

# 2016

## Centers for Disease Control Annual Report



CDC

# 2016 Centers for Disease Control Timeline

## January 20

The Legislative Yuan passed the third reading of some articles in the HIV Infection Control and Patient Rights Protection Act, lifting the restrictions related to the entry and residence of foreigners who contracted HIV. The amendments also aimed at eliminating discrimination and protecting human rights.

## March 14

To celebrate the World Tuberculosis Day, Taiwan CDC held an international conference themed Innovative TB Control Strategies to Reach the Goal of TB Elimination by 2035 and exchange good practices of TB prevention with other countries.



## March 18 to 20

Taiwan CDC organized Ebola prevention and control training course and invited foreign experts who had participated in the Ebola prevention and control effort in West Africa and Taiwan CDC medical officers to give lecturers. A total of 16 medical professionals from Southeast Asia took part in the course.



## May 5

To celebrate the 10<sup>th</sup> anniversary of Save Lives: Clean Your Hands, a WHO campaign, Taiwan CDC invited representatives from the medical industry, the government, and academia to call for medical professionals to practice hand hygiene to reduce healthcare-associated infections.

## June 1

Dr. Steve Hsu-Sung Kuo, Director-General of Taiwan CDC, visited the US and met with Ambassador Jimmy Kolker, Assistant Secretary for Global Affairs at the U.S. Department of Health and Human Services, and other senior officials to have out discussions and exchanges on Ebola outbreaks in West Africa and MERS-CoV outbreak in South Korea future cooperation plans.

## June 1

A seminar on "Establishing IHR Core Capacities at Designated PoE : Phase 2 Project Demonstration" was organized to show that the core capacities of PoEs in Taiwan had met the WHO requirements. Since meeting the requirement, Taiwan has become more competent in responding to public health emergencies of international concern.

## August 12

Taiwan CDC and US CDC co-hosted "The International Training Course on Molecular Diagnosis for MERS-CoV". A total of 17 laboratory professionals from 9 countries in Southeast Asia and the Asia-Pacific region participated in this training course, expanding regional cooperation and enhancing the region's capacity to respond to infectious diseases.



## September 1 and 15

To carry out exchanges on epidemic prevention and control as well as port quarantine activities, a delegation from China attended seminars enabled by the Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs. The seminars include "The 5<sup>th</sup> Conference for the Working Group on Prevention and Control of Communicable Diseases" and "The 7<sup>th</sup> Conference for the Working Group on Inspections and Quarantines".



## September 7-8

Dr. Steve H.S. Kuo, Director-General of Taiwan CDC, led a delegation to attend the APEC-Global Health Security Agenda Policy Forum on Infection Control Infrastructure held by the U.S. in Seoul, South Korea. In this forum, delegates discussed healthcare-associated infections and antimicrobial resistance, and presented Taiwan's surveillance system for hospital infections and antimicrobial resistance.

### September 10-11

Dr. Jih-Haw Chou, Deputy Director-General of Taiwan CDC led a delegation to attend the 12th Taiwan-Japan Symposium held by National Institute of Infectious Diseases, NIID in Japan.



### September 14

The Executive Yuan activated the Central Epidemic Command Center for Dengue Fever, integrating resources and manpower from the Ministry of Health and Welfare, the Environmental Protection Agency, the Ministry of Defense, and the Ministry of Education to prevent further spread of dengue fever outbreaks.



### September 16

Taiwan CDC participated in the EU SHIPSAN Joint Act and AIRSAN projects, sharing information and technologies related to public health in seaports and airports to improve Taiwan's capacity to respond to infectious diseases at PoE.

### October 15-18

Taiwan CDC held the 12<sup>th</sup> Taipei International Conference on HIV/AIDS, inviting both domestic and foreign experts and scholars from Taiwan and other countries to share new technologies and strategies of preventing AIDS.



### October 23

Taiwan CDC co-organized the Roundtable on Biotechnology Industry and Infectious Disease Prevention with the NTU Infectious Diseases Research and Education Center, inviting experts from the government, industry, and academia to exchange ideas on rapid screening tests, protective equipment, human vaccines, and drugs for infectious diseases.

### November 30

To celebrate the World AIDS Day, Taiwan CDC held a press conference themed On the Fast-Track to End AIDS and lighted up the decorating lights placed in the shape of a giant red ribbon on the wall outside the Taiwan CDC office to raise people's awareness of AIDS and care for individuals with AIDS.



### December 4

To commemorate the 50<sup>th</sup> anniversary of malaria eradication in Taiwan, Taiwan CDC dedicated the Certificate of Gratitude to healthcare workers involved in malaria eradication for their hard work and contribution.

### November 25-26

Taiwan CDC held a Bioterrorism Emergency Drill. Through courses and drills on emergency response procedures for bioterrorist attacks, and simulating various scenarios, the capacities to deal with bioterrorism incidents have improved.

### December 7-8

Taiwan CDC, the Ministry of Foreign Affairs, and AIT held the International Conference on Dengue Prevention and Control and the International Dengue Expert Consultation Meeting, inviting dengue fever experts from 12 countries in the Asia-Pacific and Southeast Asia to share their experiences in the control and prevention of dengue fever, establish collaboration network, and strengthen regional capacity to respond to dengue threats.





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## Message from the Director-General

Over the recent years, the occurrence of emerging infectious diseases such as Ebola and MERS-CoV have spread from one person to another across the globe. At the end of last year, Zika virus broke out in South America and in a few months swept across every continent in the world. The spread of the virus has seriously threatened global and regional public health, presenting challenges to disease prevention and control efforts.

The prevention and control of infectious diseases rely not only on each nation's efforts, but also requires international collaboration. Therefore, to establish a regional network for disease prevention and control, Taiwan CDC and the US jointly organized the Training Course for Preparing Healthcare Workers to Work in Ebola Treatment Units, the International Training Course on Molecular Diagnosis for MERS-CoV, and the International Conference on Dengue Prevention and Control and International Dengue Expert Consultation Meeting, inviting medical professionals, experts, scholars, and government officials from the Asia-Pacific and Southeast Asia regions to share their countries' policies and experiences in combating infectious diseases. These events have also helped effectively increase the region's capacity to respond to infectious diseases.

Additionally, Taiwan CDC aggressively stays abreast of international trends. Through participating in multi-national research activities and collaboration efforts, we continue



to acquire the latest information on disease prevention and control and learn the latest applications of technology. In this report, a chapter is dedicated to sharing the results of our international collaboration efforts for disease prevention and control. In the future, we will continue to proactively promote bilateral and multilateral cooperation for infectious disease prevention and control. Under the Global Cooperation Training Framework (GCTF), we will increase the regional capacity to prevent and control infectious diseases and ensure global public health.

In 2015, Taiwan suffered from the most serious dengue outbreaks in years. The number of patients hit a record high. To control and prevent the disease, the central and local governments, medical professionals, and everyone in Taiwan exerted every effort to contain the outbreak. Furthermore, Taiwan CDC also invited medical research groups to help develop and introduce innovative technologies to combat dengue fever in order to reduce the risk of the disease.

Due to globalization, disease prevention has faced numerous unknown and unseen challenges. As Taiwan CDC is dedicated to the prevention and control of infectious diseases in Taiwan, we publish this report to provide information on the epidemiology of the major infectious diseases, including enteroviruses, influenza, tuberculosis, and AIDS, and the strategies we implement to prevent and control them and help all sectors gain a better understanding of infectious disease prevention and control and our achievements. It is my sincere hope to share with the international community through this annual report Taiwan CDC's experiences in combating infectious diseases and the important milestones reached in 2015 as an attempt to promote global health security as an international security priority.



Steve Hsu-Sung Kuo, MD, MPH, PhD  
Director-General  
Taiwan Centers for Disease Control

# About Taiwan CDC





**Figure 1-2 Regional Center Jurisdictions**



Taiwan CDC consists of six divisions, two centers, five offices, six regional centers, and three task forces, as follows:

1. Six Divisions: Division of Planning and Coordination; Division of Infection Control and Biosafety; Division of Acute Infectious Diseases; Division of Chronic Infectious Diseases; Division of Preparedness and Emerging Infectious Diseases; 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. Three Task Forces: Public Relations Office; Vaccine Center; Office of Preventive Medicine



**Table 1-1 Age Distribution of Taiwan CDC Employees**

Under 29 years	30-39 years	40-49 years	50-59 years	60-65 years
6%	32%	35%	23%	4%



**Table 1-2 Education Level of Taiwan CDC Employees**

Graduate School	University	College	High School or Under
51%	34%	10%	5%

Distribution of Employees by Gender, Age, and Education: At the end of December 2015, there were 782 Taiwan CDC employees, with a male to female ratio of 1:3.34. Average age was 43.3 with 73% under 49 years old. About 44% graduated from university or college while 51% completed a graduate school degree.

## Core Values of Taiwan CDC

- 1. Humanity:** This concept is central to everything Taiwan CDC does to promote disease prevention and control. While providing support and care, Taiwan CDC puts itself in other people's shoes to consider their needs. When required it uses its legal authority to provide the greatest benefit to the people and help them avoid the risk of disease.
- 2. Professionalism:** Taiwan CDC recognizes the need for continued study so it can maintain the knowledge and techniques needed to carry out its duties, familiarize itself with the regulations and policies introduced by overseeing authorities, and raise core capabilities. This professionalism puts Taiwan CDC in a position to solve problems and provide the people of Taiwan with world-class public service.
- 3. Proactivity:** As a leader in the field of disease prevention and control Taiwan CDC must forecast developing disease-related situations. It analyzes current conditions along with response capabilities and measures. Worldwide it watches developing situations closely so it can introduce early responses to reduce the impact of epidemics. Taiwan CDC also revises policy as needed to build preventive mechanisms.
- 4. Teamwork:** Disease prevention and control involve a wide range of people working as a team that rallies together in cooperation. Individual strength is limited, but the small contributions each person makes can be combined into a powerful force. Battles may prove difficult to win, but together people have the strength to forge ahead.
- 5. Communication:** Effective communication, which is dependent on grasping others' opinions, requires that listening serve as a foundation for empathy. Communication is both internal and external, expert opinions must be presented in ways that are widely understood, and people must believe that they are valued, trusted and respected.

# *2015 Focus - International Cooperation*



## 2015 Focus - International Cooperation

### Background

In 2015, emerging and re-emerging infectious diseases such as Ebola in Western Africa, MERS in Korea and dengue fever in Southern Taiwan and Southeast Asian countries continue to threaten the people around the world. To address the threats, Taiwan CDC made great efforts in international cooperation and contributed tremendously to the international community through promoting and enhancing regional and global capacities to respond to the infectious disease outbreaks in 2015.

### Accomplishments

#### I. Taiwan-US Cooperation on International Training Program

During the year of 2015, we collaborated with the Ministry of Foreign Affairs (MOFA), the American Institute in Taiwan (AIT) and the US Department of State to hold three training courses for healthcare workers, public health professionals and laboratory diagnostic professionals in order to enhance their capabilities to detect, access, report, notify, verify and respond to the threats and challenges presented by Ebola, MERS and Dengue Fever.

##### 1. "Training Course for Preparing Healthcare Workers to Work in Ebola Treatment Units"

The Ebola training course was held at the Center for Infectious Disease Control and Prevention of Taiwan CDC in Tainan City during March 18-20, 2015. 16 participants from Cambodia, Indonesia, Malaysia, the Philippines, Singapore and Vietnam



Training Course for Preparing Healthcare Workers to Work in Ebola Treatment Units, March 18-20, 2015.

attended the training course. In addition, two experts from the U.S. were invited to share their experiences with all the participants. Both of them worked in the Ebola Treatment Units (ETU) in Sierra Leone during the Ebola crisis and later served as trainers at the training course, "Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa", conducted by US CDC in Anniston, Alabama.

The training course was modeled after the courses organized by US CDC and a mock ETU was set up to allow trainees to practice working under simulated conditions.

## 2. "International Training Course on Molecular Diagnosis for MERS-CoV"

On June 1, 2015, Taiwan and the US signed the Global Cooperation and Training Framework (GCTF) Memorandum of Understanding (MOU). The Framework is a milestone that brings into full focus Taiwan's dramatic transformation from an international aid recipient to an aid provider.

Under GCTF, US CDC and Taiwan CDC co-organized the "International Training Course on Molecular Diagnosis for MERS-CoV" held at the Center for Infectious Disease Control and Prevention of Taiwan CDC in Tainan City during August 12-14, 2015. Experts from both agencies served as the lecturers of the training course. A total of 17 laboratory professionals from countries in the Western Pacific and Southeast Asia region, including Cambodia, India, Indonesia, Japan, Malaysia, Papua New Guinea, the Philippines, Thailand and Vietnam, participated in the training course.



International Training Course on Molecular Diagnosis for MERS-CoV, August 12-14, 2015.

### 3. “International Conference on Dengue Prevention and Control and International Dengue Expert Consultation Meeting”

Under GCTF, the International Conference on Dengue Prevention and Control and the International Dengue Expert Consultation Meeting were respectively held at the Magic School of Green Technology in National Cheng Kung University in Tainan



International Conference on Dengue Prevention and Control in Tainan City, December 7, 2015.

City on December 7, 2105 and the Ministry of Health and Welfare in Taipei City on December 8, 2015. The conference gathered dengue experts and environmental and public health officials from 12 countries in the Asia Pacific and Southeast Asia regions, including Australia, India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, the Philippines, Singapore, Thailand, U.S.A and Vietnam, to promote the exchange and sharing of knowledge and information on dengue prevention and control. It was hoped that close partnership could be formed among countries in the Asia Pacific and Southeast Asia regions in order to strengthen regional capacity to respond to dengue threats and ensure global health security.



International Dengue Expert Consultation Meeting in Taipei City, December 8, 2015.

## II. Bilateral and Multilateral Cooperation Progress Report

1. Taiwan CDC continued the work of the Implementation Arrangement No. 4 (EIS training program) and the Implementation Arrangement No. 5 (Influenza related materials sharing and vaccine seed production training program) with US CDC.
2. Taiwan CDC deployed staff to the Austrian Agency for Health and Food Safety (AGES) for European CDC 2015-2017 EPIET training program.
3. Taiwan CDC and Japan's National Institute of Infectious Diseases (NIID) have fostered a stable, friendly relationship since 2004. In September 2015, 18 Taiwanese experts visited Japan to participate in the 12th Taiwan-Japan Bilateral Symposium.
4. Taiwan CDC and Chinese health authorities held the meetings of the Working Group on Prevention and Control of Communicable Diseases and the Working Group on Inspections and Quarantines in Taipei under the Cross-Trait Medical and Healthcare Cooperation Agreement.



12<sup>th</sup> Taiwan-Japan Bilateral Symposium, Sep 9-12, 2015.

## III. International Exchanges in 2015

1. A total of 94 guests from 25 different countries visited Taiwan CDC.
2. Taiwan CDC participated in the WHO conferences and related activities, including the 68th World Health Assembly (WHA) as an observer and 5 technical meetings.
3. Taiwan CDC attended 4 APEC Conferences, including the 2015 1st and 2nd APEC Health Working Group Meeting, APEC Training Course on Building Capacity in Health

Hotline Responding to Public Health Emergencies, and APEC & Global Health Security Agenda (GHSA) Policy Forum.

4. Taiwan CDC participated in 23 international conferences, sent 34 staff overseas, and dispatched 29 employees to join the short-term study programs and another 4 employees to participate in the long-term EPIET and EIS training.
5. Taiwan CDC published 69 SCI papers.

#### IV. Participation in the Global Health Security Agenda (GHSA)

In February 2014, the United States launched the Global Health Security Agenda (GHSA) in partnership with the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), and the World Organization for Animal Health (OIE) to bring together countries from all over the world to promote global health security as an international security priority, to prevent the occurrence of disease outbreaks, to detect possible threats early, and to respond to threats rapidly. These goals include the implementation of internationally agreed upon standards such as the WHO International Health Regulations (2005), the OIE Performance of Veterinary Services Pathway, and other global health security frameworks in order to ensure global health security.



Following the framework of GHSA, Taiwan CDC aims to promote human medicine and veterinary collaboration efforts and construct a one health system for infectious disease control and prevention. As a result, Taiwan CDC cooperated with the Bureau of Animal and Plant Health Inspection and Quarantine of Agriculture Council, the Ministry of Science and Technology, and Academia Sinica jointly proposed a technology research project based on the GHSA action packages, "One Health Approach to Global Health Security" which pursues a multilateral and multi-sectoral approach to strengthen our capacity to prevent, detect and respond to threats posed by infectious diseases and better align with the international community in order to prevent the occurrence and transmission of infectious diseases. Furthermore, Taiwan CDC has set up a taskforce working group to voluntarily participate in the Joint External Evaluation and assess our capacity



APEC & Global Health Security Agenda (GHSA) Policy Forum, Sep 6-9, 2015.

to prevent detect and rapidly response to public health threats independently of whether they are naturally occurring, deliberate or accidental, which will be conducted by the UPMC Center for Health Security in 2016. In addition, Taiwan CDC was invited to attend the “APEC & Global Health Security Agenda (GHSA) Policy Forum on Partnering to Establish Basic Infrastructure for Infection Prevention & Control” held in Seoul, Republic of Korea on September 6-9, 2015 and presented on “Nosocomial Infections and Antimicrobial Resistance Surveillance System in Taiwan”.

