

### Risk Factor Analysis of Imported Dengue Fever Cases at Taiwan Taoyuan International Airport, 2015–2017

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#### Abstract

The frequent international interactions stimulated and increased the number of passengers between Taiwan and adjacent Southeast Asian countries. Simultaneously, the challenge of imported dengue fever (DF) became serious and brought about domestic outbreaks on and off. To precisely evaluate the factors of inbound passengers who were infected with the dengue virus and prevent outbreaks through border quarantine has become a significant issue. In this study, we aimed to analyze the risk factors of DF-positive cases. We collected data from the inbound passengers at Taiwan Taoyuan International Airport who traveled from high-risk areas via the system of infectious disease surveillance between 2015 to 2017. Information collected included those who had a fever and were screened by blood tests as well as epidemiologic characteristics. Among 8,711 passengers tested, 448 were confirmed positive. The inbound travelers who came from Indonesia, Malaysia, Vietnam, the Philippines, and Thailand were more likely to have DF. Other risk factors of DF included being foreign workers and immigrants who went back for a reunion, business people, travelers who stayed in high-risk areas for more than 10 days, and having pyrexia and DF signs and symptoms. Focusing on high-risk groups and conducting rapid screening tests as well as educating the passengers pertaining to the protective approaches are essential to lower the risks of domestic outbreaks resulting from imported infection cases.

**Keywords:** Imported dengue cases, quarantine, risk factor

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## Investigation of Indigenous Dengue Fever Outbreak in a University in Tainan, Taiwan, 2019

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### Abstract

In September 2019, an indigenous dengue fever outbreak occurred at a university in Tainan, Taiwan. This outbreak caused six patients, five of whom were indigenous. The serotype of dengue virus isolated from all patients was confirmed as Type III, which was different from other outbreaks in Tainan in the same period. The local health authorities investigated and identified a foreign student as the possible infection source. The home country of the imported case was the same as the origin of the dengue virus serotype in this outbreak based on laboratory surveillance data. The university, local health authorities, and the Taiwan Centers for Disease Control implemented control measures to prevent further transmission. Since the number of international students had been increasing in recent years, the university set up a prevention management plan for dengue fever for international students. This investigation highlighted the possibility of dengue-infected foreign students causing an indigenous outbreak. As a risk factor, education departments and universities should consider the placement of foreign students as part of management projects on dengue fever control and prevention.

**Keywords:** Dengue fever, indigenous case, imported case, foreign student, campus outbreak

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Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 22★		Week 1-22			
Classification	Disease Diagnosed	2023	2022	2023		2022	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Cholera	0	0	0	0	0	0
	Typhoid fever	0	0	2	2	1	0
	Paratyphoid Fever	0	0	4	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Shigellosis	4	2	27	8	37	0
	Amoebiasis	7	3	126	53	84	31
	Enterohemorrhagic E.coli Infection	0	0	0	0	0	0
	Anthrax	0	0	0	0	0	0
	Diphtheria	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	1	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Acute Flaccid Paralysis	1	0	22	0	10	0
	Measles	0	0	1	1	0	0
	Rubella	0	0	0	0	0	0
	Dengue Fever	3	0	47	47	2	2
	West Nile Fever	0	0	0	0	0	0
	Acute Viral Hepatitis type A	0	1	39	2	93	0
	Malaria	0	0	1	1	2	2
	Chikungunya Fever	0	0	5	5	0	0
	Hantavirus syndrome	0	1	2	0	2	0
Zika virus infection	0	0	2	2	0	0	
Mpox	20	-	140	8	-	-	
Category III	Acute Viral Hepatitis type B	2	1	63	4	45	0
	Acute Viral Hepatitis type C	9	4	249	0	192	1
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	7	2	6	0
	Acute Viral Hepatitis, untyped	0	0	1	1	0	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	6	0	0	0
	Haemophilus Influenza type b Infection	0	0	0	0	1	0
	Japanese Encephalitis	1	0	2	0	0	0
	Legionnaires' Disease	9	10	118	2	140	1
	Mumps	7	3	114	2	86	0
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
Tetanus	0	0	3	0	1	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	1	0	22	0	12	0
	Endemic Typhus Fever	0	0	5	0	5	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	25	0	213	3	0	0
	Invasive Pneumococcal Disease	10	6	135	1	77	0
	Leptospirosis	0	0	17	0	15	0
	Listeriosis	5	3	88	1	55	0
	Lyme Disease	0	0	0	0	1	1
	Melioidosis	0	0	7	0	1	0
	Q Fever	0	0	2	0	2	0
	Scrub Typhus	3	4	43	0	62	0
	Toxoplasmosis	0	0	14	2	12	0
	Tularemia	0	0	0	0	0	0
Severe Fever with Thrombocytopenia Syndrome	0	0	0	0	0	0	
Severe Pneumonia with Novel Pathogens	1,646	512,401	1,377,352	18,112	2,386,885	10,740	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	1	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.  
 2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.  
 3. Numbers of mumps and tetanus cases are summed up by the week of report.  
 4. "Mpox" has been listed as a Notifiable Infectious Disease since June 23, 2022.  
 5. "Severe Pneumonia with Novel Pathogens": The case definition has been revised to include patients who have both a positive test for SARS-CoV-2 and associated complications since March 20, 2023. Additionally, it has been modified from Category V to Category IV since May 1, 2023.

