

The Investigation of the First Autochthonous Chikungunya Outbreak in Taiwan, 2019

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Abstract

In 2019, an outbreak of chikungunya fever occurred in Zhonghe District of New Taipei City, Taiwan. Since the first case was confirmed on August 26, a total of 20 cases had been confirmed during the follow-up period. All cases had been to the neighboring area of Guoqiangling or the hiking trails to Yuantong Temple. The laboratory evidence revealed high sequence similarity in the structural gene between the first case and the imported cases from Burma in 2019. Thus, the New Taipei City Government blocked the entrance of 20 more trails in Niupu Mountain to restrict access. In view of the experiences of dengue fever prevention, mountainous area is a natural breeding sites for *Aedes albopictus* mosquitoes, and it is hard to control the outbreak. The transmission of the chikungunya fever is fast, which can be transmitted to new hosts in only 2 days. Also, clinical differential diagnosis of chikungunya from dengue fever is difficult. Moreover, Taiwan never had autochthonous case before. Unfamiliarity of the associated symptoms led to challenges in disease prevention and control. We suggest that epidemic prevention members should enforce publicizing and communicating with healthcare providers and the public for better understanding and awareness of chikungunya fever.

Keywords: Chikungunya fever, outbreak, mountainous area

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Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

| Case diagnosis year | | Week 44★ | | Week 1–44 | | | |
|----------------------|---|----------|------|--------------|----------------|--------------|----------------|
| Classification | Disease Diagnosed | 2019 | 2018 | 2019 | | 2018 | |
| | | | | 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 | Acute Flaccid Paralysis | 2 | 1 | 55 | 1 | 60 | 0 |
| | Acute Viral Hepatitis type A | 4 | 1 | 82 | 20 | 75 | 29 |
| | Amoebiasis | 15 | 7 | 292 | 152 | 273 | 133 |
| | Anthrax | 0 | 0 | 0 | 0 | 0 | 0 |
| | Chikungunya Fever | 2 | 0 | 106 | 85 | 6 | 6 |
| | Cholera | 0 | 0 | 0 | 0 | 7 | 0 |
| | Dengue Fever | 18 | 14 | 565 | 466 | 433 | 260 |
| | Diphtheria | 0 | 0 | 0 | 0 | 0 | 0 |
| | Enterohemorrhagic E. coli Infection | 0 | 0 | 1 | 0 | 0 | 0 |
| | Epidemic Typhus Fever | 0 | 0 | 0 | 0 | 0 | 0 |
| | Hantavirus Pulmonary Syndrome | 0 | 0 | 0 | 0 | 0 | 0 |
| | Hemorrhagic Fever with Renal Syndrome | 0 | 0 | 1 | 0 | 1 | 0 |
| | Malaria | 0 | 1 | 6 | 6 | 6 | 6 |
| | Measles | 1 | 0 | 134 | 54 | 36 | 9 |
| | Meningococcal Meningitis | 1 | 0 | 6 | 0 | 5 | 1 |
| | Paratyphoid Fever | 0 | 0 | 7 | 6 | 7 | 6 |
| | Poliomyelitis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Rubella | 0 | 0 | 21 | 17 | 9 | 8 |
| | Shigellosis | 2 | 5 | 119 | 38 | 146 | 48 |
| | Typhoid fever | 0 | 0 | 23 | 19 | 13 | 10 |
| West Nile Fever | 0 | 0 | 0 | 0 | 0 | 0 | |
| Zika virus infection | 0 | 0 | 4 | 4 | 2 | 2 | |
| Category III | Acute Viral Hepatitis type B | 2 | 4 | 93 | 2 | 125 | 9 |
| | Acute Viral Hepatitis type C | 7 | 20 | 519 | 2 | 396 | 3 |
| | Acute Viral Hepatitis type D | 0 | 0 | 0 | 0 | 0 | 0 |
| | Acute Viral Hepatitis type E | 0 | 0 | 8 | 4 | 6 | 0 |
| | Congenital Syphilis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Congenital Rubella Syndrome | 0 | 0 | 0 | 0 | 0 | 0 |
| | Enteroviruses Infection with Severe Complications | 1 | 0 | 55 | 1 | 36 | 0 |
| | Haemophilus Influenza type b Infection | 0 | 0 | 2 | 0 | 5 | 0 |
| | Japanese Encephalitis | 0 | 0 | 21 | 0 | 36 | 0 |
| | Legionellosis | 1 | 7 | 227 | 14 | 173 | 9 |
| | Mumps | 10 | 13 | 517 | 7 | 519 | 9 |
| | Neonatal Tetanus | 0 | 0 | 0 | 0 | 0 | 0 |
| | Pertussis | 0 | 0 | 25 | 0 | 27 | 2 |
| Tetanus | 0 | 0 | 3 | 0 | 5 | 0 | |
| Category IV | Botulism | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brucellosis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Complicated Varicella | 0 | 1 | 54 | 1 | 51 | 0 |
| | Endemic Typhus Fever | 1 | 1 | 26 | 3 | 23 | 1 |
| | Herpesvirus B Infection | 0 | 0 | 0 | 0 | 0 | 0 |
| | Invasive Pneumococcal Disease | 11 | 4 | 365 | 2 | 395 | 0 |
| | Leptospirosis | 2 | 4 | 107 | 0 | 84 | 1 |
| | Listeriosis | 0 | 7 | 156 | 1 | 146 | 1 |
| | Lyme Disease | 0 | 0 | 1 | 1 | 2 | 2 |
| | Melioidosis | 0 | 0 | 43 | 0 | 23 | 1 |
| | Q Fever | 0 | 1 | 22 | 5 | 16 | 1 |
| | Scrub Typhus | 9 | 19 | 404 | 4 | 318 | 1 |
| | Severe Complicated Influenza | 22 | 6 | 1957 | 8 | 1067 | 5 |
| | Toxoplasmosis | 0 | 0 | 13 | 2 | 14 | 1 |
| Tularemia | 0 | 0 | 0 | 0 | 0 | 0 | |
| 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 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Novel Influenza A Virus Infections | 0 | 0 | 0 | 0 | 0 | 0 |
| | Rift Valley Fever | 0 | 0 | 0 | 0 | 0 | 0 |
| Yellow Fever | 0 | 0 | 0 | 0 | 0 | 0 | |

