								1	0 / 1	0 / 1	
Hanshin（Osaka）	OSA	55	15	1,160								0												0			1								1	0 / 1	0 / 1	
Hannan	HAN	56	5	360								0												0			2								2	0 / 2	0 / 2	
Hanshin（Kobe）	UKB	57	41	3,040								0												0	1	3	4							2	10	0 / 7	0 / 7	
Mizushima	MIZ	58	10	760								0												0			1								1	0 / 1	0 / 1	
Sakai	SMN	59	5	400								0												0			2								2	0 / 2	0 / 2	
Hamada	HMD	60	6	240								0												0											0			
Fukuyama	FKY	61	9	720								0												0	1										1	0 / 1	0 / 1	
Kure	KRE	62	5	400								0												0			2								2	0 / 2	0 / 2	
Hiroshima	HIJ	63	10	700								0												0			2								2	0 / 2	0 / 2	
Iwakuni	IWK	64	3	120								0												0											0			
Tokuyamakudamatsu	TXD	65	3	220								0												0											0			
Ube	UBJ	66	3	120								0												0			2								2	0 / 2	0 / 2	
Tokushimakomatsushima	TKX	67	3	120								0												0											0			
Sakaide	SKD	68	6	480								0												0											0			
Matsuyama	MYJ	69	6	440								0												0											0			
Niihama	IHA	70	10	360								0		1										1	3		4								7	0 / 7	0 / 7	
Mishimakawanoe	MKX	71	6	160								0												0											0			
Kochi	KCZ	72	4	160								0												0											0			
Kanmon	MOJ	73	15	1,200								0												0			9								9	0 / 9	0 / 9	
Hakata	HKT	74	15	1,200								0												0			3							1	4	0 / 3	0 / 3	
Miike	MII	75	2	160								0												0			1								1	0 / 1	0 / 1	
Karatsu	KAR	76	2	160								0												0	1										1	0 / 1	0 / 1	
Imari	IMI	77	4	320								0												0	1	1	3								5	0 / 4	0 / 4	
Sasebo	SSB	78	5	400								0												0											0			
Nagasaki	NMX	79	10	800								0												0											0			
Hitakatsu	HTK	80	1	40								0												0											0			
Izuhara	IZH	81	6	480								0				7								7				3							3	0 / 3	0 / 3	
Oita	OIP	82	9	360								0												0			2								2	0 / 2	0 / 2	
Saganoseki	SAG	83	3	60								0												0											0			
Saiki	SAE	84	3	100								0	7											7		2									2	0 / 2	0 / 2	
Minamata	MIN	85	5	400								0												0				1							1	0 / 1	0 / 1	
Yatsushiro	YAT	86	5	400								0												0			3								3	0 / 3	0 / 3	
Misumi	MIS	87	1	80								0												0											0			
Hososhima	HSM	88	5	400								0												0											0			
Shibushi	SBS	89	6	480								0									4			4			1								1	0 / 1	0 / 1	
Kagoshima	KOJ	90	5	400								0												0			7								7	0 / 4	0 / 4	
Kiire	KII	91	5	400								0												0											0			
Kushikino	KSO	92	1	80								0												0			2								2	0 / 2	0 / 2	
Kinnakagusuku	KNX	93	10	800								0												0	2										2	0 / 2	0 / 2	
Naha	NAH	94	14	1,080								0			2									2	5	7	1								13	0 / 12	0 / 12	
Hirara	HRR	95	6	480								0	2					1						3	8	13									21	0 / 20	0 / 20	
Ishigaki	ISG	96	5	400								0												0											0			
Total			606	39,758		0	2	2	1	0	0	5	196	2	34	10	4	1	0	8	4	0	0	259	53	166	101	21	0	6	15	4	0	3	369	0 / 345	0 / 341	0 / 0

Vector-borne diseases：C；Crimean-Congo femorrhagic fever, HF；Hemorrhagic fever with renal syndrome（HFRS）, HP；Hantavirus pulmonary syndrome（HPS）, L；Lassa fever, P；Plague, S；South American hemorrhagic fevers

※1 Pathogen testing was not performed because the sample was dead.

Table 7−2. Results of rodents(including flea and tick) surveillance by rat or mouse-traps at quarantine airports in 2023

Quarantine airport	IATA code IATA	Quarantine code	No. of survey area (1km mesh)	No. of traps		Rodent(including flea and tick) taxa: Flea(No. of samples collected)							Tick(No. of samples collected)												Rodents(No. of samples captured)											Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples / No.of samples		
						Xenopsylla cheopis	*Nosopsyllus fasciatus*	*Ctenophthalmus Kolenati*	*Monopsyllus anisus*	*Stivalius aestivalis*	Un-known	Total	*Laelaps nuttalli*	*Laelaps algericus*	*Laelaps echidninus*	*Laelaps jettmari*	*Laelaps microti*	*Ixodes granulatus*	*Eulaelaps onoi*	*Ornithonyssus bacoti*	*Ixodes ovatus*	*Haemaphysalis hystricis*	Un-known	Total	*Rattus rattus*	*Rattus norvegicus*	*Mus musculus*	*Apodemus speciosus*	*Apodemus argenteus*	*Microtus montebelli*	*Clethrionomys rufocanus bedfordiae*	*Apodemus speciosus ainu*	*Microtus montebelli*	Un-known	Total	Plague	HFRS	HPS
					Invasive species Primary vector Secondary vector	P	P																		P,HF	P,HF	P,HF	P,HF	P	P	P,HF	P	P					
New Chitose AP	SPK	193	10	800								0									3			3		2						1			3	0 / 2	0 / 1	
Asahikawa AP	AKJ	194	2	160								0												0			2				1				3	0 / 2	0 / 2	
Hakodate AP	HKD	195	4	80								0												0		2	3								5	0 / 4	0 / 4	
Aomori AP	AOJ	196	10	760				9		3		12				7								7			3	11	5	6					25	0 / 25	0 / 25	
Sendai AP	SDJ	197	16	1,680								0				1	1						2	4			1	2					1		4	0 / 4	0 / 3	
Akita AP	AKP	198	1	20								0												0											0			
Fukushima AP	FKS	199	2	160						1		1											1	1				4							4	0 / 4	0 / 4	
Narita International AP	NRT	200	29	1,920								0							1					1		1	7	9						1	18	0 / 15	0 / 15	
Tokyo International AP	HND	201	24	1,800								0		3	3									6		3	11								14	0 / 10	0 / 10	
Niigata AP	NII	202	6	480								0												0			1								1	0 / 1	0 / 1	
Toyama AP	TOY	203	6	480								0												0											0			
Komatsu AP	KMQ	204	6	480								0												0				1							1	0 / 1	0 / 1	
Chubu Centrair International AP	NGA	205	16	1,062								0												0		1									1	0 / 1	0 / 1	
Kansai International AP	KIX	206	21	1,680								0												0			4								4	0 / 4	0 / 4	
Okayama AP	OKJ	207	10	800								0												0											0			
Miho AP	YGJ	208	5	400								0												0				10							10	0 / 10	0 / 10	
Hiroshima AP	HIT	209	10	880								0											1	1			1	1							2	0 / 2	0 / 2	
Matsuyama AP	MAY	211	10	640								0												0			1								1	0 / 1	0 / 1	
Fukuoka AP	FUK	212	30	2,400								0		1										1			2								2	0 / 2	0 / 2	
Kitakyushu AP	KKJ	213	6	480								0												0											0			
Oita AP	OIT	214	2	320								0												0											0			
Nagasaki AP	NGS	215	3	240								0												0			1								1	0 / 1	0 / 1	
Kumamoto AP	KMJ	216	5	400								0												0											0			
Miyazaki AP	MZA	217	10	800								0				15						1		16			4	4							8	0 / 8	0 / 8	
Kagoshima AP	KOP	218	5	344								0												0											0			
Naha AP	NAP	219	17	1,280								0	1		16									17	18		7								25	0 / 24	0 / 24	
Shizuoka AP	FSZ	222	1	80								0												0											0			
Hyakuri AP	IBK	223	5	400								0												0				2							2	0 / 2	0 / 2	
Saga AP	QSG	225	4	320								0												0											0			
Takamatsu AP	TKG	226	9	640								0												0	2		2								4	0 / 3	0 / 3	
Total			285	21,986		0	0	9	0	4	0	13	1	4	19	23	1	0	1	0	3	1	4	57	20	9	50	44	5	6	1	1	1	1	138	0 / 126	0 / 124	0 / 0

