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CDC Taiwan Centers for Disease Control 2023 Annual Report

2023 Centers for Disease Control Annual Report

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Message from the Director General

2022 marked the third year since the COVID-19 pandemic upturned people's lives around the world. Omicron became the dominant variant not long after its first appearance at the end of 2021. Infections around the world peaked, and Taiwan entered the widespread community transmission stage of the pandemic.

Due to Omicron's decreased pathogenicity, Taiwan changed the direction of its response to the pandemic. On April 6, 2022, President Tsai Ing-wen announced the "New Taiwan Model" that aimed to achieve the goals of "normal life, active disease prevention, and steady opening up." Taiwan's prevention policies shifted overall from containing the spread of the disease to normalizing living with COVID.

Taiwan implemented a gradual relaxation of border controls, quarantine requirements, and community disease prevention measures throughout 2022. To prevent these changes from having a significant impact on people's health, Taiwan CDC monitored the spread of variants and promoted the use of rapid tests and personal disease prevention measures. Taiwan introduced antivirals, strengthened infection control in healthcare institutions, and implemented strategies for admission and treatment of mild and severe cases. To improve people's immunity, Taiwan CDC used a variety of channels to encourage people to get vaccinated while also making vaccines more accessible. By the end of 2022, approximately 65.36 million doses of COVID-19

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Director-General, Taiwan Centers for Disease Control

vaccines had been administered in Taiwan. The coverage rate reached 94% for a first dose, 88.8% for a second dose, 75.7% for a first booster, and 19.8% for a second booster. The Focus section of this annual report details the various efforts we made to promote COVID-19 vaccines.

In addition, in 2022, we continued to improve strategies for controlling tuberculosis and HIV/AIDS while initiating response measures to manage the threat posed by Mpox. Communicable diseases have always posed a serious threat to people's health, and no country can face it alone. Therefore, Taiwan CDC will continue to seek stronger international cooperation to work with the international community to combat the threat of disease and achieve the universal goal of global health security.

01

About Taiwan CDC

About Taiwan CDC

Owing to the reorganization of the Executive Yuan and its subordinate agencies, the Taiwan Centers for Disease Control (Taiwan CDC) was organizationally restructured in 2013. Taiwan CDC is the agency in charge of communicable disease control in Taiwan and shall implement the following matters:

1. Planning and execution of policies and relevant regulations concerning the prevention and control of communicable diseases.
2. Prevention, control, investigation, research, and laboratory testing of various communicable diseases.
3. Reporting and surveillance of diseases within the country; collection and exchange of international disease information.
4. Preparedness, response, and emergency management of disease outbreaks.
5. Provision of pharmaceuticals for disease control, government-funded vaccines, biologics, and immunization against notifiable disease.
6. Quarantine and sanitary control of international airports and ports; health management of migrant workers.
7. Formulation of laboratory testing standards of various diseases; verification of laboratory testing; biosafety management.
8. Training of disease control and quarantine professionals.
9. International cooperation and exchanges on disease control.

Organizational Structure

Taiwan CDC is under the command of the director-general, who is assisted by two deputy directors and a chief secretary. Since government restructuring in July 2013, Taiwan CDC has comprised six divisions, five offices, two centers, six regional centers, and two task forces (Figure 2-1), as follows:

1. Six Divisions: Division of Planning and Coordination; Division of Acute Infectious Diseases; Division of Chronic Infectious Diseases; Division of Preparedness and Emerging Infectious Diseases; Division of Infection Control and Biosafety; Division of Quarantine
2. Two Centers: Epidemic Intelligence Center; Center for Diagnostics and Vaccine Development
3. Five Offices: Information Management Office; Secretariat; Personnel Office; Accounting and Statistics Office; Civil Service Ethics Office
4. Six Regional Centers: Taipei Regional Center; Northern Regional Center; Central Regional

Center; Southern Regional Center; Kaohsiung-Pingtung Regional Center; Eastern Regional Center

5. Two Task Forces: Public Relations Office; Office of Preventive Medicine

Distribution of Employees by Gender, Age, and Education: At the end of December 2022, there were785 Taiwan CDC employees, with a male to female ratio of 1:3. Average age was 42.9 with 69% under 49 years old (Table 2-1). About 44.6% graduated from university or college while 54.6% completed a graduate school degree (Table2-2).

Figure 2-1 Organization

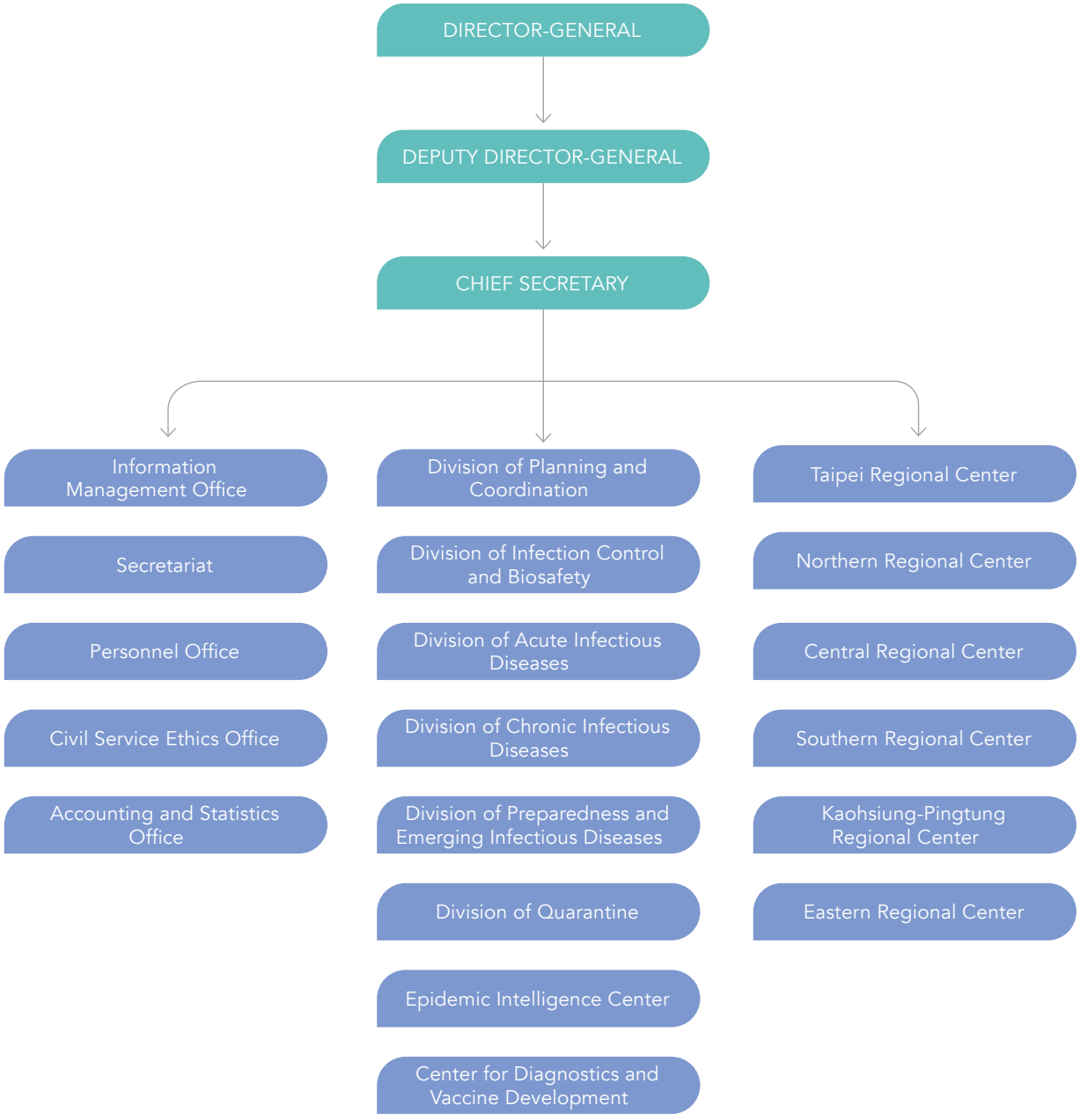


Table 2-1 Age Distribution of Taiwan CDC

Under 29 years	30-39 years	40-49 years	50-59 years	60-65 years
10.1%	28.5%	30.4%	26.8%	4.2%

Table 2-2 Education Level of Taiwan CDC Employees

Graduate School	University	College	High School or Under
54.6%	40.4%	4.2%	0.8%

Core Values of Taiwan CDC

1. Expertise Cultivation

Putting science and new knowledge into action to strengthen Taiwan's capacity for preventing and confronting emerging infectious diseases.

2. Pragmatic Actions

Working relentlessly around the clock to implement disease prevention measures and ensure the health and wellbeing of the people in Taiwan.

4. Securing Public Trust

Enhancing communications to ensure public access to real-time information and win the public's trust and praise.

3. Concerted Efforts

Cooperating with central and local governments, experts, and NGOs in epidemic control; strengthening international cooperation to keep abreast of the latest knowledge and technology.

02

2023 Focus – Increasing COVID-19 Vaccination Rates

2023 Focus – Increasing COVID-19 Vaccination Rates

Vaccination is the most effective way to prevent infectious diseases. Many countries implemented COVID-19 vaccination programs to boost the immunity of elderly and high-risk populations and reduce their risk of death and severe disease following infection in order to control the COVID-19 pandemic effectively and maintain medical capacity, Taiwan began to plan its national COVID-19 vaccination program in 2020.

1. Vaccine Procurement

In order to acquire safe and effective vaccines, the Central Epidemic Command Center (CECC) pursued multiple avenues, including international investment (participation in the COVAX mechanism led by the WHO, GAVI, and CEPI), procurement from manufacturers, and domestic production. As of September 2020, it had procured 33.41 million doses, consisting of 4.76 million doses from the COVID-19 Vaccines Global Access (COVAX) program, 10 million from AstraZeneca, 6.05 million from Moderna, 5 million from domestic manufacturers, and 7.6 million from Pfizer-BioNTech.

As new variants of SARS-CoV-2 continue to emerge, most countries encourage people to get a COVID-19 booster shot. In July 2021, Taiwan signed a two-year supply agreement with U.S. pharmaceutical company Moderna Inc. to purchase a total of 35 million doses of its COVID-19 vaccine. Under the supply agreement, Moderna would supply doses of its prime series and next-generation booster vaccine candidate in batches in 2022 and 2023, to respond to the threats posed by SARS-CoV-2 variants and offer vaccines to more groups of people. As of December 2022, it had procured a total of 68.41 million doses.

In addition, Taiwan Semiconductor Manufacturing Co., Ltd. (TSMC), Hon Hai Precision Industry Co., Ltd./Yonglin Charity Foundation, and Buddhist Tzu Chi Charity Foundation showed their compassion and concern for society by donating a total of 15.207 million doses of BioNTech's COVID-19 vaccine. Diplomatic allies and friendly nations contributed an additional 9.058 million doses. A total of 92.675 million COVID-19 vaccine doses have been procured by the government and domestic enterprises or donated to Taiwan by diplomatic friends.

Moderna vaccines purchased arrive in Taiwan

2. Planning and Implementation of Vaccine Policies

(1) Ongoing COVID-19 Vaccines Campaigns

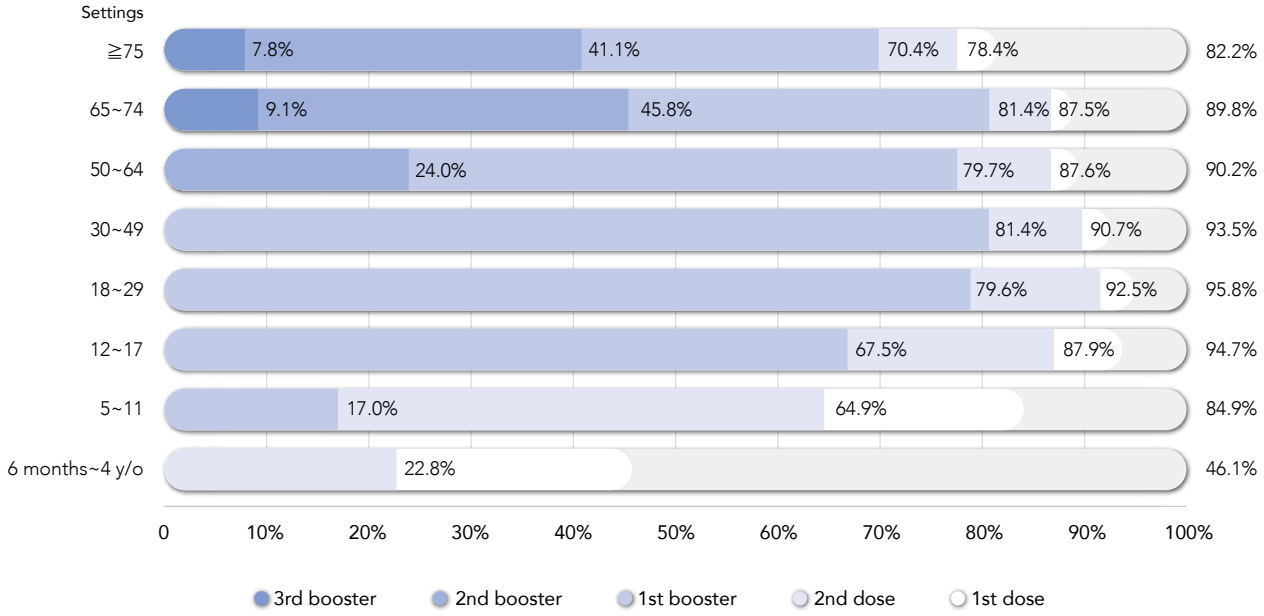
Taiwan's COVID-19 immunization policies were formulated based on the recommendations of the Advisory Committee on Immunization Practices (ACIP) and were implemented in accordance with vaccine supply and delivery schedule to achieve the goal of quickly increasing coverage. On March 22, 2021, Taiwan launched its COVID-19 vaccination program which prioritized medical workers, and then epidemic prevention officials, frontline workers with high exposure risk, and staff and care recipients in the social welfare system for vaccination. On June 7, 2021, large-scale and free vaccinations for the general public began. Eligibility for vaccinations was expanded to include people 75 and older, pregnant women, and people who worked in key infrastructure facilities. Eligibility was gradually expanded to include people aged 65 and above, people aged 50 to 64, people aged 12 to 49, and children aged 6 to 12. On July 21, 2022, children aged 6 months to 5 years became eligible for COVID-19 vaccination., Currently, vaccination is open to people of all ages. Taiwan began mass vaccination in schools by offering a first dose to students aged 12 to 17 starting on September 22, 2021, and a second dose to students in this age group starting on December 20, 2021.

As the pandemic remained serious around the world and the Omicron variant posed an increasing threat to the world, the ACIP decided that, starting December 2, 2021, people aged 18 or above who had completed their COVID-19 primary series five or more months earlier would be eligible for a booster dose. In response to increased risk of infection in the community caused by the spread of the Omicron variant in Taiwan, on January 7, 2022, the interval between the last dose of the primary series and a booster shot was shortened to 12 weeks (84 days) to allow people to further boost their immunity and lower the risk of serious illness or death as soon as possible. Starting June 13, 2022, vaccination with a second booster shot was gradually made available to different groups of people.

Considering the risk posed by the Omicron BA.4 and BA.5 subvariants spreading around the world, and with the fall and winter seasons approaching, on September 24, 2022, Taiwan began offering the Moderna bivalent Original / Omicron BA.1 vaccine. It then rolled out the Moderna bivalent Original / Omicron BA.4/BA.5 vaccine on November 18, 2022, to prepare for potential risks posed by the easing of border restrictions.

By the end of 2022, approximately 65.36 million doses of COVID-19 vaccines had been administered in Taiwan. The coverage rate was 94% for a first dose, 88.8% for a second dose, 0.8% for an additional dose, 75.7% for a first booster shot, and 19.8% for a second booster shot.

COVID-19 Vaccine Coverage Rate by Age (End of 2022)



(2) Free Vaccines and Better Vaccination Accessibility

To promote the large-scale COVID-19 vaccination program and encourage contracted healthcare facilities to offer free vaccinations to members of the public, besides providing a subsidy of NT$100 per dose for vaccine administration, the government offered an additional incentive of NT$100 per COVID-19 vaccine shot administered as a reward for healthcare facilities reaching monthly targets.

To improve vaccination accessibility, primary care clinics were included as vaccination sites, bringing the total number of contracted healthcare facilities participating in the COVID-19 vaccination program to over 3,000. Based on regional characteristics and needs, local governments established community-based or large-scale vaccination stations in crowded and convenient places, so that people could get vaccinated easily.

Taiwan CDC's COVID-19 vaccination healthcare facility webpage (https://reurl.cc/7eW0AQ) collated information on healthcare facilities offering COVID-19 vaccinations or maps

A large-scale vaccination station at Taipei Main Station improves vaccination accessibility

showing locations of these healthcare facilities provided by local governments to map healthcare facilities offering COVID-19 vaccinations across Taiwan. People could check the webpage and select a healthcare facility close to their home or workplace. Additionally, each local health department also used its website to provide information on contracted healthcare facilities offering vaccinations in its region. For people with mobility problems or who were otherwise unable to visit a contracted healthcare facility or vaccination station, at-home vaccination was given. Health education was provided to elderly people to inform them of post-vaccination precautions and how to seek appropriate consultations to accelerate the growth of vaccine coverage.

(3) Enhanced Communication Raises Vaccine Willingness

To encourage people not fully vaccinated to complete their vaccination course as soon as possible, from January 5 to March 31, 2022, the government offered health education materials valued at NT$200 or below to people 18 years of age or older who got their first or second dose. From March 10 to July 31, 2022, people 65 years of age or older (including indigenous people 55 to 64 years of age) were eligible to receive health education materials valued at NT$500 or below after receiving their first, second, additional, or booster shot. Later, a second booster shot was added to the program, and two rapid test kits were given as gifts to encourage more people to get vaccinated quickly. Taiwan CDC also continued to monitor the status of vaccination coverage, vaccine protection, and vaccine safety worldwide. Taiwan CDC disseminated information on the advantages of vaccination, vaccine protection, and safety data to raise people's confidence in vaccination. Taiwan CDC continued to keep abreast of topics of concern, such as vaccine safety, side effects, and adverse reactions and provide relevant information for the public through press conferences in a timely manner. Various types of health education materials, including a series of epidemic prevention videos and easy-to-understand leaflets, were produced for use by healthcare facilities and for sharing on new media platforms, such as Facebook, Line, and Instagram, in order to increase public awareness, clarify false information or rumors, and dispel people's doubts. These efforts were made to increase people's willingness to get vaccinated.

The use of new media platforms strengthens vaccination campaigns and increases people's willingness to get vaccinated.

03

Domestic Epidemic Prevention and Control

Current Immunization Program & Vaccine Injury Compensation Program

National Immunization Programs

Current Status

The Taiwan government provides free immunizations to children up to 6 years of age, including BCG, 5-in-1 (diphtheria and tetanus toxoid with acellular pertussis, Haemophilus influenza type b, and inactivated polio, DTaP-Hib-IPV), hepatitis B, pneumococcal conjugate vaccine (PCV), varicella, measles, mumps, rubella (MMR), hepatitis A, Japanese encephalitis, tetanus, diphtheria toxoids, acellular pertussis and inactivated polio vaccine (DTaP-IPV) and influenza. The current immunization schedule is shown in Table 3-1. Parents of newborns are given a children's health handbook with a recommended immunization schedule. Children can receive vaccinations at 347 health stations and more than 1,500 contracted hospitals and clinics across Taiwan.

Health stations regularly carry out health promotion programs for improving coverage rate. The programs include mailing reminder postcards, making notification phone calls, scheduling home visits, and providing media announcements. Moreover, public health

Table 3-1 Current Immunization Schedule in Taiwan

Vaccine \ Age	<24hr	1 month	2 months	4 months	5 months	6 months	12 months	15 months	18 months	21 months	27 months	5 years	1-6th grade Primary school students
Hepatitis B	HepB1	HepB2				HepB3							
BCG					BCG								
Diphtheria, Tetanus, Pertussis, Hib, Polio			DTaP-Hib-IPV 1	DTaP-Hib-IPV 2		DTaP-Hib-IPV 3			DTaP-Hib-IPV4			DTap-IPV	
Pneumococcal conjugate vaccine[note1]			PCV13 1	PCV13 2			PCV13 3						
Varicella							Var						
Measles, Mumps, Rubella							MMR1					MMR2	
Japanese Encephalitis[note2]								JE1			JE2	JE3[note3]	
Hepatitis A[note4]							HepA1		HepA2				
Influenza							Influenza (yearly)						

note1: 2 primary doses at least 8 weeks apart

note2: The mouse brain-derived vaccine was replaced by the Vero cell-derived Japanese encephalitis vaccine in May 2017.

note3: JE3 (live attenuated cell-based vaccine) was provided for 5-yr children who have received 2 doses of inactivated JE vaccine.

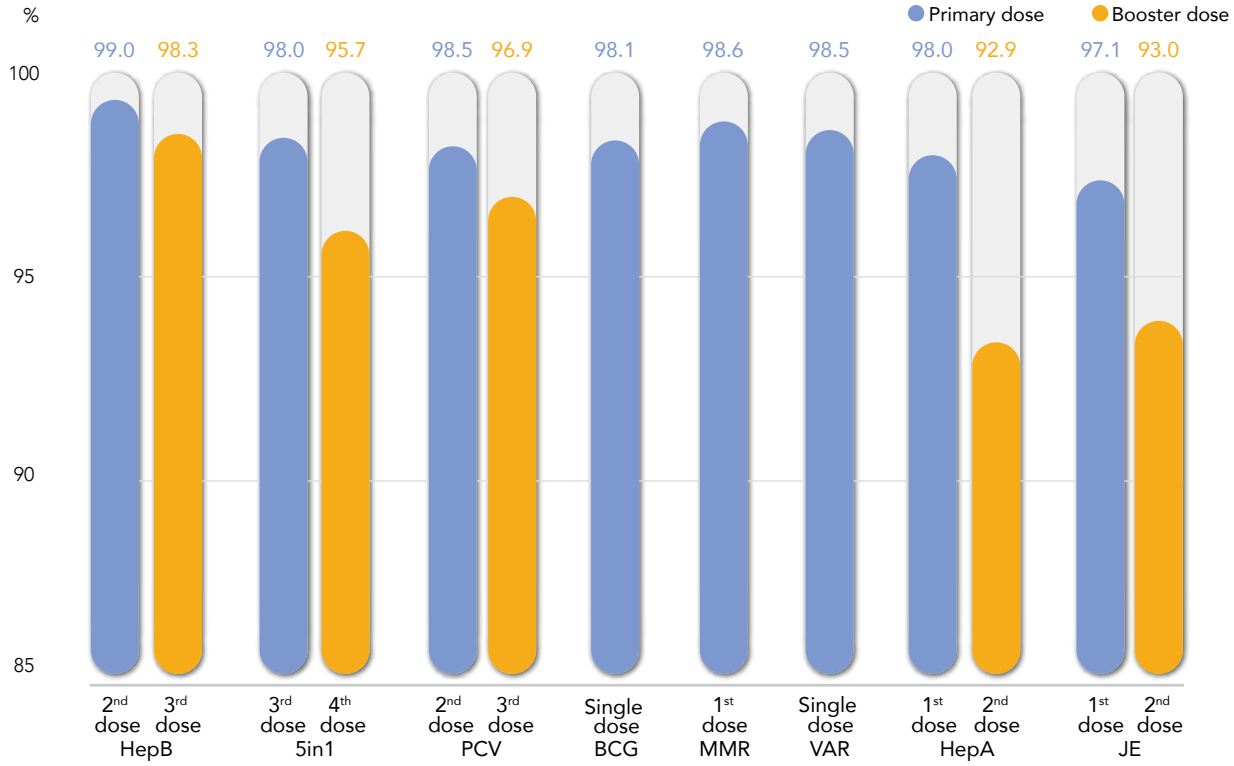
note4: In January 2018, hepatitis A vaccine was introduced into routine immunization program for children born after January 2017. The original hepatitis A vaccine program for children registered in selected aboriginal areas are implemented continuously.

nurses at the health stations where children are registered regularly monitor immunization records and follow up on children who have not received up-to-date immunization toensure those children complete the vaccination series. The immunization coverage rate of primary doses was as high as above 96%. (Figure 3-1)

Accomplishments

1. The world's first universal hepatitis B vaccination program has been implemented in Taiwan since July 1986 that demonstrated great impacts of such vaccination program by reducing the rates of both HBV infection and hepatocellular carcinoma.

Figure 3-1 National Immunization Coverage



Source: The values were calculated in December 2022 by compiling retrospectively the immunization data of the National Immunization Information System

Footnote:
- HepB: Hepatitis B vaccine
- 5in1: DTaP-Hib-IPV
- PCV: Pneumococcal 13-valent conjugate vaccine BCG: Bacillus Calmette-Guérin vaccine
- MMR: Measles, mumps and rubella combination vaccine VAR: Varicella vaccine
- HepA: Hepatitis A vaccine
- JE: Japanese encephalitis vaccine

2. With the promotion of vaccination policies, many major infectious diseases that have threatened national health such as poliomyelitis, diphtheria, and measles have been effectively controlled, eliminated, or even eradicated.

3. The National Vaccine Fund was launched in 2010 based on Article 27 of the Communicable Disease Control Act. Due to the establishment of the National Vaccine Fund, it is possible to expand national immunization program to protect children's health, including:

   (1) Replaced DTwP and OPV with DTaP-IPV-Hib in 2010.

   (2) Replaced Tdap and OPV given to new primary school enrollees with Tdap-IPV in 2011. In order to improve the effectiveness of the booster dose, Tdap-IPV was replaced with DTaP-IPV in 2017.

   (3) Gradually expanded pneumococcal conjugate vaccine (PCV) vaccination target from 2009 to 2014. In 2015, 13-valent PCV (PCV13) was introduced into routine immunization for children.

   (4) Replaced the mouse brain-derived Japanese encephalitis (JE) vaccine with the live attenuated cell-based JE vaccine in 2017, which has fewer side effects, high efficacy, and the manufacturing process is also in line with the humanitarian use of animal models and international standards.

   (5) Expanded the target individuals for hepatitis B immunoglobulin (HBIG) from infants born to HBeAg-positive mothers to infants born to HBsAg-positive mothers in 2019 to prevent more mother-to-infant transmission of hepatitis B.

4. In order to improve the quality of vaccination services and encourage the hospitals and clinics continuously providing convenient and high-quality vaccination services, the subsided vaccination treatment fee has to be expanded from 2018. Children and the elderly should not pay diagnostic fees for the public funded vaccines.

5. In January 2018, Taiwan introduced hepatitis A vaccine into children's routine immunization program for children born after January 2017, and hepatitis A vaccine provided under the program was donated by Paujar Charity Foundation.