## Future Prospects

While globalization spurs the speed and frequency of the spread of infectious diseases more than ever before, a crisis anywhere may easily and soon become a problem everywhere. In order to achieve global health security, 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. Taiwan CDC will continue to assist its counterparts in the Asia Pacific and Southeast Asian regions to enhance their disease surveillance and diagnosis capabilities and core capacities to detect, assess, report, notify, verify and respond to the threats and challenges presented by emerging infectious diseases under the US-Taiwan Global Cooperation Training Framework (GCTF). In addition, we will continue to seek more opportunities for active participation in the international arena in order to help ensure a world safe and secure from infectious disease threats and promote global health security as an international security priority that will be beneficial to us and the region.

# *Domestic Epidemic Prevention and Control*



# Current Immunization Program & Vaccine Injury Compensation Program in Taiwan

## 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 influenzae type b, and inactivated polio, DTaP-Hib-IPV), hepatitis B, pneumococcal conjugate vaccine (PCV), varicella, measles, mumps, rubella (MMR), Japanese encephalitis, tetanus, diphtheria toxoids, acellular pertussis and inactivated polio vaccine (Tdap-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 373 health stations and more than 1,600 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 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 to ensure those children complete the vaccination series. The immunization coverage rate is now as high as above 95%. (see Figure 3-1)



**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	27 months	5 years	≥ 65 years
BCG						BCG							
Hepatitis B		HepB1	HepB2				HepB3						
Diphtheria, Tetanus, Pertussis, Hib, Polio				DTaP-Hib-IPV 1	DTaP-Hib-IPV 2		DTaP-Hib-IPV 3			DTaP-Hib-IPV4*		Tdap-IPV	
Pneumococcal conjugate vaccine <sup>note1</sup>				PCV13 1	PCV13 2			PCV13 3					
Varicella								Var					
Measles, Mumps, Rubella.								MMR1				MMR2	
Japanese Encephalitis <sup>note2</sup>									JE1, JE2		JE3	JE4	
Influenza								Influenza (yearly)				Influenza (yearly)	
Hepatitis A <sup>note3</sup>								HepA1		HepA2			

<sup>note1</sup>: 2 primary doses at least 8 weeks apart

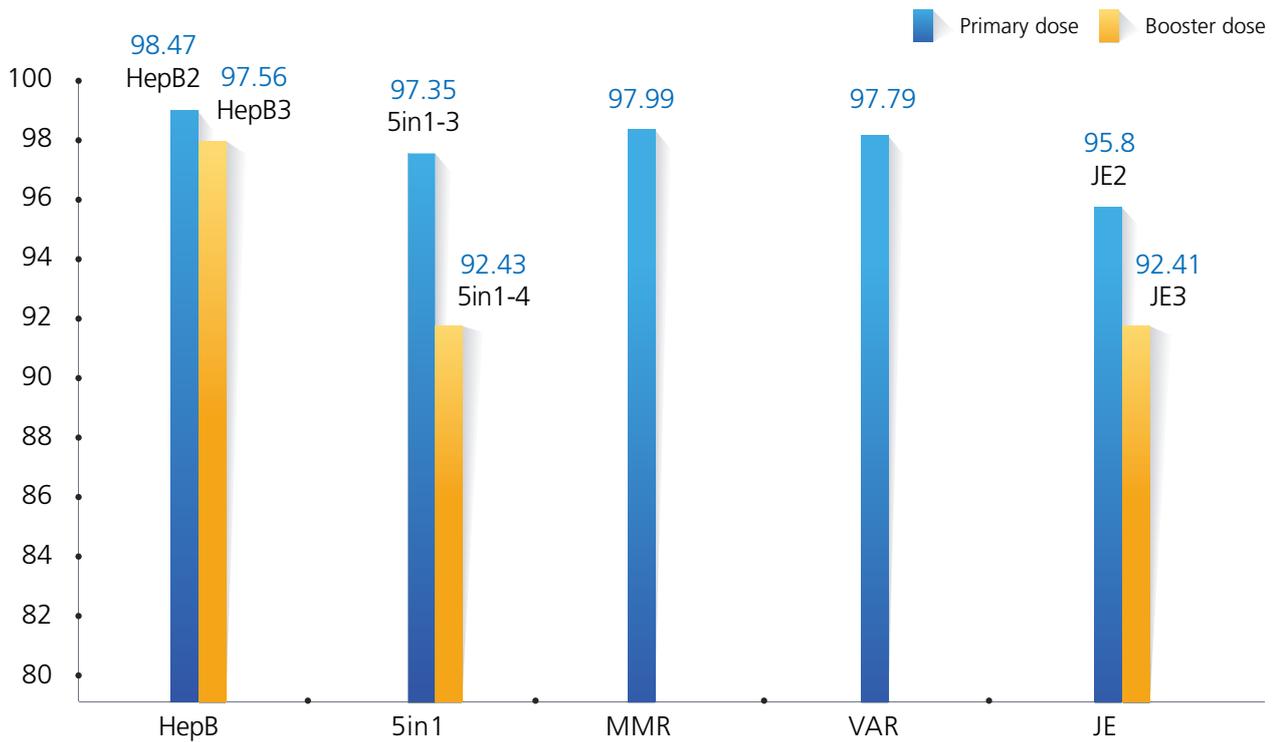
<sup>note2</sup>: 2 primary doses at least 2 weeks apart

<sup>note3</sup>: In selected aboriginal areas.

\* Due to global DTaP-Hib-IPV vaccine shortage, the immunization schedule of the 4th dose of DTaP-Hib-IPV had been revised from 18 months to 27 months in January 2014.



**Figure 3-1 National Immunization Coverage**



Source: The values was calculated in December 2015 by compiling retrospectively the immunization data of National Immunization Information System

Footnote:

- HepB: Hepatitis B vaccine
- 5 in1: DTaP-Hib-IPV
- MMR: Measles, mumps and rubella combination vaccine
- VAR: varicella vaccine
- JE: Japan encephalitis vaccine

## Accomplishments

1. A vaccine fund was launched in 2010 based on Article 27 of the Communicable Disease Control Act.
2. The 5-in-1 vaccine was launched to replace the traditional DTwP vaccine in March 2010, for reducing adverse reactions such as fever and redness or swelling where the shot is administered.
3. In 2011, Tdap-IPV was given to new primary school enrollees to replace Tdap and OPV. This improved vaccination convenience and successfully switched to IPV in accordance with the WHO suggestion to cease the use of OPV after polio eradication.
4. In April 2012, the schedule for receiving MMR2 and Tdap-IPV was revised from enrollment in primary school to 5 years of age. In addition, the schedule for receiving JE4 was also revised to 5 years of age in 2013.
5. Gradually expand pneumococcal conjugate vaccine (PCV) vaccination target to include children aged under 5 years who are high-risk groups, who live in mountainous areas and offshore islands or are from low-income and medium-low income families. Since March

2013, Children aged 2-5 years old have been provided one dose of PCV13. The vaccination targets were further expanded to children aged 1-5 years old in 2014. To prevent Invasive Pneumococcal Disease (IPD) infection of young children, Taiwan CDC have introduced PCV13 into routine immunization for children aged 2 months, 4 months and 12-15 months in 2015.

## Future Prospects

With a stable source of support from the 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 plan to introduce cell-based JE vaccine to replace mouse-brain JE vaccine according to international vaccination trend and improve the vaccine quality.

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## National Immunization Information System

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### 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 Civil Affairs, Ministry of the Interior. The information is updated daily and transmitted to NIIS. Through NIIS, authorities can remind parents via text and e-mail to of their children's immunization schedule, thereby improving immunization coverage rates.

### Accomplishments

1. Enhancing the functions and efficiency of the central database to handle yearly increases in data quantities and improve management efficiency.
2. Use of different ways 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 did not received the MMR vaccine. Local health agencies then arrange vaccination.

### Future Prospects

1. Promote the use of vaccination records in National Insurance IC cards to report immunization information at contract hospitals/clinics, improve the accuracy, completeness and timeliness of immunization data.

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 NIS immunization reminders to improve the coverage rate.
4. Continue to revise NIS to improve the capabilities and effectiveness of the system.

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

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### Current Status

Taiwan launched polio, measles, congenital rubella syndrome (CRS), and neonatal tetanus (NT) eradication programs in 1991. After achieving its goal of polio eradication on October 29, 2000, in accordance with a WHO suggestion it ceased use of OPV in 2011 by replacing Tdap and OPV with Tdap-IPV for new primary school enrollees.



Measles became the primary elimination target after polio. In 2015, there were twenty-nine confirmed measles cases, six of which were imported cases and nineteen of which were importation-related cases and four of which were imported-virus cases. The incidence rate for non-imported cases was under one per million. 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 born to foreign mothers. No confirmed CRS case has been reported since 2009. Rubella occurs worldwide; in 2015, there were seven confirmed cases in Taiwan, four of which were imported.

### Accomplishments

1. In 2015, 19 AFP (acute flaccid paralysis) cases under the age of 15 were reported and investigated. The investigation completion rate within 48 hours was up to 100%. 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 or an immunization certificate. This requirement is also included in the physical check for foreign laborers before entry.

3. The institutions contacting foreign traveler frequently are encouraged to provide one dose of MMR vaccination for their personnel who were born after 1981.

## 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 schedule.

## 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.



### Accomplishments

#### Hepatitis A

Confirmed cases of acute viral hepatitis A in aboriginal regions were reduced from 183 in 1995 to 0 in 2014 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to 0 in 2014.

#### 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 second and third doses of HBV for babies born in 2013 were 98.5% and 97.8%, respectively.
3. Hepatitis B vaccination rates were 98.7% for the second dose and 98% for the third dose among first-graders in 2014.

## Future Prospects

Infants born to a mother who is e antigen 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. It will continue to raise screening coverage and study effectiveness of the vaccination.

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## Vaccine Injury Compensation Program (VICP)

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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.

For effective use of vaccine injury compensation resources and to strengthen protection of compensation rights and guarantees, the Regulations Governing Collection and Review of Relief Fund for Victims of Immunization were amended in recent years. Highlights were as follows:

1. Expanded and increased compensation payments for vaccine injury and medical treatment subsidies (as described in the following table) in order to better reflect reasonable medical cost. Added regulations stating that the degree of impairments shall be decided in accordance with the types and degrees regulated by laws for the protection of the rights of the disabilities.



VICP claim evaluation committee meeting.



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

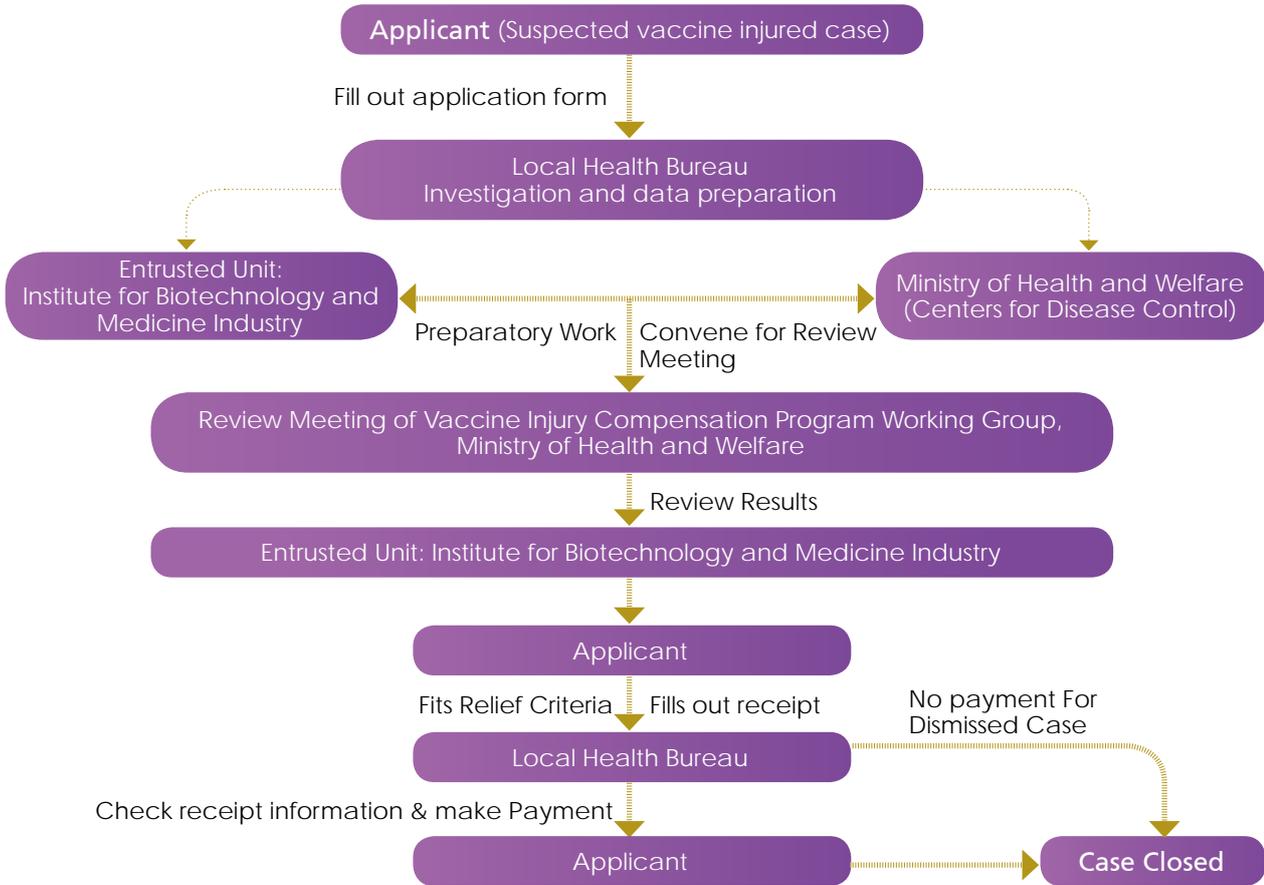
Relief Items	Criteria		Amount of Compensation (NT\$10,000)	
	Definition/Degree of Impairment	Causality Conclusion		
Compensation for Death	-	Vaccine-related	50~600	
		Possibly vaccine-related	30~350	
Compensation for Impairment	By the types and degrees of impairments regulated by laws for the protection of the rights of the mentally and physically impaired, but excluding conversion disorder associated with psychological factors.	4-extremely severe	Vaccine-related	50~600
			Possibly vaccine-related	30~350
		3-severe	Vaccine-related	30~500
			Possibly vaccine-related	20~300
		2-moderate	Vaccine-related	20~400
			Possibly vaccine-related	10~250
1-mild	Vaccine-related	10~250		
	Possibly vaccine-related	5~200		
Compensation for Severe Illnesses	To be decided by the regulations and the scopes of severe illnesses and injuries defined by the National Health Insurance and the illnesses considered as severe adverse reactions by the Procedure for Reporting Severe Adverse Reactions to Medicines, but not meeting the definition of impairment.	Vaccine-related	2~300	
		Possibly vaccine-related	2~120	
Compensation for Other Adverse Reactions	Other adverse reactions not meeting the definition of severe illnesses. However, mild, commonly seen or expectable adverse reactions of immunization are excluded	Vaccine-related/Possibly vaccine-related	0~20	
Funeral Subsidies	Funeral subsidies are provided if an autopsy is performed to determine whether the death is caused by the vaccine.	-	30	
Medical Cost Subsidies	Examination and treatment performed to help clarify the causal relationship between vaccination and symptoms.	-	0~20	
Stillbirth or Abortion Suspected to be Caused by Vaccination of the Fetus or Embryo undergone by Autopsy or Testing	Gestation after 20 weeks	-	10	
	Gestation less than 20 weeks	-	5	

2. Added conditions for not providing compensation for vaccine injury to ensure effective use of resources.

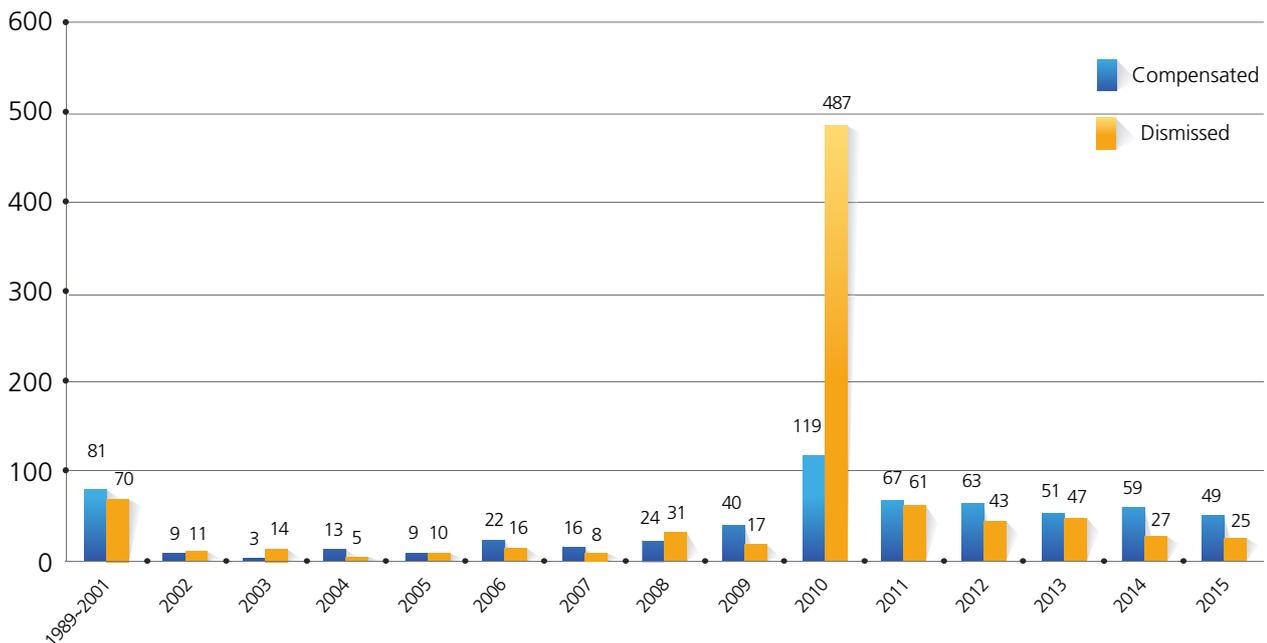
In 2015, 74 cases were settled, a total of 1,497 claims had been reviewed since program inception, and compensation disbursement had reached NT\$ 105.36 million.