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.
- Numbers of mumps and tetanus cases are summed up by the week of report.
- Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Forty-six clusters were reported during week 44, including 10 tuberculosis clusters, 14 diarrhea clusters, 9 upper respiratory tract infection clusters, 9 influenza-like illness clusters, 3 varicella clusters, and 1 fever of unknown origin cluster.

Imported Infectious Diseases

- There were 29 imported cases from 10 countries during week 44 of 2019.

| Countries Diseases | Indonesia | Vietnam | Cambodia | Myanmar | India | China | Laos | Thailand | Philippines | Nepal | Total |
|-----------------------|-----------|---------|----------|---------|-------|-------|------|----------|-------------|-------|-------|
| Dengue Fever | | 5 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 18 |
| Amoebiasis | 6 | | | | | 1 | | | | | 7 |
| Chikungunya Fever | | | | 2 | | | | | | | 2 |
| Measles | | 1 | | | | | | | | | 1 |
| Shigellosis | 1 | | | | | | | | | | 1 |
| Total | 7 | 6 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 29 |

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 918 imported cases from 40 different countries in 2019. The top 3 countries are Indonesia (247), Vietnam (140), and the Philippines (111).
- Top 3 imported diseases are Dengue Fever (466), Amoebiasis (152), and Chikungunya Fever (85).

Summary of Epidemic

- Enterovirus** : The epidemic has gradually slowed down, but it is still in the epidemic period. EV71 is still circulating in the community.
- Dengue** : The epidemics in New Taipei City, Taichung City, Tainan City and Kaohsiung City are still under observation; the indigenous epidemic has gradually slowed down. However, the risk of imported epidemic still exists.

Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

| Case diagnosis year | | Week 45★ | | Week 1–45 | | | |
|----------------------|---|----------|------|--------------|----------------|--------------|----------------|
| Classification | Disease Diagnosed | 2019 | 2018 | 2019 | | 2018 | |
| | | | | 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 | Acute Flaccid Paralysis | 1 | 2 | 56 | 1 | 62 | 0 |
| | Acute Viral Hepatitis type A | 4 | 1 | 86 | 21 | 76 | 30 |
| | Amoebiasis | 4 | 6 | 296 | 153 | 279 | 137 |
| | Anthrax | 0 | 0 | 0 | 0 | 0 | 0 |
| | Chikungunya Fever | 1 | 0 | 107 | 86 | 6 | 6 |
| | Cholera | 0 | 0 | 0 | 0 | 7 | 0 |
| | Dengue Fever | 12 | 16 | 577 | 477 | 449 | 274 |
| | Diphtheria | 0 | 0 | 0 | 0 | 0 | 0 |
| | Enterohemorrhagic E. coli Infection | 0 | 0 | 1 | 0 | 0 | 0 |
| | Epidemic Typhus Fever | 0 | 0 | 0 | 0 | 0 | 0 |
| | Hantavirus Pulmonary Syndrome | 0 | 0 | 0 | 0 | 0 | 0 |
| | Hemorrhagic Fever with Renal Syndrome | 0 | 0 | 1 | 0 | 1 | 0 |
| | Malaria | 1 | 0 | 7 | 7 | 6 | 6 |
| | Measles | 0 | 0 | 134 | 54 | 36 | 9 |
| | Meningococcal Meningitis | 0 | 0 | 6 | 0 | 5 | 1 |
| | Paratyphoid Fever | 0 | 1 | 7 | 6 | 8 | 7 |
| | Poliomyelitis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Rubella | 0 | 1 | 21 | 17 | 10 | 9 |
| Shigellosis | 2 | 1 | 121 | 38 | 147 | 48 | |
| Typhoid fever | 0 | 0 | 23 | 19 | 13 | 10 | |
| West Nile Fever | 0 | 0 | 0 | 0 | 0 | 0 | |
| Zika virus infection | 0 | 0 | 4 | 4 | 2 | 2 | |
| Category III | Acute Viral Hepatitis type B | 3 | 2 | 96 | 3 | 127 | 9 |
| | Acute Viral Hepatitis type C | 9 | 8 | 528 | 2 | 404 | 3 |
| | Acute Viral Hepatitis type D | 0 | 0 | 0 | 0 | 0 | 0 |
| | Acute Viral Hepatitis type E | 1 | 0 | 9 | 4 | 6 | 0 |
| | Congenital Syphilis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Congenital Rubella Syndrome | 0 | 0 | 0 | 0 | 0 | 0 |
| | Enteroviruses Infection with Severe Complications | 2 | 0 | 57 | 1 | 36 | 0 |
| | Haemophilus Influenza type b Infection | 0 | 0 | 2 | 0 | 5 | 0 |
| | Japanese Encephalitis | 0 | 0 | 21 | 0 | 36 | 0 |
| | Legionellosis | 4 | 7 | 231 | 15 | 180 | 9 |
| | Mumps | 4 | 13 | 521 | 7 | 532 | 9 |
| | Neonatal Tetanus | 0 | 0 | 0 | 0 | 0 | 0 |
| Pertussis | 0 | 1 | 25 | 0 | 28 | 2 | |
| Tetanus | 0 | 0 | 3 | 0 | 5 | 0 | |
| Category IV | Botulism | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brucellosis | 0 | 0 | 0 | 0 | 0 | 0 |
| | Complicated Varicella | 1 | 0 | 55 | 1 | 51 | 0 |
| | Endemic Typhus Fever | 2 | 0 | 28 | 3 | 23 | 1 |
| | Herpesvirus B Infection | 0 | 0 | 0 | 0 | 0 | 0 |
| | Invasive Pneumococcal Disease | 9 | 7 | 374 | 2 | 402 | 0 |
| | Leptospirosis | 1 | 2 | 108 | 0 | 86 | 1 |
| | Listeriosis | 2 | 0 | 158 | 1 | 146 | 1 |
| | Lyme Disease | 0 | 0 | 1 | 1 | 2 | 2 |
| | Melioidosis | 0 | 0 | 43 | 0 | 23 | 1 |
| | Q Fever | 0 | 3 | 22 | 5 | 19 | 2 |
| | Scrub Typhus | 11 | 3 | 415 | 4 | 321 | 1 |
| | Severe Complicated Influenza | 16 | 8 | 1973 | 8 | 1075 | 5 |
| Toxoplasmosis | 0 | 0 | 13 | 2 | 14 | 1 | |
| Tularemia | 0 | 0 | 0 | 0 | 0 | 0 | |
| 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 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Novel Influenza A Virus Infections | 0 | 0 | 0 | 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. Since 2018/1/1, "Listeriosis" was listed as a Notifiable Infectious Disease.

Suspected Clusters

- Forty-two clusters were reported during week 45, including 6 tuberculosis clusters, 8 diarrhea clusters, 5 upper respiratory tract infection clusters, 19 influenza-like illness clusters, 3 varicella clusters, and 1 enterovirus cluster.

Imported Infectious Diseases

- There were 17 imported cases from 10 countries during week 45 of 2019.

| Countries \ Diseases | Vietnam | Cambodia | Malaysia | Indonesia | Korea | China | Ethiopia | India | Myanmar | Philippines | Total |
|-----------------------|---------|----------|----------|-----------|-------|-------|----------|-------|---------|-------------|-------|
| Dengue Fever | 4 | 2 | 2 | 1 | | | | 1 | | 1 | 11 |
| Acute Hepatitis B | 1 | | | | | | | | | | 1 |
| Acute Hepatitis A | | | | | 1 | | | | | | 1 |
| Chikungunya Fever | | | | | | | | | 1 | | 1 |
| Legionnaires' Disease | | | | | | 1 | | | | | 1 |
| Malaria | | | | | | | 1 | | | | 1 |
| Amoebiasis | | | | 1 | | | | | | | 1 |
| Total | 5 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 17 |

Note: The table summarized the number of imported cases that were either **confirmed** or **updated** in the given week.

- There are 935 imported cases from 40 different countries in 2019. The top 3 countries are Indonesia (249), Vietnam (145), and the Philippines (112).
- Top 3 imported diseases are Dengue Fever (477), Amoebiasis (153), and Chikungunya Fever (86).

Summary of Epidemic

- **Enterovirus** : The epidemic has gradually slowed down, but it is still in the epidemic period. EV71 is still circulating in the community.
- **Dengue** : The epidemics in Taichung City and Kaohsiung City are still under observation; the indigenous epidemic has gradually slowed down. However, the risk of imported epidemic still exists.

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