6. In order to strengthen the immune protection of the elderly, the 23-valent pneumococcal polysaccharide vaccine was extended to the elderly over 71 years of age in March 2022.

Future Prospects

With a stable source of support from the National Vaccine Fund, Taiwan CDC will gradually add new vaccines to the routine immunization schedule based on cost-effectiveness and recommendations of the Advisory Committee on Immunization Practices. In the future, Taiwan CDC will continue to provide pneumococcal vaccine for the elderly over 71 years of age and plan to gradually expand the targets to high-risk groups and elderly over 65 years of age.

National Immunization Information System

Current Status

In 2004, Taiwan CDC established the National Immunization Information System (NIIS) to consolidate immunization data scattered among various health stations into one database. NIIS, together with household registration authorities and medical institutions, has improved the management of immunization operations and the efficiency of storage and retrieval of immunization information. Household data are obtained from the Department of Household Registration, Ministry of the Interior. The information is updated daily and transmitted to NIIS. Through NIIS, authorities can remind parents via text and e-mail of their children's immunization schedule, thereby improving immunization coverage rates.

Accomplishments

1. Enhanced the functions and efficiency of the central database to handle yearly increases in data quantities and improve management efficiency.
2. Adopted multiple strategies to trace and urge the unvaccinated to get vaccinated, thereby reducing delays and raising the coverage rate.
3. For children entering the country, entry information from the National Immigration Agency, Ministry of the Interior is compared with NIIS data to find children who have not received the MMR vaccine. Local health agencies will then arrange vaccination.
4. The revision of NIIS was launched in 2018, upgrading system capabilities and effectiveness.

Future Prospects

1. Promote the use of application programming interface (API) to upload and query immunization information at contract hospitals/clinics, enhance the accuracy, completeness and timeliness of immunization data, and improve the quality of vaccination services.
2. Strengthen management of atypical cases, such as foreign spouses of citizens, children who follow their parents working abroad and children who fail to complete their immunizations due to family factors.
3. Integrate various databases and systems (foreign spouses, reporting of communicable diseases, National Immigration Agency, Ministry of the Interior) and diversify NIIS immunization reminders to improve the coverage rate.

Polio, Measles, Congenital Rubella Syndrome, and Neonatal Tetanus Eradication Programs

Current Status

Taiwan launched polio, measles, congenital rubella syndrome (CRS), and neonatal tetanus (NT) eradication programs in 1991. Since achieving its goal of polio eradication on October 29, 2000, Taiwan has maintained the eradication situation of polio by maintaining a high polio-related vaccine coverage rate and improving surveillance systems.

Measles and Rubella became the primary elimination target after polio. In 2022, there were no confirmed rubella cases, and only one confirmed measles cases. No confirmed NT case has been reported since 1996 apart from a child born to a foreign mother in 2001. From 1994 to 2008, five cases of CRS were confirmed, four of which were in patients born to foreign mothers. No confirmed CRS case has been reported from 2009 to 2016. In 2017, one CRS case born to a foreign mother was confirmed through CRS active surveillance. From 2018 to 2022, there were no confirmed CRS cases.

Accomplishments

1. In 2022, 32 AFP (acute flaccid paralysis) cases under the age of 15 were reported and investigated. None of the cases were polio or polio compatible.
2. Since January 1, 2009, all foreigners applying for residence or settlement must submit either a report showing they are antibody positive for measles/rubella report or an immunization certificate. This requirement is also included in the physical check for foreign laborers before entry.
3. Encourage the institutions contacting foreign traveler frequently to provide one dose of MMR vaccination for their personnel who were born after 1981.
4. Encourage flight attendants and ground crews to receive one dose of MMR vaccine.

Future Prospects

1. Prevent the importation of polio to maintain eradication of the disease.
2. Complete measles and rubella elimination certification in accordance with the WHO.

Hepatitis Immunization Program

Current Status

Since 1982, Taiwan CDC has proposed a series of five-year programs. Priorities include: improving the surveillance system for acute cases, improving the immunization coverage rate of hepatitis B vaccine, severing hepatitis A infection paths, enhancing health education related to liver disease control, improving blood transfusion management, and raising hepatitis examination quality. Since 2018, Taiwan introduced the Hepatitis A vaccine into children's routine immunization program for children born after January 2017.

Accomplishments

Hepatitis A

1. Confirmed cases of acute viral hepatitis A in Taiwan were reduced from 633 in 1995 to 122 (67 of them were foreign workers cluster infections) in 2022; the incidence rate was lowered from 2.96 out of 100,000 people in 1995 to 0.24 out of 100,000 people in 2022. In aboriginal regions, confirmed cases were reduced from 183 in 1995 to 1 in 2022 and the incidence rate was lowered from 90.7 out of 100,000 people in 1995 to 0.49 in 2022.
2. The coverage rate of the first dose of HepA for babies born in 2020 was 98.0%.

Hepatitis B

1. The carrier rate of children at age 6 declined significantly and steadily from 10.5% in 1989 to 0.8% in 2007.
2. The coverage rates of the second and third doses of HepB for babies born in 2020 were 99.4% and 98.7%, respectively.

Future Prospects

Infants born to a mother who is HBeAg-positive face a 10% chance of becoming chronic carriers of hepatitis B even after receiving hepatitis B immunoglobulin (HBIG) and three doses of immunoprophylaxis. Taiwan CDC has offered free hepatitis B screenings for these children at age 1 since September 2010, and expanded to infants born to HBsAg-positive mothers in 2019. It will continue to raise screening coverage and study effectiveness of the vaccination.

Vaccine Injury Compensation Program (VICP)

In response to a case in which a child received oral poliomyelitis vaccination and subsequently developed polio in 1986, the Ministry of Health and Welfare established a Vaccine Injury Compensation Fund in June 1988. The fund enables individuals to claim compensations from their local health bureau in the event of death, disabilities, serious illnesses, or adverse reaction resulting from vaccination. Review of claims by the Vaccine

Injury Compensation Working Group ensures the causal relationship between the vaccine and the adverse events to eliminate vaccination worries.

In response to a significant increase in claims made to the Vaccine Injury Compensation Program (VICP), the MOHW adjusted administrative procedures and increased the frequency of claim review meetings. It not only recruited more personnel to process applications and experts to review cases, but also continued to seek assistance from external medical experts in making decisions. The investment of additional manpower and resources accelerated the case review process and upholding the prudent, objective approach to the review process,. embodying the legal nature and institutionality of the VICP.

Table 3-2 Types of Compensation, Vaccine Injury Compensation Program

Type of compensation	Criteria			Amount of Compensation (NT$10,000)
	Definition/degree of disability		Causality Conclusion	
Compensation for death	-		Vaccine associated	50~600
			Indeterminate	30~350
Compensation for disability	Determined by the types and degrees of disability set forth in regulations for the protection of physically and mentally disabled	4-extremely severe	Vaccine associated	50~600
			Indeterminate	30~350
		3-severe	Vaccine associated	30~500
			Indeterminate	20~300
		2-moderate	Vaccine associated	20~400
			Indeterminate	10~250
		1-mild	Vaccine associated	10~250
			Indeterminate	5~200
Compensation for severe illness	Illnesses determined by the Catastrophic Illness List from the National Health Insurance or based on severe adverse reactions of medicament as defined in the Regulations for Reporting Severe Adverse Reactions of Medicaments, which do not reach the definition of disability		Vaccine associated	1~300
			Indeterminate	1~120
Compensation for other adverse reactions	Other adverse reactions not meeting the definition of severe illnesses. However, commonly seen, mild and expected adverse reactions of vaccination will not be compensated		Associated/ Indeterminate	0~20

Figure 3-2 Flowchart for Vaccine Injury Compensation Claims Evaluation Process

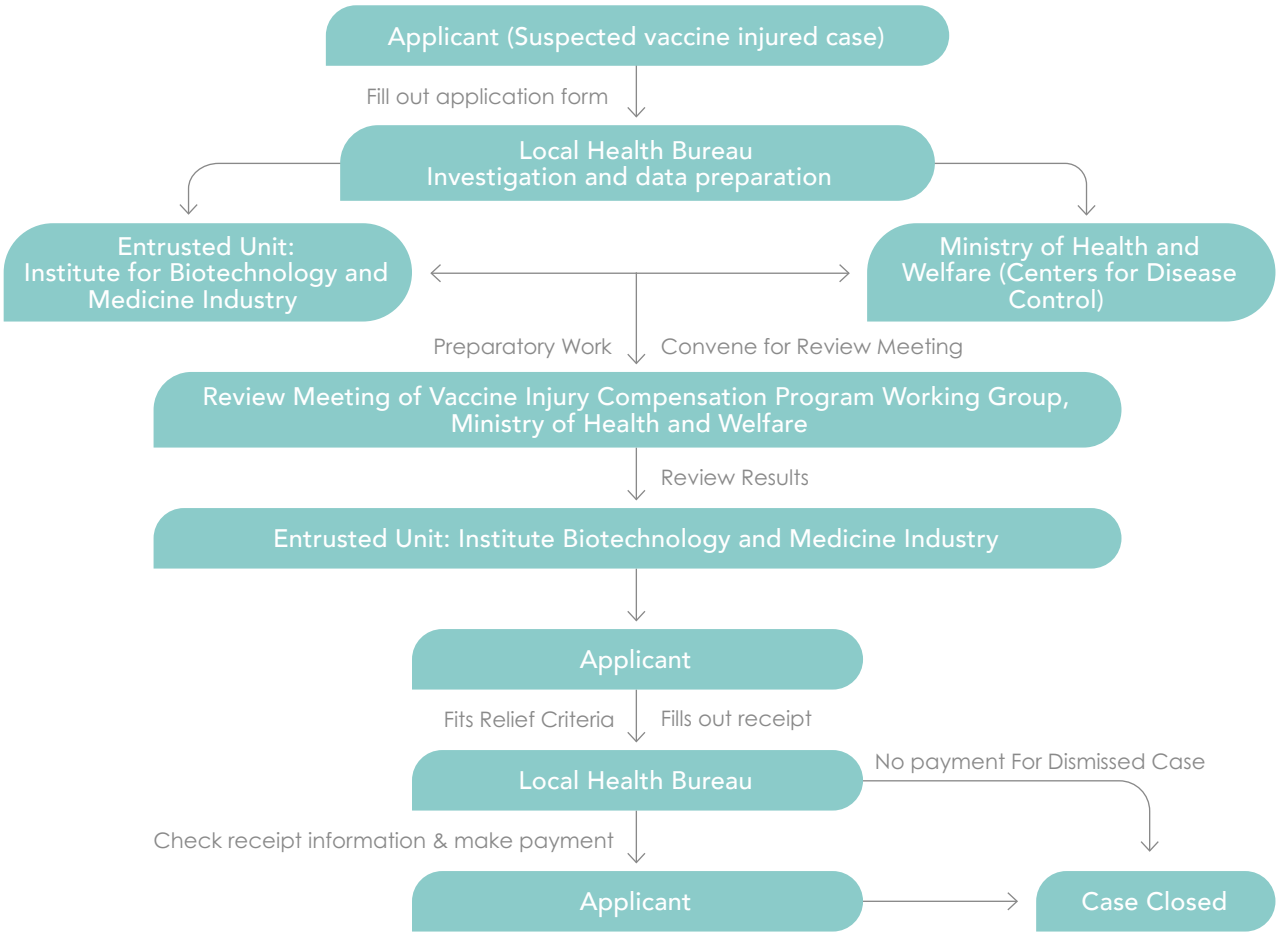
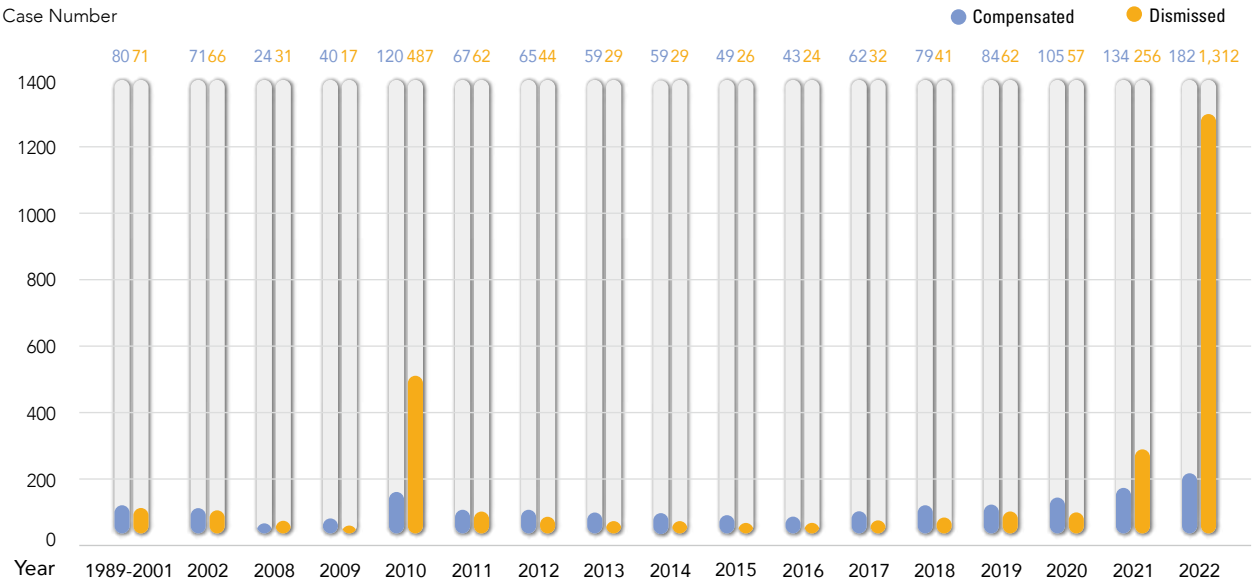


Figure 3-3 Total Number of Cases Settled Per Year from Program Inception in 1989 to 2022



Following the claim evaluation process (Figure 3-2), in 2022, 1,494 cases were settled, a total of 3,981 claims had been reviewed since program inception (Figure 3-3), and compensation disbursement had reached NT$ 252 million.

Communicable Disease Surveillance System

Current Status

Following the reorganization of the Taiwan CDC in July 1999, infectious disease surveillance shifted to the National Communicable Disease Surveillance and Response Systems. The systems began with surveillance of notifiable diseases and sentinel surveillance to detect epidemics. Later on, several systems were built to facilitate the collection of timely, complete, and precise information on infectious diseases. Taiwan CDC envisions these systems to monitor national health status and rapidly detect outbreaks by integrating various infectious disease surveillance networks.

The progress includes (1) Constructing diversified disease surveillance systems; (2) Collecting and monitoring data for disease trend analysis, predictions, and alerts; and (3) Providing regular analysis and assessments of global and indigenous infectious diseases.

Accomplishments

Notifiable Disease Surveillance System (NDSS)

If a doctor treats a patient suspected of having a notifiable infectious disease (Table 3-3), the doctor must report the case within a limited time. Taiwan CDC established the Notifiable Disease Surveillance System to give medical personnel across the country a platform for reporting diseases and grasping information related to communicable disease occurrences immediately (Figure 3-4).

Figure 3-4 Notifiable Disease Surveillance System Data Flow

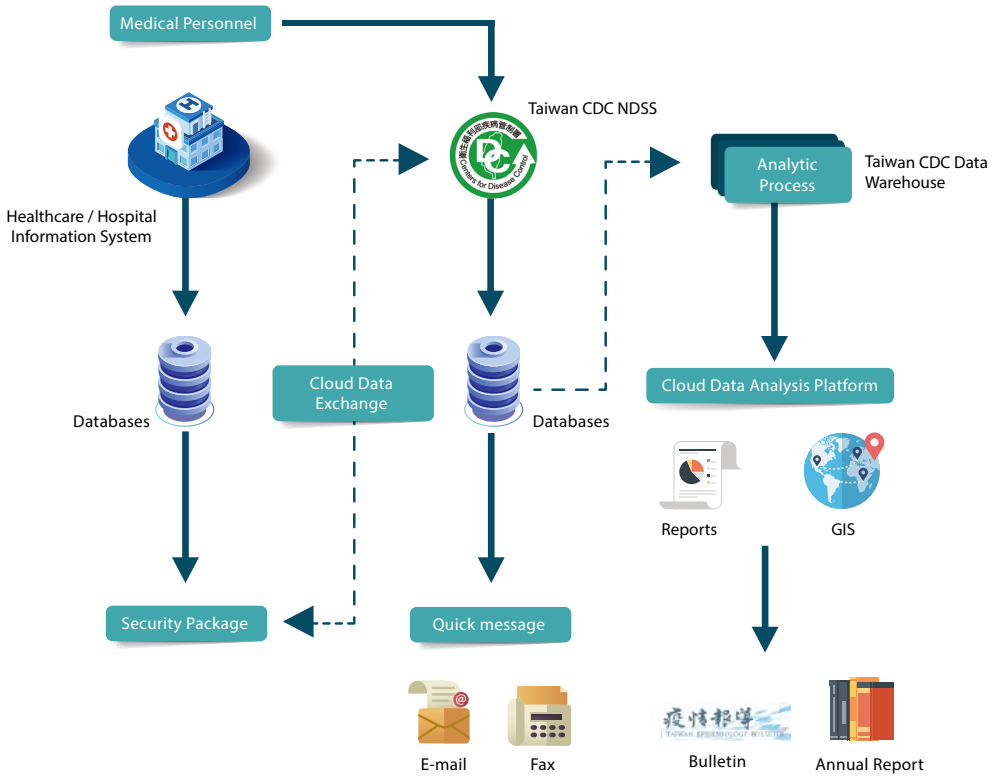


Table 3-3 List of Notifiable Diseases in Taiwan

Category	Disease	
I	Smallpox	Plague
	SARS	Rabies
II	Anthrax	Typhoid Fever
	Diphtheria	Dengue Fever
	Paratyphoid Fever	Acute Flaccid Paralysis and Poliomyelitis
	Meningococcal Meningitis	Amebiasis
	Shigellosis	Measles
	Malaria	Enterohemorrhagic E. coli Infection
	Acute Hepatitis A	Cholera
	Hantavirus Syndrome	Multi-drug Resistant Tuberculosis
	Rubella	West Nile Fever
	Chikungunya Fever	Epidemic Typhus Fever
	Zika Virus Infection	Mpox
III	Pertussis	Tetanus
	Neonatal Tetanus	Japanese Encephalitis
	Tuberculosis	Hansen's Disease
	Congenital Rubella Syndrome	Acute Hepatitis B
	Acute Hepatitis C	Acute Hepatitis D
	Acute Hepatitis E	Legionnaires' Disease
	Mumps	Syphilis
	Invasive Haemophilus Influenzae Type b Infection	Congenital Syphilis
	Gonorrhea	Enteroviruses Infection with Severe Complications
	HIV Infection and AIDS	Acute Viral Hepatitis Unspecified
IV	Herpesvirus B Infection	Leptospirosis
	Melioidosis	Botulism
	Invasive Pneumococcal Disease	Q Fever
	Endemic Typhus Fever	Lyme Disease
	Tularemia	Scrub Typhus
	Complicated Varicella	Toxoplasmosis
	Brucellosis	Influenza Case With Severe Complications
	Creutzfeldt-Jakob Disease	Listeriosis
	Severe Fever with Thrombocytopenia Syndrome	
V	Rift Valley Fever	Marburg Hemorrhagic Fever
	Yellow Fever	Ebola Virus Disease
	Lassa Fever	Novel Influenza A Virus Infections
	Middle East Respiratory Syndrome Coronavirus infections	Severe Pneumonia with Novel Pathogens

By using the system, public health personnel can make early and informed decisions on assigning manpower and resources to carry out disease prevention and thereby keep diseases from spreading.

The first stage of constructing the Notifiable Disease Surveillance System finished in July 2001, involved establishing a web-based version that enabled easier and more detailed dissemination of reported information. The second stage, completed in September 2004, strengthened the surveillance system, while the third stage, completed in September 2006, integrated this system. The fourth stage, finished in June 2008, involved building a single reporting gateway and increasing user-friendliness. In order to increase the communicable disease reporting timeliness, Taiwan CDC has developed several new ways of reporting notifiable diseases since 2014. By creating dedicated disease reporting modules within the hospital's electronic medical record systems, infection control staff from over 77 regional hospitals or medical centers have substantial workload reduction. Furthermore, Taiwan CDC allowed healthcare workers to log in to the Notifiable Disease Surveillance System without registering for an account by having their RSA cards issued by the Healthcare Certification Authority (HCA) verified inside the Virtual Private Network (VPN) of the National Health Insurance Administration. An Application Programming Interface (API) was developed for connecting the Healthcare Information System (HIS) of 53 clinics in Tainan and Kaohsiung to the Notifiable Disease Surveillance System. This allows primary medical institutes a convenient way to report the majority of notifiable infectious diseases.

School-Based Surveillance System

Taiwan CDC has implemented the School-Based Surveillance System since 2001 to monitor epidemic trends, detect possible outbreaks, and contain the spread of communicable diseases in elementary schools. Taiwan CDC collects information about school children who exhibit symptoms such as influenza-like illness, hand-foot-and-mouth disease or herpangina, diarrhea, fevers, acute hemorrhagic conjunctivitis, and varicella (chickenpox) every week in each semester. These data are used to analyze and estimate the scope and magnitude of diseases at the school and regional levels, followed by the disseminating weekly reports to participating schools and educational and public health authorities to stimulate public health action.

As of 2022, 774 elementary schools enrolling students from kindergarten to 6th grade participated in the systems, representing 29% and 99.6% of all the elementary schools and administrative areas in Taiwan, respectively.

Symptom Surveillance System

To effectively control the cluster incidents of infectious diseases at an early stage and launch prompt disease prevention mechanisms, Taiwan CDC established the Symptom Surveillance System in 2003. After the H1N1 pandemic, human infections with H5N1, H7N9, and other novel influenza viruses, and emerging diseases such as Middle East respiratory syndrome coronavirus infection, the monitoring categories have been adjusted according to the development of the epidemic. Since September 6, 2021, the system has been

incorporated into the cluster module of the Notifiable Infectious Disease Reporting System (NIDRS). Currently, the categories under surveillance include clusters with fevers of unknown etiology, diarrhea, upper respiratory tract infections, varicella, and enterovirus clusters.

Surveillance System for High-density Population Institution

The Surveillance System for High-density Population Institution is aimed at early cluster detection of infectious diseases among institution inhabitants or workers. It applies to elderly homes, long-term care facilities, apartments for older people, facilities for the disabled, juvenile protectors, veterans' homes, prisons, nursing homes, outpatient centers for mental rehabilitation, and infant care centers. If an individual or a cluster of cases with symptoms of respiratory, gastrointestinal disease, or fever of unknown origin are found, the facility must file online reports within 24 hours; in addition, the facility must report the number of people under its care weekly. As of 2022, 3,139 institutions participated in the system.

Real-time Outbreak and Disease Surveillance (RODS)

The ICD-9-CM/ICD-10-CM diagnosis codes from over 180 emergency rooms nationwide are forwarded daily to enable an early and immediate analysis of aberrations for various syndromes. RODS also enable routine monitoring of specific disease trends such as influenza-like illness, enterovirus infection, diarrhea, and conjunctivitis.

Syndromic Surveillance Using National Health Insurance Data

Daily aggregated outpatient, hospitalization, and emergency room data of specific diseases gathered by the National Health Insurance Administration from IC cards have been used to monitor trends of influenza-like illness, enterovirus infections, and diarrhea since April 2009. In 2011 and 2014, scarlet fever and varicella were added to the disease watch list respectively.

Pneumonia and Influenza Mortality Surveillance

To monitor pneumonia and influenza mortality trends and evaluate the effectiveness of its prevention and control policies, Taiwan CDC established real-time pneumonia and influenza mortality surveillance system. The number of pneumonia and influenza-related death is utilized on a daily basis by linking to death certification reports from the Department of Statistics, Ministry of Health and Welfare, in order to provide real-time monitoring and early warning.

Laboratory Automated Reporting System

To monitor disease outbreaks and establish epidemic curves caused by important pathogens timely, Taiwan CDC has developed the Laboratory Automated Reporting System (LARS) to collect the laboratory data with positive test results generated by any of the 21 pathogens via automated submitting of reports from hospital Laboratory Information System (LIS) to the LARS since 2014. LOINC (Logical Observation Identifiers Names and Codes), a universal code system for reporting laboratory and clinical observations, is the standardized format for electronically exchanging laboratory data. Using LOINC to identify laboratory observations could improve the quality of public health surveillance by reducing data transcription errors and facilitating data sharing of laboratory test results between hospitals and countries.

As of 2022, 67 hospitals participated in the LARS. Recently, more than 15,000 pieces of data have been collected weekly and used in monitoring pathogen activity.

Establishing Support Systems for Disease Management and Data Analysis

1. Taiwan CDC utilized the capabilities of the Notifiable Diseases Surveillance System, the Geographical Information System (GIS), and other surveillance systems to present and analyze data, and to develop a GIS-based prediction model for estimating the distribution of infectious diseases.

2. Taiwan CDC installed multifaceted surveillance systems for data acquisition and analysis.

Reporting via the Internet

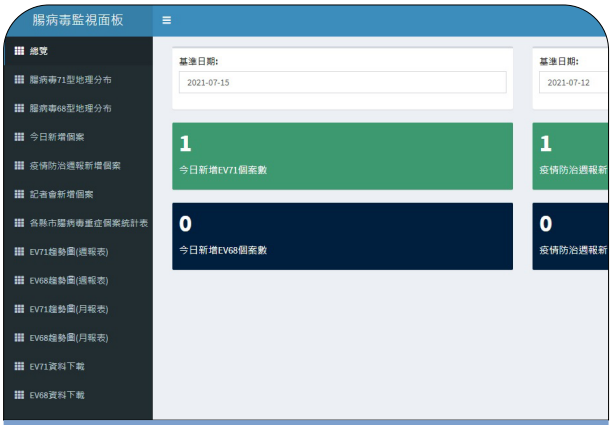
To effectively detect and monitor infectious diseases, all the Taiwan CDC reporting systems are electronic-based for users to upload information.

Systems Integration

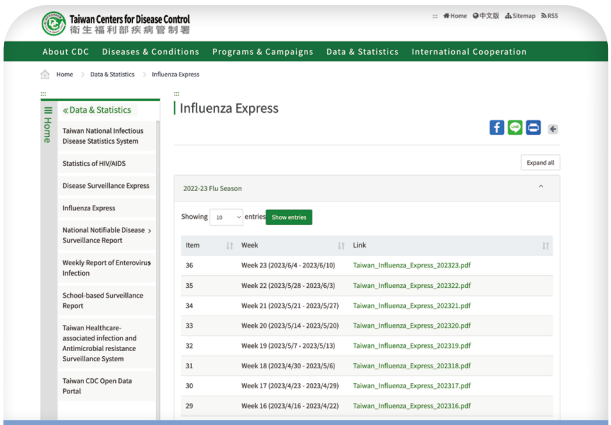
To enhance the presentation and application of surveillance systems, Taiwan CDC combined and analyzed information to improve the integration of surveillance systems, including the Notifiable Disease Surveillance System, the Symptom Surveillance System, and

The R system was developed with open-source software.