**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 2015**



# Communicable Disease Surveillance System

## Current Status

Following reorganization of Taiwan CDC in July 1999, infectious disease surveillance was shifted to the National Communicable Disease Surveillance and Response Systems. The systems began with surveillance of notifiable diseases and sentinel surveillance to detect epidemics, and later on several systems were built to facilitate 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

If a doctor treats a patient suspected of having a notifiable infectious disease, 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.

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

The first stage of the Notifiable Diseases 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 the Notifiable Disease Surveillance System. The fourth stage, finished in June 2008, involved building a single reporting gateway and increasing user-friendliness. Maintenance, increasing user-friendliness, and updating list of notifiable diseases of the system continued from 2011 – 2015.

The following table shows the five categories of notifiable diseases in Taiwan.

**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	Amoebiasis
	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	
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	Legionellosis
	Mumps	Syphilis
	Invasive Haemophilus Influenzae Type B Infection	Enteroviruses Infection with Severe Complications
	Gonorrhea	AIDS
	HIV Infection	
IV	Herpesvirus B Infection	Leptospirosis
	Melioidosis	Botulism
	Invasive Pneumococcal Disease	Q Fever
	Endemic Typhus Fever	Lyme Disease
	Tularemia	Scrub Typhus
	Complicated Varicella	Toxoplasmosis
	Brucellosis	Severe Complicated Influenza
	Creutzfeldt-Jakob Disease	
V	Rift Valley Fever	Marburg Hemorrhagic Fever
	Yellow Fever	Ebola Virus Disease
	Lassa Fever	Novel Influenza A Virus Infections
	Middle East Respiratory Syndrome	
	Coronavirus Infection	

### **School-Based Surveillance System**

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

As of 2015, a total of 689 elementary schools enrolling students from kindergarten to 6<sup>th</sup> grade participated in the systems, representing 26% and 99.5% of all number of elementary schools and counties in Taiwan respectively.

### **Symptom Surveillance System**

Increased international contact and travel facilitate transmission of communicable diseases across borders and raise challenges for health workers. For example, in the summer of 2008, 10 out of 11 people in a religious group came down with dengue fever on a trip to Myanmar. To prevent the entry of emerging communicable diseases, facilitate early public health monitoring and implement epidemic prevention measures, Taiwan CDC established the Symptom Surveillance System. In 2006, Taiwan CDC integrated several active surveillance systems to enhance the monitoring of travelers at airports and harbors for diseases contracted abroad. These steps strengthened efforts to battle importation of communicable diseases while controlling cluster incidents and launching prompt disease prevention mechanisms.

Disease categories under surveillance include influenza-like illness clusters, fevers of unknown etiology, diarrhea, coughing persisting for more than three weeks, upper respiratory tract infections, varicella, and enterovirus clusters.

The Symptom Surveillance System monitors inbound passengers at airports and seaports to prevent entry of communicable diseases. It enables Taiwan CDC to effectively control epidemic events and quickly launch prevention measures.

### **Surveillance System for Populous Institutions**

The Surveillance System for Populous Institutions 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 the elderly, facilities for the disabled, juvenile protectories, veterans' homes, prisons, nursing homes and outpatient centers for mental rehabilitation. If an individual or a cluster case with symptoms of respiratory,

gastrointestinal disease or fever of unknown origin is found, the facility must file weekly online reports, confirm data and report the number of people under its care.

### **Real-time Outbreak and Disease Surveillance (RODS)**

The ICD-9-CM diagnosis codes from over 170 emergency rooms nationwide are forwarded daily to enable early and immediate analysis of aberrations for various syndromes. RODS also enables routine monitoring of specific disease trends such as influenza-like illness, enterovirus infection, diarrhea and conjunctivitis.

### **Syndrome Surveillance Using National Health Insurance Data**

Daily aggregate outpatient clinic, 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**

Daily updated death certification reports from the Department of Statistics, Ministry of Health and Welfare were used to identify cases indicative of pneumonia and influenza death, so as to monitor trends of pneumonia and influenza mortality. This provides a reference for future prevention and control.



### **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 developed a GIS based prediction model for estimating the distribution of infectious diseases.
2. Taiwan CDC installed multifaceted surveillance systems for data acquisition and analysis.
3. On February 24, 2004, Taiwan CDC outsourced establishment of the Disease Reporting and Consulting Center to a telecoms operator. The public can dial 1922 to report communicable

diseases and obtain consultations and information on communicable disease policies. Full-time staff operate the communication platform by answering calls and taking messages.

### **Reporting via the Internet**

To effectively detect and monitor infectious disease, Taiwan CDC established several electronic reporting systems for users to upload information.

### **Systems Integration**

To enhance 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 Syndrome Surveillance System. This task was completed in September 2006.

### **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 evaluation or development of surveillance systems. Key tasks include collection, evaluation and dissemination of information to the public, local health departments and governmental authorities.

### **Training and Education**

Taiwan CDC offers training workshops on surveillance systems for users to keep them informed about updated information.

## Reducing Key Infections

### **Tuberculosis**

Tuberculosis (TB) has always been Taiwan's most reported communicable disease. Despite a per capita GDP that exceeds US\$20,000, there were still over 11,000 new cases of TB every year, making it a greater threat than all other communicable diseases combined. Half a century of hard work by health workers has reduced prevalence of the disease, but when compared with other advanced countries, Taiwan is decades behind.

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 those factors could make TB control in Taiwan more challenging. To protect the health of the general public, Taiwan needs to adopt more active and aggressive methods when faced with new challenges for TB control.

## Current Status

### 1. Incidence

There were 16,472 and 10,697 TB cases in 2005 and 2015, respectively. The incidence rate went from 72.5 to 45.6 persons per 100,000 over this time period, and there was a 5% drop between 2015 and 2014. (Table 3-4).

The number of Multi-Drug Resistant TB (MDR-TB) reported cases was 117, and the proportion of MDR-TB in new cases was 1.0% in 2015.



**Table 3-4 Taiwan TB Incidence and Mortality Rate, 2005 – 2015**

Year	Cases	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	10,697	45.6(estimated)	--	--

## 2. Mortality Rate

TB claimed 591 lives in Taiwan in 2014, for a mortality rate of 2.5 per 100,000 population. From 2005 – 2014, the mortality rate dropped by 42%.

## Goals

1. To detect infected persons as early as possible by implementing active strategies and improving contact investigation.
2. To prevent individuals with latent TB infection (LTBI) from developing active TB and halve the number of TB cases by providing comprehensive medical treatment for TB and LTBI patients.
3. To increase the completion of treatment and cure rates by implementing DOTS and DOPT.

## Accomplishments

### 1. Improving Surveillance and Monitoring

National TB Reporting and Management System

- (1) Enhances case management and epidemiological analysis
- (2) Strengthens monitoring among high-risk group

### 2. Establishing a High Quality and Rapid TB Diagnosis Network

- (1) Monitors quality of contract and authorized laboratories
- (2) Trains staff members
- (3) Develops new TB diagnosis techniques

### 3. DOTS Program

“National Mobilization Plan to Halve TB in 10 Years” (implemented since 2006)

- (1) DOTS coverage rate was 100% from 2006.
- (2) Treatment success rate for bacteriological positive TB cases was about 69 % in 2014. It has not increased significantly due to population aging (ratio of people 65 years and older was 9.7% in 2005 and 11.8 % in 2014)

### 4. Establishing the Multi-Drug Resistant TB (MDR-TB) Medical Care System

“MDR-TB Medical Care System” (established in May 2007)

- (1) Taiwan CDC contributes resources and designated teams to offer treatment according to WHO clinical guidelines.
- (2) MDR-TB teams actively treat each patient for two years, and community health workers provide personal care via the DOTS Plus program.

(3) A total of 184 (93.3%) cases were managed in the MDR-TB system through the end of December 2015, leading to a steady decrease in the number of MDR-TB cases and a favorable outcome that about 76% of patients in 2013 cohort were cured or treatment completed after treated for 24 months.

### 5. LTBI Treatment Program (Initiated on April, 2008)

(1) Target population with contagious index case are:

- A. Child contacts < 13 years old
- B. Contacts over 13 ~ Birth cohort younger than 1986 (expanded since April, 2012)
- C. Starting from Mar 1, 2016, all contacts of all ages will receive LTBI treatment.

(2) During 2015, up to 4,706 contacts received LTBI treatment, and the DOPT rate reached 93%.

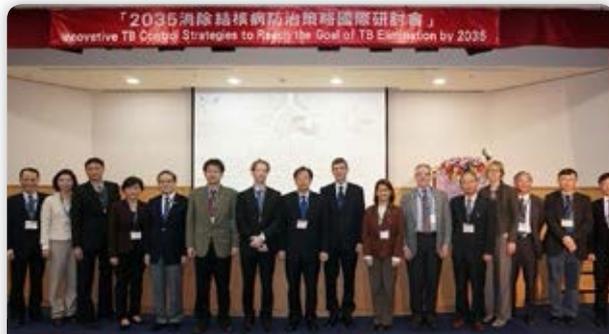
### 6. Principles of Collaborative Management for HIV/TB Co-infections

In order to build a collaborative mechanism for TB/HIV management, Taiwan CDC not only revised the "TB control handbook" and the "HIV/AIDS control handbook" but also conducted public health worker and TB control campaigns starting in June 2013.

The purposes of collaborative management are to enhance cooperation between health bureau departments, check HIV status of TB cases between 15 and 49 years of age, and improve contacts investigation. During January to October in 2015, 95% of new and retreatment TB cases reported having a known HIV status.



Mar 24, 2015. World TB day press conference, hoping to reach the goal of "No affected families facing catastrophic costs due to tuberculosis".



Mar 14, 2015. "Innovative TB Control Strategies to Reach the Goal of TB Elimination by 2035" international conference.



Mar. 26, 2015. Expert speech: TB control and environment control. Dr. Edward Anthony Nardell from Harvard T.H. Chan School of Public Health and Dr. Hsien-ho Lin from National Taiwan University.

## 7. Improving Quality of Case Management through Cohort Review Process

Initiation of a three-year program (2013 – 2015) aimed at:

- (1) Assessing progress of national TB control program objectives and indicating staff training and education needs.
- (2) Improving staff knowledge base and skill of TB control measures and increasing accountability for patient treatment outcomes.
- (3) TB case management quality assessment program in all 367 townships to enhance care quality and empower the healthcare workers.

## 8. Training, Research and International Cooperation

- (1) Taiwan CDC sent representatives to participate in international conferences so they could acquire the latest TB control knowledge and share experiences of TB control with other countries.
- (2) In 2015, Taiwan CDC hold the “Innovative TB Control Strategies to Reach the Goal of TB Elimination by 2035” international conference, and invited experts from WHO Stop TB Partnership, IUATLD, USA, Brazil, Netherland, Japan, Philippines, and Hong Kong and local scholars to attend the conference.
- (3) Taiwan CDC exchanged experiences of TB control with policymakers and health care workers from USA, Swaziland, and Burkina Faso.

## Future Prospects

Echoing post-2015 global TB control strategy, besides case management, Taiwan CDC will focus on preventive treatment of persons at high risk. By continuously implementing LTBI treatment program and introducing WHO-recommended new diagnostic tools and new regimen, to achieve annual reduction of new TB cases and gradually eliminate TB by 2035.



September 24-25, National TB Prevention and Care Review Conference.

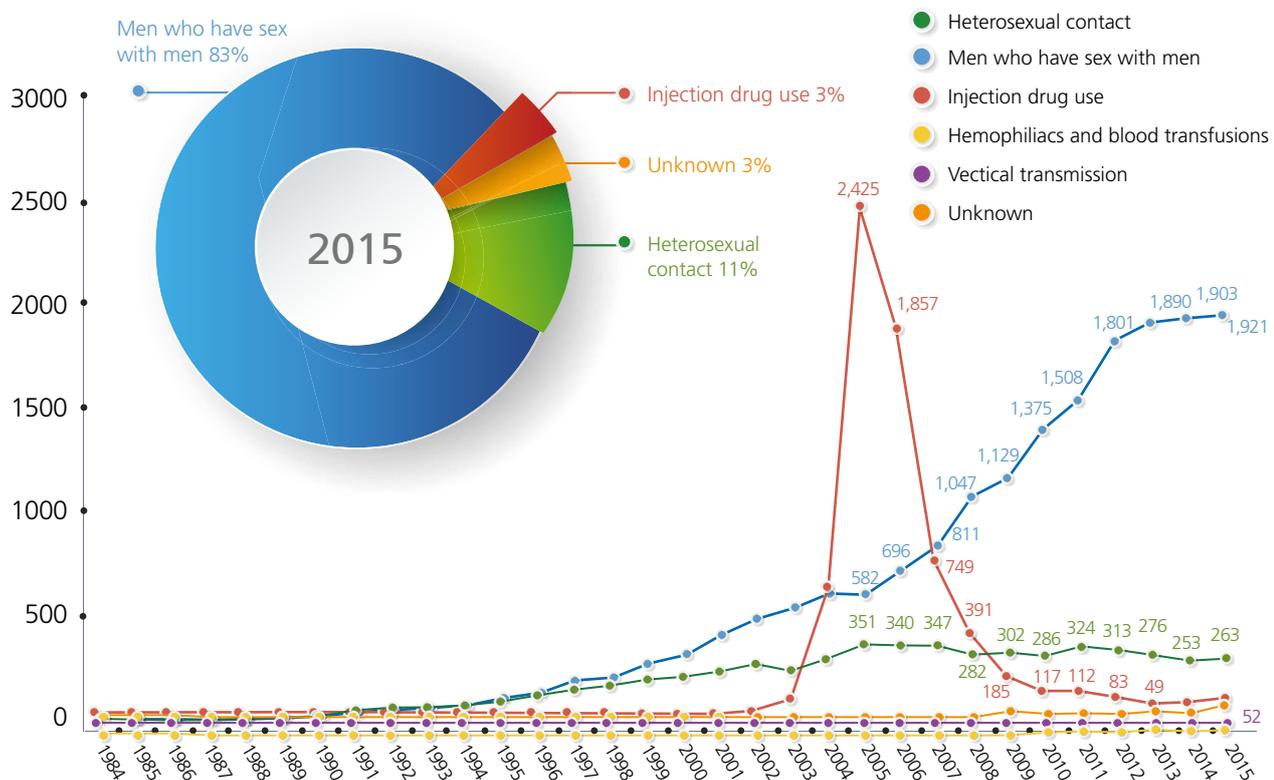
## HIV/AIDS

### Current Status

The first HIV case in Taiwan was reported in 1984. By 2015, there were an accumulated 31,030 patients (14,003 of whom had developed full-blown AIDS with 5,085 deaths). Infections surged in 2005 due to skyrocketing infections among injecting drug users (IDUs). Faced with this dire situation, Taiwan CDC co-operated 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). In 2014, the number of new cases began to decline a second time, demonstrating the success of prevention strategies.