## Suspected Clusters

- Sixty-three clusters related to Upper respiratory tract infection (26), Diarrhea (16), Enterovirus (12), Tuberculosis (7), Varicella (1) and Fever of unknown origin (1) were reported during week 22.

## Imported Infectious Diseases

- There were 11 imported cases from at least 6 countries/areas during week 22.
  - Severe Pneumonia with Novel Pathogens:** 3 cases from China (2) and Japan (1).
  - Dengue Fever:** 3 cases from Indonesia, Thailand and Malaysia.
  - Amoebiasis:** 3 cases from Indonesia.
  - Shigellosis:** 1 case from Indonesia.
  - Legionnaires' Disease:** 1 case from Vietnam.
- During week 1–22, there were 18,259 imported cases of notifiable diseases. The top three were Severe Pneumonia with Novel Pathogens (18,112), Amoebiasis (53) and Dengue Fever (47).
- During week 1–22, imported cases of notifiable diseases were from at least 45 countries/areas. The top three were China (3,159), Japan (714) and Korea (182).

## Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens:** The epidemic is increasing.
- **Mpox:** The risk of epidemic transmission rises.
- **Enterovirus:** The epidemic reaches a plateau.
- **Japanese Encephalitis:** In the midst of the epidemic season, the number of new cases is expected to rise in all counties.
- **Influenza:** The epidemic is rising.

### Weekly Data of Notifiable Inases (by week of diagnosis)

Case diagnosis year		Week 23★		Week 1-23			
Classification	Disease Diagnosed	2023	2022	2023		2022	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
	Cholera	0	0	0	0	0	0
Category II	Typhoid fever	0	0	2	2	1	0
	Paratyphoid Fever	0	0	4	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Shigellosis	1	1	28	8	38	0
	Amoebiasis	4	1	130	54	85	31
	Enterohemorrhagic E.coli Infection	0	0	0	0	0	0
	Anthrax	0	0	0	0	0	0
	Diphtheria	0	0	0	0	0	0
	Meningococcal Meningitis	0	0	1	0	0	0
	Poliomyelitis	0	0	0	0	0	0
	Acute Flaccid Paralysis	1	0	23	0	10	0
	Measles	0	0	1	1	0	0
	Rubella	0	0	0	0	0	0
	Dengue Fever	1	0	48	48	2	2
	West Nile Fever	0	0	0	0	0	0
	Acute Viral Hepatitis type A	3	0	42	2	93	0
	Malaria	0	0	1	1	2	2
	Chikungunya Fever	0	0	5	5	0	0
	Hantavirus syndrome	1	0	3	0	2	0
	Zika virus infection	0	0	2	2	0	0
Mpox	16	-	156	8	-	-	
Category III	Acute Viral Hepatitis type B	2	0	65	4	45	0
	Acute Viral Hepatitis type C	11	5	259	0	197	1
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	7	2	6	0
	Acute Viral Hepatitis, untyped	2	0	3	1	0	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	6	0	0	0
	Haemophilus Influenza type b Infection	0	0	0	0	1	0
	Japanese Encephalitis	0	0	2	0	0	0
	Legionnaires' Disease	6	17	124	2	157	1
	Mumps	6	2	120	2	88	0
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	0	0
Tetanus	0	0	3	0	1	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	0	1	22	0	13	0
	Endemic Typhus Fever	1	0	6	0	5	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	26	0	239	3	0	0
	Invasive Pneumococcal Disease	11	5	146	1	82	0
	Leptospirosis	3	0	20	0	15	0
	Listeriosis	8	5	96	1	60	0
	Lyme Disease	0	0	0	0	1	1
	Melioidosis	0	0	7	0	1	0
	Q Fever	0	0	2	0	2	0
	Scrub Typhus	2	4	45	0	66	0
	Toxoplasmosis	0	0	14	2	12	0
	Tularemia	0	0	0	0	0	0
	Severe Fever with Thrombocytopenia Syndrome	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	1,722	487,514	1,379,072	18,114	2,874,399	11,015	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	1	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.  
2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.  
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### Suspected Clusters

- Fifty-four clusters related to Upper respiratory tract infection (40), Enterovirus (5), Diarrhea (4), Varicella (3) and Fever of unknown origin (2) were reported during week 23.

### Imported Infectious Diseases

- There were 5 imported cases from at least 3 countries / areas during week 23.  
**Severe Pneumonia with Novel Pathogens:** 3 cases from Japan (2) and Vietnam (1).  
**Dengue Fever:** 1 case from India (1).  
**Amoebiasis:** 1 case from Vietnam (1).
- During week 1–23, there were 18,263 imported cases of notifiable diseases. The top three were Severe Pneumonia with Novel Pathogens (18,114), Amoebiasis (54) and Dengue Fever (48).
- During week 1–23, imported cases of notifiable diseases were from at least 45 countries/areas. The top three were China (3,159), Japan (716) and Korea (182).

### Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens:** The epidemic reaches a plateau phase.
- **Mpox:** The risk of epidemic transmission rises.
- **Enterovirus:** The epidemic reaches a plateau phase, and the number of cases may slightly decrease.
- **Japanese Encephalitis:** In the midst of the epidemic season, the number of new cases is expected to rise in all counties.
- **Influenza:** The epidemic reaches a plateau phase.

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