The R system includes different kinds of visualized graphs, tables, and dashboards.

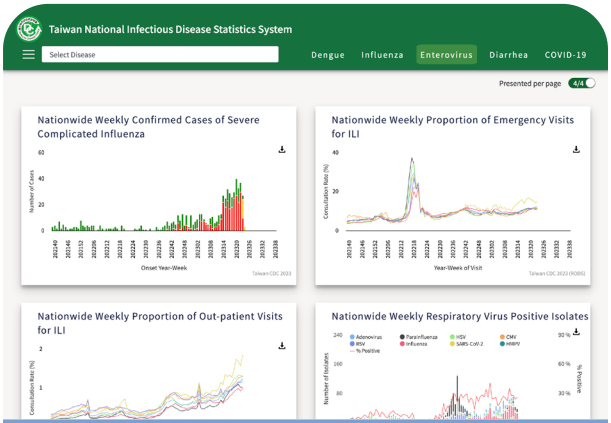


The surveillance dashboard of enterovirus infection.

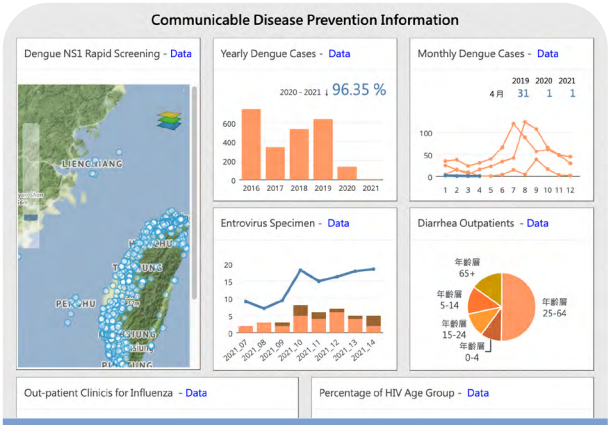


Surveillance reports are published on Taiwan CDC official website.

Source: https://www.cdc.gov.tw/En/Category/MPage/Utv3lzlSnTK-t6inZrBZsw



Taiwan National Infectious Disease Statistics System (NIDSS)
Source: https://nidss.cdc.gov.tw/en/



Taiwan CDC Open Data Portal
Source: https://data.cdc.gov.tw/en/

the Syndrome Surveillance System. This task was completed in September 2006. In 2018, the R system for epidemic statistical analysis was established to use R programming language to integrate and monitor system data. Visualized data for monitoring communicable diseases are automatically generated daily for public health professionals to obtain information on epidemiological situations across Taiwan promptly. During the COVID-19 pandemic, the R system generated different reports and analyses for epidemic monitoring and assessment.

Information Sharing

Taiwan CDC generates the School-based Surveillance Weekly Report, the Influenza Express, the Weekly Report of Enterovirus Infection, and other statistical reports of designated communicable diseases which are available online. Daily reports on international epidemics are forwarded to related authorities, while regular collaboration with academics assists with the evaluation or development of surveillance systems. Key tasks include the collection, evaluation, and dissemination of information to the public, local health departments, and governmental authorities.

In addition, the website "Taiwan National Infectious Disease Statistics System" (NIDSS) was launched in 2008, which aims at providing the general public, academic researchers, health care providers, and public health authorities with an intuitive interface to obtain the latest information on the notifiable and other infectious diseases or conditions in Taiwan. "The Taiwan CDC open data portal" provides more than 300 datasets including numbers of all notifiable disease cases and emergency department visits of selected syndromes, and information on quarantine practices, vaccines, nosocomial infections, etc.

Datasets related to a number of cases of all notifiable diseases and emergency department visits are updated automatically and daily. Taiwan CDC will keep providing new datasets to make government data available to all.

Training and Education

Taiwan CDC offers training workshops on surveillance systems to keep users informed about updated information. In addition, training on R, Python, and database management basics and applications was carried out from 2017 to 2022 to improve staff's capabilities of managing, analyzing, and creating visualized statistical data.

Reducing Key Infections

Tuberculosis

Tuberculosis (TB) has been domestic one of the most severe communicable diseases in Taiwan for decades. Nearly 6,600 domestic TB cases and 480 TB deaths are reported in Taiwan annually. Half-century of hard work by health workers has reduced prevalence of the disease, but when compared with other advanced countries, Taiwan leaves much room for improvement.

Tuberculosis control in Taiwan faces several challenges such as high population density, aging of population, comorbidities, frequent international travel, foreign spouses and labors from high TB prevalence countries. All of these factors could make TB control in Taiwan more challenging. To protect the health of the general public, Taiwan has adopted more active and aggressive methods when facing with new challenges for TB control.

Current Status

1. Incidence

There were 16,472 and 6,576 TB cases in 2005 and 2022, respectively. The incidence rate went from 72.5 to 28.2 persons per 100,000 population over this time period, declining at an average rate of 5% per year. The cumulative reduction between 2005 and 2022 was 61% (Table 3-4).

Table 3-4 Taiwan TB Incidence and Mortality Rate, 2005 - 2022

Year	Case	Incidence	Death	Mortality
2005	16,472	72.5	970	4.3
2006	15,378	67.4	832	3.6
2007	14,480	63.2	783	3.4
2008	14,265	62.0	762	3.3
2009	13,336	57.8	748	3.2
2010	13,237	57.2	645	2.8
2011	12,634	54.5	638	2.8
2012	12,338	53.0	626	2.7
2013	11,528	49.4	609	2.6
2014	11,326	48.4	591	2.5
2015	10,711	45.7	571	2.4
2016	10,328	43.9	547	2.3
2017	9,759	41.4	511	2.2
2018	9,179	38.9	506	2.1
2019	8,732	37.0	546	2.3
2020	7,823	33.2	460	2.0
2021	7,062	30.1	442	1.9
2022	6,576	28.2	477	2.0

Since 2019, Ministry of Health and Welfare (MOHW) switches to Iris automatic system for coding multiple causes of death and for the selection of the underlying cause of death. Due to the above change, TB mortality rate in 2005-2018 requires adjustment before direct comparing with statistics post 2019.

Taiwan has become an aged society since 2018. The proportion of Taiwanese people over 65 years old reached 18% of the country's total population in 2022. Of the new TB cases, the elderly over 65 year-old accounted for more than 50% of total since 2005, and the proportion amounted to 62% in 2022.

The number of Multi-Drug Resistant TB (MDR-TB) cases was 64 in 2022. The proportion of new TB cases with MDR-TB was 1.0%.

2. Mortality Rate

TB claimed 477 lives in Taiwan in 2022, with a mortality rate of 2.0 per 100,000 population. The cumulative reduction between 2005 and 2022 was 53% (Table 3-4).

Accomplishments

1. Improving Surveillance and Monitoring

National TB Reporting and Management System

(1) Nationwide real-time surveillance on TB laboratory system and TB drug prescription

(2) Strengthen monitoring among high-risk groups

(3) Enhance TB outbreak monitoring by adopting novel strategy of geospatial surveillance

2. Establishing a High Quality and Rapid TB Diagnosis Network

(1) Monitor quality of contract and authorized laboratories

(2) Train staff members

(3) Develop new TB diagnosis techniques

3. DOTS Program

(1) DOTS coverage rate surpassed 98%.

(2) Treatment success rate for bacteriological positive TB cases was about 68% in 2020 cohort. It has not increased significantly due to population aging.

4. Establishing the Drug-Resistant TB (DR-TB) Medical Care System

"DR-TB Medical Care System" (established in May 2007)

(1) Taiwan CDC contributes resources and designated teams to offer patient-centered care according to WHO DR-TB guidelines.

(2) DR-TB teams actively treat each patient for 6 months to 2 years, and designated health workers provide incentive, allowance and personal care via the DOTS Plus program.

(3) 99% MDR-TB cases were managed in the DR- TB system through the end of December 2022, leading to a favorable outcome. About 80% of patients in 2020 cohort were cured or completed after 24-month treatment.

5. LTBI Treatment Program

(1) Initiated "The LTBI Treatment for All Contacts Program" in April, 2016

- Provide LTBI screening service and treatment for TB contacts of infectious index cases, such as those with MTBC-positive pulmonary TB. LTBI treatment coverage reached 87% in 2022.
- Provide short course treatment regimens for LTBI individuals, including 1-month isoniazid and rifapentine (1HP), 3-month weekly isoniazid and rifapentine (3HP), 3-month isoniazid and rifampin (3HR),4-month rifampin (4R), and 6-month isoniazid (6H), as alternatives to the 9-month isoniazid (9H).

(2) Expand target population of LTBI high-risk groups, including the following: residence of mountainous areas, inmate of the long-term care facilities and correctional institutions, patients receiving dialysis, people living with HIV, illicit drug users, foreign spouses, chronic obstructive pulmonary disease (COPD) patients and poorly-controlled diabetic patients.

(3) In 2022, up to 8,410 TB contacts and people with high risk of TB received LTBI treatment. The DOPT rate reached 98%.

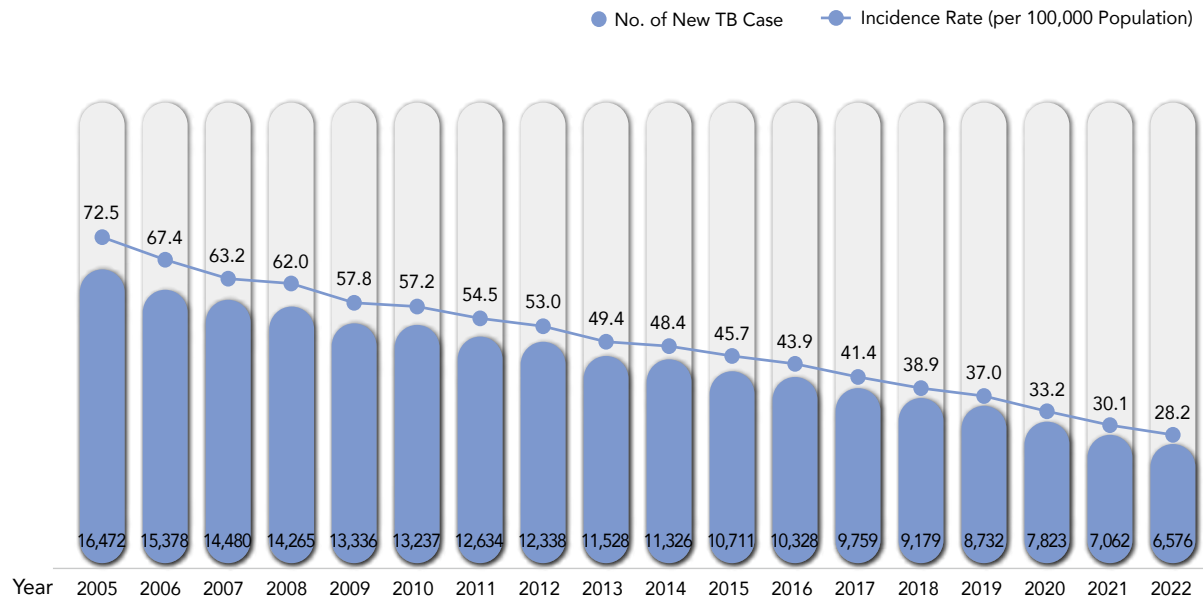
Future Prospects

Taiwan has a moderate-burden of TB, with incidence rate of 28.2 cases per 100,000 population in 2022. The National Tuberculosis Program (NTP) sets out ambitious targets to reduce TB incidence to less than 10 new cases per 100,000 population by 2035. Although

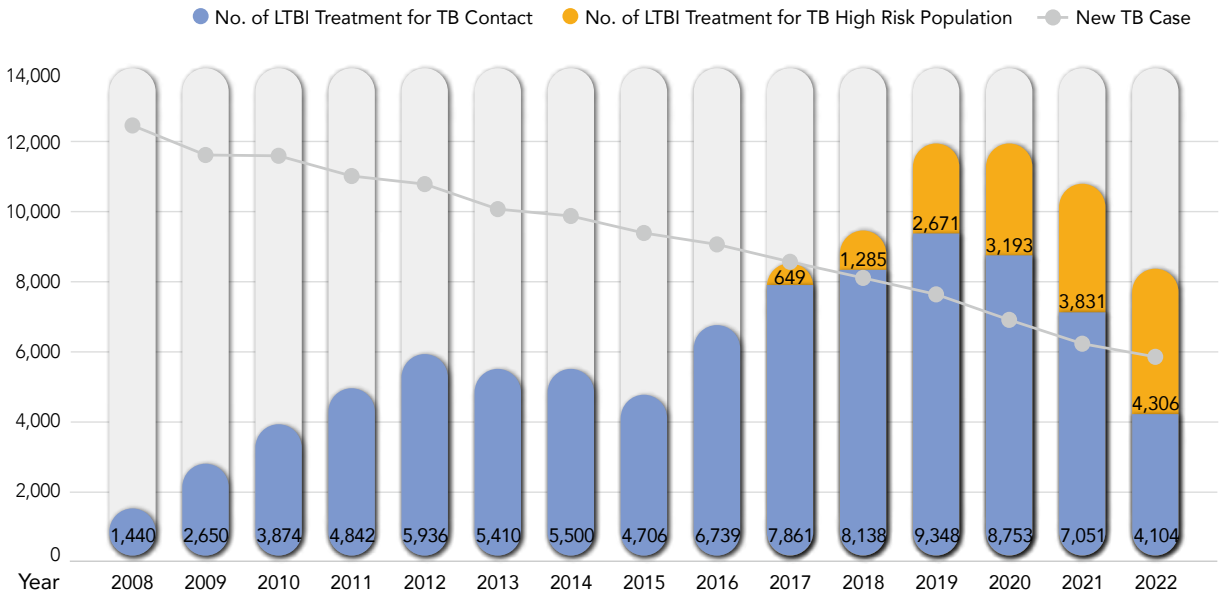
Taiwan CDC held a press conference on the theme of "Contributions from all of us to defeat TB" on March 23, 2022, in conjunction with nationwide health bureaus of 22 counties and cities. Facebook profile frames with special effects and Instagram time-limited dynamic filter activities were adopted to capture attention of the public to work together on eliminating TB.

the average annual decline rate in Taiwan was more than 2-fold compared with the global average during 2005 to 2022, there are substantial challenges that need to be overcome. To realize the targets, Taiwan CDC will focus on introducing WHO-recommended new diagnostic tools for TB and strengthening active case finding in TB high risk populations including those in mountainous areas, the elderly in long-term care facilities and new immigrants, and etc. And to further reduce the risk of TB infection progressing to active TB disease in these key populations, Taiwan CDC is putting efforts to increase awareness and access to TB preventive therapy.

TB Incidence Number and Rate, 2005-2022



LTBI Treatment Statistics, 2008-2022

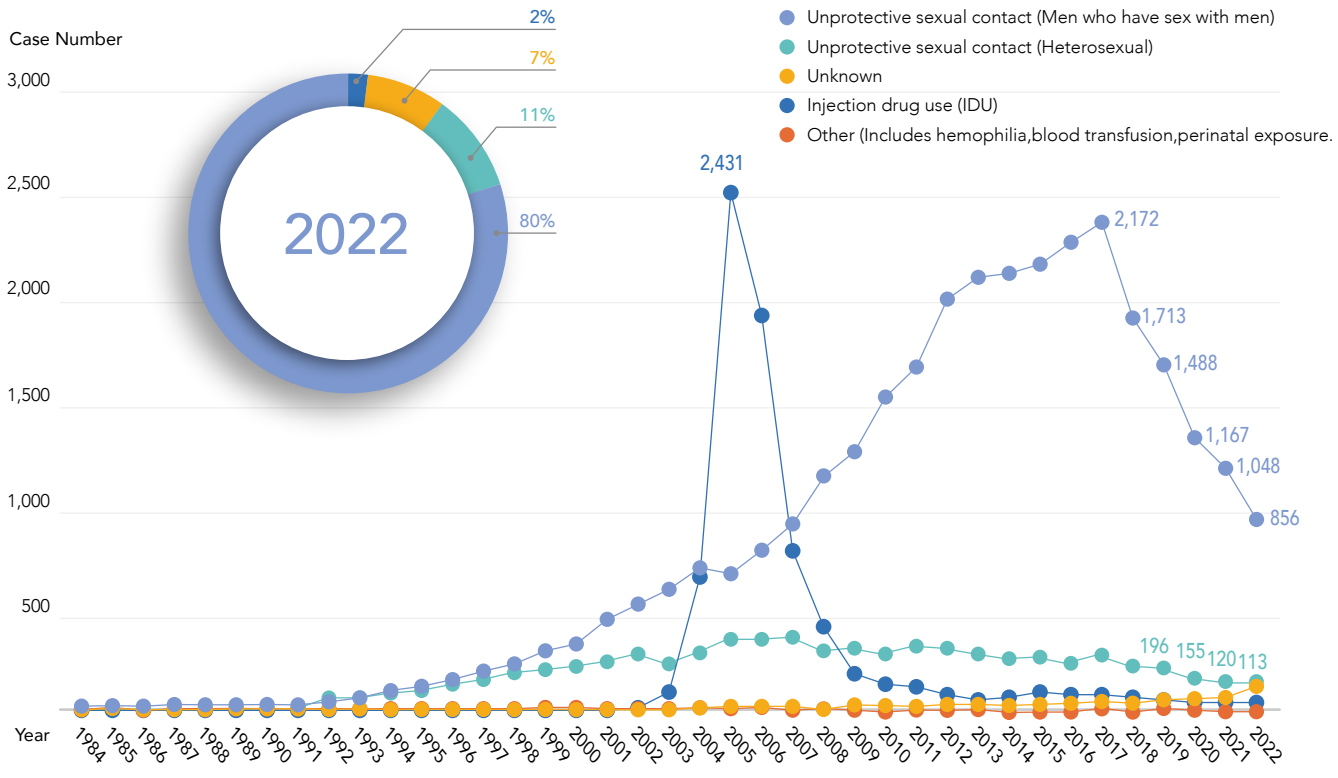


Current Status

The first HIV case in Taiwan was reported in 1984. By 2022, 43,320 domestic cases were reported (20,999 of whom had developed full-blown AIDS with 8,263 deaths). Infections surged in 2005 due to skyrocketing conditions among injection drug users. Faced with this dire situation, Taiwan CDC cooperated with other departments in dedicating a tremendous amount of effort and resources to harm reduction programs. Total reported cases dropped in 2006, marking the first trend reversal since 1984. In 2008, the epidemic took another turn, with new infections mainly occurring among men who have sex with men (MSM). The program enables people with HIV receive highly active antiretroviral therapy right after diagnosis since 2016. Mass campaign of screening and services. Pre-exposure Prophylaxis (PrEP) integrated screening services have been one of the prevention strategies since 2016. The epidemic decreased since 2018.

In 2022, there were 1,069 new infections diagnosed. In terms of age, people in the 25 to 34 age group accounted for 421, or 39%, of new infections diagnosed in 2022, more than any other group. The second-largest group was the 35 to 44 age group, numbering 268, or 25%, of all cases. An analysis of risk factors showed that the highest proportion of HIV infections was a result of unsafe sexual contact among MSM, accounting for 80% of all cases. The second-largest proportion of infections was heterosexual contact, accounting for 11% of cases (see Figure 3-5). Of Taiwanese nationals diagnosed with HIV in 2022, 1,027 people, or 96%, were males and 42 people, or 4%, were females. The sex ratio of new diagnoses was 25:1.

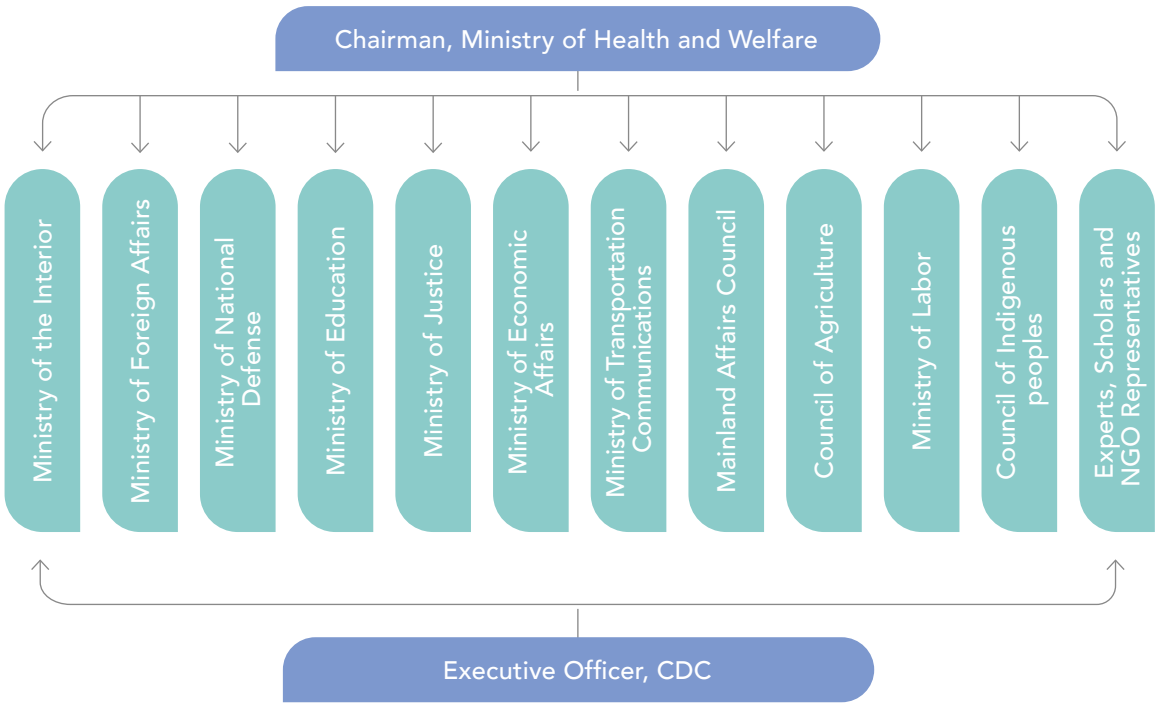
Figure 3-5 HIV Infection Risk Factors in Taiwan, 1984-2022



Accomplishments

1. The Committee for HIV Infection Control and Patient Rights Protection (Figure 3-6) held several cross-ministerial meetings in 2022.

Figure 3-6 Committee for HIV Infection Control and Patient Rights Protection, Ministry of Health and Welfare, Executive Yuan



2. To ensure the dignity and rights of people living with HIV/AIDS (PLWHA), the HIV Infection Control and Patient Rights Protection Act was amended in 2015. This amendment canceled all restrictions on the entry, stay, and residency of HIV-infected non-nationals. For the need of organ transplantations for the HIV infected, the HIV Infection Control and Patient Rights Protection Act was amended on May 18, 2018, for the HIV infected who are in good health status to donate organs to another HIV infected. Related regulations were amended and announced. The Criteria of Unsafe Sexual Behavior was amended on July 2, 2021, including the medical assessment of a significant risk of infection and causing HIV infection into the legal judgment to meet the best available scientific and medical evidence.

3. The harm reduction program has made significant progress. The reported number of HIV infections among IDUs dropped in 2006. Taiwan saw an effective reduction in the number of HIV infections, with the largest decline among IDUs. The percentage of all newly reported cases attributable to IDUs fell from a high of 72% in 2005 to only 2.4% in 2022.

4. Taiwan CDC promotes diversified prevention programs to confront the epidemic among LGBT. Initiatives include (1) Establishment of LGBT Community Health Centers that provide lesbian, gay, bisexual, and transgender (LGBT) friendly health services. (2) Implementation of health education and intervention services, such as online opinion leaders and HIV testing advertisement on mobile dating apps. (3) Providing voluntary HIV counseling and testing outreach services at saunas and pubs. (4) Installation of condom

vending machines in venues frequented by the gay population. (5) Establishment of a free hotline for MSM to provide immediate and accurate health information and counseling on HIV-related matters.

5. To prevent mother-to-child transmission, HIV screening has been incorporated into standard prenatal checkups since 2005. All pregnant women in Taiwan are offered HIV screening during the first prenatal screening in the first trimester. The Taiwan government provide pregnant women found to be HIV-infected with antiretroviral therapy. The exposed infants are provided with free perinatal prophylaxis during intrapartum and first 4-6 weeks of life. They are also supplied with breast-milk substitutes during the first 4 months of life. No mother-to-child transmission case was reported in 2022.

6. To enhance disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, and prison inmates in 1990. 74 hospitals provided anonymous HIV screening services in 2022 and 13 of them offered one-stop HIV screening services shortening the turn around time from screening to confirmation of diagnosis within 1 hour. They screened 33,327 people, with 295, or 0.9% of people, found to be HIV positive.

7. Moreover, to decrease the barriers for people to know their own HIV sero-status, from December 2018, Taiwan CDC launched a program to distribute HIV self-test kits at NGOs or health stations, and through pay-at-pickup services provided by the chained convenient store, and through vending machines at LGBT health centers, health stations, and gay sauna. Users paid 6 US dollars to get the kits, and could get a free coupon for their next HIV self-test kits after logging their test results online.

   In 2022, 54,438 kits were sold: 11,441, or 21%, through vending machines, 8,550, or 16%, distributed by LGBT health centers and health stations, 34,447, or 63%, distributed through pay-at-pickup services provided by the chained convenience stores. 0.4% of respondents reported being newly tested HIV-positive.

8. To expedite the diagnosis of HIV, Taiwan CDC has actively introduced and promoted the use of rapid HIV testing, including Ag/Ab combination testing, Immunochromatographic testing (ICT), and Nucleic Acid Testing (NAT), while amending the HIV testing procedure. Moreover, Taiwan CDC has made adjustments to HIV testing covered by National Health Insurance (NHI) program which took effect on November 1, 2021.

9. Taiwan CDC held a pilot project of PrEP which provided subsidies for drugs, HIV & STI testing since 2016, then had scaled up nationally for those who were

Taiwan CDC held a press conference in the Taipei Performing Arts Center, designed exclusive filters and choreographed gesture dances via social media to echo the theme of "Equalize" of world AIDS Day on November 30, 2022.

serodiscordant couples/partners of PLWH and prioritized population aged below 30 y/o since 2018. Since 2021, this project expanded to those aged below 35 y/o. Moreover, sex workers and drug addicts could be enrolled without age restrictions in 2022. The total amount of participants enrolled in the project in 2021-2022 was 2,669 people of which 2,275 people were aged below 35 y/o (85%) and 394 people were serodiscordant couples/partners of PLWH (15%).