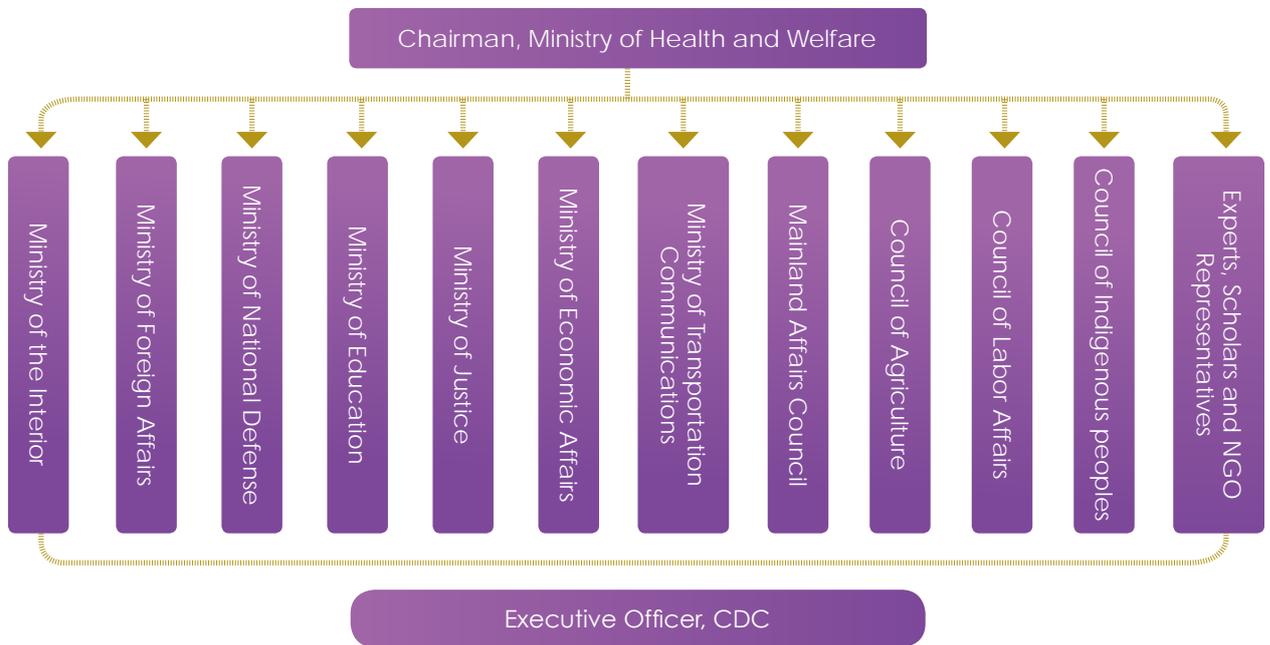
In terms of age, people in the 25 to 34 age group accounted for 983, or 42.2%, of new infections diagnosed in 2015, more than any other group. The second largest group was the 15 to 24 age group, numbering 664, or 28.5%, of all cases. An analysis of risk factors showed that the highest proportion of HIV infections was a result of unsafe sexual contact among MSM, accounting for 82.6% of all cases. The second largest proportion of infections was heterosexual contact, accounting for 11.3% of cases (see Figure 3-4). The three major transmission modes were sexual contact (MSM and heterosexual) and IDU. Of Taiwanese nationals diagnosed with HIV in 2015, 2,262, or 97.2%, were males and 65, or 2.8%, were females. The sex ratio of new diagnoses was 35:1.

**Figure 3-4 HIV Infection Risk Factors in Taiwan, 1984-2015**





**Figure 3-5 Committee for HIV Infection Control and Patient Rights Protection, Ministry of Health and Welfare, Executive Yuan**



### Accomplishments

1. The Committee for HIV Infection Control and Patient Rights Protection held two cross-ministerial meetings in 2015.
2. To ensure the dignity and rights of people living with HIV/AIDS (PLWHA), the AIDS Prevention and Control Act was amended in 2015. This amendment lifted all restrictions on the entry, stay and residence of HIV-infected non-nationals. Related regulations were amended and announced.
3. The harm reduction program has made significant progress.  
The reported number of HIV infections among IDUs dropped in 2006. Toward the end of 2010, 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 3.5% in 2015.
4. Taiwan CDC promotes diversified prevention programs to confront the epidemic among MSM. Initiatives include (1) Establishment of community health centers for homosexuals that provides lesbian, gay, bisexual, and transgender (LGBT) people with friendly health



December 30, 2015. The cross-ministerial Committee for HIV Infection Control and Patient Rights Protection.

services. (2) Implementation of health education and intervention services, such as online opinion leaders and promotional banners for HIV screening 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.



December 30, 2015. Taiwan CDC building adorned with lights formed in giant red ribbon shape in response to UNAIDS's call to "speed up AIDS fight".

5. To enhance disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, prison inmates in 1990, and foreign laborers in 1991. There were 43 hospitals that provided anonymous HIV blood-screening services in 2015 (including 10 hospitals that have provided this service since 1997). They screened 38,599 people, with 785, or 2%, found to be HIV positive. To cope with the increase in female HIV patients and mother-to-child transmission of HIV/AIDS, an HIV screening plan was established for pregnant women since 2005.
6. 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 at the first trimester. In 2015, there were 10 new cases of HIV detected in pregnant women. Pregnant women found to be HIV-



December 30, 2015. Taiwan CDC building adorned with lights formed in giant red ribbon shape in response to UNAIDS's call to "speed up AIDS fight".

infected are provided with free perinatal prophylaxis, which includes antiretroviral therapy during pregnancy, intra-partum and for exposed infant during the first 6 weeks of life.

7. 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 2015, 59 designated hospitals provided HIV/AIDS patients medical service, and 89.7% of HIV patients had continued to receive medical treatment. Furthermore, to meet the need of long term care in HIV/AIDS patients, the government designated several nursing homes to provide services.
8. The 12<sup>th</sup> Taipei International Conference on HIV/AIDS in conjunction with 10<sup>th</sup> Asia-Pacific Congress of Medical Virology 2015 was held in Taipei International Convention Center, from October 15<sup>th</sup> to 18<sup>th</sup>, 2015. During the conference, participants shared and exchanged their advanced knowledge and precious experiences in HIV and other viral diseases.
9. According to statistics from the National Health Insurance Administration, medical expenses for HIV patients in 2015 totaled about NT\$3.5 billion, with most of the costs attributed to HAART. To control the escalation of medical costs, in 2011 Taiwan CDC launched multiple medical expense control countermeasures, including drug formulary management, price negotiation, and bulk purchasing. The rate of cost increase fell from 2.2% in 2014 to 0.5% in 2015 while growth of the treatment population was 15%.

### Future Prospects

Years of hard work led to remarkable results in HIV prevention, but still, the number of new cases has not been brought under control. Taiwan CDC hopes that the participation of all sectors and the implementation of multipronged strategies will enable Taiwan to achieve the UNAIDS 90-90-90 treatment goal by 2020 and eradicate HIV in the near future.



October 15-18, 10<sup>th</sup> Asia-Pacific Congress of Medical Virology 2015 (APCMV 2015) in conjunction with 12<sup>th</sup> Taipei International Conference on HIV/AIDS.



October 15-18, 10<sup>th</sup> Asia-Pacific Congress of Medical Virology 2015 (APCMV 2015) in conjunction with 12<sup>th</sup> Taipei International Conference on HIV/AIDS.

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## Preparing for Influenza Pandemics

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### Current Status

When an avian influenza epidemic emerged at the end of 2003, Taiwan began to prepare for a potential pandemic. From the experience of SRAS in 2003, government agencies were highly supportive and willing to allocate necessary funding for preparations.

Taiwan CDC started to work out the influenza pandemic preparedness since 2003. In May 2005, the FIRST National Influenza Pandemic Preparedness Plan was approved by Executive Yuan (hereafter referred to as the 'Preparedness Plan'). In May 2015, the Executive Yuan approved the Phase III plan as a continuation of the Phase II plan, to engage with all the preparedness.

The outlines of Taiwan's influenza pandemic response are hinged on the four major strategies at five lines of defense. The four major strategies were defined as following : 1.Surveillance and assessment, 2.Interruption of transmission, 3.Antivirals, and 4.Influenza vaccine; and the five lines of defense are defined as following : 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 mortality rate, economic losses and impact of novel influenza viruses.

### Accomplishments

While Taiwan detected H5 avian influenza in poultry in 2015, Taiwan CDC promptly activated the response system, under the existing response framework to acquire the latest epidemic information and closely monitor the change in genetic sequence of virus at threats of bird-to-human transmission as well, to advance the arrangement of preparedness and response. Taiwan CDC also assist the Council of Agriculture, Executive Yuan, in effectively containing the outbreak.

Additionally, Taiwan CDC monitored the health status of 8,311 poultry farm workers and disease control personnel. No bird-to-human transmission was identified. Taiwan CDC also provided the Council of Agriculture and the Ministry of National Defense with personal protective equipments hereafter referred to as the PPE's, such as N95 respirators and surgical masks, which, in turn, were delivered to personnel in charge of cleaning the infected poultry farms. Taiwan CDC urged the Council of Agriculture to amend laws and regulations to ban poultry slaughter in wet markets. Taiwan was the first among the Chinese community to implement the policy. As a result, it effectively eliminated the transmission of avian influenza and let Taiwan had a greater capacity for influenza pandemic prevention and control. The content of the Preparedness Plan is outlined as follows:

#### 1. Vaccine Stockpile and Use

##### (1) Seasonal Influenza Vaccines

The seasonal influenza vaccination program, which began on October 1, 2015, prioritizes

eight groups of people: 1. Elderly persons aged 65 and above; 2. Preschool children aged 6 months through 6 years and elementary school students; 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 aged 50 to 64 years who had underlying medical conditions; and 8. Pregnant women. In January 2016, Taiwan CDC expanded the program to those who had underlying medical conditions. The program continued a policy of not charging diagnostic fees for elderly persons aged 65 and above, preschool children receiving government-funded influenza vaccines, residents and staff in nursing homes and long-term care facilities and rare disorders. Influenza vaccines were given to school-aged children at primary schools and to other groups at clinics or hospitals.

## (2) Pre-pandemic Influenza Vaccines (H5N1)

WHO data showed that between the globally widespread re-emergence of H5N1 in 2003 and the end of 2015, there were 844 confirmed human case of H5N1 and 449 deaths (for a fatality rate of 53%). Faced with the threat of human H5N1 infections in neighboring countries, Taiwan CDC continued to act in accordance with the Phase III plan to strengthen health safeguards by raising immunity among high-risk groups. A total of 30,000 doses of H5N1 vaccines were stockpiled in 2015 in anticipation of a potential pandemic. And Taiwan CDC continued a voluntary A/H5N1 vaccine immunization program that covered six high-risk groups: 1. laboratory workers with potential exposure to HPAI H5N1 viruses; 2. health care workers; 3. public health personnel; 4. poultry and livestock farmers and animal health inspectors; 5. customs, immigration, quarantine and security (CIQS) personnel; and 6. travelers who will travel to H5N1 virus affected areas.

## 2. Stockpiling and Use of Antiviral Drugs

In accordance with a WHO recommendation to maintain a diverse stockpiles of influenza antivirals in preparation for a pandemic, Taiwan CDC has established national stockpiles of Relenza, Tamiflu and Rapiacta. 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 who were at increased risks for influenza-related complications such as infants, elderly and patient with chronic diseases. In addition, during the peak of flu season, usually from December 1 to March 31, Taiwan CDC expands target population for antiviral drug use and adjusts the duration based on



Taiwan CDC PPE stockpiles

actual conditions. There were more than 3,200 contracted hospitals and clinics to administer government-funded antivirals.

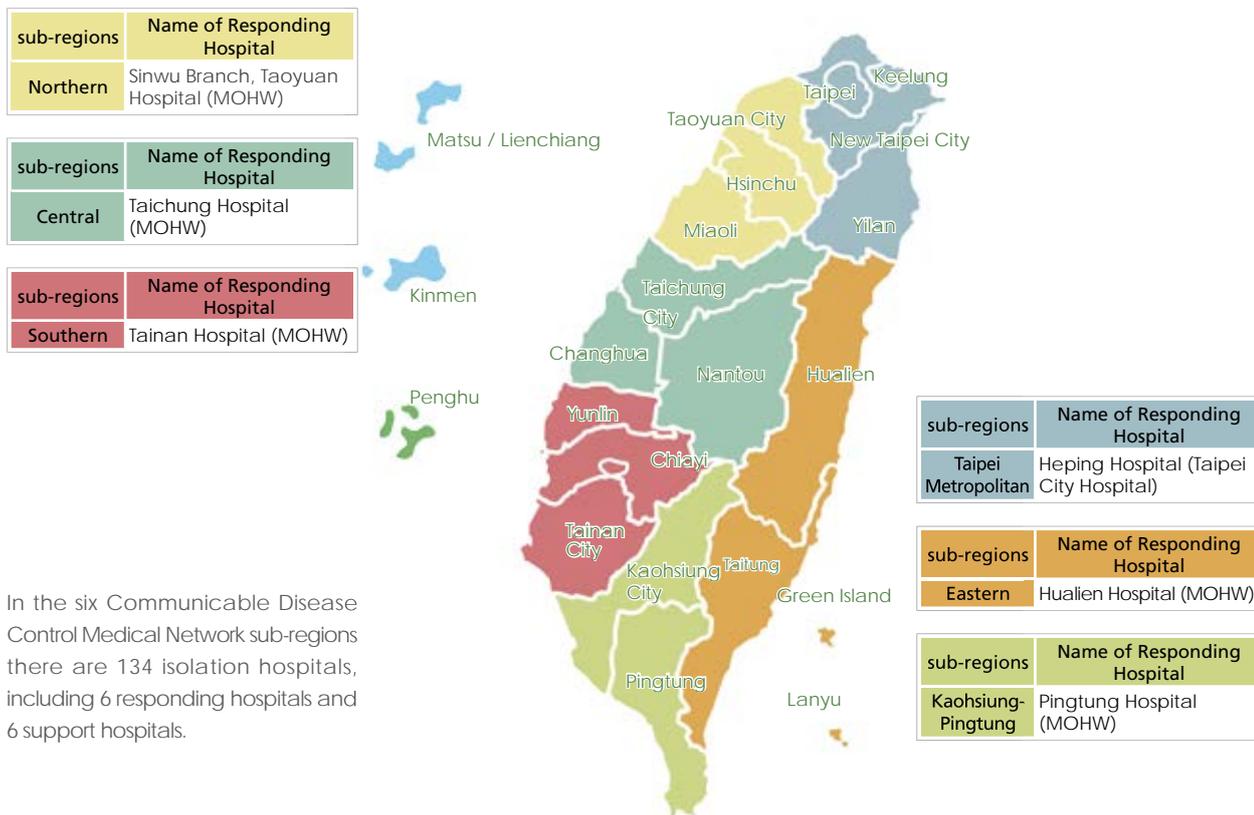
### 3. Stockpiling and Management of Personal Protective Equipment (PPE)

Taiwan CDC established a three-tiered hierarchy of PPE stockpiles. Taiwan CDC, local health authorities and medical facilities should maintain a safety stock of PPE, timely adjust the stockpile quantity, and replenish the stockpile pursuant to the epidemic conditions, whenever required. The system manages the stockpiling of goods, collection of information on epidemic control material supply chains, and the replacement of expired materials. These measures ensure that new materials are always available and stockpiles are maintained by eliminating expired



Staff training and drills

**Figure 3-6 Communicable Disease Control Medical Network**



items at normal times, ensuring sufficient supply during epidemics, and managing the stockpiles, dispatch and circulation of time-variable materials. Annual on-site inspections of local health authorities and medical facilities ensure stock quantity and quality. PPE safety stockpiles built up by Taiwan CDC included 31 million surgical masks, 900,000 N95 respirators and 140,000 coveralls. Also, in accordance with Article 6 of the Implementation Regulations Governing Materials for Communicable Disease Control and Establishment of Resources, medical facilities shall regularly keep a stockpile for one month requirement.

#### 4. Communicable Disease Control Medical Network Preparedness

The Communicable Disease Control Medical Network (CDCMN) has been set up since 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 2015, the nation's communicable disease control network was divided into 6 sub-regions with 133 designated isolation hospitals for treating communicable disease patients.

There are 6 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 115 communicable disease response training courses and 23 practice drills for response staff. Each area of the communicable disease control network had a commander and deputy commander who assisted with area epidemic control and preparedness of response hospitals.

### Future Prospects

Influenza viruses are still undergoing mutation. We need to continue to prepare for possible pandemic. Therefore, it is important to maximize limited resource. In accordance with the Pandemic Influenza Risk Management, WHO Interim Guidance, announced by the WHO on June 10, 2013, Taiwan CDC will put effort to develop and strengthen existing pandemic strategies more flexibility, and develop sustainable stockpile of antivirals, vaccines, and PPEs. We expect that will pave the way for appropriate responses to coming pandemic in order to ensure people's health.



