

Infectious diseases risk assessment for the 2025 World Exposition (Expo 2025)

National Institute of Infectious Diseases
Center for Field Epidemic Intelligence, Research and Professional Development
Center for Emergency Preparedness and Response
Center for Surveillance, Immunization, and Epidemiologic Research

1 Objective

The 2025 World Exposition (Expo 2025) is considered an international mass gathering event where many people from both domestic and international locations simultaneously gather at a specific place or region for the same purpose. It is crucial to anticipate health crisis events centered around potential infectious diseases and prepare for public health responses. Furthermore, because many international visitors to Expo 2025 are expected to stay in the country for a certain period, it is crucial to have consistent preparedness inside and outside the Expo 2025 venue and to share information domestically and internationally. Regarding Expo 2025, it is crucial for national and local government entities, especially those in the Kinki region, including Osaka prefecture and Osaka city, which are responsible for infectious disease management, to evaluate the risk of infectious diseases in advance for residents and domestic and international visitors, and to contribute to preparedness and responses to the event.

Target :

- All visitors to Expo 2025
- Residents around the Expo 2025 site
- Participants: Official participants from 160 countries and areas, 9 international organizations, and other unofficial participants, including those involved in pavilion exhibitions, events, operations, and sales (as of November 14, 2023).
- Staff working at the Expo 2025 venue: Medical, security, cleaning, information desk attendants, volunteers, etc.
- Related organizations: Japanese government, Osaka prefectural and Osaka city governments, police, fire departments, etc.

2 Overview of Expo 2025

Duration¹ : 184 days, April 13 to October 13, 2025

Venue¹ : Yumeshima, Konohana-ku, Osaka (Area: approximately 155ha)



<https://www.Expo 2025.or.jp/en/overview/>

Participants: Official and unofficial participants (the estimated number is about 15,000 by the Expo Association as of October 2023)²⁻⁴, expo staff including volunteers (estimated at 70,000), as well as personnel from the police, fire departments, local governments, and other related organizations, will be involved in operations. The total number of visitors is expected to be approximately 28.2 million (24.7 million (88%) domestic and 3.5 million (12%) overseas), with approximately 15.59 million (63%) domestic visitors from the Kinki region and 9.19 million (37%) from outside the Kinki region. Most overseas visitors are expected from Southeast Asia and Oceania.

3 Characteristics of Expo 2025 should be considered when conducting a risk assessment for health hazards based on an overview of the Expo and the situation of past Expos.

(1) Timing and Duration

- The event lasted for more than 180 days.
- Includes periods prone to occurrences of food poisoning.
- Includes periods that may be affected by heavy rain, typhoons, and extreme heat.
- Includes breeding season for vector mosquitoes.

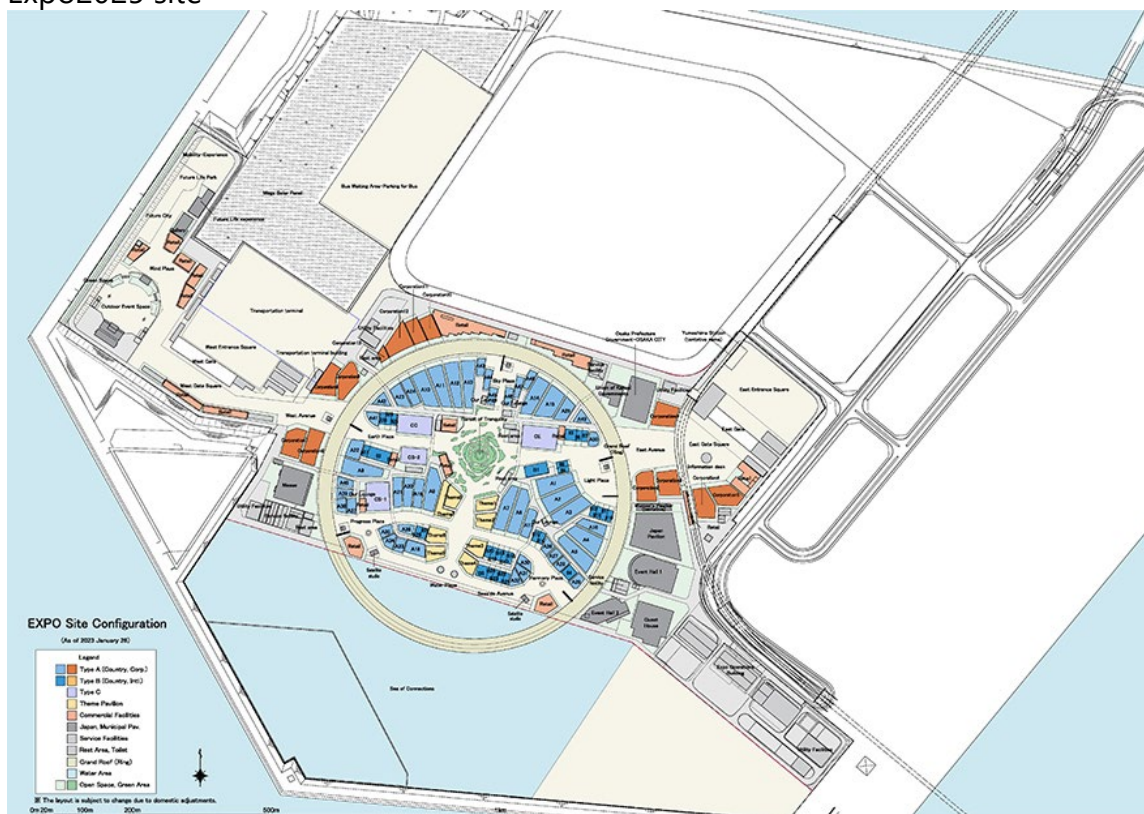
(2) Community mobility related to Expo 2025