Vector-borne diseases：C；Crimean-Congo femorrhagic fever, HF；Hemorrhagic fever with renal syndrome（HFRS）, HP；Hantavirus pulmonary syndrome（HPS）, L；Lassa fever, P；Plague, S；South American hemorrhagic fevers

Table 7－3. Results of rodents(including flea and tick) surveillance by rat or mouse-traps at quarantine ports and airports in 2023

	No. of survey area (1km mesh)	No. of traps		Rodent(including flea and tick) taxa																														Examination of pathogen (Antibody, RT-PCR, PCR) No.of positive samples / No.of samples		
				Flea(No. of samples collected)							Tick(No. of samples collected)												Rodents(No. of samples captured)													
				Xenopsylla cheopis	*Nosopsyllus fasciatus*	*Ctenophthalmus Kolenati*	*Monopsyllus anisus*	*Stivalius aestivalis*	Un-known	Total	*Laelaps nuttalli*	*Laelaps algericus*	*Laelaps echidninus*	*Laelaps jettmari*	*Laelaps microti*	*Ixodes granulatus*	*Eulaelaps onoi*	*Ornithonyssus bacoti*	*Ixodes ovatus*	*Haemaphysalis hystricis*	Un-known	Total	*Rattus rattus*	*Rattus norvegicus*	*Mus musculus*	*Apodemus speciosus*	*Apodemus argenteus*	*Microtus montebelli*	*Clethrionomys rufocanus bedfordiae*	*Apodemus speciosus ainu*	*Microtus montebelli*	Un-known	Total			
			Invasive species																																	
			Primary vector	P																														Plague	HFRS	HPS
			Secondary vector		P																		P,HF	P,HF	P,HF	P,HF	P	P	P,HF	P	P					
Total	891	61,744		0	2	11	1	4	0	18	197	6	53	33	5	1	1	8	7	1	4	316	73	175	151	65	5	12	16	5	1	4	507	0 / 471	0 / 465	0 / 0

Vector-borne diseases：C；Crimean-Congo femorrhagic fever, HF；Hemorrhagic fever with renal syndrome（HFRS）, HP；Hantavirus pulmonary syndrome（HPS）, L；Lassa fever, P；Plague,
S；South American hemorrhagic fevers

Table 8. Summary of risk assessment of vector - borne disease (Primary vector, Secondary vector, Possible vector) at quarantine ports and airports in 2023

		Dengue fever	Japanese encephalitis	West Nile fever	Malaria	Chikungunya fever	Zika virus infection	Plague	Hemorrhagic fever with renal syndrome (HFRS)	Hantavirus pulmonary syndrome (HPS)	Lassa fever	South American hemorrhagic fevers
		Seaports and airports										
No.of vector-borne identified seaport and airport		96	110	115	13	91	91	82	82	0	0	0
Risk level	A	26	12	7	109	31	31	40	40	122	122	122
	B	95	108	115	13	90	90	82	82	0	0	0
	C	1	0	0	0	1	1	0	0	0	0	0
	D	0	2	0	0	0	0	0	0	0	0	0
Total		122	122	122	122	122	122	122	122	122	122	122

【Reference】Each quarantinable infectious diseases of permanent surveillance results of for occurrence risk level

Quarantinable infectious diseases of occurrence risk level	Result of permanent surveillance	
	Investigation of mosquitoes	Investigation of rodents
A：Very low	No vector mosquitoes collected during permanent surveillance, etc. in Cabinet Order-specified areas is known as a vector (primary, secondary, or possible vector), or no mosquito is captured.	No rodent has been captured during permanent surveillance, etc. in the areas specified by Cabinet Order.
B：Low	Vector mosquitoes (primary, secondary, or possible vector) known as vectors for quarantinable infectious diseases or the like have been collected during permanent surveillance, etc. in the areas specified by Cabinet Order. Pathogen or gene of pathogen for quarantinable infectious diseases or the like has not been detected.	Indigenous rodents (primary or secondary vector) or fleas/mites (primary or secondary vector) known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in the areas specified by Cabinet Order. Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has not been detected.
C：Moderate	Adult or larval vector mosquitoes of invasive species known as vectors for quarantinable infectious diseases or the like (primary vector) have been detected during permanent surveillance, etc. in the areas specified by Cabinet Order. Possession of pathogen or gene of pathogen for quarantinable infectious diseases or the like has not been detected.	Invasive rodents (primary vector)or fleas/mites (primary vector)known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in the areas specified by Cabinet Order. Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has not been detected.
D：High	Adult vector mosquitoes of species known as vectors for quarantinable infectious diseases or the like (primary, secondary, or possible vector)have been detected during permanent surveillance, etc. in the areas specified by Cabinet Order. Possession of pathogen or gene of pathogen for quarantinable infectious diseases or the like has been detected.	Antibody, pathogen, or gene suggestive of pathogen for quarantinable infectious diseases or the like has been detected from rodents (primary or secondary vector) or vector fleas/mites (primary or secondary vector)captured during permanent surveillance, etc. in the areas specified by Cabinet Order.

※ When mosquitoes or rodents were captured on board a ship or aircraft, they are not subject to risk assessment because they did not constitute an intrusion into a specified area of cabinet order .

Figure 1-1　Quarantine ports and airports investigated in 2023 (Quarantine CODE)