National Influenza Pandemic Preparedness Plan- Phase III

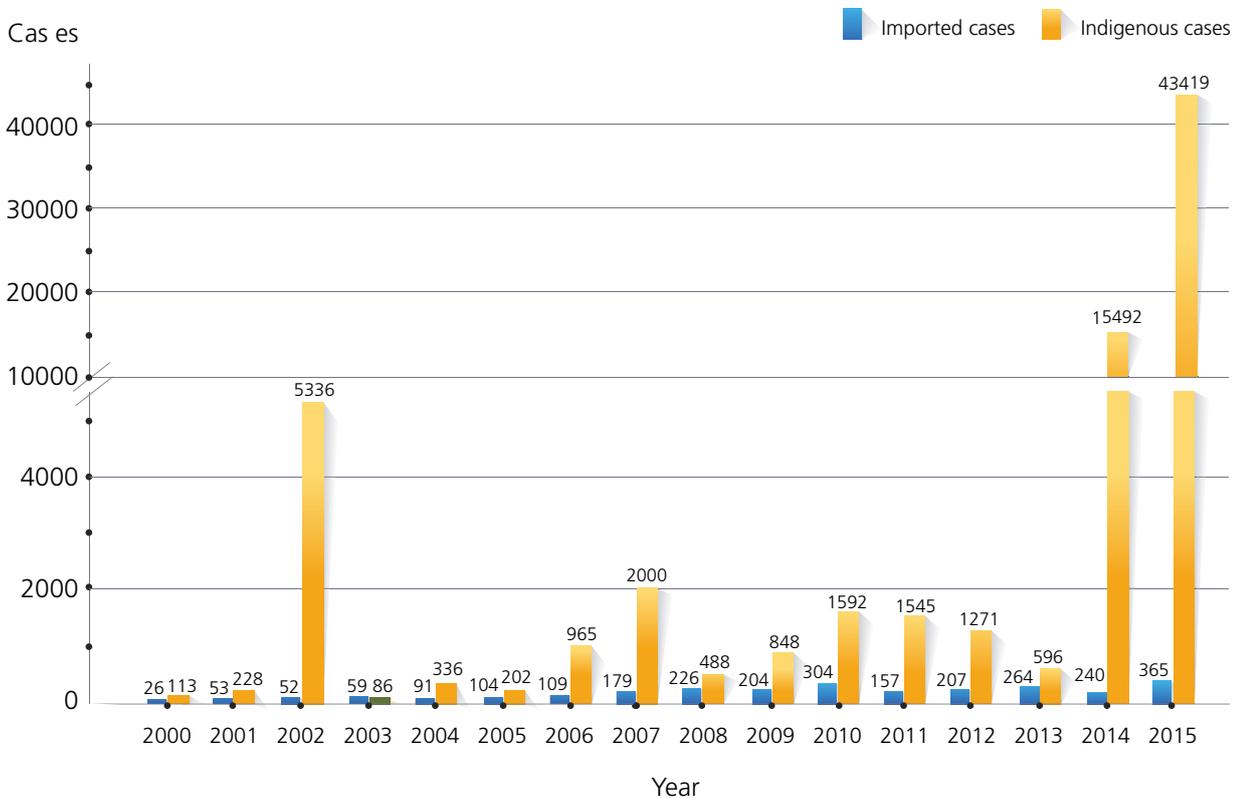
## Dengue Fever

### 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. In 2002, a dengue outbreak in southern Taiwan similar to the 1987-1988 outbreak had 5,336 indigenous cases, including 241 cases of dengue hemorrhagic fever that caused 19 deaths. Between 2003 and 2005, there were fewer than 400 indigenous cases. Since 2006, Taiwan has faced dengue outbreaks of different scales every year concentrated mainly in the southern regions of Kaohsiung, Tainan and Pingtung (Figure 3-7). Taiwan suffered another severe dengue outbreak in 2015, with 43,419 indigenous cases, including 228 deaths.

Severe dengue epidemics in Southeast Asia in recent years has led to an increase of imported cases, reaching 304 in 2010 and 365 in 2015.

 **Figure 3-7 Indigenous and imported dengue cases in Taiwan, 2000- 2015.**



## 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 dengue hemorrhagic fever 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

In 2015, the high transmission season for dengue fever in Taiwan began in May. During this period, the number of dengue fever cases continued to increase. Tainan County and Kaohsiung City were most seriously affected. Due to the continuous spread of the epidemic, the Ministry of Health and Welfare was granted the permission from the Executive Yuan to establish the “Central Epidemic Command Center for Dengue” on September 15 to coordinate and monitor preventive measures, establish a Forward Command Center in Southern Taiwan, and supervise the implementation of the first line works of disease control.

During the operation of the Central Epidemic Command Center for Dengue, various Ministries and Agencies of the Executive Yuan provided resources and preventive manpower to cooperate with the local government facilities, significantly alleviating the situation. As of the end of December, the outbreak was effectively contained. In Taiwan, 43,419 people were infected with dengue in 2015. Some 98% of these patients lived in Kaohsiung and Tainan.

### Primary Prevention

1. Distribute health education and promotional materials, including leaflets, posters, banners, the Combat Manual for Dengue Fever, and VCDs.
2. Produce promotional materials, such as epidemic control programming and newspaper ads, which call on the general public to eliminate breeding sources. These include TV commercials and short films for screening in TV slots reserved for public service announcements.



Central Epidemic Command Center (CECC) for Dengue Outbreak holding a conference. (2015)



Central Epidemic Command Center for Dengue Outbreak holding a press conference. (September 18<sup>th</sup>, 2015)



Our staff detected breeding sources of mosquitoes regularly as shown in this photo.

3. Publish the Guidelines for Dengue Control to be the reference for local health organizations.
4. Formulate 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.
5. Encouraged experts to conduct studies in insecticide efficiency and mosquito resistance to promote better insecticide use.
6. Promote 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 and the general public 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 NT\$4,000, and those who reported an imported case were awarded NT\$2,500. Patients who volunteered to be tested and were subsequently confirmed as infected were awarded NT\$2,500.
2. Continued body-temperature monitoring at international airports and seaports to limit disease importation. In 2015, 142 dengue cases were detected at ports, accounting for 38.9% of the 365 imported cases (see Table 3-5).



In 2015, Seminars on the Prevention and Control of Dengue Fever, Chikungunya Fever, and Scrub Typhus were organized for related personnel of Health Bureaus across Taiwan. (March 25<sup>th</sup>-27<sup>th</sup>, 2015)

### Tertiary Prevention

More than 1000 clinical physicians attended dengue diagnosis and treatment training courses in May to September 2015.

**Table 3-5 Serotypes and Origins of Imported Dengue Cases, 2015**

countries of infection	Serotypes					Total
	I	II	III	IV	ND	
Indonesia	10	11	7	2	51	81
Malaysia	11	12	4	0	31	58
Vietnam	7	6	1	3	40	57
Philippines	2	8	3	5	36	54
Thailand	2	1	5	5	29	42
Myanmar	5	6	0	2	11	24
Singapore	4	1	1	0	8	14
Cambodia	1	3	0	1	6	11
India	0	1	0	0	5	6
Brasil	2	0	0	0	2	4
Maldives	0	0	0	0	4	4
Australia	0	0	0	0	3	3
China	0	0	0	0	2	2
Sri Lanka	1	0	0	0	1	2
Costa Rica	1	0	0	0	0	1
South Africa	0	0	0	0	1	1
Laos	0	0	0	0	1	1
Total	46	49	21	18	231	365

## Future Prospects

Dengue is a major health threat throughout tropical and sub-tropical regions of the world. Countries at high risk are developing new measures to combat dengue in an effort to control the disease. In Taiwan, an unusually severe dengue outbreak occurred in 2015, and the risk of dengue pandemic may increase significantly in the future.

The Ministry of Health and Welfare, and Environmental Protection Administration jointly developed a response plan and SOP for Dengue Control in 2016. The central and local governments will continue to promote and implement the dengue prevention program. In addition, the development and introduction of new prevention technologies will reduce the risk of dengue fever outbreaks.

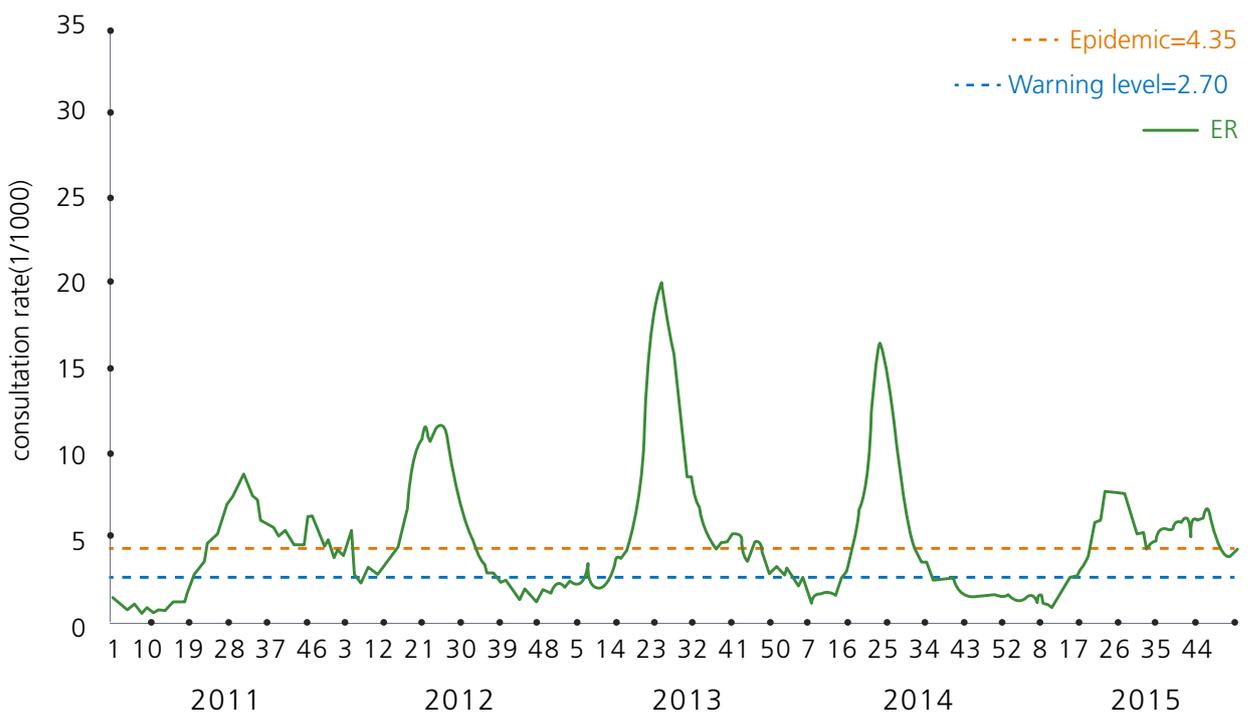
## Enteroviruses

Enterovirus belongs to a group of small RNA viruses, including polioviruses, Coxsackie A viruses, Coxsackie B viruses, echoviruses, and other enteroviruses (EV68~). Enterovirus 71 (EV71) has a significantly higher pathogenicity compared to other known enteroviruses, especially regarding neurological complications. Enteroviruses are found in the gastrointestinal tract (the stool of infected persons, mouth) 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 the survey data gathered over a period of several years by Taiwan CDC, the weekly consultation rate of enterovirus infection cases, shown by the real-time outbreak and disease surveillance system (RODS), 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 (see Figure 3-8). Many types of enteroviruses exist around the world. Humans appear to be the only known host and source of transmission. There are currently no preventive vaccines for non-polio enteroviruses and no known highly efficacious medicine to eliminate the virus once it is inside the human body. Therefore, enteroviruses will continue to pose a threat to human health for the foreseeable future.

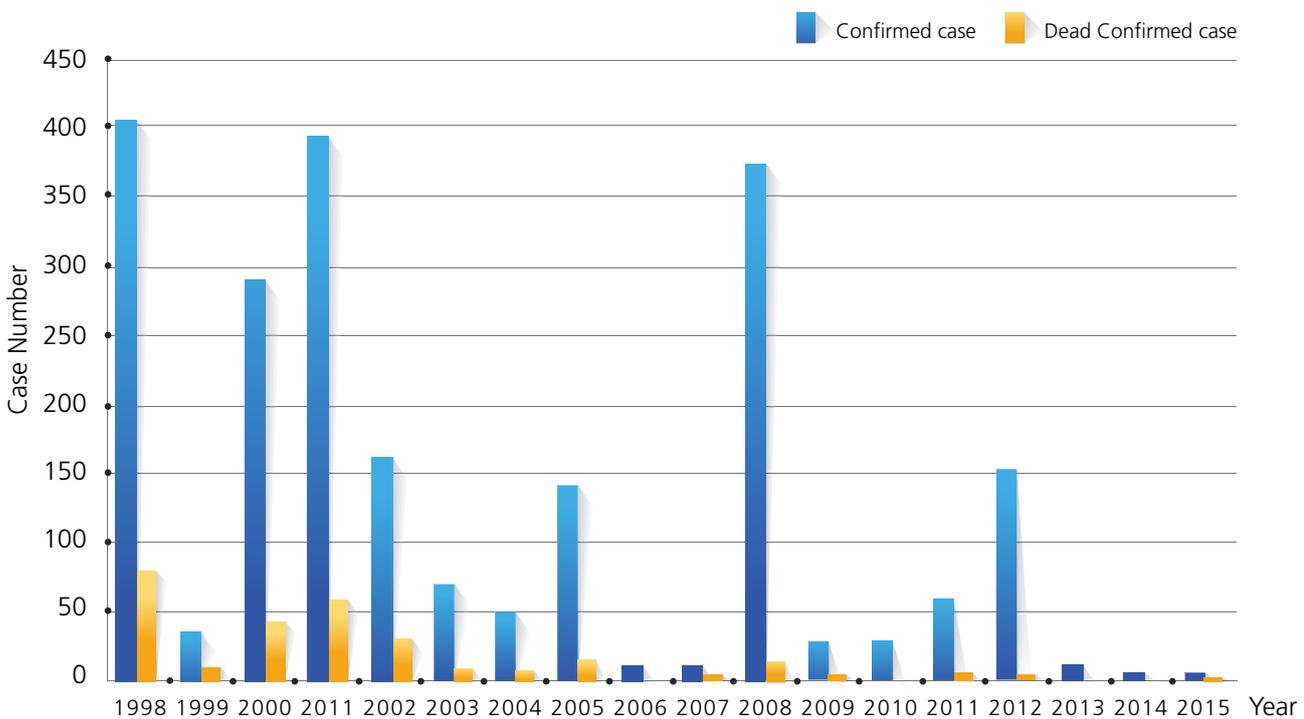
 **Figure 3-8 RODS Weekly Consultation Rate of Enterovirus Infections in Taiwan, 2011-2015**



The peak season for enterovirus infections in temperate regions is summer. According to various surveys, enterovirus infection trends suggest that children under the age of 5 are more prone to critical complications and death. The major symptoms of enterovirus infection are herpangina and hand-foot-and-mouth disease (HFMD). EV71 is the most commonly seen serotype of cases of enterovirus infection with severe complications (EVSC) in Taiwan.

In 2015, Coxsackie A viruses were the predominant type. There were 6 confirmed cases of EVSC, infected by Coxsackievirus A16, Coxsackievirus B5 and echovirus 3. Two newborn patients died (see Figure 3-9).

 **Figure 3-9 Volume of Cases and Case Fatality Rate of EVSC in Taiwan, 1998-2015**



### Accomplishments

1. Established multiple and real-time surveillance systems for enterovirus infections, covering HFMD and herpangina, severe cases, clustering, virus isolation and typing
2. Constructed a medical service network, including six regional chiefs, 81 responsible hospitals and eight contract laboratories.
3. Health Education
  - (1) Local organizations work with the community to promote enterovirus education and prevention.
  - (2) Restaurants, schools, hospitals, clinics and other public gathering places must conduct regular inspections for environmental sanitation and provide hand-washing facilities.

4. Establishment of consultation channels staffed by clinical professionals. The professionals provide clinical health care consultation and guidelines for treating enterovirus complications. Primary care for patients with complications can effectively lower the mortality rate.
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 annually.
6. Workshops are held on the clinical treatment of critical enterovirus complications to enhance doctors' skills in treating the disease, raise treatment quality and reduce mortality rates and sequelae.

## Future Prospects

### 1. Enterovirus Prevention Enhancement

- (1) Strengthen the household hand-washing activity drive by asking adults to wash their hands before interacting with children.
- (2) Encourage people not to go to school or work when they are sick.
- (3) Augment caregiver awareness of prodromal complications for enterovirus infections with severe complication.

### 2. Assessment of Current Prevention Policies

- (1) Assess consequences resulting from suspending classes.
- (2) Conduct research on the integrity of medical facilities to assess treatment criteria of severe enterovirus cases.

## Emerging Infectious Diseases (EID) Response

### Ebola Virus Disease

1. The WHO declared the Ebola outbreak in West Africa as a Public Health Emergency of International Concern (PHEIC) on August 8<sup>th</sup>, 2014. On the same day, Taiwan CDC activated the Ebola Virus Infection Emergency Response Task Force, which was based on Taiwan's existing diseases control and prevention framework. It strengthened implementation of four major strategies: health education for outbound passengers, quarantine for incoming passengers, preparedness or drill performance, and international cooperation. It held three experts' consultation meetings to evaluate and revise preparation measures, and it solicited overseas Taiwanese experts to establish an Ebola advisory task force.