- The scale of participating countries and the number of participants is large.
- The number of visitors from overseas during this period is estimated to be about 3.5 million, presumably from Southeast Asia and Oceania.
- The length of stay is expected to be similar to that of ordinary visitors to Japan, with approximately 70% of these visitors assumed to stay for approximately one to two weeks.

- The lodging destinations and geographical activity range of domestic and international tourists are likely to be centered around tourist spots in Osaka Prefecture and the Kinki region, but there is a possibility of moving and staying in various areas within Japan.
- Many domestic and international visitors and tourists are expected to use public transportation for travel.

(3) Venue

Expo2025 site ¹



<https://www.Expo 2025.or.jp/en/overview/masterplan/>

- The venue includes indoor and outdoor areas where people (including international visitors) congregate, such as pavilions and event spaces.
- Some pavilions serve food (organized by both domestic and international stakeholders).
- The venue includes several areas, such as the Forest of Tranquility and Water Plaza, that attract insects and animals capable of transmitting infectious diseases.
- There are cooling towers, water dispensers, and dry mist systems.
- There are also water-based effects in performances that may sprinkle water on the audience.

(4) Medical Facilities at the Venue

- Regarding the venue's medical and first aid facilities, there are plans to establish eight clinics and first aid stations, which are expected to be primarily operated by physicians and nurses working in Osaka Prefecture.

(5) Other Considerations

- It is assumed that there will be high media interest. In case of infectious disease events or other health crisis events, there will be a reputational risk for the hosting local government and the government promoting the event.
- Attention must be paid to both scenarios: tourists from overseas visiting the Expo not exclusively, leading to possible infections in the city visiting the venue, and cases where infections acquired at the venue could spread as tourists continue sightseeing in the city.

4 Risk Assessment

The risk assessment was conducted by the following backbone of risk evaluation, examining points ① as well as ② and ③ (with ② and ③ being considered independently).

(1) Backbone of the Risk Assessment

① Organization of basic information necessary for the public health response system

- Existing surveillance systems (including pathogens and vector mosquitoes)
- Food poisoning and infectious disease response systems (especially those for wide-area response and information sharing)

② Baseline incidence of infectious diseases (imported and domestic cases) (particularly from May to October) as well as vaccination rates and antibody prevalence for vaccine-preventable diseases (VPDs)

③ Criteria for Evaluation

Selecting priority infectious diseases for countermeasures based on the characteristics of the Expo and the following features related to diseases and disasters: evaluating infectious diseases (targeting diseases mainly transmitted within the community reported in the National Epidemiology Surveillance and those reported to food complaint services).

i. Characteristics of infectious diseases to consider:

- High possibility of being brought in by visitors and staff coming to Japan.
- Clinical diagnosis and pathogen testing are not straightforward, making early detection challenging.
- High severity of illness
- The high burden on administrative and medical institutions responding to the disease.

ii. Characteristics of transmission routes to consider:

- Diseases that could be exposed to unspecified individuals at the Expo 2025 venue or on public transportation (including exposure via the environment, vector insects, and vector animals)
- Foodborne infections could occur at the Expo venue or in its vicinity.