10. The Taiwan government has provided HIV/AIDS patients with free medical treatment since 1988 and free highly active antiretroviral therapy (HAART) since 1997. At the end of 2022, 83 designated hospitals, 3 clinics and 87 pharmacies provided HIV/AIDS patients medical services, and over 95% of people living with HIV received HAART and 95% of all people receiving HAART had viral suppression in 2022. In addition, TCDC has implemented the "Quality Improvement Project for Designated Medical Institutions" since 2016. In 2022, 79 designated hospitals, 3 clinics and 67 pharmacies participated in the project. The participated institutions are subsidized for the case management provided to the patients according to their performances. Furthermore, to serve the need of long-term care for HIV/AIDS patients, the government designated 24 nursing homes, and subsidized 27 hospitals to sign agreements with 48 long-term care institutes.

Taiwan CDC projected "2022 World AIDS Day" at Shilin Night Market during November 30 and December 1, attracting public attention to HIV/AIDS and emphasizing the importance of eliminating discrimination.

Prospects

Taiwan continues to promote various HIV prevention and treatment strategies with three major aspects: prevention, screening, and treatment. With the efforts of health units and non-governmental organizations led to remarkable results in HIV. The number of HIV-infected new cases has declined for five consecutive years. We hope that through the participation of relevant units and the implementation of multiple strategies, Taiwan can reach the UNAIDS 95-95-95 target by 2030 and end the HIV/AIDS in the near future.

Current Status

Taiwan began to prepare for potential pandemics since the avian influenza epidemic emerged at the end of 2003. From the experience of SARS in 2003, government agencies were highly supportive and willing to allocate necessary funding for preparations.

In May 2005, the first National Influenza Pandemic Preparedness Plan (hereafter referred to as the 'Preparedness Plan') was approved by the Executive Yuan. In July 2021, the Executive Yuan approved the Emerging Infectious Diseases, Pandemic Influenza Preparedness, and Border Quarantine Plan as a continuation of the preparedness plan, to engage with all the preparation work.

The influenza pandemic strategic plan in Taiwan is composed of four major strategies and five lines of defense. The four major strategies are as follows: (1) Surveillance and assessment, (2) Interruption of transmission, (3) Antivirals, and (4) Influenza vaccines; and the five lines of defense are defined as follows: (1) Containment abroad, (2) Border control, (3) Community epidemic control, (4) Maintenance of medical system functions, and (5) Individual and family protection. Together, these measures minimize the morbidity and mortality rate, economic losses, and impact of novel influenza viruses.

Accomplishments

The content of the Preparedness Plan is outlined as follows:

1. **Vaccine Stockpile and Use**
   (1) Seasonal Influenza Vaccines
   The 2022 government-funded seasonal influenza vaccination program was launched in two stages. Except for adults aged 50-64 without high-risk chronic diseases who started to be vaccinated in the second stage on November 1, 2022, other eligible individuals began to receive their vaccination on October 1, 2022. The seasonal influenza vaccination program targeted nine groups of people: 1. Persons aged 50 years and above; 2. Children and adolescents aged 6 months through 18 years; 3. People with catastrophic illnesses; 4. Residents and staff in nursing homes and long-term care facilities; 5. Healthcare workers and public health personnel; 6. Poultry and livestock farmers and animal health inspectors; 7. People who had underlying medical conditions; 8. Pregnant women and parents of infants less than 6 months of age; 9. Kindergarten caretakers, and Childcare professionals. The program subsidizes a policy of not charging diagnostic fees for all vaccination groups to lower barriers and increase the willingness of influenza vaccination. Influenza vaccines were given to school-aged students at campus and to other groups at clinics or hospitals.

   (2) Pandemic Influenza Vaccines
   In recent years, the emergence of the H5N1, H1N1pdm and more recently, the H7N9 virus has continued to cause more and more human infections, indicating the urgent

need for influenza pandemic preparedness. Taiwan CDC now continues to act in accordance with the Emerging Infectious Diseases, Pandemic Influenza Preparedness, and Border Quarantine Plan to ensure that the vaccines are available and sufficient during a pandemic.

2. Stockpiling and Use of Antiviral Drugs

In accordance with the WHO recommendation to maintain a diverse stockpile of influenza antivirals in preparation for a pandemic, Taiwan CDC has established national stockpiles of Tamiflu, Relenza, Eraflu, Rapiacta, and Avigan. These stockpiled antivirals are sufficient to supply at least 10% of the population. In response to seasonal influenza control, as well as the proper use of stockpiled drugs, it followed recommendations from the Advisory Committee on Influenza Control and Prevention to supply antivirals to those reported as severe complicated influenza, and who were at increased risks for influenza-related complications such as infants, the elderly, and patients with chronic diseases. In addition, during the peak of flu season, usually from December 1 to March 31, Taiwan CDC expands the target population for antiviral drug use and adjusts the duration based on actual conditions. There were more than 4,200 contracted hospitals and clinics to administer government-funded antivirals.

Stockpiling of influenza Antiviral Drugs and Active Pharmaceutical Ingredient (API)

3. Stockpiling and Management of Personal Protective Equipment (PPE)

Taiwan CDC established a 3-tier stockpiling framework of PPE. Taiwan CDC, local health authorities, and medical institutions should maintain a minimum stock of PPE (including surgical masks, N95 respirators and coveralls) and ensure a sufficient supply for personnel engaged in epidemic control and health care services during the early phase of an epidemic.

In 2011, Taiwan CDC initiated a stockpile replacement model in order to optimize the PPE stockpiling efficiency. This stockpile replacement model employs a first-in-first-out principle in which the oldest stock in the central government stockpile is regularly replaced and replenished with the same amount of new and qualified products, ensuring the availability and the maintenance of the minimum stockpiles.

During the COVID-19 pandemic, in order to reach a rational distribution of PPE and ensure enough PPE for the front line medical workers to protect themselves, the Ministry of Health and Welfare purchased or requisitioned medical face masks, surgical masks, N95 respirators, isolation gowns and coveralls produced by domestic manufacturers for

professional use in healthcare settings or for public health. Moreover, to ensure universal access to face masks and to increase fairness and transparency in resource allocation for healthy individuals, a name-based rationing system was implemented. Information such as purchases, stocking, inventory, collection and re-stocking at all levels of inventory units can be monitored in real time by using the Epidemic Prevention Supplies Management Information System. Furthermore, they can be delivered to local health authorities and hospitals in a regular cycle, based on the inventory conditions at the local health authorities and hospitals. Taiwan CDC also invited hospitals to re-assess actual needs of PPE to adjust their PPE stockpiles.

Stockpiling of Personal Protective Equipment (PPE)

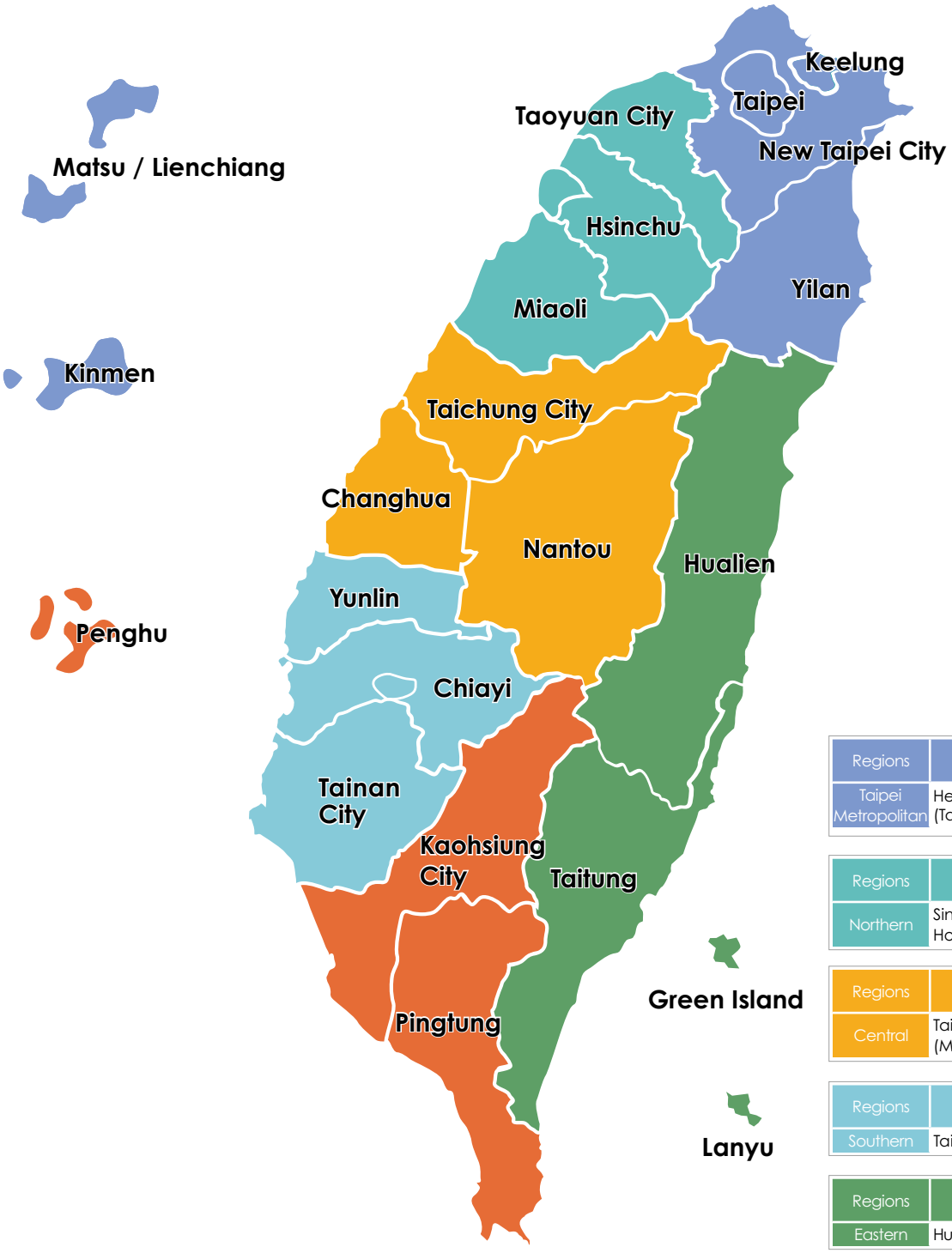
4. Communicable Disease Control Medical Network Preparedness

The Communicable Disease Control Medical Network (CDCMN) was set up in 2003 after SARS. It has brought together the medical and public health systems to provide safer, more effective treatments for communicable disease patients, and strengthen Taiwan's capacity to handle contingencies in the prevention and control of communicable diseases. In 2022, the CDCMN have established 141 response hospitals, which were led and overseen by infectious disease experts across 6 regions (Figure 3-7), and all municipalities, counties and cities designated their primary response hospitals. There are 6 regional response hospitals for treating patients suspected of having contracted category 1 or category 5 notifiable diseases or emerging infectious diseases. Additionally, 6 designated support hospitals provided medical treatment advice, and local health authorities offered manpower support to response hospitals. To improve staff capabilities, there were 385 communicable disease response training courses and 40 practice drills for response staff in 2022. Each region of the CDCMN had a commander and a deputy commander who assisted with area epidemic control and preparedness of response hospitals.

Future Prospects

Mutation of influenza viruses is still ongoing. We need to continue to prepare for possible pandemics. Therefore, it is important to maximize the use of limited resources in accordance with the Pandemic Influenza Risk Management, which is a guidance released by the WHO in May 2017. Taiwan CDC will put effort in developing and strengthening existing pandemic strategies as well as consolidating a sustainable stockpile of antivirals, vaccines and PPEs. We expect the above actions to pave the way for appropriate responses to possible pandemics in order to ensure people's health.

Figure 3-7 Communicable Disease Control Medical Network



Regions	Name of Regional Response Hospital
Taipei Metropolitan	Heping Hospital (Taipei City Hospital)

Regions	Name of Regional Response Hospital
Northern	Sinwu Branch, Taoyuan Hospital (MOHW)

Regions	Name of Regional Response Hospital
Central	Taichung Hospital (MOHW)

Regions	Name of Regional Response Hospital
Southern	Tainan Hospital (MOHW)

Regions	Name of Regional Response Hospital
Eastern	Hualien Hospital (MOHW)

Regions	Name of Regional Response Hospital
Kaohsiung-Pingtung	Pingtung Hospital (MOHW)

In the six Communicable Disease Control Medical Network regions there are 141 response hospitals, including 6 regional response hospitals and 6 support hospitals.

Current Status

During the first half of the 20th century, there were three island-wide dengue outbreaks in Taiwan (1915, 1931 and 1942). After almost 40 years of dormancy, a DEN-2 outbreak occurred in Liuchiu Township, Pingtung County in 1981, and another DEN-1 outbreak occurred in the Kaohsiung area (1987-1988). Thereafter, dengue outbreaks became more common. Epidemics mainly have occurred in Kaohsiung, Tainan and Pingtung, with several instances in the north. The past ten years have seen an increase in cases of dengue fever and severity level. There were more than 1,000 cases in Taiwan in 2007, 2010, 2011, and 2012. Though the number of cases did not reach 1,000 in 2006, 2009, and 2013, there were still more than 500 cases each year. 2014 and 2015 saw unprecedented outbreaks with more than 10,000 cases. Some 97% of the indigenous cases in 2014 were concentrated in Kaohsiung while indigenous cases were concentrated in Kaohsiung (45%) and Tainan (52%) in 2015.

After suffering the serious dengue outbreaks, Taiwan CDC developed and implemented new approaches. There were few indigenous cases in Taiwan from 2016 to 2022. In 2022, the number of indigenous cases in Taiwan was 20. (Figure 3-8) Severe dengue epidemics in Southeast Asia in recent years have led to an increase in imported cases in Taiwan, reaching 363 in 2016, 350 in 2018, and 540 in 2019. In response to the COVID-19 pandemic in 2020 to 2022, border controls have been implemented. In 2022, the number of imported cases was 68, the third lowest over the previous 10 years. (Figure 3-9)

Figure 3-8 Indigenous Dengue Cases in Taiwan, 1988 –2022

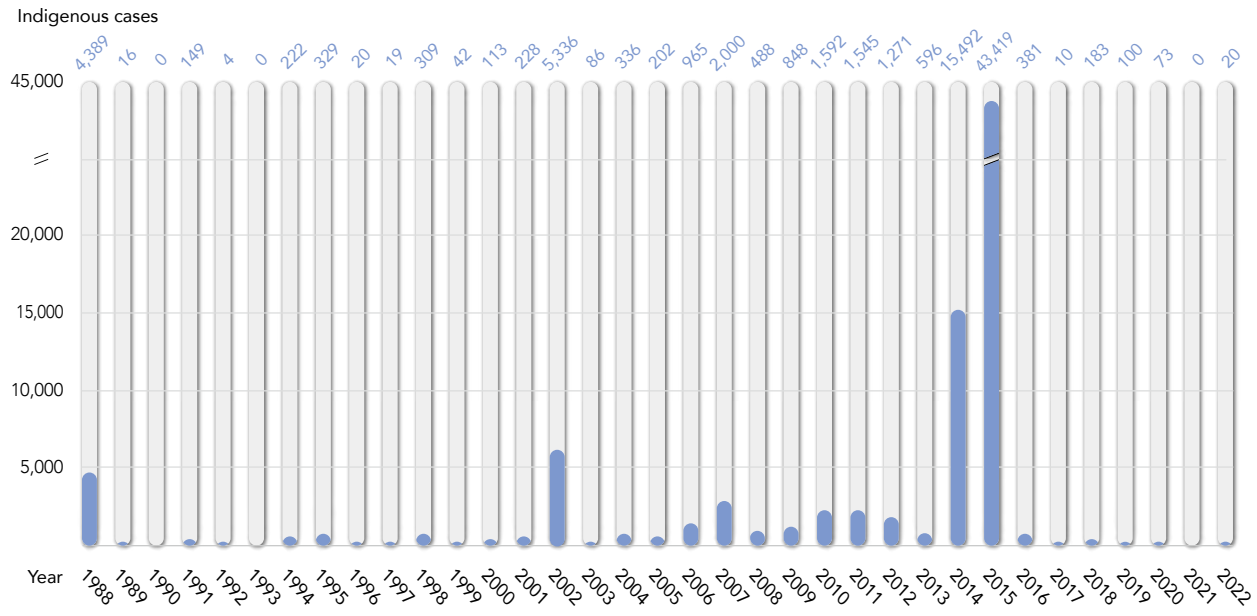
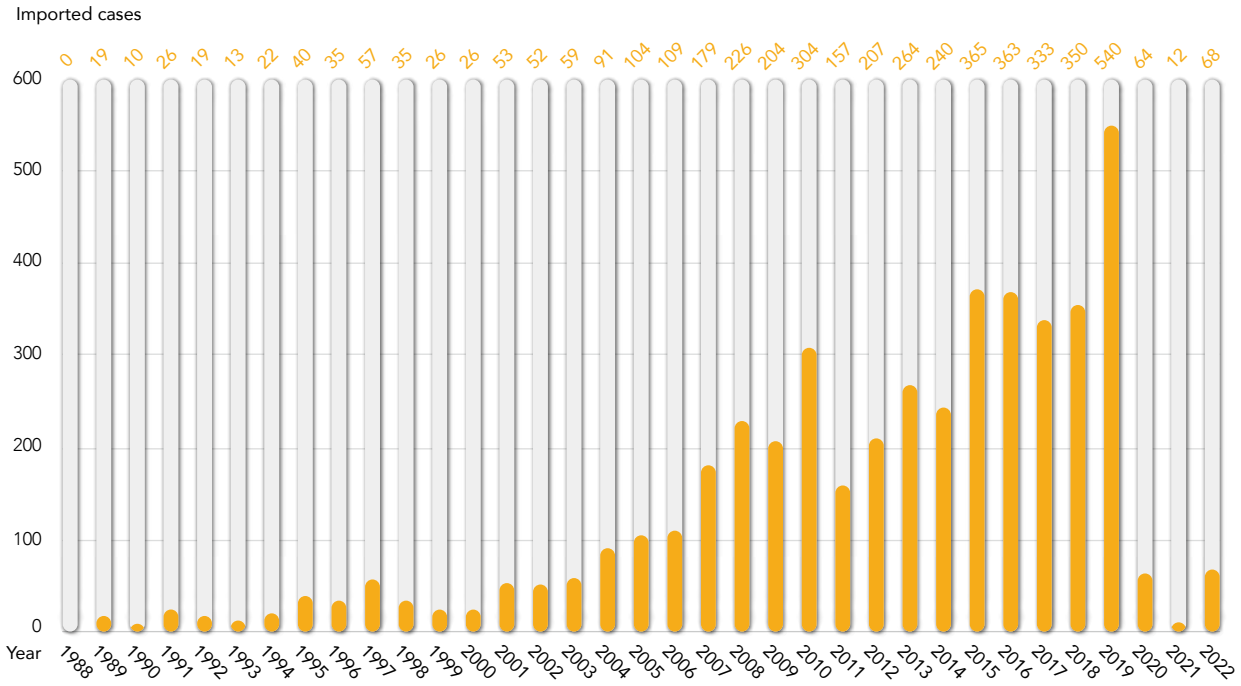


Figure 3-9 Imported Dengue Cases in Taiwan, 1988 – 2022



Goals & Strategies

The main strategies to control dengue in Taiwan are eliminating vector (mosquito) breeding sources and lowering vector density.

Taiwan CDC has devised a three-stage prevention strategy for controlling the dengue epidemic. Primary prevention measures include source reduction and control of the vector population. Secondary measures cover disease surveillance and emergency/contingency mechanisms. Tertiary prevention involves controlling the mortality rate.

Primary Prevention

1. Implementing health education through diverse communication channels to promote dengue fever and severe dengue awareness.
2. Involving the community in improving environmental and household sanitation along with reducing vector sources through volunteer training.
3. Encouraging regular inspection and eliminating vector breeding sources by cleaning empty houses, vacant lots, and other potential vector breeding sources, and keeping records for future inspections.
4. Strengthening education and training for disease prevention workers and volunteers.
5. Setting up a vector surveillance mechanism to check places with a high mosquito density probability and promptly wipe out vector sources.

Secondary Prevention

1. Constructing a disease surveillance mechanism for prompt control of suspected cases; strengthening disease surveillance and disease trend evaluation through official epidemic reporting systems, emerging disease surveillance, public reporting, and symptom declaration forms.
2. Setting up emergency/contingency mechanisms to promptly investigate suspected transmission sources, spraying insecticide to eliminate those sources, and publicizing the importance of eliminating vector-breeding sites to prevent infection.

Tertiary Prevention

1. Establishing guidelines for dengue fever and diagnosis and treatment for severe cases.
2. Organizing continuing education workshops for medical personnel to raise health care quality and lower mortality rates.

Accomplishments

The following strategies have yielded remarkable results: strengthening border quarantine efforts; improving disease surveillance systems; providing subsidies to support local governments to implement prevention and control programs; periodically convening the Cross-Ministerial Meeting on Measures to Combat Mosquito-Borne Diseases to facilitate communication between the central and local governments; cooperating with the National Mosquito-Borne Diseases Control Research Center. There were only ten indigenous cases in Taiwan in 2017 and zero cases in 2021, hitting the second lowest and the lowest record over the past five years. The aforementioned achievements are remarkable under the conditions of the serious global epidemic of dengue, frequent international interactions, and climate change, which resulted in rapid propagation of mosquito vectors.

Primary Prevention

1. Distributed health education and promotional materials, including leaflets, posters, banners, the Combat Manual for Dengue Fever, and VCDs.
2. Produced promotional materials, such as epidemic control programming and newspaper ads, which called on the general public to eliminate breeding sources. These included TV commercials and short films for screening in TV slots reserved for public service announcements.
3. Published the Guidelines for Dengue Control to be the reference for local health organizations.
4. Formulated the Community Mobilization Plan for Cleaning Up Breeding Sources of Vectors. Taiwan CDC encouraged community organizations in southern Taiwan to propose plans to CDC units and organize volunteer teams to exterminate mosquitoes. In total, 1,066 teams of volunteers were recruited. On average, they performed more than 4.5 operations per month.

5. Encouraged experts to conduct studies in insecticide efficiency and mosquito resistance to promote better insecticide use.
6. Promoted dengue fever vector mosquito surveys and the Dengue Fever Control Plan. Implementation was entrusted to the health bureaus of high-risk counties and cities in southern Taiwan (areas infested with Aedes aegypti mosquitos).

Secondary Prevention

1. Established an incentive system to encourage physicians to report cases, in turn, enabling early detection of the disease. Medical professionals, including physicians, who reported the year's first indigenous case in each city and county were awarded US$130, and those who reported an imported case were awarded US$80.
2. Continued fever screening at international airports and seaports to limit disease importation. Around 76% of imported dengue cases in 2022 were detected at ports.
3. Encouraged clinics and hospitals to use NS1 rapid test to facilitate early diagnosis and implementation of subsequent measures that prevent further transmission of the disease.
4. The Cross-Ministerial Meetings on Measures to Combat Mosquito-Borne Diseases are held monthly not only to enhance communication, cooperation and collaboration between central and local governments, but also to supervise and assist local governments in implementation and prevention efforts for vector born disease.

Tertiary Prevention

About 672 clinical physicians attended dengue diagnosis and treatment training courses on-line on July 30, 2022.

Future Prospects

After Taiwan suffered a serious dengue outbreak in 2015, from 2016 to 2022 Taiwan implemented several prevention and control strategies that have yielded concrete results, which will serve as the foundation for Taiwan CDC to strengthen the cooperation between central and local governments to combat dengue fever. Additionally, Taiwan CDC will continue to strengthen border quarantine efforts, improve disease surveillance systems, raise public awareness through diverse channels, and stay abreast of the technological trends for preventing and controlling communicable diseases in order to respond to upcoming challenges.

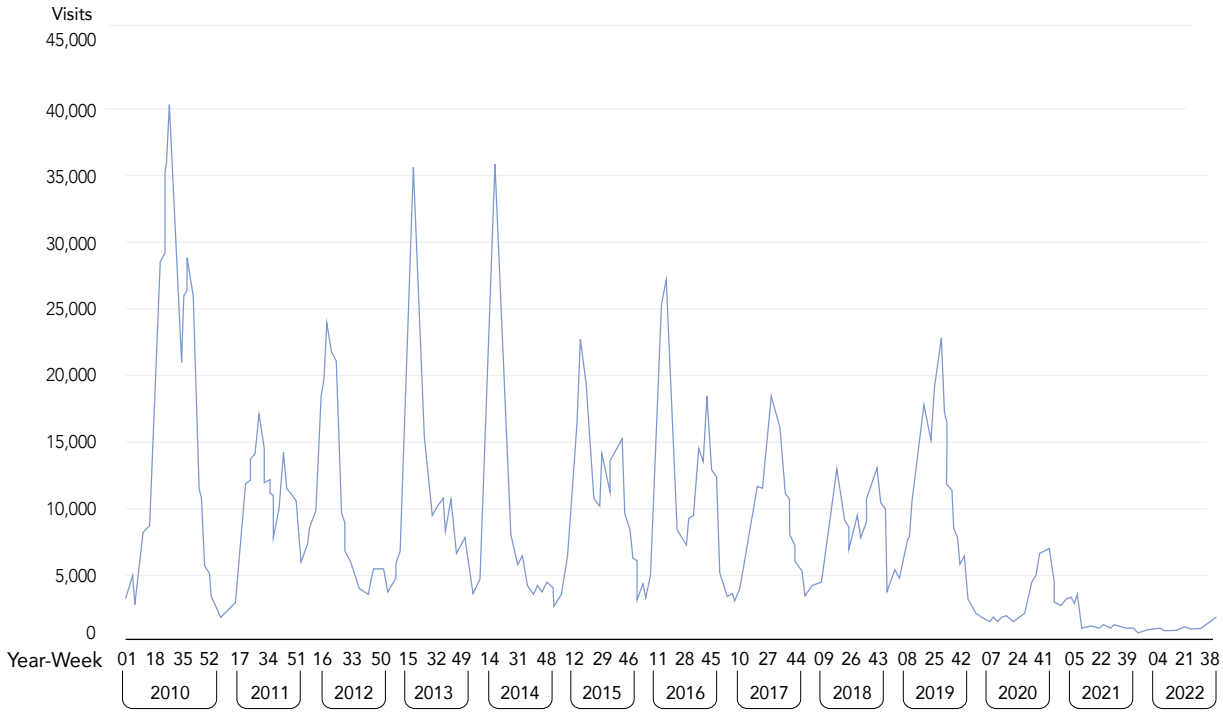
Enteroviruses

Enterovirus belongs to a group of small RNA viruses, including polioviruses, Coxsackie A viruses, Coxsackie B viruses, echoviruses, and other enteroviruses. Enterovirus A71 (EVA71) has significantly higher pathogenicity compared to other known enteroviruses, especially regarding neurological complications. Enteroviruses are found in the gastrointestinal tract (the stool or mouth of infected persons) and respiratory tract (such as saliva, sputum, or nasal mucus). Infections can be produced by direct contact with the secretions of infected persons or with contaminated surfaces or objects.