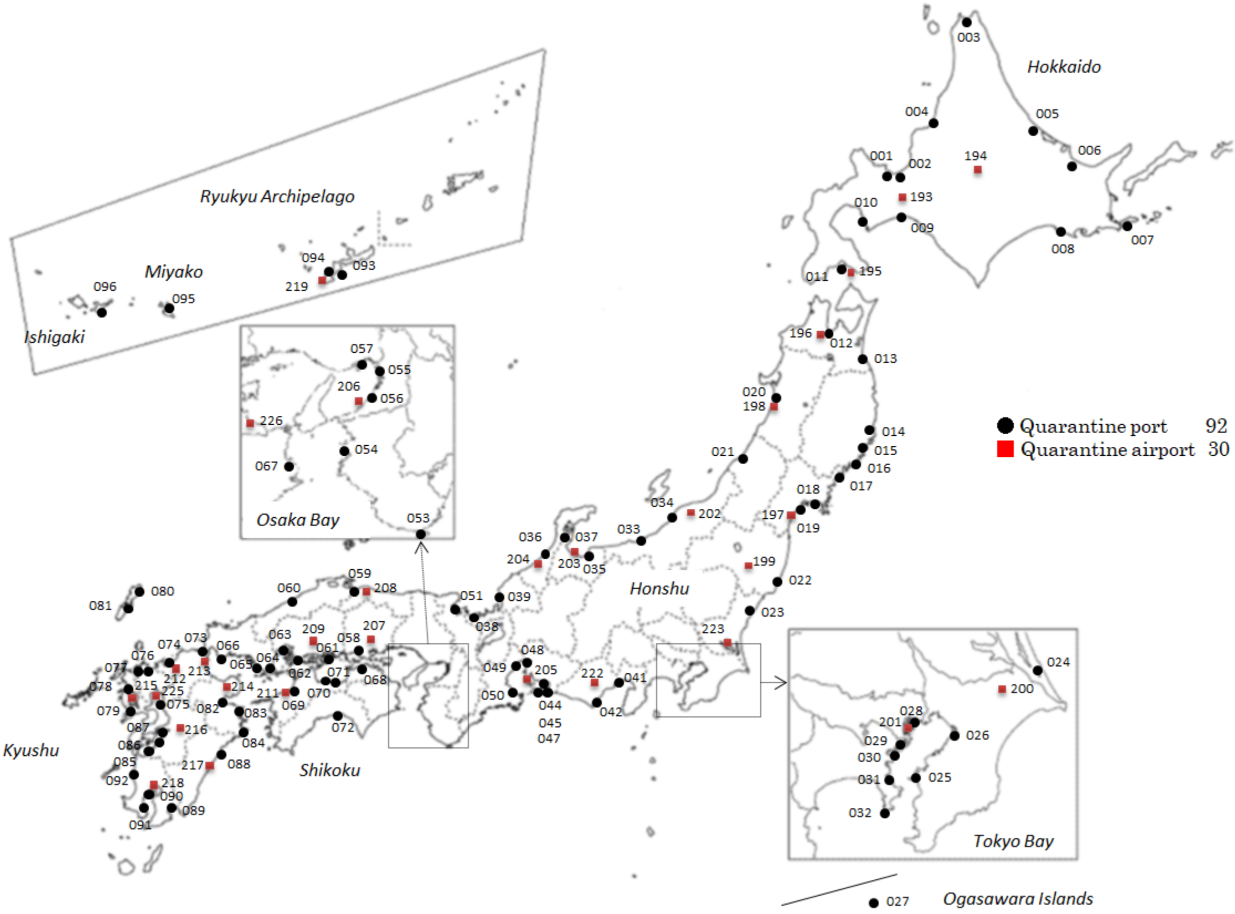


Figure 1-2　Quarantine ports and airports investigated in 2023 (UN/LOCODE, IATA CODE)

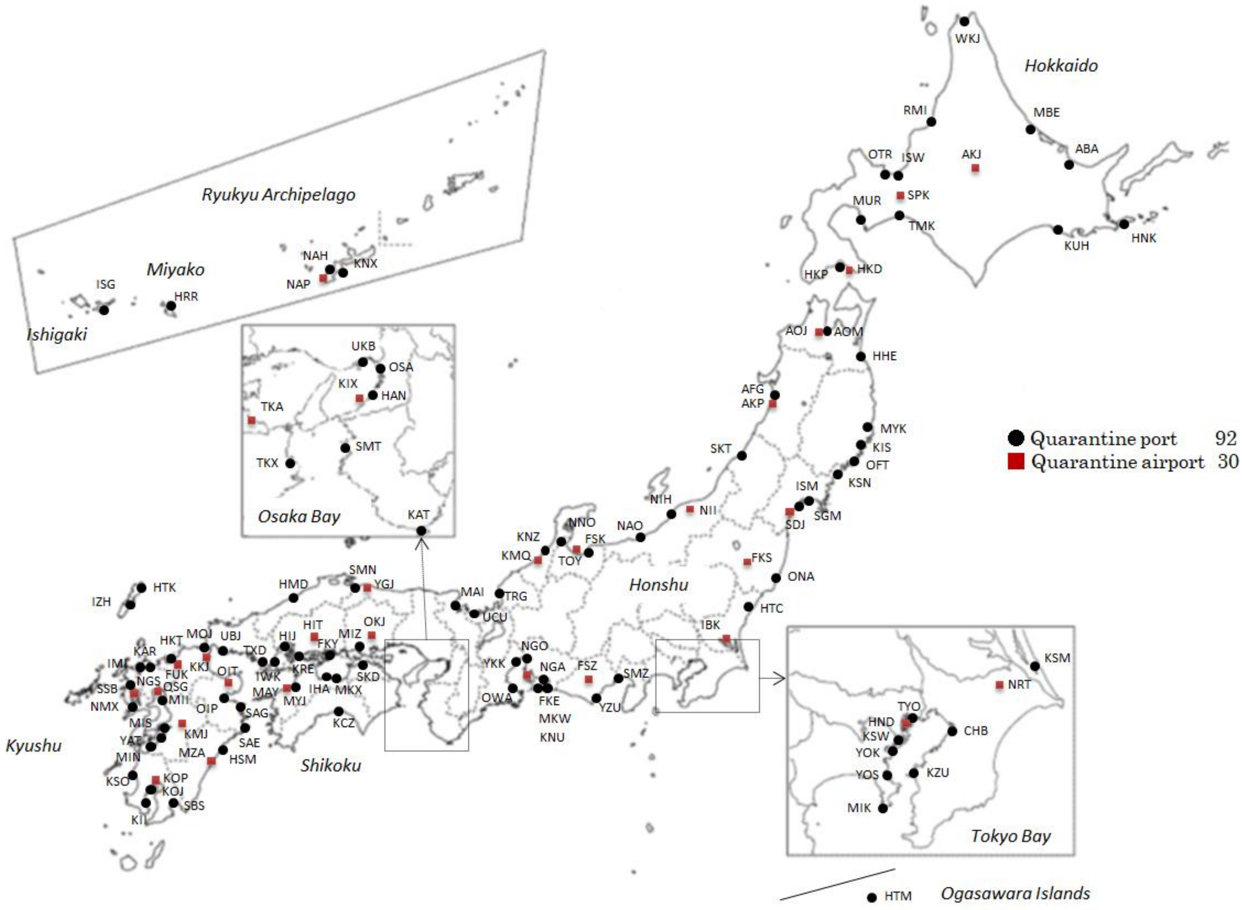


Figure 2　Invasive mosquitoes found in international aircrafts and the origin of the flights in 2023

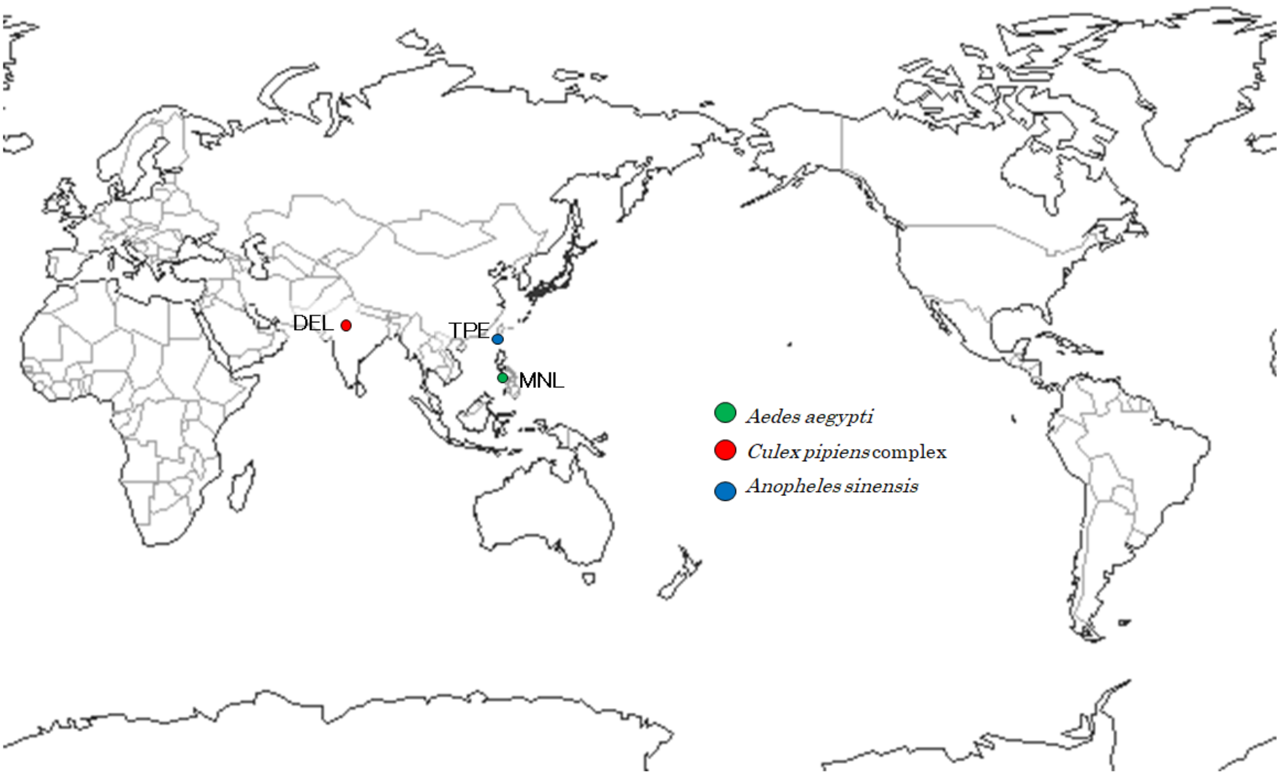


Figure 3　Vector situations of chikungunya fever and Zika virus infection at quarantine ports and airports, Japan in 2023