- Infectious diseases can be transmitted from person to person and may spread at the Expo venue, in urban areas, or accommodation facilities.
- iii. Infectious diseases that could occur after natural disasters (especially considering staff responsible for dealing with flooding and earthquake damage at the venue)
 - iv. Bioterrorism disasters
 - v. Infectious diseases that were subjects of enhanced surveillance or previously reported (including suspected cases) in previous Expos.

Results

Risks for each infectious disease were categorized as follows: (A) importation from abroad, (B) transmission within Osaka Prefecture, (C) cluster outbreaks related to the Expo (visitors and staff), and (D) occurrence of large-scale and severe cases (see table). Given the potential for large-scale outbreaks and high severity, measles, invasive meningococcal infections, Middle East Respiratory Syndrome (MERS), and food-related enterohemorrhagic *E. coli* infections warrant particular attention. Vigilance from venue-provided food is required for cluster outbreaks of acute respiratory infections, including COVID-19, seasonal influenza, and mass food poisoning incidents. The emergence of severe, unexplained infections related to the Expo also must be considered. This risk assessment excludes longer-term infectious risks apart from acute infections and food poisoning as they require different strategic approaches.

Table

Category	Infectious diseases	(A) Import from abroad ^a	(B) Spread within Osaka Prefecture ^b	(C) Outbreak related to Expo 2025 (visitor, staff)	(D) Large and severe outbreak	Note on public health response to the outbreak, etc.
Vaccine- preventable diseases (VPD)	Measles ^a	○		○	○	High burden of outbreak response, such as contact tracing and case isolation
	Invasive meningococcal disease			○	○	High burden of outbreak response, including contact tracing, case isolation, and prophylactic medication
	Rubella			○		Large burden of responding to outbreaks, such as contact tracing, etc.
No experience in Osaka (Japan) / bioterrorism related diseases	Middle East Respirator Syndrome (MERS)	○			○	Concerns about delays in diagnosis. Large burden of administrative response, risk communication, etc.
	Smallpox, pestis, anthrax			○	○	Concerns about bioterrorism.
Food-borne illness ^c / Gastroenteritis	Enterohemorrhagic <i>Escherichia coli</i> infection ^b		○	○	○	There is a significant public health burden, including food consumption, contact tracing, and concern about outbreaks due to food served at the venue. May require a coordinated response between the infectious disease and food sanitation departments
	Gastroenteritis ^(S)		○	○		
	Hepatitis A ^{ab} (VPD)	○	○	○		
	Dysentery ^a	○		○		
	Typhoid/Paratyphoid ^a	○		○		

Table, continued

Category	Infectious diseases	(A) Import from abroad ^a	(B) Spread within Osaka Prefecture ^b	(C) Outbreak related to Expo 2025 (visitor, staff)	(D) Large and severe outbreak	Note on public health response to the outbreak, etc.
Acute respiratory infection	COVID-19 ^{(S)(VPD)}	○	○	○		Concerns about seasonal influenza brought in from the southern hemisphere. Early detection is difficult with the existing surveillance system.
	Pertussis ^b (VPD)		○	○		
	Acute respiratory infection with influenza-like illness, including. seasonal influenza ^(S, partially) (VPD)	○	○	○		
	Legionellosis ^b		○	○		In the event of an outbreak associated with a venue, etc., source investigations and other response measures will be required.
Mosquito-borne infection	Dengue/Chikungunya/Zika ^a	○		○		A large burden of mosquito vector control, etc.
Others	Tuberculosis ^b	○	○			

(S): Sentinel surveillance

(VPD): Vaccine-preventable diseases

a. Diseases with an importation index greater than the median value of 0.06 among all monitored diseases.

b. Diseases reported in Osaka Prefecture with an annual average case count exceeding 10, and over 61% of annual reports are made from April to October (considered seasonal), among all monitored diseases from 2015 to 2019. For vaccine-preventable diseases, antibody prevalence and vaccination rates were considered. Diseases with few reports making seasonality less apparent, or where factors such as antibody prevalence are more influential than seasonality, were excluded from column (B) evaluations.

c. Diseases that may be transmitted via routes other than foodborne pathways.

Special Note

- Diagnosing imported infectious diseases may be difficult because general clinicians often lack diagnostic experience, and some specific tests may not be available at the medical institution level, making diagnosis difficult.
- Tick-borne infections, including Tsutsugamushi disease, Japanese spotted fever, and Severe Fever with Thrombocytopenia Syndrome (SFTS), have been reported in Osaka Prefecture. Although there is no human-to-human transmission, multiple infections could occur due to activities in the forests within the venue or high-risk areas in the prefecture.
- Diseases eradicated in some countries and regions (such as measles and rubella) could lead to different levels of risk perception among visitors from countries where elimination has been achieved if related cases occur at the Expo, potentially increasing the burden of international communication.
- In the event of natural disaster damage at the venue, special attention must be paid to infections associated with disasters, such as tetanus and leptospirosis, among responding staff and volunteers.
- Furthermore, the table's evaluation items (A) and (B) are not necessarily specific to or exclusively affected by the Expo.