Current Status

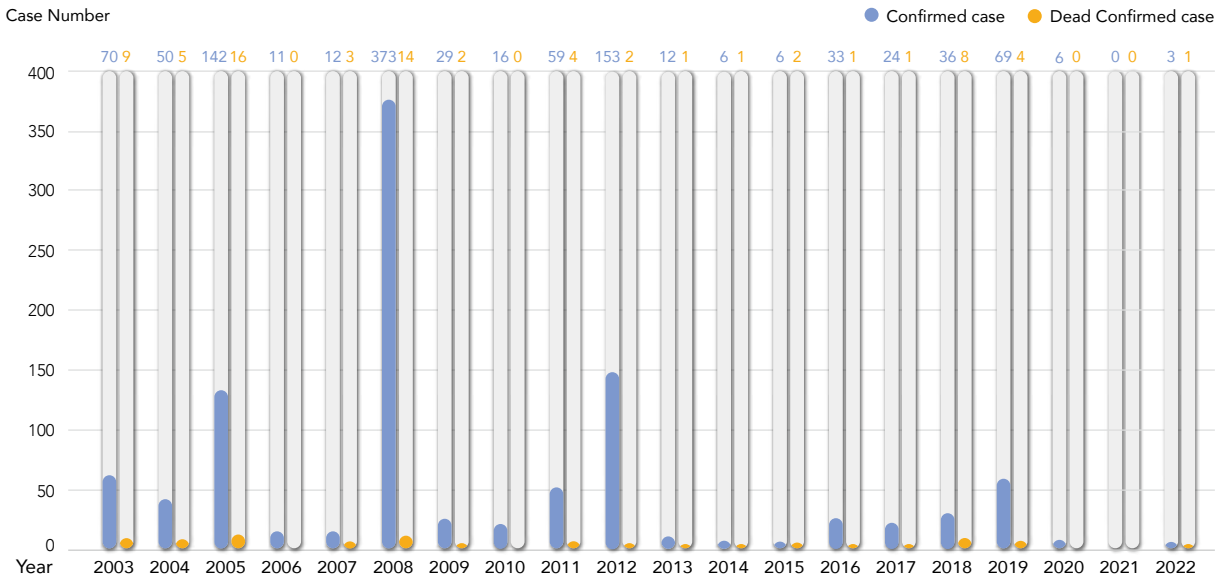
According to survey data gathered over a period of several years by Taiwan CDC and National Health Insurance Administration (NHI), the number of weekly outpatients and emergency visits for enterovirus infection increases in late March and peaks around mid-June. It decreases after mid-June. There is usually another smaller outbreak when schools reopen in September (Figure 3-10). Many types of enteroviruses exist around the world. Humans appear to be the only known host and source of transmission. The patient is contagious before disease onset, and the infectivity lasts for weeks after the patient is recovered. There are currently no preventive vaccines for non-polio enteroviruses in Taiwan and no known highly efficacious medicines to eliminate the virus once it is inside the human body. Therefore, enteroviruses will continue to pose a threat to human health in the foreseeable future.

Figure 3-10 The Number of Weekly Outpatient and Emergency Visits for Enterovirus Infection in Taiwan, 2010 –2022



The major symptoms of enterovirus infection are herpangina and hand-foot-and-mouth disease (HFMD). According to various surveys, enterovirus infection trends suggest that children under the age of 5 are more prone to critical complications and death. EVA71 is the most commonly seen serotype of cases of enterovirus infection with severe complications (EVSC) in Taiwan. In 2022, Coxsackie A virus was found to be the predominant circulating virus. There were 3 confirmed cases of EVSC infected by enterovirus D68 (1) and Coxsackie A virus (2). One case died (enterovirus D68). (Figure 3-11)

Figure 3-11 The Volume of Confirmed Cases and Deaths of EVSC in Taiwan, 2003 – 2022



Accomplishments

1. Established multiple and real-time surveillance systems for enterovirus infections, covering patients of enterovirus infection (HFMD and herpangina), severe cases, clustering, virus isolation, and typing.

2. Constructed a medical service network, including 6 regional chiefs, 82 responsible hospitals and 8 contracted laboratories. Experts were invited to visit responsible hospitals and provide guidance. Training programs within responsible hospitals and hospitals in their neighborhoods were subsidized.

3. Cooperated with local governments

   (1) Conduct regular inspections for environmental sanitation, provide hand-washing facilities and related prevention measures in schools, kindergartens, baby care centers, hospitals, clinics, postpartum care facilities, and other public gathering places. To reduce the risk of infection, Taiwan CDC strengthened its inspection on kindergartens and nursery homes during the epidemic.

   (2) Enhance health education on enteroviruses prevention and control for the general public and organize training for professionals.

4. Established consultation channels staffed by clinical professionals. The professionals provided clinical health care consultation and guidelines for treating enterovirus complications.

5. "The Manual for Enterovirus Prevention" and "The Handbook for Enterovirus Prevention for Child Care Workers" list all necessary precautions. These materials are provided on the Taiwan CDC website and updated when needed.

6. Workshops are held on the clinical treatment of critical enterovirus complications or neonatal enterovirus infection by hospitals and societies to enhance doctors' skills in treating the disease, raise treatment quality, and reduce mortality rates and sequelae.
7. According to the risk of EVSC clustering, the recommendation of class suspension has been revised for the pre-school education and care institutions, which are high-risk groups.
8. Research and development progress of EVA71 vaccine in Taiwan: After accepting the technology of EVA71 vaccine from the National Health Research Institutes, two domestic biotechnology companies have completed Phase III clinical trials and applied for vaccine approval in Taiwan.

Future Prospects

1. Enterovirus Prevention Enhancement
   (1) Increase public awareness of hand-washing and not going to school or work when sick.
   (2) Enhance caregivers' awareness of prodromal complications for enterovirus infections with severe complication.
   (3) Raise the awareness of pregnant women, care workers and medical staff for prevention and risk of neonatal enterovirus infection.
   (4) Strengthen the implementation of infection control measures in hospitals or nursing homes to reduce the risk of neonatal enterovirus clusters.
2. Continuous monitoring of epidemic changes, timely adjustment of prevention and control strategies.
3. Follow the development progress of EVA71 vaccine.

● COVID-19

Current Status

From the start of the COVID-19 pandemic in 2020 to the end of 2022, the number of affected countries/areas around the world increased to 201, and there were 655,846,937 confirmed cases and 6,687,909 deaths, resulting in an average mortality rate of 1.0%. During this period, there were 9,878,848 confirmed cases, consisting of 9,825,892 domestic cases and 52,902 imported cases, 36 cases from the Dunmu fleet, three cases on aircraft, one case of unknown origin, and 14 cases under investigation in Taiwan.

The Omicron variant that emerged in December 2021 had characteristics different from the earlier circulating variants, leading Taiwan to change its prevention policies overall from containing the spread of the disease to normalizing living with COVID. In line with this change, Taiwan gradually eased border, quarantine, and community disease prevention measures, actively increased vaccine booster coverage rates, and promote rapid tests. Taiwan also used antivirals and implemented strategies for admission and treatment of mild cases and severe cases to lower the incidence of severe illness and death.

Accomplishments

1. Border Quarantine
   A. In 2022, Taiwan began to steadily open its borders and ease or lift restrictions. The measures relaxed included the following: saliva-based PCR tests were no longer required for inbound passengers from August 15, from October 13, home quarantine was no longer required, from December 10, the weekly cap on international arrivals ended, and arrivals were advised to adhere to a seven-day of self-initiated prevention and use at-home rapid antigen tests.

   B. At the later stages of the COVID-19 pandemic, border quarantine measures returned to regular surveillance and control. This means necessary health evaluations and measures would be imposed only for travelers with symptoms at airports or ports. Rolling adjustments were made based on pandemic trends, domestic disease prevention, and medical capacity.

At-home rapid antigen test kits are distributed to arrivals at the airport

2. Deployment of Antivirals
   Since 2022, Taiwan has procured remdesivir, Paxlovid, molnupiravir, and the monoclonal antibody medications (bamlanivimab + etesevimab, casirivimab + imdevimab, and Evusheld). Taiwan issued emergency use authorization for each of these therapeutic treatments the use of which was then included in the Interim Clinical Guidance for Management of Patients with Confirmed SARS-CoV-2. Simplified usage procedures and expanded drug access points provided fast access to these treatments for confirmed COVID-19 patients who were at risk of developing severe illness.

3. Expanded Distribution of Rapid Tests
   A. In order to increase the supply of COVID-19 rapid tests, the government helped domestic manufacturers increase production capacity, expropriated and procured rapid tests in accordance with the law, and eased import restrictions. There was a significant increase in supply in the middle of April 2022. To distribute tests in a fair manner and maintain

reasonable prices, on April 28, 2022, the government implemented a name-based distribution system for at-home rapid test kits. People were able to purchase test kits by presenting their NHI cards at NHI-contracted pharmacies or rural health centers. Starting from May 9, 2022, more channels were added to sell test kits, including the four major convenience store chains and four major retailers, making test kits more accessible. Starting from May 2022, special programs and a name-based distribution system were implemented to distribute free at-home rapid test kits to disadvantaged people and high-risk groups.

B. After there was a sufficient supply of rapid tests, Taiwan began to ease COVID-19 restrictions. Starting from May 17, 2022, close contacts of COVID-19 cases who tested negative on a rapid test no longer were subject to home isolation and could go out. Starting from May 26, 2022, the case definition for COVID-19 was revised to include an individual who tested positive using an at-home rapid antigen test kit and had their test result confirmed by a medical professional or who tested positive with a rapid antigen test performed by a medical professional. The diagnosis allowed patients to quickly receive medications. Starting from September 12, 2022, new rules were implemented for contacts of confirmed cases to allow them to attend class if they tested negative on a rapid test. On September 29, 2022, Taiwan ended saliva-based PCR testing for inbound travelers. Instead, each arrival received four rapid test kits for at-home testing.

4. Medical System Responses

A. To expand medical response capacity, the principles for admission and treatment of mild COVID-19 and severe cases were drawn up. In addition to the responding hospitals designated by the Communicable Disease Control Medical Network, emergency hospitals, enhanced government quarantine facilities/quarantine hotels, and patients' homes were used as places to admit and treat COVID-19 patients. Starting from April 19, 2022, home care and isolation became the primary method of treatment, with centralized isolation and care playing a supplementary role.

Taiwan CDC uses new media to spread information on epidemic prevention measures and provide health education

B. To strengthen medical care for children, Taiwan's 22 cities and counties established green channels for children and a cross-regional transfer mechanism for severe cases. Eleven pediatric critical care hospitals began offering children's telemedicine outpatient services, further increasing the modes of seeking medical care.

C. Starting from February 2020, telemedicine consultations provided by designated healthcare facilities for patients undergoing home isolation, home quarantine, or self-health management were covered by NHI. Starting from May 15, 2021, the rules for telemedicine consultations were relaxed to allow outpatients to have telemedicine consultations to protect people's right to medical care. On April 18, 2022, NHI-covered telemedicine services were expanded to include confirmed cases receiving home care, so that high-risk groups could receive oral antivirals quickly.

5. Health Education

Taiwan CDC regularly held press conferences to disseminate important epidemic information, policies, and measures. Health education materials were produced to spread key topics, and a series of epidemic prevention videos were created, translated into multiple languages, and then released via government requisitioned broadcast media, new media, and public warning systems.

6. Smart Disease Prevention

A. As Taiwan faced community transmission of COVID-19, on May 1, 2022, Taiwan CDC launched a contact tracing self-reporting system for confirmed COVID-19 cases to simplify contact tracing for local governments and reduce the need for paper notices.

B. Taiwan launched the Digital COVID-19 Certificate system on December 28, 2021, to allow the general public to download their certificate when they need one. On March 24, 2022, the system was updated to allow people to apply for a certificate using their passport number, to add their digital certificate to an iOS or Android app, and print their certificate at convenience stores using cloud services. On May 30, 2022, another update was made to the system to add the function of reissuing COVID-19 Designated Location Isolation (Home Isolation) Notices to confirmed cases. On July 14, 2022, the system was updated to include the function of issuing digital vaccination certificates in the Smart Health Card (SHC) format.

Future Prospects

During the post-pandemic period, as relevant measures are being lifted, communicable diseases still pose a serious threat to human health. Therefore, we must continue to strengthen herd immunity, implement personal disease prevention measures, train public health professionals, and enhance our public health system. Active measures must be taken to prevent and respond to disease outbreaks so that we can achieve our shared goal of ensuring the health and safety of everyone.

Emerging Infectious Diseases (EID) Response

Emerging Infectious Diseases (EIDs) Risk Surveillance, Response and Preparedness

In recent years, rapid changes in the global ecosystem and frequent international exchanges have resulted in the occurrence and spreading of many emerging infectious diseases (EIDs), which recognize no geographical borders and spread rapidly.

This has threatened public health, economic development, and even national security. The SARS outbreak in 2003, the MERS-CoV outbreak in 2012, the Ebola outbreak in 2014, and the Mpox outbreak in 2022 are cases in point, COVID-19 outbreak was described in other chapter. EIDs surely have drawn international attention. In light of this, Taiwan CDC proposed the "Surveillance, Response, and Preparedness Plan for the Risk from Emerging Infectious Diseases", which was approved by the Executive Yuan on the 9th of June in 2015, to effectively prevent and control EIDs. The program started in 2016 and end in 2021. In July 2021, the Emerging Infectious Diseases, Pandemic Influenza Preparedness, and Border Quarantine Plan as a continuation of the plan, to engage with all the preparation work. It aims at maintaining the core capacities at the designated Point of Entrys (PoEs) based on the IHR, expanding the capabilities of testing and diagnosis of emerging pathogens, strengthening preparedness and emergency response, enhancing training and conducting drills to counter possible bioterrorism, and increasing international cooperation.

Accomplishments

1. Successfully maintained the core capacities at 7 designated PoEs based on the IHR and improved skills for monitoring EIDs and risk assessment.
2. National testing capability to detect emerging infectious diseases has been enhanced since 2022. Increases one novel testing methodology for emerging infectious diseases per year, which is added to the laboratory portfolio.
3. In June 2022, Taiwan CDC declared Mpox (formerly known as monkeypox) as the second category of notifiable infectious disease. In response to the Mpox outbreak, we have published the public health responses as a reference for health care and public health workers. In addition, we have purchased 1,120 doses of Mpox vaccines to protect against Mpox.

Personal Protective Equipment (PPE) Training for Support Staffs

4. Carried out proper maintenance for both software and hardware in the Center for Infectious Disease Control and Prevention, Taiwan CDC. In addition, drills, exercises and multiple channels of training courses were offered for 3,155 persons.
5. Conducted training programs and exercises for the Biohazard Response and Verification Expert Team (BRAVE) and maintained the equipment. More than 80% of BRAVE members obtained certification. These efforts ensured a sufficient capacity for bioterrorism response.
6. Commanders and deputy commanders participated in 919 CDCMN consultation meetings and COVID-19 international web conferences, provided opinions and shared experience.

Certification of Biohazard Response and Verification Expert Team (BRAVE)

Infection Control and Biosafety

Healthcare-associated Infection Control

Current Status

The COVID-19 outbreak highlighted the importance of infection control in hospitals. To improve patient safety and combat healthcare-associated infections, Taiwan CDC coordinates annual inspection programs, gathers surveillance data on the occurrence of healthcare-associated infections and antimicrobial resistance, and formulates infection control guidelines.

Our goals are:

1. To reduce healthcare-associated infections through national action plans and compilation of infection control guidelines.
2. To improve the performance of infection control programs in hospitals by boosting the quality of infection control inspection programs and sharing infection control experiences in on-site audits.
3. To continue promoting hospital participation and strengthening data quality in the Taiwan Healthcare-associated infection and Antimicrobial resistance Surveillance (THAS) system.
4. To promote infection control and reduce healthcare-associated infections in long-term care facilities by implementing infection control inspections.

Accomplishments

1. **Infection Control Inspections**
   Starting in 2008, Taiwan CDC commissioned the Joint Commission of Taiwan to implement a quality improvement project for infection control inspections. Experienced infection control practitioners and infectious disease specialists joined local health authorities in conducting on-site inspections. Since 2017, the inspection frequency for each hospital was adjusted to at least once in every two years. Between 2020 and 2022, in response to COVID-19 outbreak, the infection control inspections were canceled. Instead, Taiwan CDC conducted the unannounced infection control inspections. In 2022, 149 of the 176 hospitals inspected, passed the inspections with a pass rate of 84.7%.

2. **Healthcare-associated Infection Surveillance and Reporting**
   Hospitals may either provide healthcare-associated infections data through web-based entry or convey their data electronically through interchange platform to the THAS system. More than 486 hospitals participated in reporting in 2022. Participating hospitals and public health authorities could retrieve feedback reports from the system, including infection incidence densities, common pathogens for healthcare-associated infections, and the antimicrobial resistance profiles, etc.

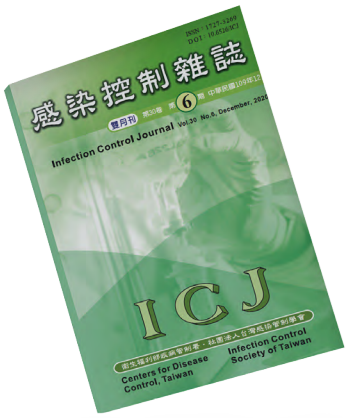
3. **Infection Control Journal**
   Taiwan CDC commissioned the Infection Control Society of Taiwan to publish the bimonthly Infection Control Journal, which provides healthcare workers with information on trends and research related to the prevention and control of healthcare-associated infections.

4. **Infection Control Inspections in Specific Facilities**
   In response to the COVID-19 outbreak, the 2022 routine infection control inspections in specific facilities were canceled on Apr 8, 2022, to enable facilities to dedicate on preventing outbreaks in facilities. In order to prevent flu outbreak, Taiwan CDC conducted unannounced infection control inspections of residential long-term care institutions, baby care centers, and correctional organizations. Local competent authorities inspected 529 facilities in October and November. A total of 450 facilities passed all the inspection items with a pass rate of 85.1%.

Future Prospects

1. Draft, implement and revise regulations and guidelines on healthcare-associated infections based on recommendations announced by the WHO and leading countries. The information Taiwan CDC gathered from around the world on policies, laws, regulations and implementation results will serve as the references for policymaking.

2. Revise the infection control inspection and quality improvement project on an annual



Infection Control Journal was published to provide healthcare workers with information on trends and research related to the prevention and control of healthcare-associated infections.

basis, according to the previous implementation experiences and recommendations from external experts.

3. Continue to promote hand hygiene and the care bundles that prevent device-associated infections including central line-associated bloodstream infections (CLABSI), ventilator-associated pneumonia (VAP), and catheter-associated urinary tract infections (CAUTI). Thus, hospitals could make sustained progress in patient safety and healthcare quality, as well as reduce medical costs by reducing healthcare-associated infections.
4. Continue to improve usefulness, simplicity, and efficiency of THAS system. It is expected that data reported to THAS system will be useful for quality improvement activities.
5. Continue to conduct the infection control inspections of long-term care facilities to improve health care quality, reduce healthcare-associated infections, and prevent outbreaks.

Taiwan Healthcare-associated infection and Antimicrobial resistance Surveillance (THAS) system.

Antimicrobial Resistance

Current Status

Antimicrobial resistance (AMR) has become a major global crisis. In response to the increasingly serious threat posed by AMR, Taiwan CDC implemented the National Antimicrobial Stewardship Program, established multi-disciplinary surveillance on multidrug-resistant organisms (MDROs), conducted hospital infection control inspection related to the antimicrobial stewardship, carried out coordinated infection control interventions, implemented appropriate use of antimicrobials to alleviate the AMR crisis. Furthermore, Taiwan CDC proactively established relevant guidelines, produced e-learning materials, called up hand hygiene and antimicrobial awareness campaigns to engage public to curb AMR.

Echoing WHO's World Hand Hygiene Day, Taiwan CDC and alliance hospitals of the Infection Prevention and Control and Antimicrobial Stewardship Quality Improvement (IPCASQI) Program called up a campaign on May 4, 2022 to educate that people should wash their hands timely to prevent and control infectious diseases.

Taiwan CDC awarded the four medical centers which were accredited as IPCAS CoE and led their alliance hospitals and clinics to achieve IPCASQI Program standards on December 10, 2022.

Our goals are:

1. To strengthen surveillance of antimicrobial resistant pathogens and to control the spread of MDROs.
2. To promote excellence in antimicrobial use and combat antimicrobial resistance through Infection Prevention and Control and Antimicrobial Stewardship Centers for Excellence (IPCAS CoE) Program.
3. To conduct hospital infection control inspection to request or encourage all hospitals to implement antimicrobial stewardship programs.
4. To provide a series of e-learning courses for antimicrobial stewardship to strengthen understanding and awareness among healthcare workers.
5. To hold national campaigns to raise awareness of the public and healthcare workers about AMR crisis.
6. To combat AMR based on the One Health approach.

Accomplishments

1. **Surveillance of Antimicrobial Resistant Pathogens**
   Taiwan CDC has conducted AMR surveillance via the National Infectious Disease Reporting System (NIDRS) and the Taiwan Nosocomial Infection Surveillance (TNIS) system for years. To further improve the AMR surveillance efficacy, Taiwan CDC has added a new reporting module, the Antimicrobial Resistance Surveillance Module, to the TNIS system to collect laboratory testing data of clinical isolates since March 2017. The TNIS system further incorporated tailored visualization reports and formally reformed as THAS system in 2020. Hospitals are encouraged to report cases through Electronic Data Interchange mechanism. More than 187 hospitals participated in this module in 2022, and the results of antimicrobial resistance reported by each hospital were analyzed and published as Taiwan Antimicrobial Resistance Surveillance Annual Report.

World Antibiotic Awareness Week Campaign 2022, "Preventing Antimicrobial Resistance Together", supporting WHO and increasing awareness of global antibiotic resistance.

2. **IPCASQI and IPCAS CoE Program**
   Taiwan CDC has integrated and enrolled selected medical centers to lead alliance hospitals and clinics to perform Infection Prevention and Control and Antimicrobial Stewardship Quality Improvement (IPCASQI) Program and to reinforce excellence in antimicrobial use and combating antimicrobial resistance through IPCAS CoE Program.

3. **Hospital infection control inspection related to antimicrobial stewardship**
   Three indicators have been used to evaluate the antimicrobial stewardship through the hospital infection control inspection system—leadership and accountability of antimicrobial stewardship program, surveillance and management mechanism of antimicrobial use, and surveillance and precaution measure of MDROs.

4. **National campaigns**
   To raise public and healthcare workers awareness of hand hygiene and AMR, Taiwan CDC continued to engage the WHO's World Hand Hygiene Day (May 5) and the World Antibiotic Awareness Week (November). Taiwan CDC invited delegates from several relevant government agencies, health professional associations, leaders and healthcare workers from hospitals to attend the launch ceremony and to show the public their commitment to improve hand hygiene and combat antimicrobial resistance. Campaign information was also disseminated to all healthcare facilities and healthcare workers were encouraged to display their engagements in practicing hand hygiene and tackling AMR.

Future Prospects

1. Promote hospitals to participate in the Antimicrobial Resistance and Use Management and Surveillance Module in THAS system to strengthen surveillance of AMR.
2. Continue to require or encourage all hospitals to implement the antimicrobial stewardship programs.
3. Continue to strengthen surveillance of antimicrobial-resistant pathogens and promote cooperation between human health and animal sectors to combat antimicrobial resistance.

Current Status

Establishment of BSO management system

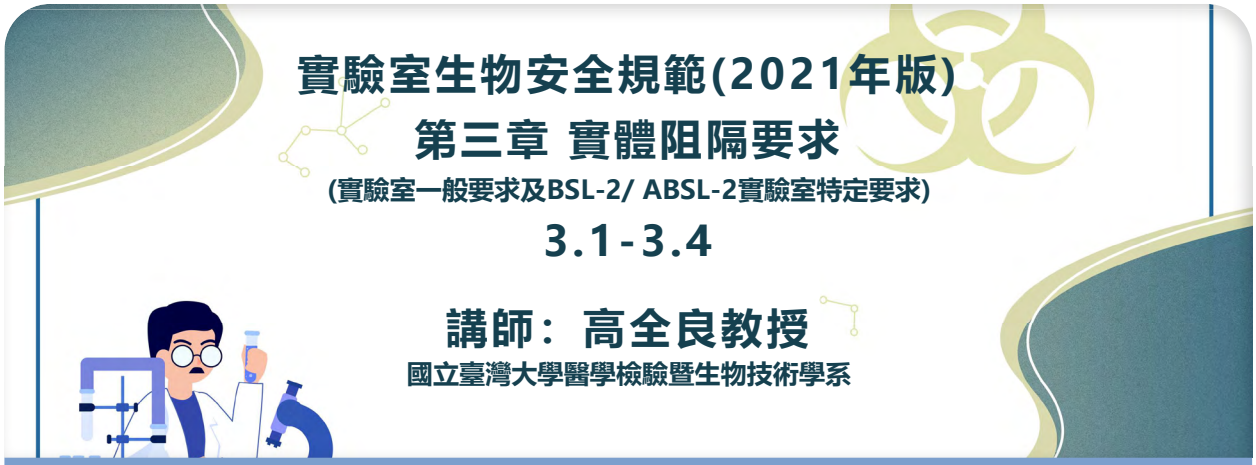
In response to the amendment of "Regulations Governing Management of Infectious Biological Materials" on December 15, 2021, the entities that possess, store, or use pathogens and toxins in Risk Groups (RG) 2 to RG4 shall assign a biosafety officer (BSO) to supervise biosafety management affairs, such as conducting annual internal laboratory audits and supervising emergency response drills in laboratories. The BSO shall complete the Biosafety Officer Fundamental Training Course within 3 months after approval and 8 hours of continuing education annually from the next year. The aforementioned training requirements for BSO will officially take effect on January 1, 2025. In order to prepare for the establishment of a specialized system for BSO training in our country, in 2022, Taiwan CDC developed 14 on-line basic training courses and 16 continuing education materials for BSO. By December 2022, entities which set up BSO over 3 months have all completed basic training course.

Biosafety Mechanism Registration

By December 2022, 606 entities have set up biosafety management units and reported to Taiwan CDC, in which 481 entities had established biosafety committees and 125 entities had a designated BSO. Those 606 entities include 26 government agencies, 169 medical institutions, 60 academic research institutions and 351 other groups.