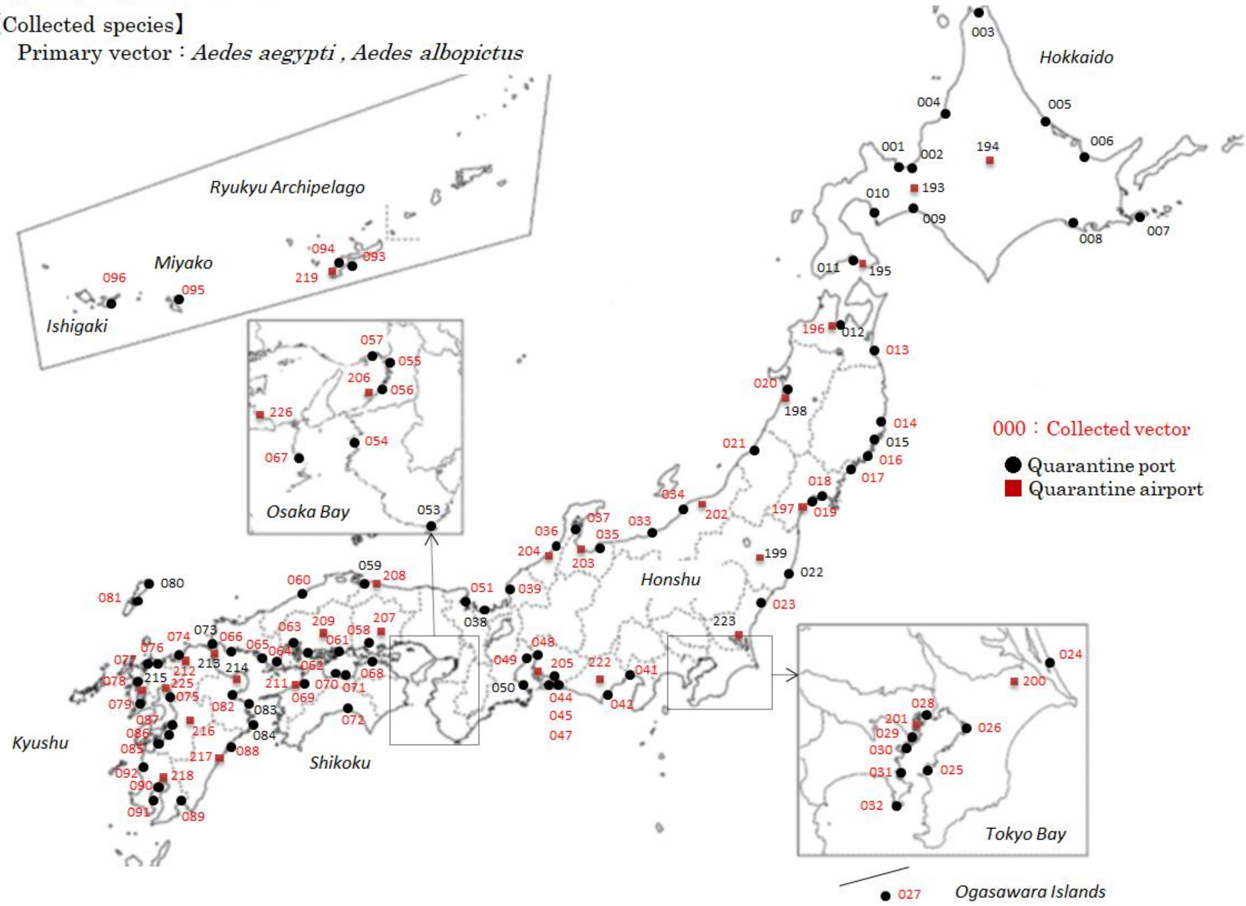


Figure 4 Vector situations of dengue fever at quarantine ports and airports, Japan in 2023

【Collected vector】

Primary vector ：*Aedes aegypti* , *Aedes albopictus*

Possible vector：*Aedes dorsalis* , *Aedes flavopictus* , *Aedes riversi* , *Culex tritaeniorhynchus*

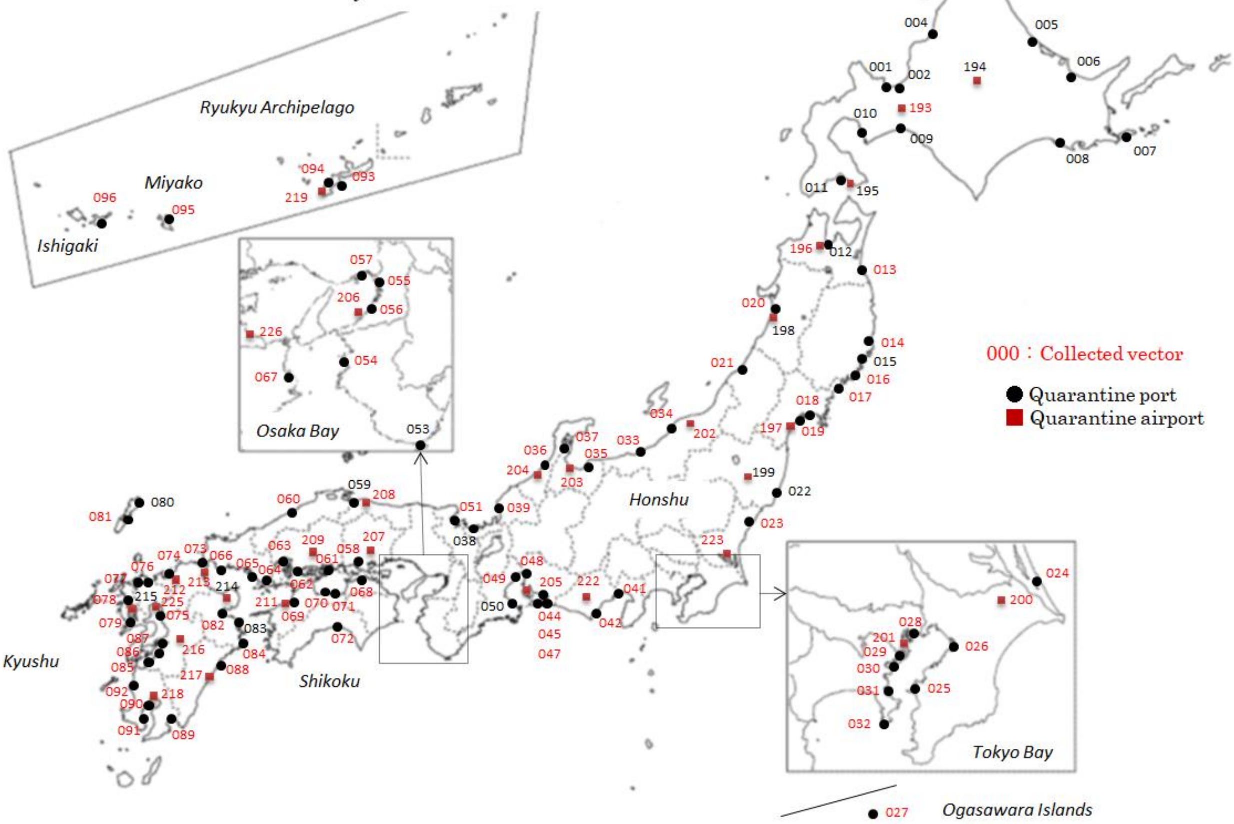


Figure 5 Vector situations of malaria at quarantine ports and airports, Japan in 2023