2. With respect to quarantine measures, from October 21, 2014 to January 31, 2015, travelers arriving from Europe and Dubai were asked to fill out an Ebola Declaration Card. As for medical system preparedness, the designated response hospitals were asked to prepare an Emergency Response Plan and conduct drills for taking in suspected patients. In addition, Taiwan CDC has provided 20 training courses of Ebola Virus Disease Response and Prevention for Healthcare Workers to improve front-line healthcare workers' competence on emerging infectious diseases and proper donning and doffing of personal protective equipment in between February and June, 2015.



Participants practiced corpse movement at a mock Ebola Treatment Unit (ETU).

3. By obtaining firsthand epidemic control information from the WHO and other nations through the IHR Focal Point, the health representative of Ministry of Health and Welfare and medical officers in the US CDC and ECDC, Taiwan CDC was able to review and update its prevention strategies and responses in line with international practices. In addition, 2 medical officers were sent to the US CDC for its Ebola training course in November, 2014 as the seed trainers. Accordingly it held an Ebola training camp at Center for Infectious Disease Control and Prevention in Tainan, Taiwan. The first training section took place in March, 2015 with a total of 16 healthcare personnel from Philippines, Malaysia, Indonesia, Singapore, Cambodia, and Vietnam.



At the opening ceremony of the first training section, representatives from Ministry of Foreign affairs, AIT, Tainan City government, Taiwan CDC, lecturers, and participants took a group photo.

## Middle East Respiratory Syndrome Coronavirus (MERS)

1. In 2012, the WHO announced the first confirmed case of MERS. It was listed as category 5 Notifiable infectious disease in Taiwan in October. In response to the outbreak in South Korea, Taiwan CDC established a MERS Emergency Response Task Force on May, 22<sup>nd</sup>, 2015. Expert consulting meeting was held and 3 possible scenarios were postulated in advance for potential imported MERS-CoV cases from South Korea. The measures focused on improving epidemic surveillance assessments, laboratory testing and diagnosis, border control for arriving passengers, preparedness on healthcare system, international cooperation, and risk communication.
2. Taiwan CDC issued travel notice for South Korea. Passengers travelling from South Korea were given a document listing necessary medical information. If necessary, inspections were carried out on board.
3. Six designated response hospitals and health facilities assigned to treat MERS cases were required to examine PPE storage to take place simulation drill. Communications was issued to raise doctors' awareness. Doctors were required to investigate patients' TOCC and reported suspected cases.

### MERS(莫士)流行地區入境旅客健康管理須知

2015.6.11 中華民國  
MERS Health Advice  
중동호흡기증후군유행지역의 여행건강관리 알림

**親愛的旅客：**  
歡迎您來到/返回臺灣！因為您曾前往 MERS 疫情國家，為了您及家人的健康，提供您重要的預防資訊及配合事項，如果您在 14 日內有發燒、咳嗽、身體不適，請您立即戴外科口罩，及撥打 1922 防疫專線(免付費 24 小時)，以協助儘速就醫治療。

Ladies and gentlemen,  
Whether you are returning home or just visiting, welcome to Taiwan!  
Since you are coming from a country with confirmed MERS cases, for your own health and the health of your families, we would like to provide important health precautions and advices for you and your families. If you develop flu-like symptoms such as fever, cough or general discomfort within 14 days after returning home, please put on a mask immediately, call the toll-free hotline 1922 to seek assistance in getting medical attention and inform the doctor of your recent exposure and travel history.

여러분께 여러분：  
타이완 방문/귀국을 환영합니다！MERS 유행지역을 방문하셨기에 본인과 가족들의 건강을 위하여 MERS 에 관한 중요한 예방정보와 주의사항을 알려드립니다. **입국후 14 일 내에 발열이나 기침 등 호흡기 증상이 있으며 몸이 편치 않은 경우 즉시 마스크를 사용해 주십시오. 그리고 질병정보전송 전화번호 1922 로 (24 시간 무료) 연락하여 진료 안내를 받아주시기 바랍니다.**



入境症狀通報  
Report symptoms  
입국 시 증상 신고.



自主健康监测  
Self-monitoring for  
14 days  
14 일 동안 자기  
점검



有症狀戴口罩  
Wear surgical mask  
when symptoms occur  
증상이 있을 경우  
마스크 착용



1922  
Report to authority  
질병정보예방센터  
에 통보함.

### 傳染途徑 How does it spread? 감염경로

**傳染途徑**

駝峰傳人(接觸傳染)  
Cameled to Human (Contact)  
낙타와의 접촉 (접촉감염)



人傳人(飛沫傳染)  
Human to Human (Aerosol)  
사람간 접촉 (비말감염)



### 症狀 What are the symptoms? 증상

**症狀**

發燒  
Fever 발열



咳嗽  
Cough 기침



呼吸短促及困難  
Shortness of breath  
숨가쁨 및 호흡 곤란



### 預防方法 How to prevent? 예방법

**預防方法**

有呼吸困難或發燒  
症狀戴口罩  
Wear Mask when  
Experiencing Flu-like  
Symptoms or Fever  
감염이나 호흡기 증상이  
있을 경우 마스크 착용



非必要避免  
前往醫院  
Avoid Unnecessary  
Hospital Visits  
병원 방문, 가급적  
자제



避免在流行地區騎駝、接觸  
駝駝或生飲駝奶等動物奶  
Avoid Contact with Camels  
or Consuming Raw Milk  
MERS 유행지역에서 낙타와의  
접촉을 피하고 멸균되지 않은  
생낙타우유 같은 동물유를  
섭취하지 않음



衛生福利部疾病管制署  
TAIWAN CDC  
疫情通報及關懷專線：1922 <http://www.cdc.gov.tw>

A list of necessary medical information for passengers travelling back from affected areas.

4. By IHR focal point, Taiwan CDC was able to obtain first-hand information immediately. Meanwhile, it continued to distribute health information and knowledge to the public, providing guidelines to people traveling to and returning from epidemic areas. Taiwan CDC also sent medical officer to South Korea to observe the situation of MERS and provide health information for our citizens in South Korea.



5. By many manners, Taiwan CDC promptly refuted fake news on the Internet to prevent public panic and stated that spreading inaccurate rumors violates law.

6. In August, 2015, US CDC and Taiwan CDC co-hosted the International Training Course on Molecular Diagnosis for MERS-CoV. 17 laboratory professionals from Japan, the Philippines, Indonesia, Cambodia, Malaysia, Vietnam, Thailand, India, and Papua New Guinea participated in the training course. The training course aimed to provide an opportunity for them to interact and discuss issues of mutual concerns with one other, and establish a laboratory network in Asia Pacific and Southeast Asia regions that could offer more collaboration opportunities and effectively increase the regional capacity to respond to infectious disease.



The International Training Course on Molecular Diagnosis for MERS-CoV organized by Taiwan CDC and USCDC.

# Infection Control and Biosafety

## Healthcare-association Infection Control

### Current Status

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

Our goals are:

1. To reduce nosocomial 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 nosocomial infection control inspection programs and sharing nosocomial infection control experiences in on-site audits.
3. To continue promoting hospital participation and strengthening data quality in the Taiwan Nosocomial Infection Surveillance (TNIS) system.
4. To combat antimicrobial resistance through national action plans and compilation of infection control guidelines of multidrug-resistant organisms (MDROs).
5. To monitor variations and evolving trends of the carbapenem-resistant genes in Enterobacteriaceae.
6. To implement the Antimicrobial Stewardship Program for promoting appropriate use of antimicrobial. This will improve patient safety and treatment quality by reducing antimicrobial resistance and healthcare-associated infections.
7. To promote infection control and reduce healthcare-associated infections in nursing facilities by implementing infection control inspections.

### Accomplishments

#### 1. Infection Control Guidelines and the *Infection Control Journal*

- (1) In 2015, Taiwan CDC released the guidelines for infection control for dentistry and in burn unit, as well as for environmental infection control in health care settings. Taiwan CDC also updated the guideline on preventing novel coronavirus (MERS-CoV) in healthcare facilities, revised infection control guidelines of MDROs, and released prevention handbooks of methicillin-resistant *Staphylococcus aureus* (MRSA), and carbapenem-resistant *Acinetobacter baumannii* (CRAB). Formulated infection control

guidelines for Rotavirus, Adenovirus, Respiratory syncytial virus (RSV) and MDROs in long-term care facilities (LTCFs) were also done by this year.

(2) 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 nosocomial infections.

## 2. Nosocomial Infection Control Inspections

Starting in 2008, Taiwan CDC commissioned the Taiwan Joint Commission on Hospital Accreditation to implement a quality improvement project for infection control inspections. Experienced infection control practitioners and medical officers joined local health authorities in conducting on-site inspections. In 2015, of 367 hospitals inspected, none of them failed to meet requirements.

## 3. Implementation of Care Bundle

The Centers of Excellence, established by seven medical centers and another 45 hospitals, participated in the national initiative to implement the care bundles to prevent ventilator-associated pneumonia (VAP) and catheter-associated urinary tract infection (CAUTI). The initiative can reinforce patient safety, improve healthcare quality and reduce medical costs.



## 4. Nosocomial Infection Surveillance and Reporting

In 2015, about 420 hospitals reported data to the TNIS system. Taiwan CDC produced a nationwide nosocomial infection quarterly report to provide periodic feedback and strengthen communication with hospitals.

## 5. Surveillance of Carbapenem-resistant Enterobacteriaceae

Taiwan CDC records cases with *Klebsiella pneumoniae* carbapenemase (KPC) and New Delhi metallo-beta-lactamase (NDM)-producing Enterobacteriaceae through two methods: a MDROs monitoring system and a scientific research program. Prevention guidelines were issued to help hospitals to enhance infection control measures, minimize the spread of MDROs and improve healthcare quality.

## 6. Nationwide Antimicrobial Stewardship Program

Three implementation levels – a program management center, demonstration centers and participating hospitals – operate the Antimicrobial Stewardship Program jointly. The management center was established in 2013 to launch the program. Some seven hospitals were selected to serve as regional demonstration centers assisting in overall

implementation and promotion of the systems, and 71 hospitals were selected to participate the program in 2015. An international congress, antimicrobial stewardship program summit forums, an award/certification ceremony and accomplishment presentation were held for promotional purposes.



Antimicrobial Stewardship Program Summit Forum, Aug 22, 2015.

#### 7. Infection Control Inspections in Nursing Facilities

In 2015, Taiwan CDC implemented infection control inspections of nursing facilities. Local health authorities and infection control experts inspected 340 facilities and conducted follow-up inspections at 6 audited facilities that failed to meet requirements. The total pass rate was 98.2%.

#### 8. "Taiwan Hand Sanitizing Relays Campaign 5 May 2015"

The campaign attracted 213 organizations, including 98 hospitals, 80 LTCFs and 35 medical student groups, to participate in. It aimed at promoting the practice hand hygiene to reduce healthcare-associated infections.



Taiwan Hand Sanitizing Relay, May 5, 2015.

## Future Prospects

1. Draft, implement and revise nosocomial infection control regulations and guidelines based on recommendations announced by the WHO and leading countries. The information Taiwan CDC gathers from around the world on policies, laws, regulations and implementation results will serve as a reference for policymaking.
2. Improve nosocomial infection control inspections. Taiwan CDC will draft the 2016 nosocomial infection control inspection quality improvement project based on implementation experiences from 2008 to 2015 and outside recommendations. It will arrange an inspection schedule based on the Ministry of Health and Welfare's medical investigation consolidation policy.
3. Continue to promote the care bundles that prevent VAP and CAUTI. By reducing device-associated infections, hospitals are able to improve patient safety and healthcare quality, and reduce medical costs.
4. Promote hospital participation in the TNIS system while strengthening surveillance of nosocomial infections and antimicrobial resistance.
5. Continue to implement a national program of antimicrobial stewardship to combat antimicrobial resistance at hospitals.
6. Extend the infection control inspections to veterans' homes, psychiatric rehabilitation institutions, and welfare institutions for the disabled in 2016 in order to improve health care quality, reduce healthcare-associated infections and prevent outbreaks.

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## Laboratory Biosafety Management

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### Current Status

#### Legislative and Regulatory Changes

In 2009, Taiwan CDC began revising the Regulations Governing Management of Infectious Biological Materials and Collection of Specimens. It added select RG1 microorganisms, strengthened biosecurity measures among units holding infectious materials, established a laboratory biosafety training system with a time component, and introduced a laboratory biosafety oversight and information system. After completing a related amendment to the Communicable Disease Control Act, it will jointly announce these revisions. In 2015, The "Operation Directions Governing Management of Infectious Biological Materials" has been updated. Directions on the risk group of vaccine strain, the P620 packing and shipping management for specimens with infectious pathogens, and biosafety operating requirements in laboratory for handle biological toxins, etc. were added. Taiwan CDC also completed editing, revision, and announcement of the Laboratory Biosafety Guidance for Conducting Testing for Human Immunodeficiency Virus (HIV), *Mycobacterium tuberculosis* (TB) and MERS-CoV.

### Biosafety Mechanism Registration

By December 2015, 517 organizations registered biosafety mechanisms to Taiwan CDC, of which 391 established biosafety committees and 126 designated an individual. These included 33 government organizations, 171 medical institutions, 55 academic research institutions and 258 other groups.

### Biosafety Inspections of High-Containment Laboratories

Since 2006, Taiwan CDC has routinely inspected BSL-3 and above laboratories to monitor operations and ensure safety. In 2009, TB-containment laboratories, which process culture manipulation for identification and drug-susceptibility tests, were added to inspections. In 2015, Taiwan CDC inspected one BSL-4 laboratory, 20 BSL-3 laboratories and 11 TB-containment laboratories.

### Laboratory Biosafety Education and Training

In 2015, three e-learning courses on laboratory biosafety were recorded. Taiwan CDC also organized 8 biosafety training course sessions (totaling 46 hours), with a total attendance of 627 people.

### Laboratory Bio-risk Management

In 2015, the bio-risk management system using CWA 15793 standard was introduced to 11 high-containment laboratories including BSL-3 and TB-containment laboratories. By focusing on continuous improvement and the Plan-Do-Check-Act (PDCA) cycle, this system will identify and monitor all aspects of laboratory biosafety and biosecurity.

## Future Prospects

Taiwan CDC will continually supervise all BSL-3 and biotechnology microbiology laboratories to establish a bio-risk management system over the coming years. To strengthen biosafety and biosecurity for selected agents and biological toxins, and to protect public health and environmental safety, Taiwan CDC will set up a self-management and oversight mechanism to avoid any accidental or deliberate release of selected agents and biological toxins.



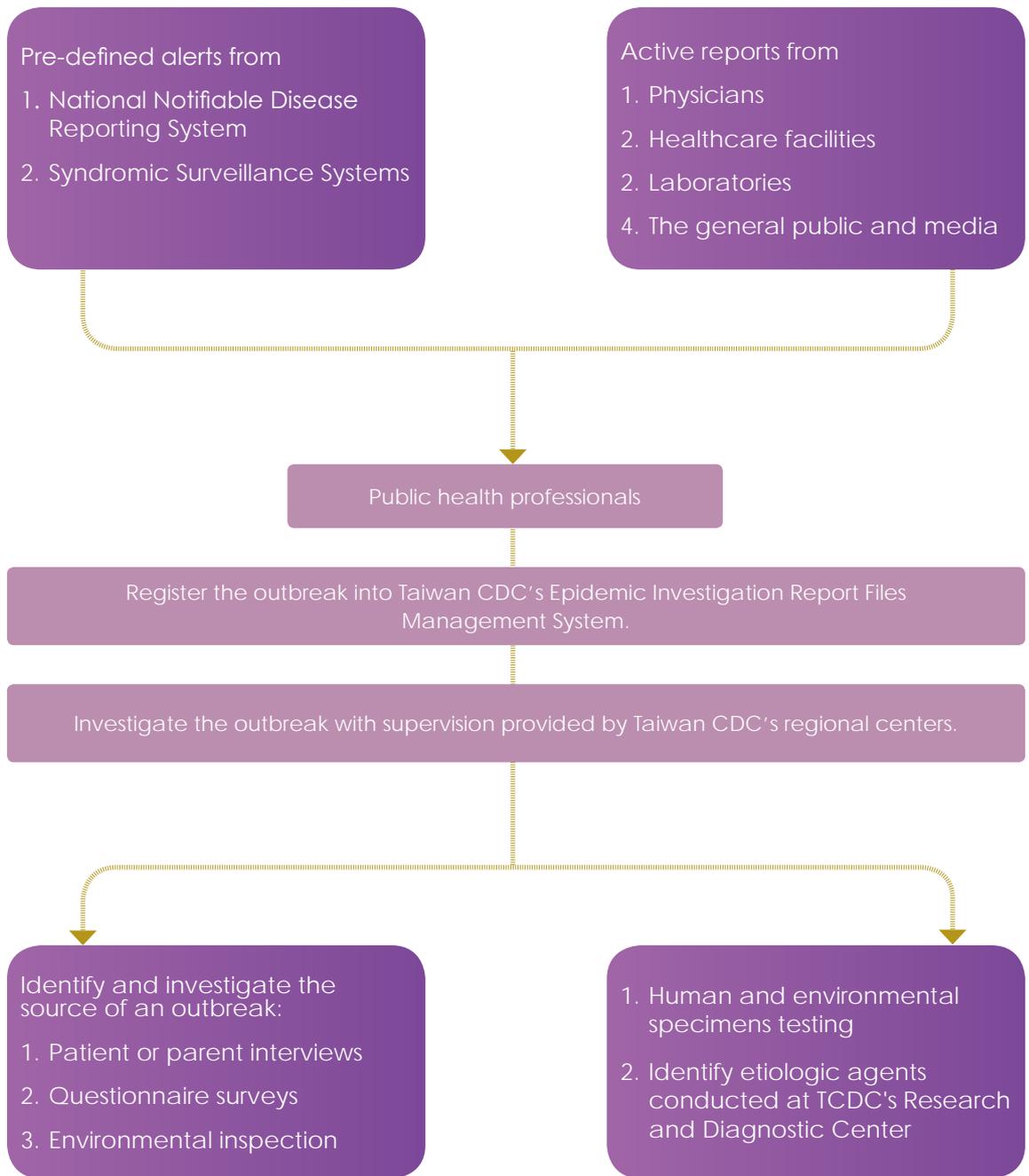
An awards ceremony was held to recognize high-containment laboratories for introducing the Lab bio-risk management system, Dec 14, 2015.