Biosafety Inspections of Microbiological and Biomedical Laboratories

Because of the COVID-19 epidemic, Taiwan CDC has replaced the annual laboratory biosafety inspection procedure with a documentary review between 2020 and 2022. In 2022, total 18 high containment laboratories have completed biosecurity review. In addition, 15 microbiological and biomedical laboratories that manipulate antimicrobial-resistance pathogens have introduced biorisk management system and completed review of their system operation.



Taiwan CDC have updated an on-line training course of "Laboratory Biosafety Management Guideline" in 2022.

Biorisk management inspections of laboratories and storage places that possess or use select agents and toxins

Laboratories and storage facilities that use and store RG3 to RG4 pathogens and select agents and toxins should establish a biorisk management system. In 2022, total 12 laboratories and storage facilities that possess or use select agents and toxins have completed biorisk management inspections.

Future Prospects

In order to enhance the laboratory biosafety self-management capability of the institutions, Taiwan CDC have amended "Regulations Governing Management of Infectious Biological Materials" and demand all entities that possess, store, or use pathogens and toxins in RG2 to RG4 shall assign a BSO to supervise biosafety management affairs. Taiwan CDC has completed the training materials for BSOs in 2022 and 2023. The focus of the next stage is to establish a mechanism for designating specialized training institutions for BSOs, so that to put in place a sound training maintaining and certification system in Taiwan before 2025.

● Outbreak Investigation

Current Status

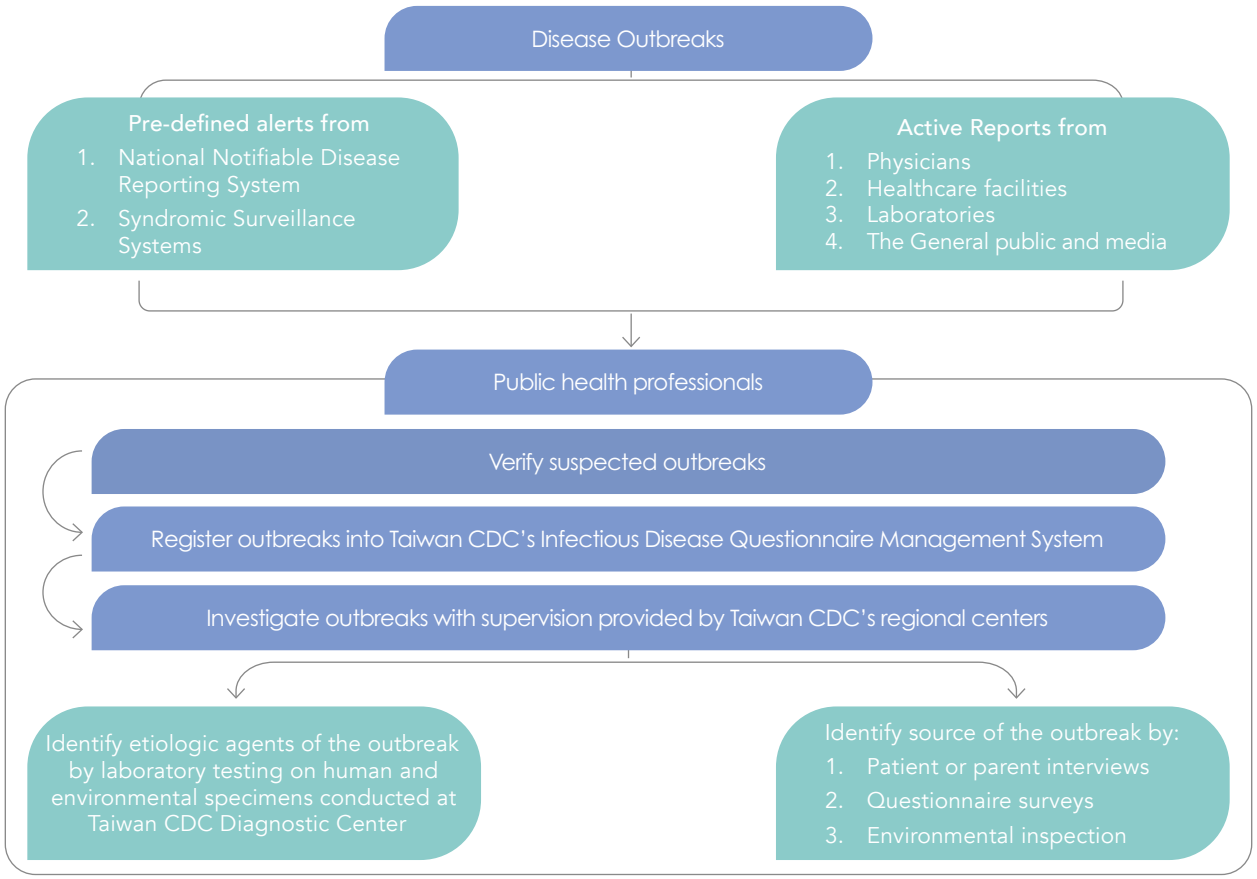
One of the core capacities of public health departments is investigating a disease outbreak to institute control and prevention measures. Outbreak investigations are challenging because the cause and source are frequently unknown and could cause public concern and anxiety. There may be hostility and defensiveness if an individual, product, or institution is suspected of being the source of the outbreak. In such pressure-packed settings, public health investigators have to remain calm, professional, and objective.

In Taiwan, outbreaks are mainly detected through pre-defined alerts or activity reports. Public health professionals will verify a suspected outbreak and conduct outbreak investigation and control measures with supervision by Taiwan CDC's regional centers (Figure 3-12).

Field Epidemiology Training Program and Medical Officers

The Field Epidemiology Training Program (FETP) of Taiwan CDC was established in 1984 to train public health professionals as disease investigators. The program is a 2-year on-the-job training focusing on hands-on field investigations and analysis of public health surveillance data. In 2005, Taiwan CDC began to recruit medical officers in preparation for emerging infectious diseases. Since then, the FETP has become a mandatory training program for newly recruited medical officers.

Figure 3-12 Flowchart of Outbreak Investigation



Accomplishments

1. In 2022, of 805 suspected outbreaks registered into Taiwan CDC's Infectious Disease Questionnaire Management System and investigated by public health authorities, 360 (45%) were confirmed outbreaks.
2. The top four reported diseases/syndromes of confirmed outbreaks were acute diarrhea (n = 290, 81%), acute respiratory infection (n = 43, 12%), tuberculosis (n = 14, 4%), and varicella/chickenpox (n = 12, 3%) (Table 3-5).

Table 3-5 Number of Confirmed Outbreaks by Reported Diseases/Syndromes — Taiwan, 2022 (n = 360)

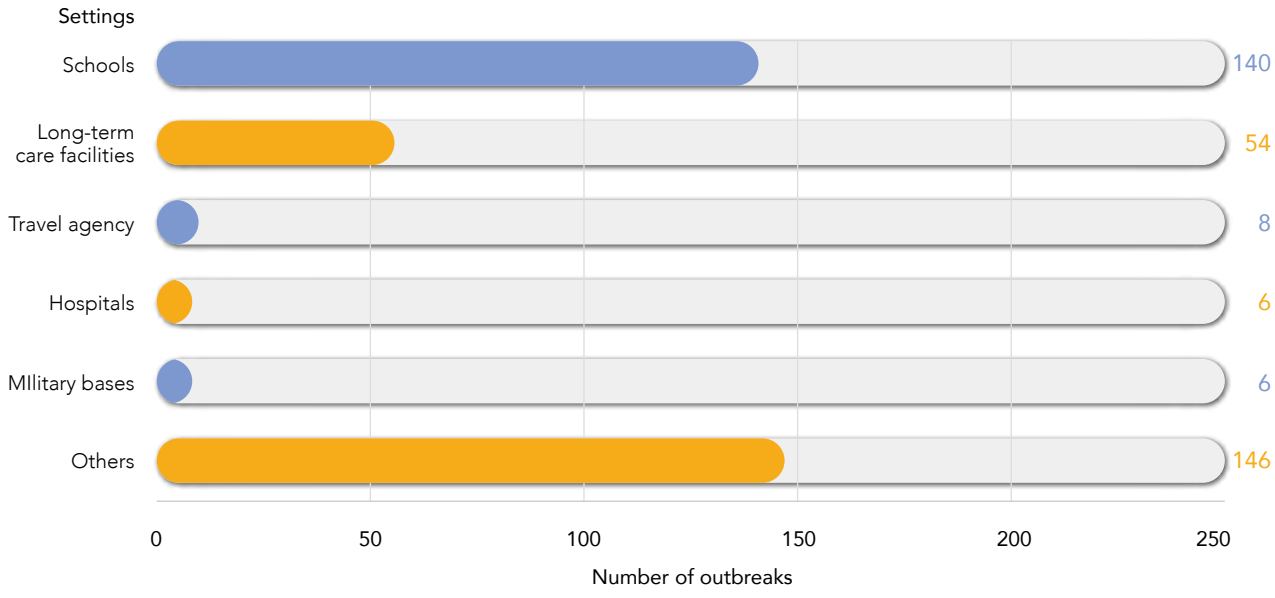
Reported diseases/syndromes	Total number of outbreaks
Acute diarrhea	290
Acute respiratory infection	43
Tuberculosis	14
Varicella/chickenpox	12
Unknown cause of fever	1
Total	360

3. The top three outbreak settings rather than COVID-19 were schools (n = 140, 39%), long-term care facilities (n = 54, 15%), and travel agency (n = 8, 2%) (Figure 3-13).
4. In response to the COVID-19 epidemic, Taiwan CDC established a self-initiated responsive mechanism for individuals testing positive and their close contacts. This mechanism involves recording the date of symptom onset or positive test result, maintaining a detailed contact and activity history, and voluntarily providing contact information to health authorities. Close contacts are urged to self-quarantine at home and follow hygiene guidelines while awaiting further instructions. These proactive measures aim to protect the health of contacts, prevent virus spread, and enable health authorities to take timely action in controlling the epidemic effectively.
5. By the end of 2022, there were 23 medical officers at Taiwan CDC. Their medical specialties included infectious diseases, internal medicine, family medicine, emergency medicine, pediatric gastroenterology, pediatric cardiology, and pathology.

Future Prospects

1. Strengthen collaborations with partners, including local health departments, food and agricultural authorities, universities, and other academic institutes.
2. Enroll newly recruited medical officers and public health professionals of interest from Taiwan CDC and local health departments into the FETP.
3. Collaborate with international networks of FETP to enable rapid response in outbreak investigations and to contribute to global health diplomacy.
4. Strengthen workforce building to prepare for and respond to emerging and reemerging public health threats.

Figure 3-13 Number of Outbreaks by Setting — Taiwan, 2022 (n = 360)



*Other settings including household, workplace, restaurant, correction agency, and unknown.
Note: COVID-19 outbreaks were not included in the analysis.

04

International Health

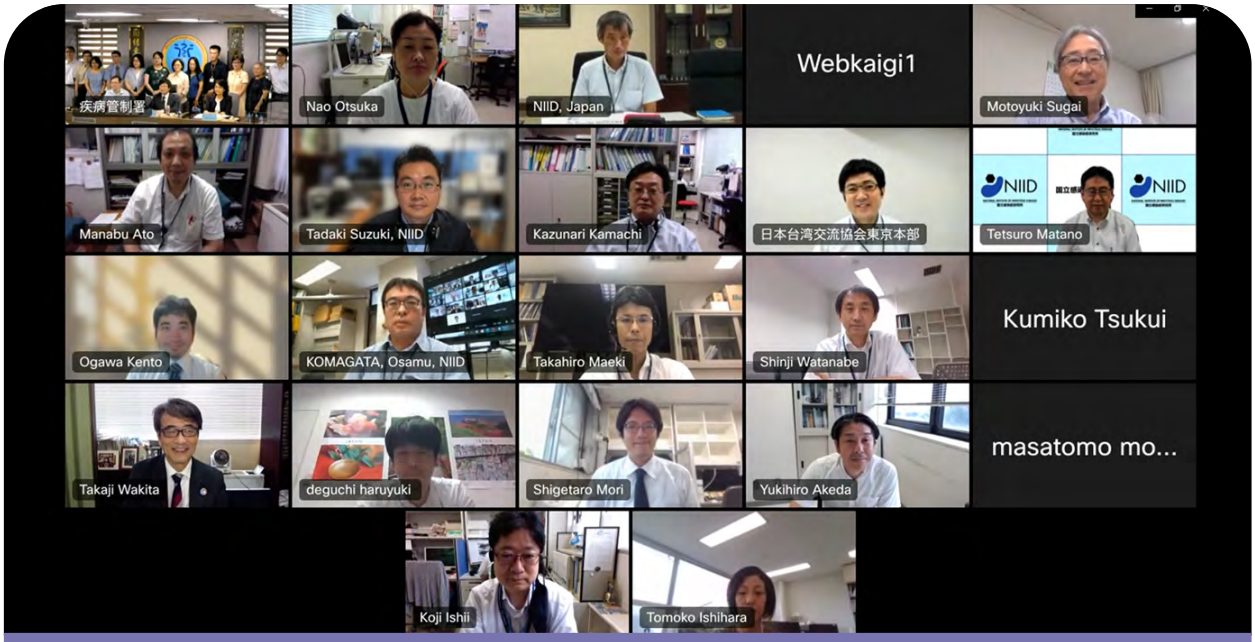
International Cooperation

Taiwan CDC has made great efforts to enhance international health exchanges by strengthening bilateral and multilateral relationships, sharing experiences and information with other countries, and participating in or holding online international public health conferences and related workshops to establish channels for cooperation and exchanges and increase regional capabilities for preventing communicable diseases.

Accomplishments

Bilateral and Multilateral Cooperation Progress Report

1. Taiwan-Japan Bilateral Cooperation
   Since 2004, Taiwan CDC and Japan NIID have taken turns to organize an annual bilateral symposium. The two sides took a step further in 2011, signing an agreement regarding joint research. This agreement has enabled Taiwan CDC and the NIID to conduct joint research on infectious disease prevention. In 2022, Taiwan CDC and NIID cooperated in conducting 11 joint infectious disease research projects and held the 19th Japan-Taiwan Symposium via videoconferencing on September 2, 2022. The participants shared their experiences in COVID-19 preventing and controlling, antimicrobial resistance, and the results of the collaborative project report.



19th Japan-Taiwan Symposium, September 2, 2022

New Southbound Policy

New Southbound Health Center:

To support the government's New Southbound Policy, Taiwan CDC established the New Southbound Health Center. The center is a joint prevention and control network that aims to prevent cross-border transmission of diseases. Its services include infectious disease education, counseling, and medical transfers for individuals traveling between Taiwan and New Southbound countries.

In 2022, Taiwan CDC collected related information on the following 11 countries: India, Indonesia, Thailand, the Philippines, Malaysia, Vietnam, Brunei, Myanmar, Cambodia, Singapore, and Sri Lanka. It then updated its medical treatment databases and health management notices and video content about such information. To support information sharing, Taiwan CDC received a total of 114 notices on local infectious disease situations provided by the central hospital in each New Southbound country (with at least one hospital per participating country), and in return, sent 12 Taiwan's notices on the latest global situation to these central hospitals. Taiwan CDC also produced 90 videos and visual aids on the festivals and holidays in New Southbound countries and disease prevention information. These were shared on Facebook and other channels and reached approximately 1.38 million people.

Medical officers visit New Southbound countries to attend disease-related meetings and conduct assessments:

1. Taiwan CDC's medical officers accepted invitations from the South Asia Field Epidemiology and Technology Network (SAFETYNET) to visit Malaysia for a SAFETYNET strategic planning workshop and Vietnam for a meeting of health investigation training managers. Topics covered included training for experts in applied epidemiology during the post-pandemic era, epidemic response strategies, and how to strengthen responses to emerging and re-emerging infectious diseases. The purpose of these events was to enhance regional public health safety networks.
2. Taiwan CDC medical officers accepted the invitation from Singapore's Ministry of Health to serve as members of the International Review Panel for TB Control in Singapore and conducted onsite assessments of TB prevention effectiveness.

International Exchanges in 2022

1. Interaction with the WHO and Other Countries in Support of the Global Disease Prevention Network
   (1) Used International Health Regulations (IHR) channels to notify the WHO of confirmed COVID-19 cases. Also, Taiwan CDC shared disease investigation information, contacts, and tracking data with IHR channels and countries around the world.
   (2) Participated in WHO professional meetings in order to understand research trends and key points relating to viruses, vaccines, and clinical treatments.
2. Interaction with APEC Members
   (1) Attended APEC Vaccine Task Force (VTF) virtual conferences, including "Understanding the Value of Vaccination: Implementing the APEC Action Plan on Vaccination Across the Life-Course," "Launch of the APEC Dashboard on Vaccination Across the Life-Course," and "Building Sustainable Immunization Practices in Chinese Taipei"

(2) Attended the virtual conferences organized by the APEC members, including "Exploring Health Technologies to Restoring Cross-Border Travel in APEC Post-COVID-19," "APEC Conference on Digital Health Innovation - COVID-19 Response by Health Information Utilization," and "COVID-19 Pandemic Impact on Health Financing: Lessons and Best Practices for Resilience,"

(3) Attended the APEC Project Quality Training organized by the APEC Secretariat, focusing on developing quality concept notes and project proposals.

(4) Attended the 1st APEC Health Working Group (HWG) virtual meetings.

3. Participated in International Meetings to Share Disease Prevention Information
   Taiwan CDC participated in 28 international conferences to share infectious diseases prevention and control policies and experiences.

4. Visits of Foreign Guests
   High-level health officials from the US states of Virginia, Texas, Washington, Tennessee, and North Carolina came to Taiwan to attend the Taiwan-US Health and Welfare Policy Symposium held by the Ministry of Health and Welfare. They also visited Taiwan CDC on December 7, 2022, to learn about Taiwan's COVID-19 prevention policies.

In December 2022, high-level health officials and experts from the United States visited Taiwan CDC

Future Prospects

In the last three years, the COVID-19 pandemic has rapidly spread across the globe, posing a threat to public health and global security, and has demonstrated that international cooperation is essential in preventing and controlling the spread of infectious diseases. To prevent such a pandemic from happening again, all countries need to have the capabilities to rapidly and effectively detect and respond to infectious diseases and other health threats.

As a result, Taiwan CDC will continue to strengthen our bilateral and multilateral cooperation with other countries and international public health institutes, and provide assistance to its counterparts in the Asia Pacific and Southeast Asian regions to enhance their disease surveillance and diagnosis capabilities and core capacities that are important to detect,

assess, report, notify, verify and respond to the threats and challenges presented by emerging infectious diseases. In addition, we will continue to seek more opportunities for active participation in the international arena to help ensure a world safe and secure from infectious disease threats and to promote global health security as an international security priority that will be beneficial to us and the region.

Implementation of the IHR

WHO International Health Regulations

The WHO International Health Regulations (IHR) is a legal instrument to help the international community to prevent and respond to public health risks that have the potential to cross borders and threaten people worldwide. The main purpose of the IHR is to implement public health responses that can prevent and control the spread of diseases across borders while limiting interference with international transport and trade. The IHR also requires that state parties investigate, evaluate and report public health risks and emergencies while reacting promptly to these threats.

Over the years, international transportation has become more convenient, which has led to the frequent movement of people and goods. Diseases can spread far and wide via international travel and trade. A health crisis in one country can impact livelihoods and economies in many parts of the world, such as the severe acute respiratory syndrome (SARS) outbreak in 2003. For these reasons, in 2005, the WHO's World Health Assembly (WHA) revised and passed the new IHR, inviting countries around the world to join. The regulations, which took effect in 2007, cover public health incidents and emerging or re-emerging diseases. The WHO has declared several Public Health Emergency of International Concern (PHEIC) events. Those events included H1N1 (or swine flu) in 2009, polio in 2014, Ebola in West Africa from 2014 to 2016, Zika from 2015 to 2016, Ebola virus disease (EVD) in the Democratic Republic of the Congo from 2018 to 2020, MERS in 2013, and COVID-19 in 2020, and the Monkeypox outbreaks in 2022.

Meanwhile, the IHR establishes several procedures and practices for assessing whether an affected country or region is facing a public health emergency of international concern (PHEIC). This model aims to prevent an epidemic from occurring in a place where it is not yet confirmed to be a communicable disease. The new IHR also strengthens each country's National Focal Point (NFP). The NFP is the state-designated center responsible for communicating with the WHO on public health incidents that have the potential to become an international concern.

Following the IHR, the Taiwan CDC, the TFDA, the Ministry of Foreign Affairs, the Council of Agriculture, and relevant departments and ministries work with the WHO and other countries to conduct prevention and control measures for communicable diseases and other major public health events.

Operations of IHR Focal Point in Taiwan

1. **Receiving information on epidemics or public health incidents that meet WHO IHR standards for reporting:**
   WHO established the Event Information Site (EIS) for IHR National Focal Points (NFPs) and granted Taiwan access in 2009 by the WHO Director General's Office. If an epidemic or public health incident occurs that meets IHR standards for reporting, the WHO uses IHR channels to alert each country, including Taiwan.

2. **Establishing a national, cross-departmental communication channel for forwarding IHR information promptly:**
   A cross-departmental contact point has been established in Taiwan CDC to facilitate timely correspondence with the WHO IHR on information regarding major public health incidents. Agencies with available counterparts include departments within the Ministry of Health and Welfare, the Taiwan Food and Drug Administration, the Ministry of Foreign Affairs, the Ministry of the Interior, the Ministry of Transportation and Communications, the Bureau of Animal and Plant Health Inspection and Quarantine, local health departments, and related authorities. This channel ensures prompt reporting, communication and responses to related events.

3. **Case referral and reporting diseases or public health events meeting IHR standards:**
   The Taiwan IHR focal point serves as a point of single contact for international referral of communicable disease cases (each country's IHR NFP is the counterpart of case referral). The IHR channel informs relevant countries of follow-up investigation results to facilitate attending and monitoring referred cases. If a PHEIC occurs, Taiwan immediately informs the WHO IHR contact point, relevant country IHR focal point partners, and international public health organizations.

Accomplishments

Due to its experience with the SARS epidemic in 2003, Taiwan has vigilantly kept track of information concerning the Covid-19 outbreak in Wuhan, China, in December 2019. On December 31, 2019, Taiwan sent an email to the International Health Regulations (IHR) focal point under the World Health Organization (WHO), informing WHO of its understanding of the disease and requesting further information from WHO. The intelligence was one of the first emails to alert WHO to the possible danger of Covid-19, which was also verified in the official report from IPPPR (Independent Panel for Pandemic Preparedness and Response), reported in the 74th World Health Assembly in 2021.

Given the lack of clarity at the time and the many rumors circulating, Taiwan's aim was to ensure that all relevant parties remained alert, especially since the outbreak occurred just before the Lunar New Year holiday, which typically sees tremendous amounts of travel. The actions mean that this channel serves as the contact point for emerging public health events and as an early warning correspondent.

In 2020-2023, Taiwan CDC referred to and acquired over 1500 COVID-19-related items of public health risks of international importance through the NFP and EIS mechanisms. Among the referrals and received items, the majority were investigation collaboration and assistance requests for COVID-19 cases and contacts. Furthermore, as a member of the global village, Taiwan devotes itself to contributing towards health safety in international society.

● International Ports Quarantine Activities

Current Status

Situated in a subtropical zone with thriving international tourism and trade sectors, Taiwan is highly vulnerable to tropical diseases. To early detect the import of disease and ensure public health, the government established quarantine offices at airports (Songshan, Taoyuan, Taichung and Kaohsiung), seaports (Keelung, Suao, Taipei, Taichung, Mailiao, Kaohsiung, and Hualien), and the three terminals (Kinmen, Matsu and Makung) of the "Mini Three Links" with Mainland China.

To meet WHO's International Health Regulations (IHR, 2005) and prevent the import of diseases by aircraft and ships, Taiwan CDC revised the Regulations Governing Quarantine at Ports. These authorize quarantine units to take all necessary quarantine measures against inbound ships and aircraft together with their crew and passengers for national security and public health protection.

Revisions included:

1. Improved Information Management: Enhanced the one-stop information system for quarantine operations. Made the quarantine process and information management more efficient.
2. Streamlined and Standardized Operations: Called for timely revision and standardization of operational procedures in response to the latest epidemic information and historical events.
3. Quarantine Procedure Follow-up: All inbound aircraft and ships, including their crew and passengers, are subject to quarantine to prevent disease importation. After release from quarantine, follow-up health checks may be performed.
4. IHR Core Capacities at Designated Points of Entry (PoE): Strengthens and maintains core capacities at designated PoEs.

Accomplishments

1. **One-Stop Information Service**
   Establishing the one-stop information system for all information regarding quarantine operations. This included quarantine operations for aircraft and ships, ship sanitation certificates, vaccinations, fee collection, and online statistics.

2. Aircraft and Ship Quarantine:

(1) Any aircraft with crew or passengers exhibiting communicable disease-like symptoms or death must notify Taiwan CDC and document the event. Taiwan CDC will take appropriate measures.

(2) Any ship arriving at a port in Taiwan must declare the state of its sanitation and passengers' health before arrival via telegraph, telex, fax, mobile phone or e-mail. Permission to enter port is granted after the report is reviewed.

(3) Possible scenarios for onboard quarantine:

A. For aircraft: According to the event or emergency, Taiwan CDC may decide to execute aircraft onboard quarantine or other control measures.

B. For ships: In the following cases, quarantine officers may board a ship to implement quarantine measures.

a. The inbound ship did not apply for quarantine.