【Collected vector】

Primary vector：*Anopheles sinensis*

Secondary vector：*Anopheles lesteri*

Possible vector：*Anopheles koreicus*

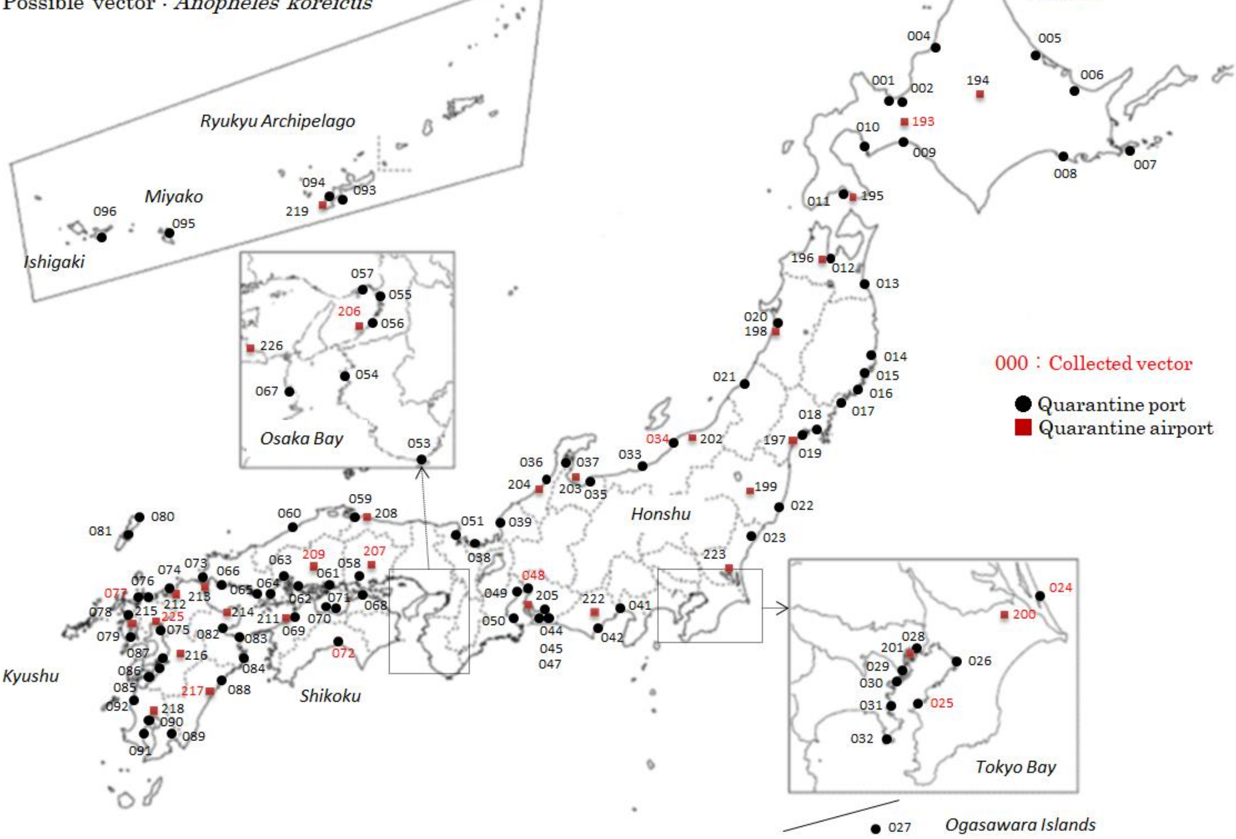


Figure 6 Vector situations of West Nile fever at quarantine ports and airports, Japan in 2023

【Collected vector】

Primary vector : *Culex pipiens quinquefasciatus* , *Culex pipiens* complex ,

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

Possible vector : *Cuex sitiens*

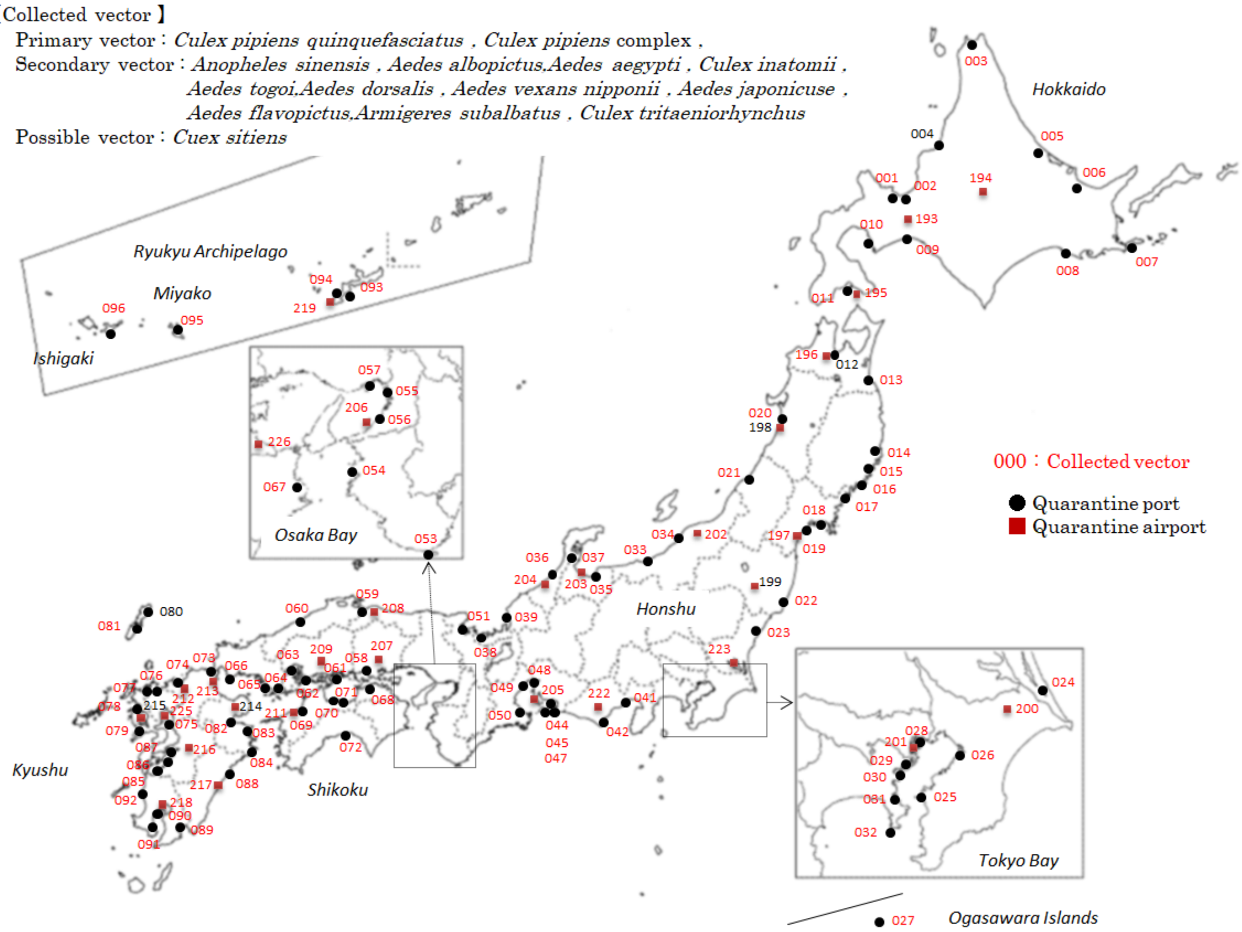


Figure 7 Vector situations of Japanese encephalitis at quarantine ports and airports, Japan in 2023

【Collected vector】

Primary vector : *Culex pseudovishnui* , *Culex tritaeniorhynchus*)