(2) Formulation of Measures

Based on the risk assessment results, the following potential measures have been listed:

Preventive actions and targets for intervention

National and Subnational/Regional

- Promotion of measles and rubella vaccination, especially for workers in the tourism sector who interact with many unspecified individuals.
- Raising awareness of rare infectious diseases, including those imported, among regional medical institutions.
- Verification and information dissemination of testing systems for relatively rare diseases, focusing on imported infections.
- Strengthening collaboration with food departments.
- Enhancement of response capabilities for widespread incidents, including establishing coordination systems with Osaka Prefecture, municipal governments, the Kinki region's local authorities, and the national government, facilitated by training programs.

Expo 2025-related facilities and staff:

- Promotion of necessary vaccinations through the Expo Association (considering meningococcal vaccination for those handling patients at Expo 2025-related medical facilities, including first aid stations and measles and rubella vaccines).
- Education, training, and awareness regarding basic infection control measures.

- Preparation for managing food service standards (primarily aimed at overseas operators, including health education).
- Establishment of first aid and medical structures within the venue.
- Water quality and hygiene management systems within the venue.
- Response to infectious disease vector insects and animals within the venue (including companion pets).

Enhanced Surveillance

National and Subnational

Plan the implementation of enhanced surveillance.

- Identification of subjects for enhanced surveillance.
- Creation of definitions for Expo-related cases and a system to determine whether cases are related to Expo 2025.
- Development of a system to share trends of infectious disease occurrences within Osaka Prefecture with the Expo Association, enabling awareness and response actions within the venue.
- Confirmation of the collaborative system for enhanced surveillance stakeholders (anticipate the need for wide-area information sharing within the Kinki region, including coordination with food departments).

Clarification of roles among stakeholders from the detection and confirmation of information to evaluation and notification.

- Including cases of food poisoning, natural disasters, and bioterrorism.
→ For this purpose, 'notification' assumes communication from normal operations to crisis communication (considering reporting based on the International Health Regulations and the need for international information sharing in cases where an outbreak may impact other countries).

Implementation of explanations and training regarding operations.

- Stakeholders need to confirm the reporting and response process for the diseases of concern mentioned above and for pseudo-disease surveillance.

Expo-related facilities and staff:

Consider the introduction of additional surveillance for visitors and staff (on-site surveillance (syndromic surveillance), including first aid stations, health observation of staff, etc.)

- Syndromic surveillance items related to infectious diseases (e.g., fever, acute respiratory infection (fever + upper respiratory tract symptoms), gastrointestinal symptoms (diarrhea, vomiting, etc.), skin rash, meningitis symptoms, suspected severe infection, etc.)

Establish a system of communication and collaboration between the Expo Association and local public health departments (infectious diseases and food hygiene departments)

- Clarification of the contact person in charge, sharing of surveillance information and infectious disease (suspected) outbreaks among relevant parties

Establish a system of coordination with local public health departments in charge of public health in the event of a case outbreak.

- Clarification of contact point, division of roles, information sharing mechanism, crisis communication (criteria for public disclosure, etc.)

Related data

(1) Classification of imported infectious diseases using annual reported cases and importation indices according to infectious diseases annual report 2015-2019