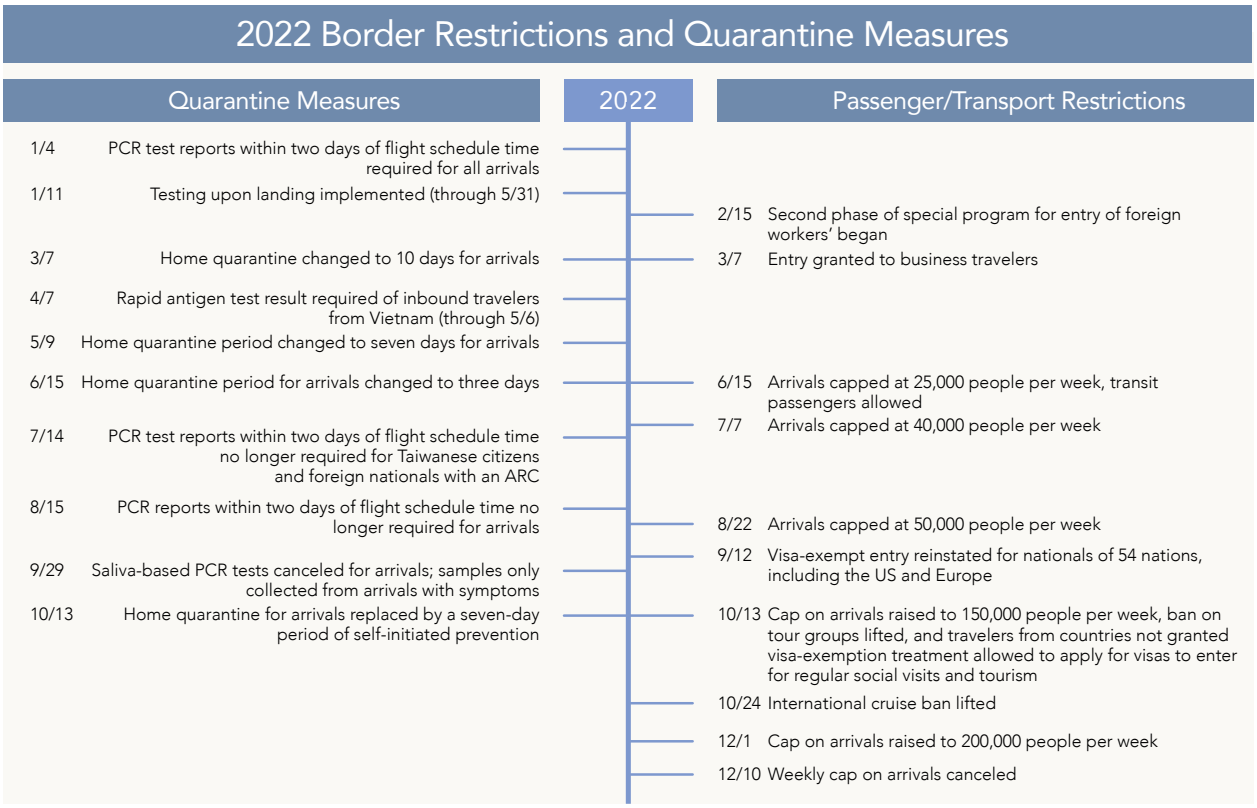
b. It has applied but failed to meet quarantine requirements.

c. It has reported a passenger/crew member suspected of suffering from a communicable disease.

d. There was an abnormal death of animals.

e. There was a suspected illness or death on the ship.

The following diagram shows the state of quarantine measures in 2022:



3. Crew and Passenger Inspection and Quarantine

All arriving passengers are required to have their body temperature measured using infrared thermometers for early detection and prevention. Passengers showing symptoms are required to fill out the Communicable Disease Survey Form. Depending on the severity of symptoms and travel history, those individuals are required to offer on-site specimen and subject to hospitalization and/or submit to follow-up tests by local health authorities.

Arriving passengers who became ill after entry were encouraged to seek medical advice and inform their doctor of recent travel history. In 2022, there were a total of 2,296,981 arrivals at international airports/ports and port of the Mini-Three-Links. With the continued spread of COVID-19, beginning January 4, 2022, arrivals had to present a negative COVID-19 test result taken within two days before their scheduled flight and complete the health declaration on the Quarantine System for Entry prior to boarding. In addition, from July 2, 2021, to September 28, 2022, Taiwan CDC strengthened quarantine measures by implementing enhanced quarantine and health monitoring for arrivals, including requiring all arrivals to take a COVID-19 PCR test. In 2022, 11,729 arrivals with symptoms were detected. Blood testing on 1,061 arrivals detected 31 cases of dengue fever. A total of 860,685 COVID-19 tests were administered to arrivals (including arrivals without symptoms), 27,774 of whom were confirmed to have COVID-19.

4. COVID-19 Border Quarantine Achievements

(1) Important Border Quarantine Measures

A. International ports and airports issued COVID-19 Home Quarantine Notices as a link to smart community prevention measures. After the start of the COVID-19 pandemic, all international ports and airports set up health declaration submission areas to collect and verify health declarations provided by arrivals. This differed from the practice in the early stages of the pandemic, when arrivals were required to fill out paper documents containing their health status and local contact information. Through cross-departmental cooperation, the Quarantine System for Entry was built to expedite the collection of passenger information and customs procedures and to further facilitate subsequent health care and monitoring by health and civil affairs officials. When travelers passed through customs, quarantine officials inspected the information they submitted to confirm the starting and ending dates of their quarantine as well as their quarantine location. Additionally, travelers were informed of relevant home quarantine and self-health management rules they were required to follow.

B. Fever screenings and health evaluations detected travelers with symptoms

Health monitoring of arrivals was implemented at airports/ports. Infrared thermal imaging cameras were installed to measure the temperature of arrivals. Arrivals with abnormal temperatures and those who report their

symptoms were asked about their travel history, occupation, contact history, and cluster information (TOCC), as well as any COVID-19 symptoms (such as abnormal sense of taste or smell). They were also requested to follow the instructions of airport/port quarantine officers regarding necessary testing, hospitalization, and treatment.

C. Enhanced response measures at airports and ports based on COVID-19 risk

a. Starting on July 2, 2021, all arrivals had to undergo a saliva-based PCR test. They were required to take a quarantine vehicle (or the vehicle of a friend, family, or their company/organization) to quarantine at home under the principle of one person per residence or stay at a quarantine hotel to complete quarantine and testing. In addition, samples collected from imported cases underwent viral genome sequencing if they tested positive for COVID-19.

b. As the severity of the Omicron variant increased at the beginning of 2022, the CECC tightened the rules concerning the validity of negative PCR test results for inbound travelers, changing it from three days to within two days of the flight schedule time. The number of days was counted from the day of specimen collection based on calendar days.

c. In January and February 2022, Taiwan CDC assembled a "national nursing team" and arranged for the team to visit international airports and ports to provide infection control guidance, seed training and implement daily staff management.

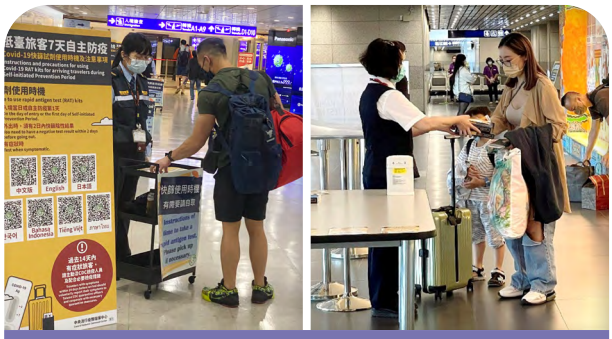
The national nursing team visits Taoyuan International Airport on January 8, 2022, to review infection control of entry procedures.

d. Between January 11 and May 31, 2022, travelers arriving in Taiwan on long-haul flights that originated in the Americas, Europe, the Middle East, New Zealand, or Australia and flights from India, East Asia, Southeast Asia, or South Korea were required to undergo a rapid PCR test when their flight touched down. Passengers who tested positive were not allowed to enter the airport terminal to reduce the risk of infection for airport workers.

On September 28, 2022, Premier Su Tseng-chang inspects quarantine procedures at Taoyuan International Airport.

D. From strict risk control to new Taiwan Model: relaxation of restrictions during stable pandemic situation.

a. Starting from August 15, 2022, all inbound passengers were no longer required to provide a negative COVID-19 PCR result taken within two days of their flight schedule time.



Rapid test kits are distributed to international arrivals. Airport staff provide information on how to administer rapid tests.

b. On September 29, 2022, saliva-based PCR testing was canceled for arrivals. Instead, each arrival was given four rapid test kits at home testing. The protocol that required arrivals with symptoms to undergo health assessments and follow other necessary measures remained in place.

c. On October 13, 2022, the CECC ended home quarantine for arrivals and instead instituted a seven-day period of self-initiated prevention. Also, COVID-19 Home Quarantine Notices were no longer issued to arriving travelers. Airports resumed normal entry procedures while providing travelers with extensive health promotional and educational materials.

d. On June 15, 2022, the CECC imposed a weekly cap of 25,000 arrivals. On July 7, 2022, it increased the weekly cap of arrivals to 40,000 people, and on August 22, 2022, it increased the weekly cap to 50,000 people. The weekly cap was increased to 150,000 people on October 13, 2022, and to 200,000 people on December 1, 2022. In order to accommodate increased travel demand at the end of the year and during the Lunar New Year holiday, the CECC removed its weekly cap of arriving passengers from December 10, 2022.

(2) Disease Prevention and Quarantine Response for Airports and Aviation Operators

A. Rolling changes to disease prevention measures for frontline workers based on the pandemic

Frontline workers at airports/ports and flight crews frequently have contact with international arrivals. At the start of the COVID-19 pandemic, Taiwan CDC evaluated the nature of the operations and infection risks at airports/ports, and then used these findings to establish relevant recommendations and principles. To ensure work safety and continuation of the operations at Taiwan's ports and aviation transport industry, the Civil Aeronautics Administration (CAA) formulated rules for personal protective equipment to be worn by crews as well as safety and protection measures for passengers. It enacted the "Operational Principles for R.O.C (Taiwanese) Airlines Air Crewmembers to Implement Health Control Measures for Epidemic Prevention" to oversee the implementation of outstation hotels and transportation management, in-flight protection measures, and quarantine measures for crews upon their return to Taiwan. Based on developments in

the pandemic situation, Taiwan CDC made rolling changes to these disease prevention measures. Regarding crew members of foreign airlines and passengers on flights with special circumstances, Taiwan CDC formulated a plan for transit and quarantine hotel stays to allow these individuals to stay in designated quarantine hotels as transit passengers. Transportation to and from the hotels followed the same standards as quarantine vehicles.

Starting from October 13, 2022, arrivals were no longer required to undergo home quarantine and instead followed a seven-day period of self-initiated prevention. Meanwhile, relevant quarantine plans for crew members were also suspended, and the CAA supervised the implementation of the business continuity planning by airlines.

B. Monitoring plan for high-risk airport workers implemented to lowered cluster risks

On August 30, 2021, Taiwan CDC began implementing a monitoring plan for designated high-risk workers in international airports. The plan included weekly COVID-19 rapid antigen testing or PCR testing for designated high-risk workers at four international airports, Taipei Songshan Airport, Taoyuan International Airport, Taichung International Airport, and Kaohsiung International Airport, for early detection of potentially infectious cases. When home quarantine for arrivals was replaced by a seven-day period of self-initiated prevention, the airport monitoring plan also ended.

(3) Rolling Adjustments to Quarantine Measures for Port and Ship Operators

A. Continued revisions to epidemic prevention guidelines for crew members and ships and quarantine measures to balance epidemic prevention work and ongoing shipping operations

The scope of Taiwan CDC's "Guidance on Epidemic Prevention Measures for Docking Ships and Health Monitoring of Crew Members" included ship arrival declarations, crew arrival notification, reporting of any health abnormalities of crew members, disease prevention management by the ship operator (captain), contingency plans to handle suspected COVID-19 cases on board, and a quarantine channel for crew members who would leave Taiwan within three days of disembarkation. Additionally,

Quarantine officials conduct on-board quarantine inspections

Taiwan CDC further developed quarantine mechanisms for risk conversion including whole ship quarantine and whole crew replacement. The number of quarantine days as well as the testing method were adjusted in response to changes in domestic disease prevention measures. When a positive case was detected on a ship, the shipmaster must report it to arrange for isolation on land. If it was a mild case, isolation could be arranged on board or the case could leave with the ship after submitting a written declaration. Taiwan CDC also cooperated with relevant maritime authorities to make rolling changes to quarantine plans for commercial vessels, offshore wind turbine installation vessels, and fishing boats in order to balance disease prevention risk management and the needs of the maritime industry.

B. Trial implementation of rapid testing program for all crew members on board before entering the Port of Kaohsiung

To ensure the health of crew members on inbound ships and reduce the risk of infection among port workers, from March 1 to May 8, 2022, a trial rapid test program for all crew members on board before entering the Port of Kaohsiung was implemented. All crew members on ships sailing on international routes were expected to undergo rapid tests or PCR tests within 48 hours before entering the Port of Kaohsiung and then report their test results. If all the crew members tested negative, the ship could proceed with normal loading and unloading procedures. If any crew member tested positive, all crew members were required to undergo PCR tests at the pier upon entry into the port. If any crew member tested positive, additional quarantine mechanisms such as whole ship quarantine or whole crew replacement should be implemented before loading or unloading could begin. During the trial, seven ships reported abnormal health situations with a total of 12 crew members having positive rapid test results.

C. Worked with Maritime Port Bureau to draw up guidelines for epidemic prevention measures for cruise ships in response to lifting of ban on international cruises

As the pandemic slowed down, some countries began to restart cruise ship operations. After evaluating the stable epidemic situation in the community and domestic epidemic prevention capacity, Taiwan CDC collaborated with the Maritime Port Bureau, MOTC to develop "Guidelines for International Cruise Ships Calling at Ports for Inbound Travel" and "Operational Guidelines for International Cruise Ships at Home Ports in Taiwan." These guidelines became effective on October 24, 2022. The guidelines stipulated the required epidemic prevention measures for cruise ships returning to home ports or calling at ports. These measures included the requirements that cruise ship operators have sufficient medical resources and test kits on board, that crew members receive epidemic prevention training, and that passengers provide a negative COVID-19 test report before boarding/disembarkation. The guidelines also offered recommendations on the required vaccine doses,management of positive cases and close contacts,

and quarantine measures for arrivals. Under the guidelines,owners of international cruise ships with home ports in Taiwan needed to submit epidemic prevention and control plans to the competent authority for review and record keeping.

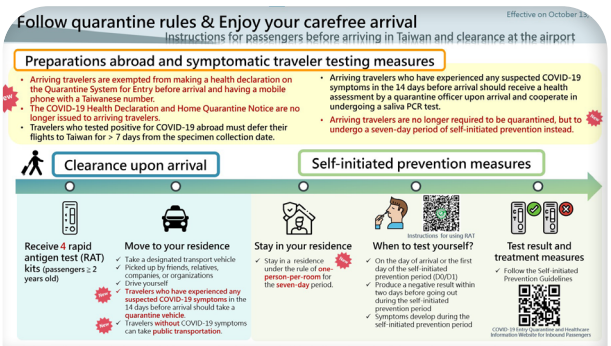
(4) Quarantine System for Entry used as a link to smart community disease prevention

A. To better implement border and quarantine policies, Taiwan CDC took an inventory of practical needs on the front lines and quickly built a system to understand the health status of arrivals. When checking in at their point of origin, travelers scanned a QR code to access the Quarantine System for Entry website. While waiting for their flight, they filled out a health declaration on the system. When their flight arrived in Taiwan, their health declaration receipt and quarantine form were sent to the travelers via text message. They showed these documents to quarantine officials in order to pass through customs and immigration.

B. Taiwan CDC enhanced advocacy and communications channels in order to increase the use of the online health declaration. Travelers followed these four steps to complete their online health declaration: scan, enter data, receive a text message, and show their phone screen. The digital declaration usage rate already exceeded 99%.

C. Taiwan CDC coordinated cross-system links and integrated data sharing. The National Immigration Agency's Advance Passenger Information System was used to assist in comparing and confirming travelers' identities. This system could provide general information, such as travel history and symptoms, which was linked to the Smart Quarantine Multifunction System to avoid repeated data entry by quarantine officials. Data was also entered into the Disease Prevention Tracing System to make community disease prevention more effective and to build data sharing mechanisms.

D. In response to the changes in border and quarantine policies, the quarantine measures for long-haul crew were adjusted on June 15, 2022. Crew members who had received a COVID-19 booster at least 14 days before their return to Taiwan and tested negative after return could undergo seven days of self-health management, instead of three days of home quarantine (based on the principle of one person per room without being permitted to leave) followed by a four-day period of self-health management. The Quarantine System for Entry was not used for entry after October 13, 2022.



On October 13, 2022, Taiwan CDC eases quarantine measures and provides online instructions for passengers to follow before arrival in Taiwan.

E. As the pandemic situation evolved, the COVID-19 Home Quarantine Notice was updated for 20 times after the Quarantine System for Entry was launched on February 16, 2020. Frequent system upgrades kept Taiwan ready for the evolving pandemic situation. When home quarantine measures ended on October 13, 2022, the system was renamed the "Entry Health Declaration System." Travelers with symptoms are required to fill out the online form. This system will continue to be used even in the post-pandemic era to make quarantine work more effective.

5. Control of Disease Vectors in Ports

To control vector density (i.e., any infectious disease carrier such as rats or mosquitoes) at ports and prevent the spread of communicable diseases, Taiwan CDC adopted the following measures:

(1) Rat Surveillance and Control:

A. Putting out anticoagulant baits in places where rats are rampant. Baits are replenished every 10 to 15 days to ensure efficacy.

B. Examining captured rats for parasites and test blood serum for Rickettsia typhi, plague, and hantavirus.

(2) Mosquito Surveillance and Control:
Mosquitoes are vectors of several communicable diseases, including yellow fever and dengue fever. The mosquito population density is closely related to the development of an epidemic. To understand the variety and quantity of mosquitoes, the following methods have been adopted:

A. Discovering and eliminating breeding sources of dengue fever vectors: Empty containers that are prone to retain water (bottles, jars, tires, etc.) are checked monthly to prevent vector breeding.

B. Setting Ovitraps: Traps are placed around the port/airport for mosquitoes to lay eggs. The inside of the traps are laid with pieces of coarse cloth moistened with Temephos to kill the larvae after they hatch out. The traps were replaced monthly, and the number of eggs laid was used for calculating the mosquito population density in the port areas.

C. Surveying Adult Mosquitoes: Lamps were hung in selected places for trapping mosquitoes to identify their species and track their activities.

(3) Organizing International Port Sanitary Groups: members are made up of port authority personnel and stakeholders, including Custom, Immigration, TCDC regional centers, Animal and Plant Quarantine, National Security Bureau, representatives of airline companies, cargo terminal, and other relevant organizations. Depending on each state of PoE, these representatives meet every three to six months to coordinate action plans and implement policies concerning port security and sanitation.

6. IHR Core Capacities at Designated PoE

In June 2022, the WHO published the "Joint external evaluation tool: International Health Regulations (2005) - third edition." It stated that all points of entry (PoEs) shall be included in national monitoring systems, and that some non-designated PoEs shall also possess core

capacities. To ensure that Taiwan's ports meet WHO recommendations, the Executive Yuan approved the second phase of the Core Capacity and Sustainable Development Plan for IHR PoEs (2022 – 2027). The plan involves re-evaluating domestic PoEs and dividing them into IHR-designated PoEs and IHR non-designated PoEs (Type 1 and Type 2) to fulfill the latest international assessment standards. In 2023, Taiwan CDC will add the Port of Taipei, the nation's third largest cargo port, as Taiwan's 8th PoE, bringing the total port throughput covered by designated PoEs to 94%. The plan also involves the formation of a team of advisors with expertise in a wide range of disciplines. Their help in formulating assessment indicators for the core capacities of ports and participation in on-site guidance and assessments will advance the overall core capacities of ports.

In 2022, Taiwan had seven designated PoEs consisting of four airports and three seaports capable of mobilizing staff from different government agencies and implementing disease prevention and quarantine measures. These PoEs have the core capacity to respond to international public health emergencies (such as COVID-19) and manage border risks to ensure national disease prevention and safety.

7. Other Sanitation Control Measures

(1) Shipboard Sanitation Control: To prevent the spread of diseases on ships on international routes, Taiwan CDC imposes ship control measures in accordance with IHR (2005) and the Regulations Governing Quarantine at Ports.

A. Implementation of IHR (2005) on June 15, 2007, included issuance of required sanitary documents for international shipping such as the Ship Sanitation Control Exemption Certificate and the Ship Sanitation Control Certificate. Taiwan CDC granted these documents a six-month period of validity. On these documents, shipping crew must identify and record all areas of ship-borne public health risks, and the required control measures conducted.

B. To prevent rats from running to shore along mooring cables, rat guards must be hung on every cable. Ships that fail to do so would be immediately reported and put on record for quarantine reference the next time they call on the port.

(2) Since direct voyage routes between several authorized fishery ports in Taiwan and China were permitted, local health authorities began to conduct additional quarantine work to prevent transmission of communicable diseases.

8. Promoting Travel Health

A total of 32 travel clinics, distributed across the country, provide pre-travel preventive medicine, vaccines and consultation for measures to prevent disease during travel. At the same time, Taiwan CDC established the Training Center for Travel Medicine to promote related education and research, and it provides people with the latest international travel health information via Taiwan CDC's official website.

The "2022 International Symposium on Travel Medicine" was held in Taipei on October 21, 2022. Professor Peter Leggat, president of the International Society of Travel Medicine (ISTM) and Dr. Lin Hwei Chen, associate professor of Harvard Medical School, USA, were invited to give a speech about response and experience in the post COVID-19 era, especially current

2022 International Symposium on Travel Medicine, October 21, 2022

challenges and future response strategies in travel medicine. Taiwan CDC's medical officers and experts shared their international travel medical expertise and the latest developments. Professional medical personnel from travel clinics and related workers were invited to participate in the discussion to enhance the professional knowledge of travel medicine.

9. **Response Preparation and Border Quarantine Plans for Emerging Infectious Diseases and Influenza Pandemic (2022 – 2027)**
   Taiwan CDC continues to advance port quarantine measures and detection capacity, optimize quarantine information systems, improve core competencies of quarantine staff, implement the second phase of the Core Capacity and Sustainable Development plan for IHR PoEs, promote travel medicine, and actively participate in international meetings and conferences. These measures enhance border detection capacity and reduce the impact of imported cases of infectious diseases on community disease prevention efforts.

Future Prospects

1. With limited manpower and equipment, CDC continually aimed to strengthen border quarantine capacities and effectively execute quarantine measures to prevent any import of disease.
2. Cultivate professional quarantine personnel, encourage the development of new quarantine techniques, and improve quarantine officers performance.
3. Further eradicate vectors on ships and monitor rat and mosquito populations in port areas to avoid the spread of communicable diseases.
4. Continue to maintain and strengthen core capacities at the seven designated PoEs based on the IHR (2005) in order to extensively improve respond capabilities of our international ports and prevent the spread of disease in our nation.
5. As the global COVID-19 pandemic situation has remained stable, many countries have eased their borders and community disease prevention measures. Taiwan decided to open its borders in a steady, gradual manner while using past experience as a basis for monitoring the COVID-19 situation and the implementation of border policies at home and abroad. Considering the domestic disease prevention capacity and medical capacity, strategic rolling changes in policies and related measures will be made to ensure border quarantine capacity and streamline border quarantine control procedures.

05

Scientific Research and Development

Research, Development and Manufacturing

Current Status

Taiwan CDC is the competent authority governing laboratory testing for communicable diseases and development of testing technologies in Taiwan with three major focuses:

1. Laboratory testing for communicable diseases, the establishment of testing standards, and training of professionals; the establishment, analysis, and application of a biorepository and pathogenic microorganism genome database; the appointment, commission, and approval of institutions for laboratory testing; the planning and execution of regulations governing laboratory biosafety and quality assurance.
2. Development and transfer of laboratory testing technologies.
3. Planning and execution of policies governing the manufacturing of anti-snake venom serum and vaccines.

In addition, facing emerging and re-emerging communicable diseases, Taiwan CDC puts great emphasis on international collaboration with a focus on information exchange, experience sharing, and laboratory technology advances.

Accomplishments

The National Laboratory System for Public Health in Taiwan

Taiwan CDC supervises quality management of the National Laboratory System conducting diagnostic testing of major infectious diseases, which includes 266 COVID-19 designated labs, 11 Novel Influenza A virus infections designated labs, 16 commissioned labs, 262 authorized labs, 1 anatomical pathology lab, and 1 diagnostic for highly pathogenic organisms and toxin lab. All of the indicators, including laboratory testing for detection of 10 priority diseases, specimen referral and transport system, effective modern point of care and laboratory-based diagnostics, as well as laboratory quality system, were verified to have sustainable capacity and thus reached the full-score level. In 2022, Taiwan CDC national laboratories conducted 164,138 tests and were accredited by TAF according to ISO 15189 from March 13, 2021, to March 12, 2024, and ISO 17043 from Jun 14, 2021 to Jun 13, 2016.

National Influenza Center (NIC)

During the COVID-19 pandemic in 2021, the influenza activity was low in Taiwan and globally. In Taiwan, no seasonal human influenza virus was detected and isolated. In 2021, a reassortant swine-origin influenza A(H1N2)v virus was isolated from a 5-year-old girl. Full-genome sequencing and phylogenetic analyses of this virus revealed that it is a novel reassortant virus containing hemagglutinin (HA) and neuraminidase (NA) gene segments derived from swine influenza A(H1N2) viruses and the other 6 internal genes are from human A(H1N1) pdm09 viruses.

Viral Respiratory Diseases Laboratory

1. Established a national laboratory network of SARS-CoV-2 with a capacity of 23,6873 real-time RT-PCR tests per day, comprised of 266 laboratories.

2. Performed multiplex real-time PCR reactions, which targeted Influenza A and B, human adenovirus, RSV, coronaviruses (229E, OC43, NL63, HKU1, MERS), human metapneumovirus, bocavirus, parainfluenza type 1-4, Enterovirus, Rhinovirus, Parvovirus B19, HSV1, HSV2, CMV, VZV, Legionella pneumophila and Mycoplasma pneumoniae, for diagnosis of unexplained severe pneumonias and respiratory disease clusters.

3. In 2022, 7,744 SARS-CoV-2 viruses were sequenced for variant genotyping, including 4,558 from domestic cases and 3,186 from imported cases in Taiwan. In domestic viruses, the variants, BA.1, BA.2 and BA.5 became predominant in January, March and September, respectively. In imported viruses, the variants, BA.1, BA.2 and BA.5 became predominant in January, February and June, respectively. The domestic variants were delayed 1-3 months to predominate temporally, compared with imported variants. Emerging variants and variant replacement were associated the level of epidemic.

Viral Enteric and Diarrhoeal Diseases Laboratory

1. Norovirus is the main cause of acute gastroenteritis (AGE) outbreaks in Taiwan. In 2022, 325 (59.6%) of 545 AGE outbreaks were laboratory diagnosed as Norovirus infection. Of them, GII.2 accounted for 158 (48.6%) was the major genotype causing norovirus outbreaks in Taiwan.

2. Join the global pediatric norovirus strain surveillance network for monitoring the emergence of new or rare strains and for developing vaccines that protect against the most common strains.

3. To better understand foodborne pathogens distribution and genotypes in Taiwan, a nanopore sequence technology was applied to real-time sequencing the whole genome sequence data of acute gastroenteritis pathogens which is directly from clinical materials.

HIV and Emerging Diseases Laboratory

1. Continued HIV drug resistance surveillance survey among treatment naïve patients. Subtype B is the most common subtype in Taiwan and the overall drug resistance rate for any class of anti-HIV drugs was around 15.8% in 2020, 13.2% in 2021.

2. There were no HIV or HCV infections due to blood-transfusion in Taiwan from 2015 to 2022 based on HIV and HCV molecular epidemiological surveillance data and case study.

3. In case of any Enterovirus outbreak, both Pan-EV real-time RT-PCR and EV semi-nested RT-PCR are available and prepared for rapid identification of suspected patients. 13 eligible medical centers are approved and authorized for both laboratory diagnostic methods applied in EV infection.