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

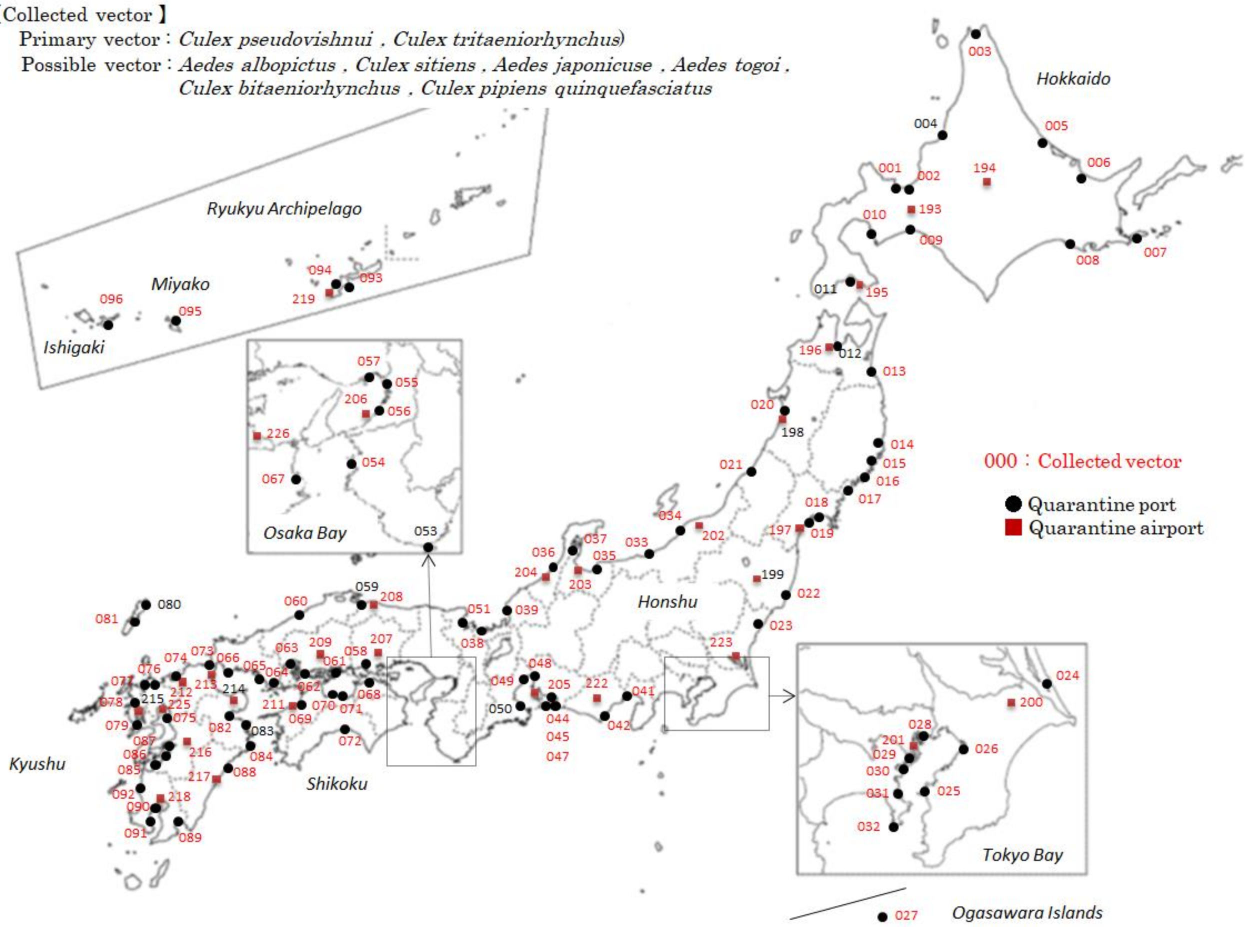


Figure 8　Vector and host situations of plague at quarantine ports and airports, Japan in 2023

【Captured vector】

Secondary vector : *Nosopsyllus fasciatus*

Host : Rodents

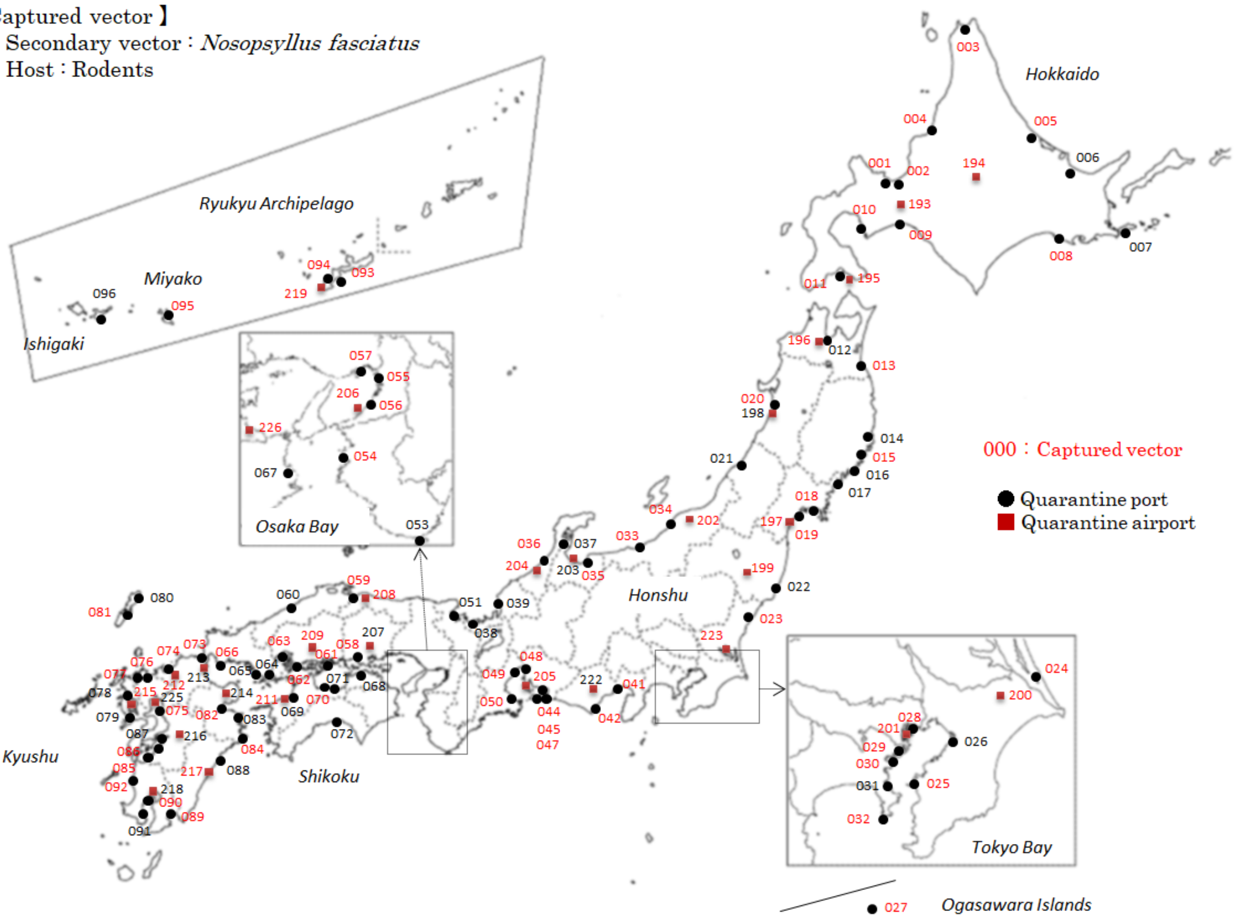


Figure 9　Vector situations of hemorrhagic fever with renal syndrome at quarantine ports and airports, Japan in 2023

【Captured vector】

Secondary vector : *Rattus rattus* , *Rattus norvegicus* , *Mus musculus* , *Apodemus speciosus* , *Clethrionomys rufocanus*