# Outbreak Investigation

## Current Status

In Taiwan, outbreaks are mainly detected through the following ways (Figure3-10)

 **Figure 3-10 Flowchart of outbreak investigation**



## 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.

### Accomplishments

1. In 2015, of 620 suspected outbreaks registered into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated by public health authorities, 428 (69%) were confirmed outbreaks.
2. The top four reported diseases/syndromes of confirmed outbreaks were acute diarrhea (n=147, 34%), acute respiratory infection (n=118, 28%), influenza-like illness (n=77, 18%), and varicella/chickenpox (n= 50, 12%) (Table 3-6).

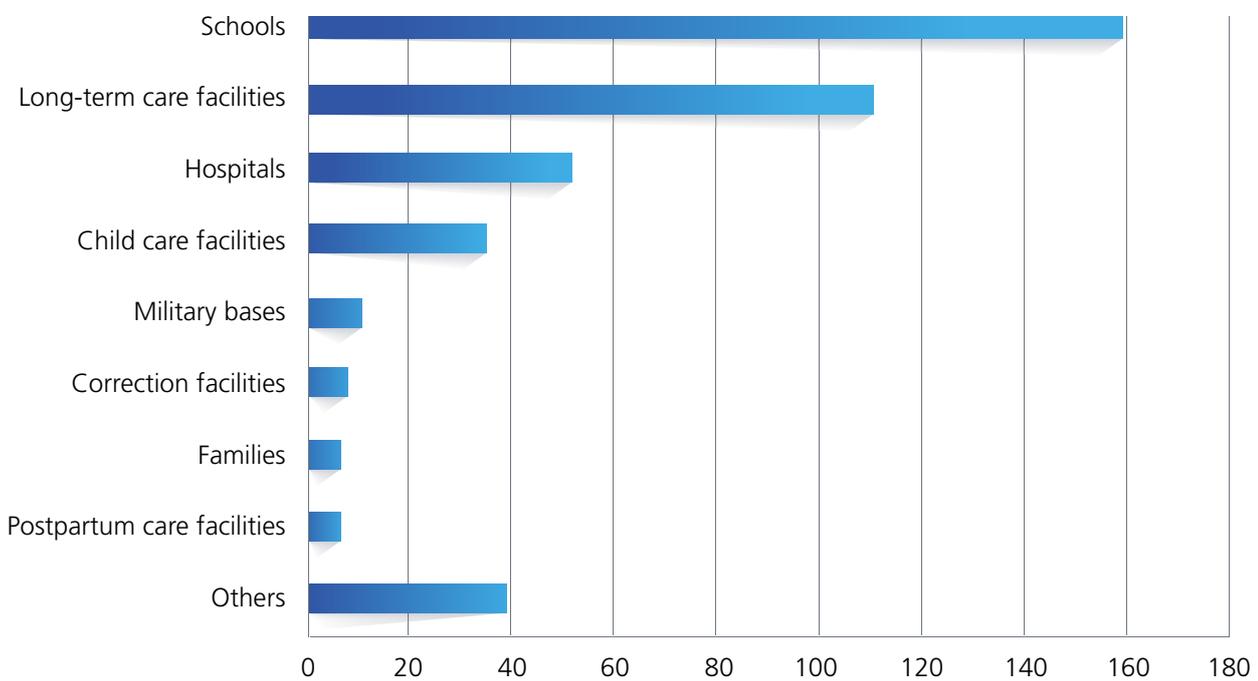


**Table 3-6 Number of reported diseases/syndromes of confirmed outbreaks — Taiwan, 2015**

Reported disease/syndromes	Total number of outbreaks
Acute diarrhea	147
Acute respiratory infection	118
Influenza-like illness	77
Varicella/chickenpox	50
Tuberculosis	16
Dengue fever	5
Unknown cause of fever	5
Enterovirus	2
Pertussis	1
Acute conjunctivitis	1
Foodborne illness (unknown pathogen)	1
Measles	1
Shigellosis	1
Total	428

3. The top three outbreak settings were schools (n=159, 37%), long-term care facilities (n=111, 26%), and hospitals (n=52, 12%) (Figure 3-11).
4. Special events in 2015 included an investigation of water-borne Norovirus outbreak and Oyster associated Norovirus outbreak.

 **Figure 3-11 Number of Outbreaks by Setting — Taiwan, 2015**



### 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 as well as control and contribute to global health diplomacy.

# *International Health*



## Implementation of the IHR

### WHO International Health Regulations

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

Over the years, international transportation has become more convenient, which leads to 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 in. The regulations, which took effect in 2007, cover public health incidents and emerging or re-emerging diseases, such as SARS, influenza and polio. Meanwhile, the IHR establish a number of procedures and practices for assessing whether an affected country or region is facing a public health emergency of international concern (PHEIC). The purpose of this model is to prevent the time when an epidemic occurs in a place where it is not yet confirmed to be a communicable disease. The new IHR also strengthen the National Focal Point (NFP) system for each country. 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, Taiwan CDC works 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. If an epidemic or public health incident occurs that meets IHR standards for reporting, WHO uses IHR channels to alert each country, including Taiwan.

### 2. Establishing a national, cross-departmental communication channel for forwarding of IHR information promptly:

A cross-departmental contact point has been established in Taiwan CDC to facilitate timely correspondence with WHO IHR on information regarding major public health incidents. Agencies with available counterparts include bureaus within the Ministry of Health and Welfare, the Taiwan Food and Drug Administration (TFDA), the Ministry of Foreign Affairs, the Bureau of Animal and Plant Health Inspection and Quarantine, and local health departments. This channel ensures prompt reporting, communication and response to new events.

### 3. Case referral and reporting diseases or public health events meeting IHR standards:

The Taiwan IHR NFP 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). Through the IHR channel, relevant countries are informed of follow-up investigation results to facilitate attending and monitoring referred cases. If a PHEIC occurs, Taiwan immediately informs WHO IHR contact point.

## Achievements

Within 2015, Taiwan CDC acquired 47 items which have been assessed against the criteria for public health risks of international importance through EIS. The majority referred to infectious disease related events around the world.

Furthermore, as a member of the global village, Taiwan is devoting itself and would take responsibilities and have obligations to make contributions to health safety in the 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, Mailliao, Kaohsiung, and Hualien), and the three terminals (Kinmen, Matsu and Makung) of the “Mini Three Links” with Mainland China.



Temperature screenings are conducted at an immigration quarantine station.

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 a one-stop information system for all information regarding quarantine operations. This included quarantine operations for aircrafts 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 on-board quarantine:

A. For aircraft: According to the event or emergency, Taiwan CDC may decide to execute aircraft on-board 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 abnormal death of animals.

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

The following table shows the state of quarantine in 2015:



**Table 4-1 Quarantine at International Ports in 2015**

Regional Center	Quarantine Office	Ships	Passengers	Aircraft	Passengers
Taipei	Keelung	4,802	277,068	-	-
	Suao	582	62,350	-	-
	Taipei	3,364	45,896	-	-
	Kinmen	9,626	883,045	1	4
	Matsu	972	21,603	0	0
	Songshan	-	-	9,332	1,665,671
Northern	Taoyuan	-	-	98,393	17,264,896
Central	Taichung*	7,284	64,401	6,053	837,157
Southern	Malliao	2,757	30	-	-
	Tainan	-	-	436	39,697
Kaohsiung-Pingtung	Kaohsiung*	14,988	71,835	16,519	2,473,077
	Makung	253	28,480	0	0
Eastern	Hualien*	987	56,541	91	12,799
	Taitung	-	-	20	1,927
Total		45,615	1,511,249	130,845	22,295,228

Source: Taiwan CDC Quarantine Information System  
\*Include the quarantine office at airport and seaport.

### 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 are encouraged to seek medical advice and inform their doctor of recent travel history. Of the 23,601,215 passengers who arrived in Taiwan last year, 17,779 showed symptoms and were put on the local quarantine follow-up list. 161 cases were confirmed as communicable disease among symptomatic passengers, in which 155 cases were diagnosed with dengue fever, 4 cases of chikungunya fever, 1 case of Severe Complicated Influenza, and 1 case of Leptospirosis.

### 4. 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 eliminate 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 Ovitrap: 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 plan and implement policies concerning port security and sanitation .

## 5. IHR Core Capacities at Designated PoE

The first-phase protocol for achieving core capacity requirements at designated ports of entry in Taiwan was approved by the Executive Yuan in 2011. The first two designated ports, Taoyuan International Airport and Port of Kaohsiung, underwent follow-up external assessments undertaken by two Australian experts, scoring 100 and 99.9, respectively. The performance not only is a testament that the improvement project has met the IHR core capacity requirements but also demonstrated that the capabilities of these designated PoE were on a par with those of other developed nations. To pass down these valuable experiences to other PoE, the Executive Yuan approved the second-phase protocol in 2014. It designated Taipei Songshan International Airport, Taichung Airport, Kaohsiung International Airport, Port of Keelung, and Port of Taichung as the PoEs to establish core capacities in the second phase. Self-assessments and initial internal assessments were carried out by domestic experts in 2014. Several gaps were identified and action plans were developed based on the experts' advice to implement the IHR (2005). The PoEs passed the external assessment with flying colors in 2015. A total of



Experts, leader of PoEs and TCDC Director-General in closing and synthesis discussion on implementing IHR core capacity assessment 2015.

seven designated points of entry have met the IHR core capacity requirements. Therefore, we have not only become able to detect, assess, report, and respond to potential public health events of international concern more effectively, but we have also met the requirements and expectations of the W.H.O. We will continue to maintain and strengthen our IHR core capacities to ensure the health and welfare of the people in our nation.

## **6. 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.

## **7. Promoting Travel Health**

A total of 26 travel clinics, distributed across country, provide pre-travel health consultations and vaccinations. Taiwan CDC established the Training Center for Travel Medicine to promote related education and research, and it also provided up-to-date travel health information via CDC's official website.

## **Future Prospects**

1. With limited manpower and equipment, CDC aimed to strengthen 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 PoE 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.

# *Scientific Research and Development*



## Research, Development and Manufacturing

The Center for Diagnostics, which comprises 11 laboratories and three service sections, employed 147 individuals and received and processed 138,063 diagnostic specimens in 2015. Facing emerging and re-emerging communicable diseases, the center emphasized international collaboration with a focus on information exchange and laboratory technology advances. From December 2011, its laboratories not only took regular proficiency tests to ensure quality and accuracy of diagnostic results but also began to be accredited by the Taiwan Accreditation Foundation.

### 2014-2015 Accomplishments

#### National Influenza Center (NIC)

1. In 2015, influenza A(H3N2) viruses circulated predominantly and influenza A (H1N1)pdm09 and influenza B viruses were also isolated with minor circulation in Taiwan.
2. In 2015, 73 A(H1N1)pdm09 viruses, 182 H3N2 and 65 influenza B viruses were tested for resistance to oseltamivir. Of them, one A(H1N1)pdm09 virus was detected to be resistant to oseltamivir.
3. The increased seropositivity rates of avian influenza (AIV) in poultry workers and poultry farmers indicate that occupational exposure is associated with a high risk of AIV infection, and the seroprevalence of particular avian influenza strains in humans reflects the endemic strains in poultry in this region.

#### Viral Respiratory Diseases Laboratory

1. In Taiwan, adults have become as one of groups susceptible to measles virus (MV) infection and have discrepant humoral immune reactions - indicated by the level of IgM and IgG antibodies compared to a naive, susceptible measles case. Genotype H1 rebounded in 2012 after an absence in 2011. In 2014, genotype B3 first appeared in Taiwan following import from the Philippines and became the most frequently detected strain.
2. Twenty-nine measles cases were confirmed from 141 reported cases in 2015 and the available viruses were characterized as genotype H1 (n=27).
3. Seven rubella cases were confirmed from 91 reported cases in 2015 and the available viruses were characterized as two genotypes: 1E (n=1) and 2B (n=3).

#### Viral Enteric and Diarrhoeal Diseases Laboratory

1. Norovirus(NV) was the major cause of AGE outbreaks in Taiwan. In the end of 2014 to 2015, novel norovirus GII.17 emerged and replaced former predominant GII.4 Sydney

strain to cause larger norovirus outbreaks all over Taiwan. The dominant GII.17 strain was the major pathogen causing diarrheal outbreak which mostly occurred in school and restaurant.

2. Two rotavirus vaccines (Rotarix and RotaTeq) became available on the private market in Taiwan, 2006. In order to monitor the impact of vaccines, hospitalized children aged <5 years with AGE were enrolled from sentinel surveillance hospitals in Taiwan. Rotavirus positivity rate steadily decreased during 2008-2010, then slightly increased in 2011. The increase in the number of G2P[4] cases was observed with great genetic diversity among G2P[4] strains.
3. Establishment and application of molecular detection methods to confirm novel viruses of reported diarrhea syndrome cluster and foodborne related outbreaks.

#### **HIV and Emerging Diseases Laboratory**

1. Executed an acute flaccid paralysis surveillance system to comply with the WHO Global Polio Eradication Initiative and maintain good proficiency testing results.
2. Involved in a National Foodborne Illness Surveillance and Study associated with viral pathogens, including HAV and HEV.
3. In response to re-emergence of Rabies in wild ferret badgers in 2013 and Ebola virus in West Africa in 2014, laboratory establishes detection ability.
4. Continue HIV drug resistance surveillance survey among treatment naïve patients and conduct incidence study in different HIV-1 (+) risk groups.
5. Enterovirus D68 has been endemic in Taiwan for some years despite a small number of positive cases.
6. No EV71 activity has been detected for the last couple years, but it has been started to pump up right after summer in 2015. The major sub-genotype is C4.

#### **Vector-Borne Viral and Rickettsial Diseases Laboratory**

1. Established and maintained the vector-borne viral and rickettsial reference laboratory to provide laboratory standards and diagnostic services to domestic and international health agencies.
2. Developed immunochromatographic test (ICT)-based rapid detection kits for the detection of vector-borne viral infections.
3. Established surveillance and molecular diagnostic systems for the detection of emerging and re-emergent vector-borne viral diseases.
4. Conducted a mosquito surveillance program for monitoring emerging and re-emerging vector-borne viral diseases.

### **Bacterial Respiratory Diseases Laboratory**

1. In 2014-2015, a total of 1,121 cases of invasive pneumococcal disease (IPD) were notified. The incidence was 2.4 cases per 100,000 population, and the case fatality was 9.8%. Among invasive *Streptococcus pneumoniae* strains, the most prevalent serotypes were serotypes 19A, 3, 14, and 15A. Toward penicillin, cefotaxime, and erythromycin, 62%, 82%, and 10% strains were susceptible, respectively. In 2015, serogroup 15 strains consist of 21% of all strains, exceeding serotype 19A strains (16%).
2. In 2014-2015, a total of 286 cases of Legionnaires' disease were laboratory-confirmed, including 221 male and 65 female. There are 46 and 240 cases in age groups of 20-49 and  $\geq 50$  years, respectively.

### **Bacterial Enteric and Emerging Diseases Laboratory**

1. Surveillance of carbapenem resistant Enterobacteriaceae: KPC is the most prevalent carbapenemase among CRE in Taiwan.
2. Establishment of multiplex real-time RT-PCR for detection of pathogens that cause encephalitis, pathogen detection rate ranged from 20-23.5% during 2013-2015.
3. Employed high-throughput sequencing for unknown pathogen discovery.