The average number of annual cases reported	Disease	The average number of annual cases reported	Importation index	Disease	The average number of annual cases reported	Importation index
High 1,000	Tuberculosis	23,348	0.04	Acquired Immunodeficiency Syndrome (AIDS)	1,360	0.08
	Pertussis	5,792	0.00	Amebiasis	1,009	0.13
	Syphilis	5,348	0.01			
	EHEC (Enterohemorrhagic Escherichia coli infection)	3,744	0.02			
	Invasive pneumococcal infection	3,003	0.00			
	Carbapenem-resistant Enterobacterales infection	1,905	0.00			
	Legionellosis	1,877	0.02			
	Rubella	1,124	0.02			
	Disease	The average number of annual cases reported	Importation index	Disease	The average number of annual cases reported	Importation index
Moderate 100	Acute encephalitis	723	0.00	Hepatitis A	430	0.15
	Severe invasive streptococcal infections	617	0.00	Dengue fever	308	1.00
	Tsutsugamushi disease	447	0.00	Viral hepatitis	287	0.07
	Invasive <i>Haemophilus Influenzae</i> infection	393	0.00	Measles	282	0.17
	Varicella (limited to hospitalized case)	380	0.02	Shigellosis	165	0.58
	Hepatitis E	362	0.04			
	Japanese spotted fever	290	0.00			
	Disseminated cryptococcosis	146	0.01			
Low 10	Tetanus	127	0.00			
	Disease	The average number of annual cases reported	Importation index	Disease	The average number of annual cases reported	Importation index
	Vancomycin-resistant Enterococci infection	74	0.02	Giardiasis	67	0.36
	Acute Flaccid Paralysis	44	0.00	Malaria	52	1.00
	Invasive meningococcal disease	37	0.02	Leptospirosis	44	0.08
	Echinococcosis	26	0.02	Typhoid fever	40	0.83
				Multiple drug-resistant Acinetobacter infection	29	0.15
				Paratyphoid fever	22	0.94
Very Low 0				Cryptosporidiosis	18	0.09
				Chikungunya fever	18	1.00
				Lyme disease	13	0.22
	Disease	The average number of annual cases reported	Importation index	Disease	The average number of annual cases reported	Importation index
	Relapsing fever	6	0.03	Cholera	6	0.84
				Zika virus infection	4	1.00
				Coccidioidomycosis	3	1.00
				Brusellosis	3	0.50
				Melioidosis	1	1.00
				Q fever	1	0.40

Diseases not currently present domestically but should be considered for potential importation in relation to Expo 2025.

- Viral hemorrhagic fever •Smallpox •Plague •Poliomyelitis
- Diphtheria •Middle East Respiratory syndrome (MERS) •Avian influenza
- West Nile fever •Yellow fever •Q fever •Rabies •Anthrax

For all nationally reported diseases under surveillance from 2015 to 2019 in Japan, the "importation index" was defined as the ratio of reported cases excluding "imported cases/unknown infection areas." Diseases with at least one imported case reported during this period had a median importation index calculated, and those with a median above this value were considered to have a high risk of importation. Furthermore, the degree of reported imported infectious diseases was categorized based on the average number of annual cases reported between 2015 and 2019 as 'low' for 10 to 99 cases, 'moderate' for 100 to 999, and 'high' for 1,000 or more.

(2) Infectious diseases in Osaka Prefecture with the average number of annual case reported exceeding 10 cases (2015 - 2019)

Disease*1	Average number of annual case reported (2015-2019)*2	Seasonal (April-October) Exceeds 32/52 (61%) of annual reports ³	Importation index Above median*4	Incubation period*5
Tuberculosis	> 100	○		6 months-2 years
Syphilis		○		-
Pertussis		○		7-10 days
IPV				-
EHEC		○		2-9 days
AIDS			○	> 2 weeks
Legionellosis		○		2-10 days
Amoebiasis			○	2-4 weeks
Rubella	> 10			2-3 weeks
Measles			○	10-21 days
Invasive <i>Hemophilus influenzae</i>				-
Acute encephalitis				-
STSS				-
Dengue		○	○	3-10 days
Hepatitis A		○	○	2-6 weeks
Varicella (Hospitalization)		○		10-21 days
Viral hepatitis (except from A and E hepatitis)		○	○	-

*1 Diseases are listed in descending order based on the total number of reports from Osaka Prefecture according to the National Epidemiological Surveillance of Infectious Diseases (2015-2019)

*2 Diseases with the average number of annual case reported in Osaka prefecture exceeding 10 or 100 cases according to the National Epidemiological Surveillance of Infectious Diseases (2015-2019)

*3 Calculated based on the number of reports up to week 44 of each year starting from week 13.

*4 For diseases with overseas infection cases reported in the National Epidemiological Surveillance of Infectious Diseases from 2015 to 2019, the proportion of overseas infection cases in the reported cases was used as an importation index, and its median value (0.06) was calculated.

*5 Excludes diseases with the shortest incubation period of more than four weeks (other than tuberculosis) and drug-resistant bacterial infections with an unclear incubation period.

Reference

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Acknowledgment

We would like to express our appreciation to the Infectious Disease Control Planning Division, Department of Public Health and Medical Affairs, Osaka Prefectural Government, the Infectious Disease Control Division, Osaka City Public Health Center, and Emergency Preparedness and Response Section, Division of Public Health, Osaka Institute of Public Health for their cooperation in preparing this infectious disease risk assessment.