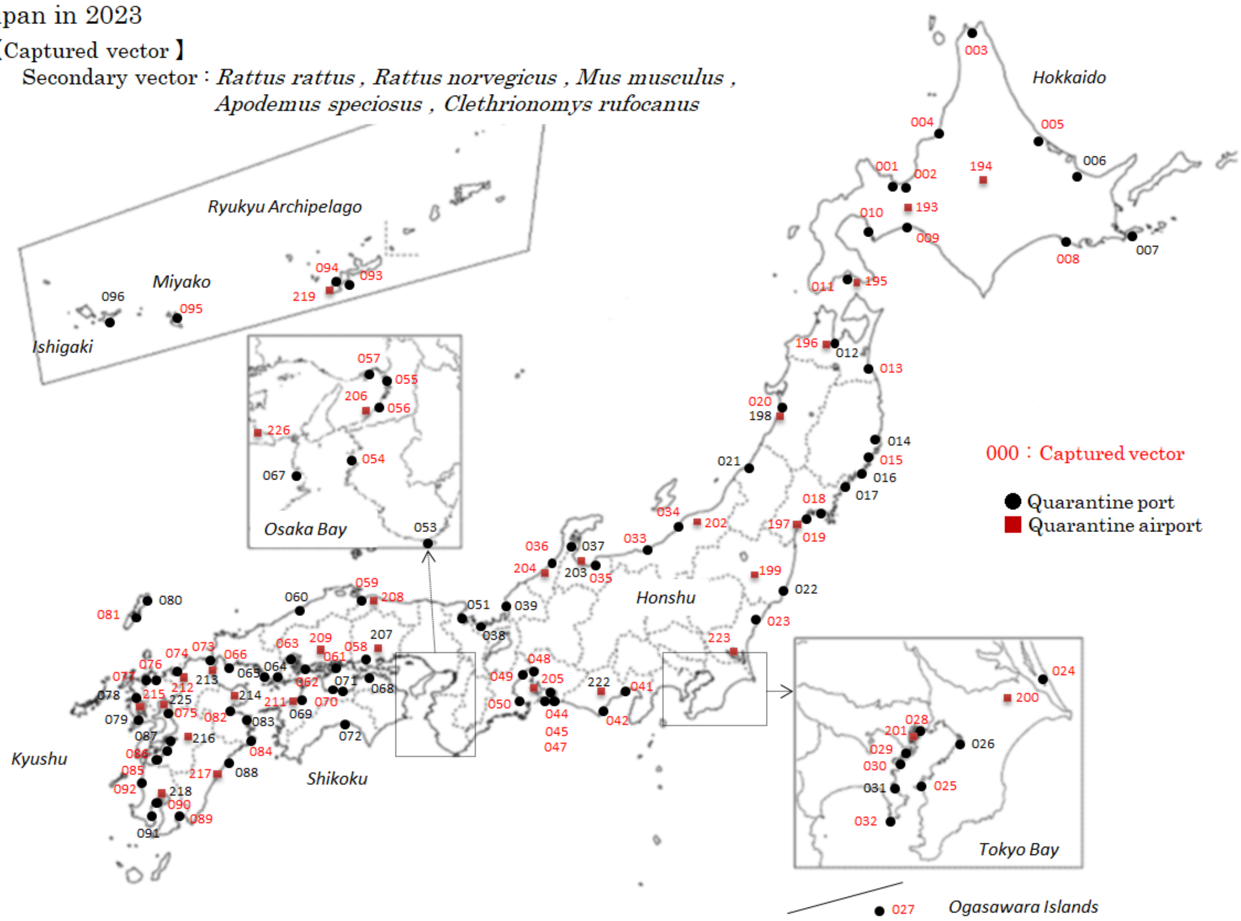


Figure 10　Invasive mosquitoes and pathogens detected at points of entry in 2006 - 2023

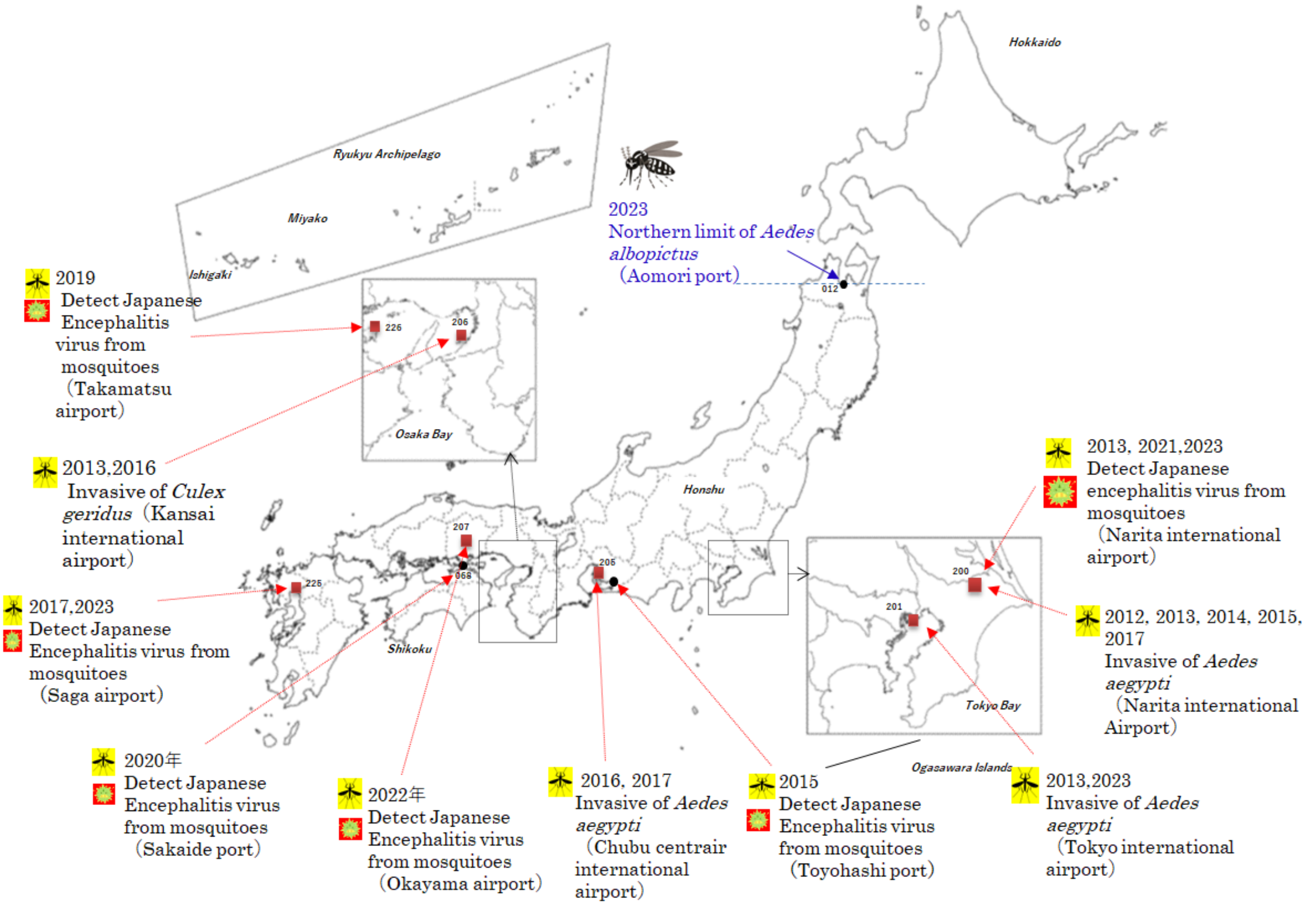
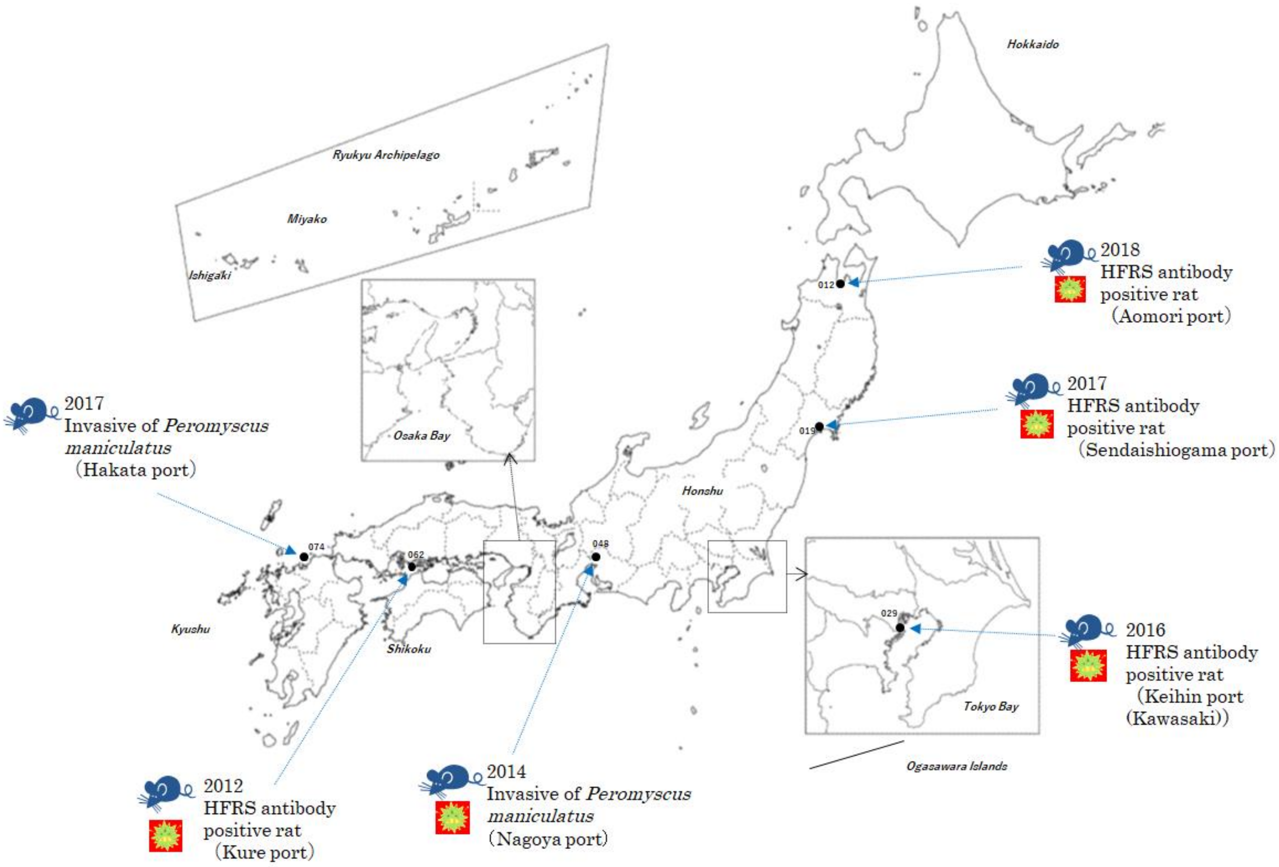