### **Parasitic Diseases Laboratory**

1. Identify a continuous increase of amoebiasis cases among foreign laborers.
2. Diagnose imported malaria cases and identify *Plasmodium* to the species level by microscopic and molecular methods.
3. Organize two Malaria Microscopy Training Courses.
4. Conduct toxoplasma diagnosis in high risk populations.
5. Develop diagnostic methods for foodborne and waterborne parasitic diseases.

### **Mycotic Diseases Laboratory**

1. Conducted diagnostic assays and molecular epidemiology studies of fungal and nocardial pathogens, sexually-transmitted pathogens, and other pathogens, such as *Chlamydia pneumoniae*, *Chlamydia psittaci*, *Chlamydia trachomatis*, and *Mycoplasma pneumoniae* infections.
2. Carried out G-NICE (gonococci-National Isolate Collection for Epidemiology) for the surveillance of resistance trend and molecular epidemiology study on *Neisseria gonorrhoeae*. Constructed major sexual networks in Taiwan. Identified an azithromycin resistant clone in Taiwan.
3. Established novel multiplex bead array platforms to rapidly detect clinically important fungi, nosocomial pathogens and sexually transmitted pathogens.

### Vector Biology Laboratory

1. Conducted a molecular epidemiological surveillance for tick-borne emerging and zoonotic diseases especially tick-borne virus diseases.
2. Conducted an epidemiological survey of anaplasmosis and spotted fever on rodents, isolated *Anaplasma* spp. and *Ehrlichia* spp. from rodent's blood and tissue.
3. Published a book named "Chigger Mite Fauna of Taiwan: (Acari: Trombiculidae and Leeuwenhökidae)", described 38 chigger mite species including 3 new species and 23 new record species in Taiwan.
4. Performed data analysis of dengue vector surveillance weekly.
5. Conducted species identification of mosquitoes collected from malaria vector (*Anopheles minimus*) surveillance and harbor-airport mosquito surveillance.
6. Carried out virus detection on *Culex* vectors of Japanese encephalitis and *Aedes* vectors of dengue by request.
7. Conducted efficacies of common used insecticides against *Aedes aegypti* field populations in dengue high-risk areas to monitor the use of chemical control during dengue outbreaks.

### Establishment and Application of a Pathogen Genome Sequence Database in Taiwan

Taiwan Pathogenic Microorganism Genome Database (TPMGD)-open version ([http://tpmgd.cdc.gov.tw/tpmgd\\_public/](http://tpmgd.cdc.gov.tw/tpmgd_public/)) is accessible to the general public online. Anyone can surf and download from the website or do contrastive analysis of 28,988 pathogen sequence data and simple epidemiological information.



Taiwan Pathogenic Microorganism Genome Database

# Manufacturing of Serum and Vaccines

## Production of Bio-Products

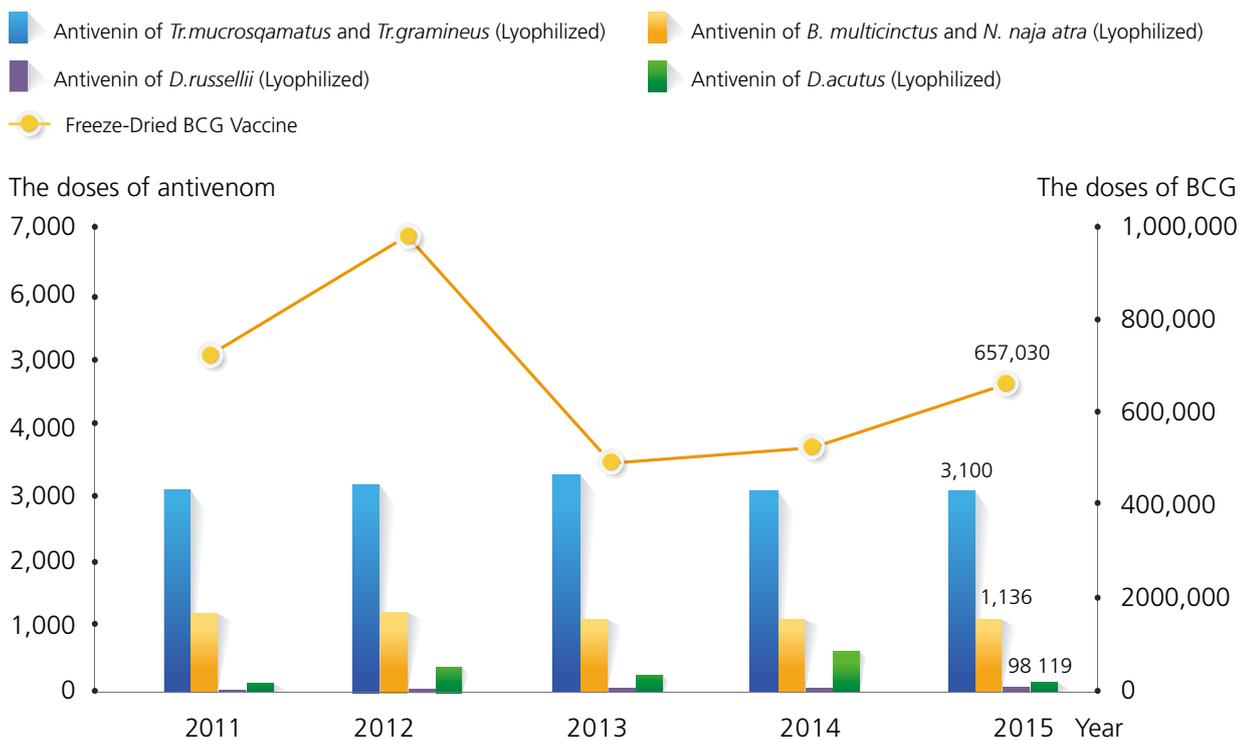
1. A total of 404.7 liters of antivenom immunoglobulins is separated from the blood of hyperimmunized horses in 2015.
2. Simulation of plasma collection from horses was completed in the incoming horse farm- National Antivenom Horse Farm.



National Antivenom Horse Farm & Simulation of plasma collection

3. A supply of 661,483 doses of vaccines and antivenoms was available in 2015. Income from sales of these biologics totaled about NT\$34.4 million.

**Figure 5-1 Biologics supplied by the vaccine center in 2011~2015.**

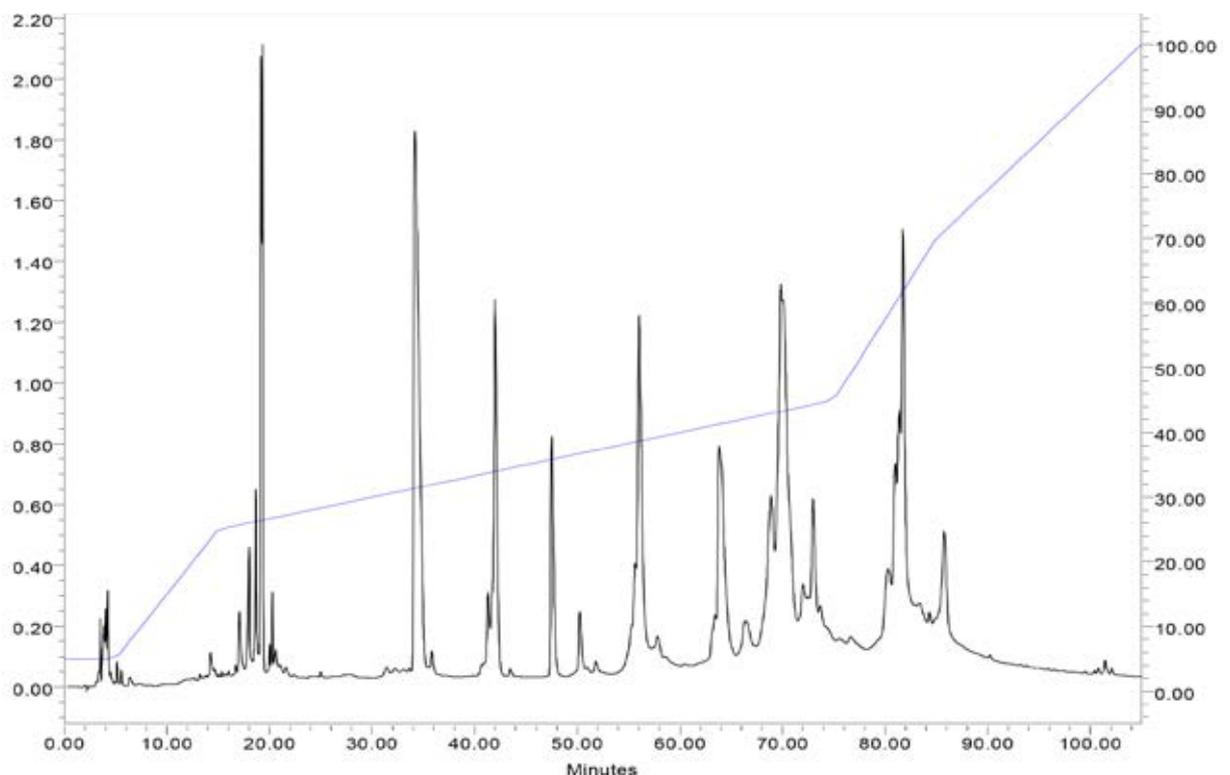


## Development of Bio-Products

1. Based on the project results of 2014, Enterovirus 71 strains(excluding genotypes B4 and C4) that caused epidemics over 2005 to 2013,were selected to set up virus seed bank including 11 strains. The following procedures were adopted to select a vaccine candidate. First, based on TCID<sub>50</sub> and cytopathic effect (CPE), viral strains that were easy to cultivate and propagate were selected. The selected strains were further screened for with high antigenicity using ELISA and western blot. Mouse experiments were conducted to identify viral strains that could elicit stronger immune responses and more effective cross protection. The final result was confirmed using rabbit experiments. C2-E98-07 was selected as the vaccine candidate. Based on the results of a two-year research, subgenotype C2 is chosen as the primary target for developing new vaccines against Enterovirus 71.
2. Established quality control method for identifying *Tr. mucrosquamatus* and *Tr.gramineus* from Taiwan. The venom species is identified by high performance liquid chromatography (HPLC) and double immunodiffusion testing. The molecular masses of purified proteins were determined by SDS-PAGE. Comparison of the chromatographic and electrophoretic toxin patterns of these venoms points to the specific peaks for distinguishing among different types of venoms. The long-term goal of this project is to identify six snake venoms of Taiwan CDC.



**Figure 5-2 HPLC separation of the proteins from the venom of *Tr. mucrosquamatus*.**



# Marketing and Publications



# Health Marketing

## Current Status

For the public to become more knowledgeable about communicable diseases, understand related policies, and support Taiwan CDC's actions, the agency has created a health marketing program. It hopes that through a series of interactive events it can promote disease prevention.

## Goals

To strengthen communication between the government and citizens on the risks of communicable disease, improve knowledge among the general public, and make everyone part of the battle against epidemics.

## Accomplishments

### 1. Monitoring and Immediate Response to disease prevention

A news monitoring and alert mechanism was set in place to enhance communication of communicable disease control policies. In 2015, a total of 9,490 related news had been reported, in response to the public concern over the disease control conditions, authorities voluntarily hold press conferences and issue news releases to inform the public and intensify policy communication. Moreover, 92 press conferences had been held, 318 press releases had been issued, and a total of 904 news reports had been made.



## 2. Integrated Marketing of Disease Prevention

In 2015, Taiwan CDC focused on AIDS, Tuberculosis, Seasonal Influenza, Enterovirus, H7N9, Dengue fever, and MERS-CoV prevention campaigns:

(1) Press Conferences: When announcing disease prevention measures and new communicable diseases, Taiwan CDC holds press conferences to raise awareness of major policies and achievements. By focusing on a specific issues, Taiwan CDC aims to attract media attention and spreads its message to every household in the nation.

To celebrate World AIDS Day, Taiwan CDC held a press conference themed “On the Fast-Track to end AIDS” and lighted up a the decorating lights placed in the shape of a giant red ribbon on the wall outside the Taiwan CDC office to raise people’s awareness of AIDS and care for individuals with AIDS.

In response to the outbreak of MERS-CoV in South Korea, Taiwan CDC held weekly press conference on the latest development of the outbreak. In the press release, Taiwan CDC provided clear and up-to-date information on disease control and prevention measures, debunking misinformation and rumors. Moreover, Taiwan CDC sent a medical officer to South Korea to learn first-hand about the MERS-CoV preparedness and response strategies implemented by the Korean health authorities and provide the Taiwanese communities there with relevant health education. In addition, Taiwan CDC also requested hospitals in Taiwan to conduct on-site drills for managing MERS-CoV patients. Besides scaling



up our preparedness and response efforts to improve our capacity to detect and respond to the threat posed by MERS-CoV, we also made sure that the information passed on to the public through media channels was complete and accurate.

(2) Creative Promotional Materials: To promote disease prevention concepts, Taiwan CDC makes creative, stylish and useful promotional materials available online for use by local health bureaus, schools, medical centers and enterprises. It also provides hard copies to members of the general public (see appendix).

### 3. Communicable Disease Reporting and Consultation Hotline: 1922

To provide a convenient channel for communicable disease reporting and counseling, Taiwan CDC has operated an easy-to-remember, toll-free hotline “1922” since 2003. By calling 1922, users can receive 24-hour reporting service, communicable disease counseling, prevention policy promotion and control measures information throughout the year.

In 2015, the 1922 hotline received 76,382 calls and made 50,242 referrals. Since January 1, 2010, a survey to investigate customer service satisfaction has investigated four main topics: waiting time, service attitude, clarity of explanation and timely response. In 2015, 96.29% of 6,145 total respondents said they were satisfied.



### 4. Social Marketing Media

To promote its cause to different groups, Taiwan CDC is constantly looking for new marketing channels. In 2015, it not only continued to improve marketing via traditional channels such as print media and TV, but also developed interactive marketing on the Internet.

Marketing channels include:

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



(2) Featured Multimedia & Tools: Responding to Internet trends, Taiwan CDC uses popular online social media tools to promote healthy living and disease prevention. Its efforts include establishing an online disease prevention community and 1922 hotline disease prevention information banks on Facebook, LINE@, Weibo accounts. These sites promote communicable disease control and have become a bridge for Taiwan CDC to communicate with people over the Internet.

The 1922 epidemic prevention Facebook page already has more than 61,519 fans. Besides daily epidemic information, the page offers lifestyle news such as weather reports along with epidemic prevention info, comics, and themed fan activities. Taiwan CDC also posted creative videos on YouTube which attracted more than 1,207,674 views in 2015.



### 5. Medical Correspondence Letters

To provide up-to-date information on communicable diseases, clinical treatments and disease prevention policies, Taiwan CDC sends special correspondence letters to medical personnel. The electronic reporting system serves as an immediate communication platform to reach the National Health Insurance Administration, medical hospitals, schools and guilds. In 2015, Taiwan CDC sent out 37 medical correspondences and reached 8,587 regular subscriber.



### 6. Epidemic Prevention Exhibition

In 2007, for the first time Taiwan CDC expanded its disease prevention publicity initiatives to southern Taiwan through a



cooperative effort with the Kaohsiung National Science and Technology Museum. Together they presented southern Taiwan's first epidemic prevention exhibition, called the Diseases Prevention Combat Camp. Dynamic displays covering dengue, enterovirus, HIV/AIDS, tuberculosis and influenza incorporated situational activities, interaction and direct participation. Each year up to 200,000 visitors. In addition, as a part of epidemic prevention campaign, the exhibition organizers also prepared new epidemic prevention teaching tools for schools in the nearby area.

### 7. Corporate Cooperation

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



Taiwan CDC recognized Formosa Plastics Group's donation of Pneumococcal vaccines.



Taiwan CDC collaborated with HTC Corporation in developing vaccination APP.

### Future Prospects

Taiwan CDC will continue to promote disease prevention, develop new marketing channels, and improve communication of infectious disease risks to protect the health of Taiwan's citizens.

### Educational materials on Health and Sanitation:

CF

AIDS, Dengue fever, and disease prevention after natural disasters  
(<https://www.youtube.com/user/taiwancdc>)



### Poster and Flyers

AIDS, Dengue fever, 12 tips for disease prevention, and MERS-CoV (<http://www.cdc.gov.tw>)



## Periodicals and Books



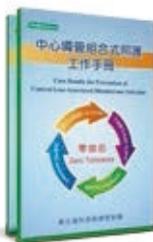
Guidelines for Dengue/  
Chikungunya Control



Clinical Manifestations, Diagnosis  
and Treatment of Dengue Fever



The Killer in the Darkness -  
Tuberculosis



Care Bundle for Prevention of  
Central Line-Associated Bloodstream  
Infection



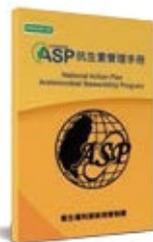
Moving Home



Laboratory Biosafety Management  
A Compilation of Regulations and  
Administrative Guidance



Chigger Mite Fauna of Taiwan  
(Acari: Trombiculidae and  
Leeuwenhökidae)



National Action Plan  
Antimicrobial Stewardship Program



Taiwan Epidemiology Bulletin



Infection Control Journal



CDC Annual Report 2015

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