4. Due to the escalating global monkeypox (Mpox) outbreak a Public Health Emergency of International Concern was issued by WHO, molecular detection methods have been rapidly established within Taiwan CDC laboratory and four imported cases were identified.

Vector-Borne Viral and Rickettsial Diseases Laboratory

1. Developed a rapid multiplex nucleic acid assay for anaplasmosis, ehrlichiosis and murine typhus to provide medical diagnosis and control measures of the diseases. And has successfully applied for a patent in Taiwan. (Invention No.: I788990)

2. In 2022, a total of 68 imported dengue cases, 20 indigenous dengue cases, one imported chikungunya case, 19 Japanese encephalitis cases, and five hantavirus cases were identified. No Zika cases had occurred during 2022. Dengue virus genome sequences provided essential information on the global expansion and genetic evolution of vector-borne viruses.

3. In 2022, a total of 276 scrub typhus cases and 17 murine typhus cases were detected by a laboratory-based surveillance project. The results provide essential epidemiological information for disease control.

4. In 2022, one SFTSV confirmed case was identified from suspected rickettsioses cases, phylogenetic analysis showed that the genotype belonged to genotype B, which was closely related to Korean and Japanese isolates.

5. In 2022, the COVID-19 Antigen Rapid Test Kit has successfully transferred technology to a biotech manufacturer, which will benefit the development of the biotechnology industry.

Bacterial Respiratory Diseases Laboratory

1. In 2021 and 2022, a total of 391 cases of invasive pneumococcal disease (IPD) were notified. The incidence was 0.8 cases per 100,000 population, and the case fatality rate was 8.6%. Among invasive Streptococcus pneumoniae strains, the most prevalent serotypes were 23A, 15A, 19A, and 34. Toward penicillin, cefotaxime, and erythromycin, 47%, 63%, and 13% strains were susceptible, respectively.

2. In 2021-2022, a total of 734 cases of Legionnaires' disease were laboratory-confirmed, including 580 males and 673 cases older than 50 years.

Bacterial Enteric and Emerging Diseases Laboratory

1. Analysis and comparison of carbapenem-resistant Enterobacteriaceae by next generation sequencing.

2. Analysis of full genome sequences of SARS-CoV-2 by next generation sequencing.

3. Employed high-throughput sequencing for unknown pathogen discovery.

Parasitic Diseases Laboratory

1. Diagnosed imported malaria cases and identified Plasmodium to the species level by rapid test, microscopic and molecular methods.

2. Conducted amoeba and toxoplasma diagnosis in high-risk populations.

3. Published printed and online "Atlas of Human Blood Parasites" and "Atlas of Human Intestinal Parasites" as diagnostic references for medical technicians and health care workers.

4. Intestinal and blood parasite smears were made and sent to about 60 hospitals in 2022 to improve the competence in parasite microscopy of medical technicians and increase the detection rate.

Mycotic Diseases Laboratory

1. Conducted diagnostic assays and molecular epidemiology studies of fungal and sexually-transmitted pathogens.
2. Performed *Candida haemulonii* species complex identification to monitor *Candida auris* infections in Taiwan.
3. Carried out G-NICE (Gonococci-National Isolate Collection for Epidemiology) for the surveillance of resistance trend and molecular epidemiology study on *Neisseria gonorrhoeae*. In 2022, 2.91% of isolates were decreased susceptibility to cefixime (MIC≥ 0.25 mg/L); 0.54% of isolates were decreased susceptibility to ceftriaxone (MIC ≥ 0.125 mg/L); 0.54% of isolates exhibited azithromycin resistance (MIC≥ 2 mg/L).

Tuberculosis Research Center and Mycobacterial Disease Laboratory

1. Provided advanced molecular detection technologies such as whole genome sequencing for facilitating investigation of tuberculosis (TB) transmission, and targeted next generation sequencing for comprehensive detection of resistance to 14 anti-TB drugs.
2. Adopted the One Health approach to establish a bovine TB (bTB) surveillance program. The burden of human bTB in Taiwan was 1%; of which, 27.7% Mycobacterium bovis isolates were concurrently resistant to isoniazid and pyrazinamide.
3. Carried out external quality assurance program by monitoring clinical TB experimental data and quality index of 51 authorized TB laboratories through the Laboratory Information Management System, by performing AFB smear rechecking, by providing drug-susceptibility testing proficiency testing, and by conducting on-site visits.
4. Managed an archive of approximately 160,000 Mycobacterium tuberculosis complex isolates, and a genotype database of 25,257 with an automatic genotype comparison platform for timely TB cluster surveillance.
5. Confirmed 50% (4/8) notified leprosy cases using a molecular test.

Vector Biology Laboratory

1. Conducted serosurveillance of *Rickettsia typhi* infection and ectoparasite identification of rats from 21 international harbors and airports in 2022.
2. Performed data analysis of dengue vector surveillance weekly.
3. Conducted species identification of mosquitoes collected from malaria vector (Anopheles minimus) surveillance and harbor-airport mosquito surveillance.
4. Carried out virus detection on Culex vectors of Japanese encephalitis and Aedes vectors by request.

Establishment and Application of a Pathogen Genome Sequence Database in Taiwan

Taiwan Pathogenic Microorganism Genome Database (TPMGD) – is now online and accessible to the general public. Users can apply for an account to browse over 50,000 Taiwanese pathogen sequences, with basic epidemiological information, and perform comparative genomic analysis. Bioinformatic tools, including BLAST, are available for finding similar viral genome sequences from Taiwan. Furthermore, the viral strains included in the latest WHO-recommended composition of the influenza vaccine are kept updated. The latest version of the website is available at https://genin.cdc.gov.tw/TPMGDWeb/.

Manufacturing of Serums and Vaccines

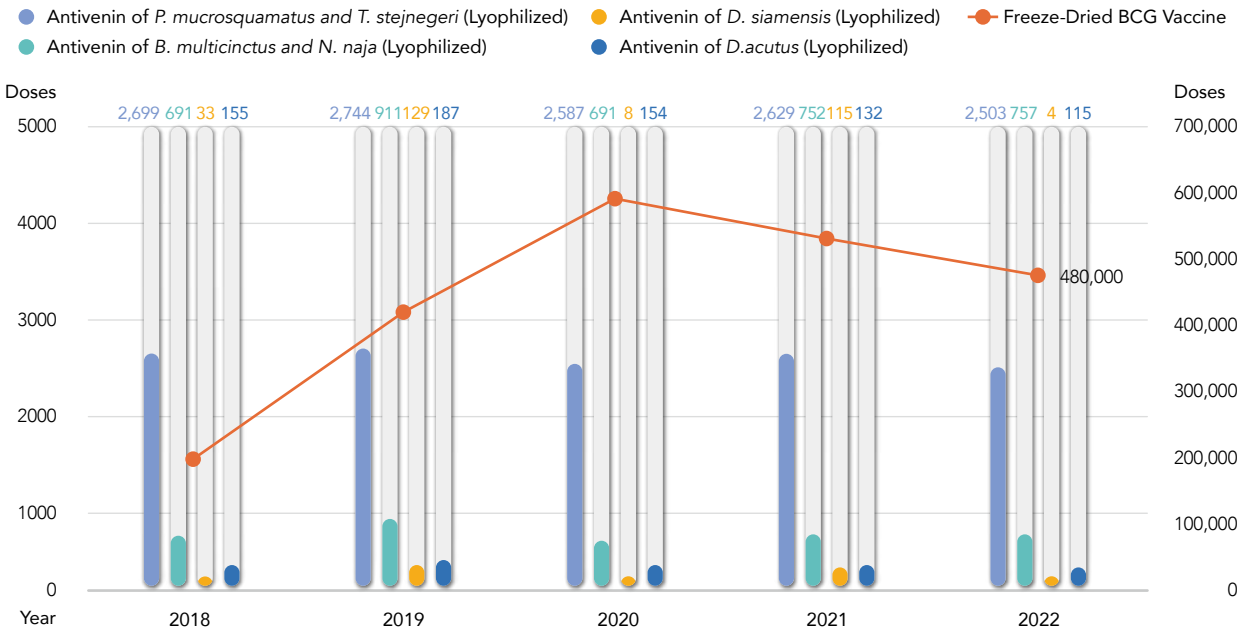
1. Production of Bio-Products

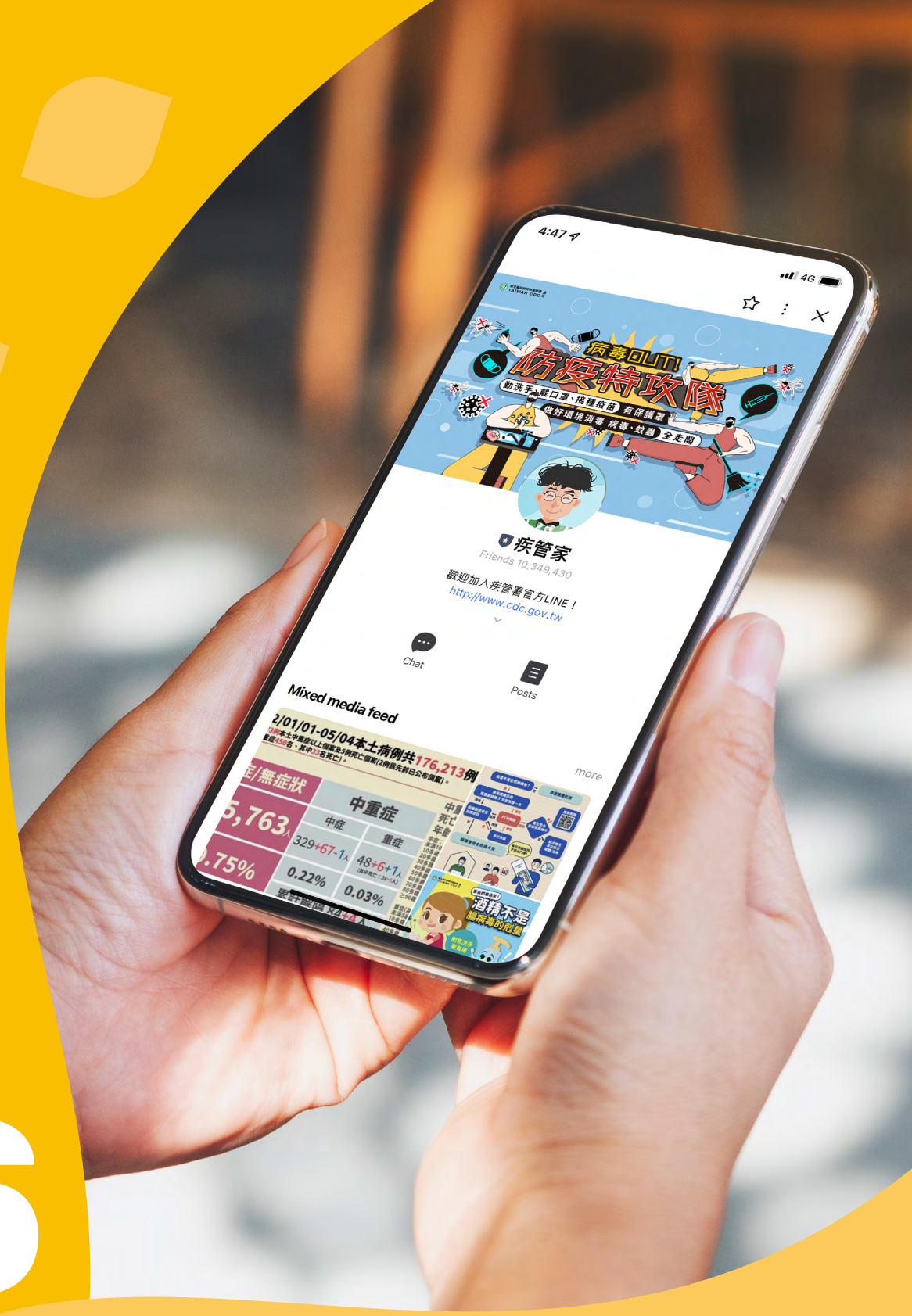
   (1) A total of 312.9 liters of antivenom immunoglobulins was separated from the blood of hyperimmunized horses in 2022.

   (2) A supply of 483,379 doses of vaccines and antivenoms was available in 2022 (Figure5-1). Income from the sales of these biologics totaled about NTD$83.72 million.

2. Contract manufacturing
   In 2022, a total of 4,870 doses of antivenin and 480,000 doses of BCG were supplied by the contract manufacturer, operated by the bioproduction plant of the National Health Research Institutes.

Figure 5-1 Biologics Supplied by Taiwan CDC in 2018~2022





06

Marketing and Publications

Marketing and Publications

Current Status

To improve public awareness about communicable diseases and related policies, as well as public support for Taiwan CDC's efforts, the agency created a health marketing program. The program aims to promote disease prevention among the general public through a series of interactive events.

Goals

To strengthen risk communication with the public, improve public awareness, and involve everyone in efforts against epidemics.

Accomplishments

1. Media Monitoring and Timely Response

A news monitoring and alert mechanism was set in place to enhance communication of communicable disease control policies. In 2022, a total of 41,668 pieces of related news were reported in response to public concern over matters related to disease control. Competent authorities voluntarily held press conferences and issued press releases to keep the public informed and intensify policy communication. Moreover, 276 press conferences were held and 679 press releases were issued.

2. Integrated Marketing of Disease Prevention

Each year Taiwan CDC selects specific diseases to focus on. Through focusing on specific diseases, Taiwan CDC aims to spread key messages related to disease control and increase public health awareness. In 2022, Taiwan CDC's major focuses were COVID-19, tuberculosis, AIDS and seasonal influenza.

(1) Press conferences: When announcing disease prevention measures and new communicable diseases, Taiwan CDC holds press conferences to improve awareness about major policies and achievements. In support of World TB Day and its theme for 2022 of "Invest to End TB. Save Lives," on March 23 ,Taiwan CDC held a special event

titled "Together We Have the Strength to Beat TB.". In cooperation with 22 county and city health bureaus, through the special effect frame of Facebook profile picture and Instagram limited-time dynamic filter activities. Let's call on the public to fight against COVID-19, but don't forget that tuberculosis, which is also a respiratory infectious disease, has not yet been eliminated. It requires more attention from the whole people and concerted efforts to achieve the goal of eliminating tuberculosis.

Facing potential human health threats posed by influenza, every year Taiwan CDC promotes measures for preventing influenza and the importance of vaccination through different channels before the influenza season begins. Taiwan CDC held an event titled "The Power of Vaccines" to help different groups of people understand the benefits of the influenza vaccine. The press conferences was held to give updates on the outbreak along with press releases.

(2) Creative Promotional Materials: To promote disease prevention concepts, Taiwan CDC makes creative, stylish, and useful promotional materials available online for use.

3. Communicable Disease Reporting and Consultation Hotline: 1922

To provide a convenient channel for communicable disease reporting and consultation, Taiwan CDC has operated the easy-to-remember, toll-free hotline "1922" since 2003. By calling 1922, users can access 24-hour case reporting service, communicable disease counseling service, prevention policy promotion, and control measure information all year round.

In 2022, the 1922 hotline received 7.53 million calls and made 121,635 referrals. 90.38% of users said they were satisfied.

4. Social Marketing Media

To reach different groups of target audiences, Taiwan CDC is constantly looking for new marketing channels. In 2022, besides continuing to improve the existing marketing strategies via traditional channels such as print media, TV and radio broadcast, Taiwan CDC also developed interactive digital marketing strategies. Marketing channels include:

(source: https://www.cdc.gov.tw/)

(1) The Internet: The Internet's influence is far-reaching and powerful, and it has become an important marketing tool for Taiwan's media. Taiwan CDC also focused on the Internet as a marketing channel.

(2) Featured Multimedia and Tools: Responding to Internet trends, Taiwan CDC uses popular online social media tools to promote healthy living and disease prevention. Taiwan CDC established an online disease prevention community on Facebook, LINE@, and Instagram. These sites promote communicable disease control and act as a bridge for Taiwan CDC to communicate with people over the Internet.

(3) The Taiwan CDC 1922 Facebook fan page already has more than 1.06 million followers. Besides daily epidemic information, the page offers lifestyle news such as weather reports along with epidemic prevention information, comics, and themed activities to interact with fans. Taiwan CDC also posted creative videos on YouTube which attracted more than 0.29 million people subscribed.

Taiwan CDC LINE@ issues at least two push notifications to share the latest information on disease prevention every week. Taiwan CDC LINE@ already has more than 10 million followers. Additionally, Taiwan CDC launched LINE @ chatbot - the Disease Control Butler, an AI "chatbot" jointly developed by HTC Corp., on September 28, 2017. LINE @ chatbot - the Disease Control Butler, has been providing basic consultations on influenza vaccination since its launch.

(Source: Taiwan CDC LINE@)

Taiwan CDC 1922 Facebook fan page

Correspondence Letters

LINE users can also use the chatbot to access phone consultations as well as ask information about contracted healthcare facilities for further consultations. The chatbot is responsive, significantly shortening the time required for people seeking consultations.

5. Correspondence Letters

To provide up-to-date information on communicable diseases, clinical treatments, and disease prevention policies, Taiwan CDC sends special correspondence letters to the healthcare community. In 2022, Taiwan CDC sent out 27 medical correspondences and reached 5,263 regular subscribers.

6. Corporate Cooperation

Taiwan CDC cooperates with private companies and foundations that are also involved in disease prevention to maximize resource efficiency, creativity, and marketing opportunities and improve awareness of related issues.

To promote public awareness about influenza vaccination, Taiwan CDC has proactively cooperated with HTC Corp. and PX Mart Co., Ltd. to develop the LINE @ chatbot - the Disease Control Butler and provide the public with convenient access to influenza vaccination.

Many people in Taiwan travel during summer vacation. To prevent people from contracting communicable diseases during their trips and create a safety net to combat epidemics, Taiwan CDC cooperated with Watsons, a health care and beauty care chain store, to urge people to prepare travel kits to protect against infectious diseases. Campaign materials for elevating public awareness were available at some 550 Watsons stores in Taiwan with staff pharmacists advising people about things that need to be considered before, during, and after a trip.

Corporates are encouraged to pay more attention to disease prevention and to cooperate with the government to prevent communicable diseases.

Future Prospects

Taiwan CDC will continue to promote disease prevention, develop new marketing channels, and improve risk communication concerning infectious diseases to ensure the health and wellbeing of the people in Taiwan.

Educational materials on Health and Sanitation:

CF

(https://www.youtube.com/user/taiwancdc)

COVID-19, Enterovirus Type 71,Influenza virus infections and Human Immunodeficiency Virus.

Poster and Flyers

(http://www.cdc.gov.tw)

Periodicals and Books

Guidelines for Dengue/ Chikungunya Control (15E)

CHELSEA AND FRIENDS 2022

Taiwan Guidelines for TB Diagnosis & Treatment

Taiwan Epidemiology Bulletin

Infection Control Journal

Taiwan Tuberculosis Control Report 2021

2022 CDC Annual Report

Statistics of Communicable Diseases and Surveillance Report 2021 (English version)

Statistics of Communicable Diseases and Surveillance Report 2021 (Traditional Chinese version)

2022 Summarized Chronology of Events

JAN

6 The government-funded flu vaccination program was expanded to include all unvaccinated individuals 6 months of age and older.

11 In response to more arrivals testing positive for COVID-19, travelers arriving in Taiwan on long-haul flights needed to be tested upon landing. Arrivals who tested positive were transported to the hospital.

20 On-arrival testing was expanded to include travelers arriving on flights from India and Southeast Asia.

24 The first batch of 2,016 courses of the oral COVID-19 antiviral drug molnupiravir arrived.

27 The first batch of 3,200 courses of the oral COVID-19 antiviral drug Paxlovid arrived.

FEB

15 The second phase of a special program that allowed foreign workers to enter Taiwan was launched. Foreign workers had to be fully vaccinated against COVID-19 before coming to Taiwan and had to complete home quarantine and self-health management after arrival.

MAR

7 Home quarantine for close contacts of confirmed COVID-19 cases and for arrivals was shortened to 10 days, followed by seven days of self-health management.

22 Testing upon landing was expanded to include travelers on flights from South Korea.

23 For World TB Day, Taiwan CDC held a press conference to promote the theme "Contributions from all of us to defeat tuberculosis." The event centered on plans to end TB by 2035.

27 Workers at designated types of leisure and entertainment venues were required to take a rapid test for COVID-19 every week until April 30.

APR

8 The CECC announced the three new objectives of "normal life, active disease prevention, and steady opening up" and stated its policy of " zero serious infections and effective control of mild cases."

12 PCR testing at the end of the home isolation and quarantine periods was no longer required, and that people instead needed to administer their own rapid tests and then report their results.

14 The principles for admitting and treating mild and severe COVID-19 cases were revised. Mild cases were sent to enhanced government quarantine facilities or quarantine hotels, and severe cases were sent to hospitals.

20 The Advisory Committee on Immunization Practices (ACIP) at MOHW recommended the use of the Moderna vaccine for children aged 6 to 11, for adolescents aged 12 to 17 as a booster dose, and for certain groups as a second booster dose.

25 "Key contact tracing" was implemented. Under the new policy, a close contact was identified as a family member living in the same household or a classmate or coworker in the same space as a confirmed COVID-19 case in the two days before the onset of disease.

26 The home isolation period for close contacts of confirmed COVID-19 cases was reduced to three days, followed by four days of self-initiated disease prevention.

27 Contact information registration requirements for commercial and public venues were cancelled. People were encouraged to download the Taiwan Social Distancing App.

28 A name-based distribution system for at-home rapid test kits was implemented to allow people to purchase test kits at NHI-contracted pharmacies or rural health centers by presenting their NHI card or alien resident certificate.

MAY

1 The contact tracing self-reporting system for confirmed COVID-19 cases was implemented to simplify contact tracing procedures for front-line workers.

8 Principles for identifying close contacts were revised to include only friends or relatives living in the same household as confirmed cases, and digital fencing for people in home isolation was removed.

9 The mandatory home quarantine period for arrivals was reduced from 10 to seven days, followed by seven days of self-health management. During the quarantine period, the principle of one person per residence was required.

12 The case definition for COVID-19 was revised to include an individual in home isolation or quarantine who tested positive with a rapid test and had their test result confirmed by a medical professional.

17 Family members living in the same residence as confirmed COVID-19 cases and who received three vaccine shots were no longer required to undergo home isolation. They were required to practice a seven-day period of self-initiated prevention. If they had not received three vaccine shots, they needed to practice three days of home isolation followed by a four-day period of self-initiated prevention.

26 The case definition for COVID-19 was revised to include an individual who tested positive for COVID-19 with an at-home rapid antigen test kit and had their test result confirmed by a medical professional or who tested positive with a rapid antigen test performed by a medical professional.

JUN

1 COVID-19 testing upon landing ended for travelers arriving on long-haul flights, and instead all arrivals needed to have a saliva-based test at the airport.

15 Arrivals needed to practice a three-day home quarantine and a four-day period of self-initiated prevention. The cap on arrivals was 25,000 people per week.

21 The case definition for COVID-19 was revised to include an individual who tested positive for COVID-19 with a SARS-CoV-2 at-home PCR test kit and had their test result confirmed by a medical professional.

23 Monkeypox was designated as a Category 2 Communicable Disease. On June 24, 2022, Taiwan reported its first confirmed case of monkeypox imported from Germany.

JUL

14 The cap on arrivals increased from 25,000 to 40,000 people per week. ROC nationals, Alien Resident Certificate holders, and transit passengers were exempt from providing a negative PCR result from a test taken within two days of their scheduled flight time.

21 Moderna's COVID-19 vaccine became available for children 6 months through 5 years of age.

25 Taiwan began to allow foreign nationals to apply for visas to enter Taiwan for volunteering, religious purposes, internships, international exchanges, and working holidays (youth exchanges).

AUG

8 ACIP recommended the use of the Pfizer-BioNTech vaccine for children aged 6 months to 5 years.

15 The requirement that all inbound passengers provide a negative PCR result from a test taken within two days of their scheduled flight time was removed.

22 The cap on arrivals increased from 40,000 to 50,000 people per week.

25 Taiwan CDC cooperated with the Bureau of Animal and Plant Health Inspection and Quarantine and Animal Health Research Institute, under the Council of Agriculture of the Executive Yuan, to form a cross-departmental zoonotic disease risk assessment team. The team completed a risk analysis of H5 avian influenza subtypes, including H5N2, H5N6, and H5N8.

SEP

1 A shipment of 560 monkeypox vaccine doses purchased from the Danish biotech firm Bavarian Nordic arrived in Taiwan.

12 Taiwan reinstated visa-exempt entry for nationals of the United States, Canada, New Zealand, Australia, Europe, and diplomatic allies.

29 The weekly cap on arrivals increased to 60,000 people. The saliva-based PCR testing requirement for inbound travelers ended. Arrivals instead received rapid test kits for at-home testing.

OCT

1 Taiwan CDC held a press conference titled "Give You a Shot" to kick off the 2022 influenza vaccination campaign and to encourage people eligible for government-funded influenza vaccines in the first stage of this campaign to make an appointment for vaccination as soon as possible.

13 Home quarantine requirements for arrivals were removed. Instead, a seven-day period of self-initiated prevention was implemented. The health declaration requirement on the Quarantine System for Entry also ended.

13 The CECC lowered the COVID-19 travel notice for all countries/regions to Level 2: Alert. It advised travelers to be fully vaccinated against COVID-19 at least 14 days before traveling abroad and to take personal precautionary measures.

NOV

1 The HIV Self-Testing Program continued until December 31, 2022, to offer free HIV test kits to students in the high-school or vocational-school level and higher.

1 The second stage of the government-funded flu vaccination program began.

7 The isolation/self-health management period for confirmed cases receiving home care was reduced to "7+n" days. Under the "7+n" scheme, a confirmed case could end their self-health management period after five days of isolation and producing a negative rapid test result. Contacts of the confirmed case needed to practice a "0+7" period of self-initiated prevention and could go out if they had a negative result from a rapid test taken within two days.

7 The mandatory requirement that commercial and public venues take the temperature of visitors was removed. People were no longer required to have received a COVID-19 vaccine booster shot or take a rapid test before going to religious events, group tours, gyms, or adult entertainment venues.

14 The CECC adopted the policy of "5+n" days of isolation/self-health management for confirmed cases receiving home care. Under the policy, confirmed cases no longer had to undergo self-health management after five days of isolation and a negative rapid test result.

30 Taiwan CDC held the 2022 World AIDS Day press conference at the Taipei Performing Arts Center.

DEC

1 The outdoor mask requirement was cancelled, whereas the indoor mask requirement remained. However, masks could be removed in some situations, including when exercising, driving alone or with family, taking photos or filming, or eating or drinking.

10 The weekly cap on international arrivals ended.

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