Figure 11　Invasive rodents and pathogens detected at points of entry in 2006 - 2023



○ 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 receding 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. 116, March 29, 2024)

(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 infection, Middle East respiratory syndrome (confined to the syndrome caused by MERS coronavirus of the genus Beta coronavirus; 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 Influenza virus 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 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 hemorrhagic fever;

ii Crimean-Congo hemorrhagic fever;

iii Smallpox;

iv South American hemorrhagic 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 Area Sanitation Control" (Finally Amended December 26, 2022) (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 investigation

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 infection, 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 infection, chikungunya fever, dengue fever, malaria, West Nile fever, and Japanese encephalitis

3. Implementation of port sanitation investigation

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 investigation 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 investigation

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 the areas specified by Cabinet Order, 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 areas specified by Cabinet Order. 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 examination.

(5) Emergency measure

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 examination

Identification of the species of captured rodents and plague-transmitting parasitic fleas and their pathogen examination 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 Examination, 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 Examination Request Sheet" (Form 1-2) after the collection of testing materials and parasitic fleas by each Examination Section and Laboratory. If species identification is difficult at the Examination 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 examination 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 infection, 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 investigation

Mosquito investigation 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 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 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 areas specified by Cabinet Order, 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 areas specified by Cabinet Order. However, if multiple cases of similar detection have been reported, a focused survey needs to be conducted in the areas specified by Cabinet Order. The samples collected during such a survey need to be immediately subjected to the pathogen examination. 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) Emergency measure

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 examination

Identification of the species of captured mosquitoes and their pathogen are carried out at each examination 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 examination are requested to the Testing Center using a filled-in "Mosquito Examination 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 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 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 examination 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 areas specified by Cabinet Order 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, there by 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) (Table 1).

Table 1 Points based on number of arrival vessels and quarantinable infectious diseases cases

Annual total number of arrival vessels（seaport / airport） A					
0	≤ 30	≤ 300	≤ 3,000	≤ 30,000	＞ 30,000
Annual total number of Quarantinable infectious disease cases B					
0	1	≤ 10	≤ 100	≤ 1,000	＞ 1,000
0 point	1 point	2 points	3 points	4 points	5 points

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.

Table 2 Survey frequency based on risk assessment（Permanent Surveillance）

Results of risk analysis（A+B）	Seaport / Airport		Airport
	Ivestigation of rodent	Investigation of mosquito	Aircraft survey
9 points or more	60 or more survey areas per year	60 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	60 or more aircraft per year
8 points	50 or more survey areas per year	50 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	50 or more aircraft per year
7 points	40 or more survey areas per year	40 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	40 or more aircraft per year
6 points	30 or more survey areas per year	30 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	30 or more aircraft per year
5 points	20 or more survey areas per year	20 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	20 or more aircraft per year
4 points	15 or more survey areas per year	15or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	15 or more aircraft per year
3 points	10 or more survey areas per year	10 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	10 or more aircraft per year
2 points	5 or more survey areas per year	5 or more survey areas throughout the year, focusing on months when the monthly average temperature is 15°C or higher	5 or more aircraft per year
0 ～ 1 point	1 or more survey areas per year	1 or more survey areas throughout the year	5 or more aircraft per year

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 emergency measure in addition to permanent surveillance for closer assessment of the sanitation status throughout the areas specified by Cabinet Order 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 areas specified by Cabinet Order, 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 vector)[1)] or vector fleas/mites (primary or secondary vector)[1)] captured during permanent surveillance, etc. in the areas specified by Cabinet Order.	D High risk for invasion of quarantinable infectious diseases or the like	① Emergency measure, 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 vector)[1)]or fleas/mites (primary vector) [1)] known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in the areas specified by Cabinet Order. 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 vector)[1)] or fleas/mites (primary or secondary vector)[1)] known as vectors for quarantinable infectious diseases or the like have been captured during permanent surveillance, etc. in the areas specified by Cabinet Order. 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 the areas specified by Cabinet Order.	A Very low risk for invasion of quarantine 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 found, 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 vector, secondary vector, 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 vector means the species involved in past epidemic of quarantinable infectious diseases or the like.

Secondary vector 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 vector mosquitoes of species known as vectors for quarantinable infectious diseases or the like (primary, secondary, or possible vector)[1] have been detected during permanent surveillance, etc. in the areas specified by Cabinet Order. 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 Emergency measure, 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 vector mosquitoes of invasive species known as vectors for quarantinable infectious diseases or the like (primary vector)[1] have been detected during permanent surveillance, etc. in the areas specified by Cabinet Order. 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
Vector mosquitoes (primary, secondary, or possible vector)[1] known as vectors for quarantinable infectious diseases or the like have been collected during permanent surveillance, etc. in the areas specified by Cabinet Order. 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

No vector mosquitoes collected during permanent surveillance, etc. in Cabinet Order-specified areas is known as a vector (primary, secondary, or possible vector)[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 found, 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 vector, secondary vector, 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 vector means the species involved in a past epidemic of quarantinable infectious diseases or the like.

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