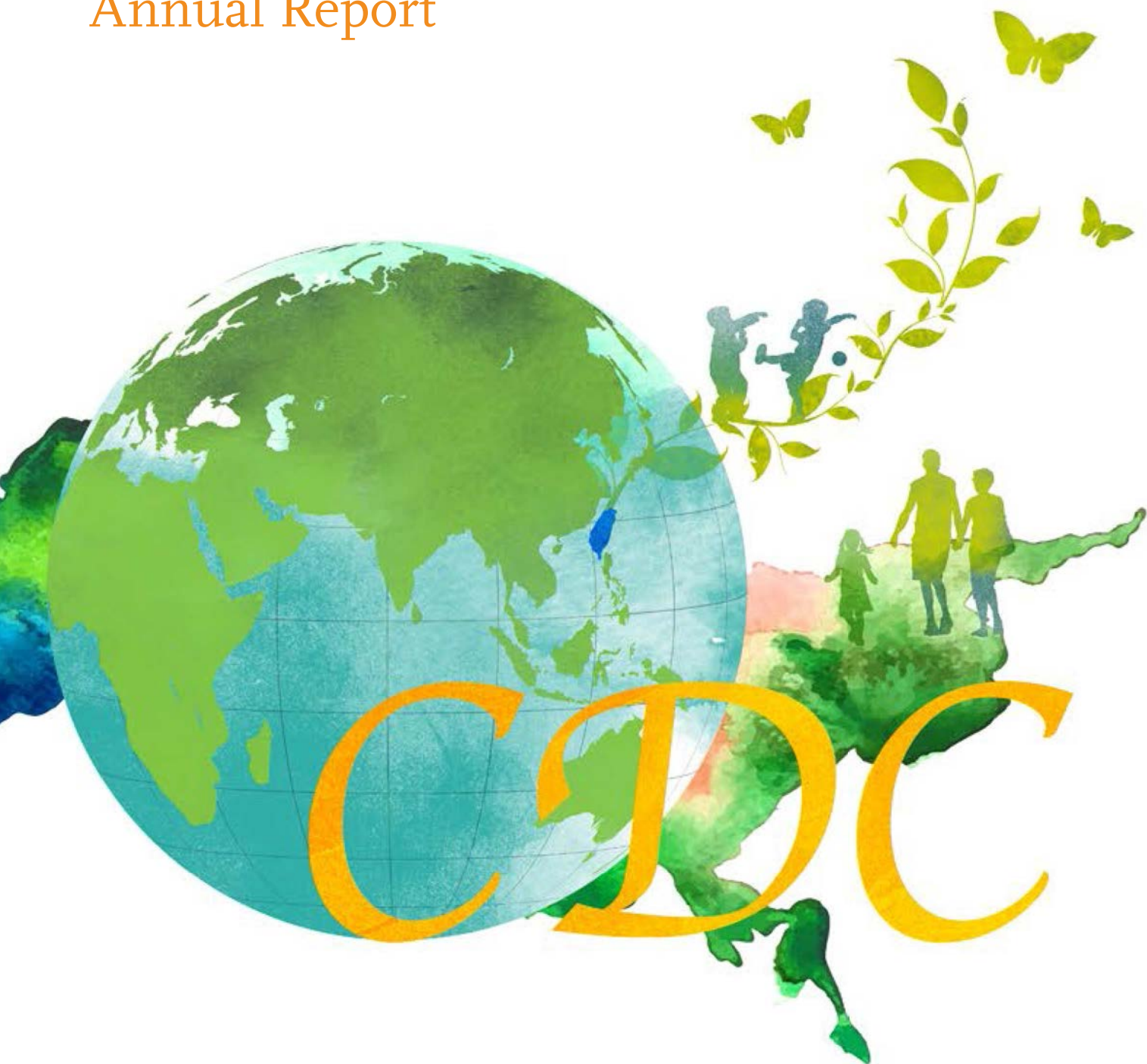


2015

Centers for Disease Control Annual Report



2015 Centers for Disease Control Timeline

January 1

Taiwan CDC expanded the use of publicly funded pneumococcal conjugate vaccine from children 2-5 years of age to include children 1-2 years of age. It subsidized clinical diagnostic fees for children from low- and mid-to-low income households who were receiving the government-funded vaccine.

Marh 21

Taiwan CDC observed the World Tuberculosis Day on March 24, 2014 with a new campaign titled, "Discover the Truth. Fear Not Tuberculosis". Taiwan CDC collaborated with street artists to spread TB awareness to stress the importance of early diagnosis and treatment while increasing knowledge of TB among the general public.



June 17

Dr. Steve Hsu-Sung Kuo, who previously served as the Ministry of Health and Welfare's (MOHW) representative in the United States, was sworn in as the 10th Director-General of Taiwan CDC.



June 25,26

As part of the Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs, Taiwan CDC personnel visited mainland China to attend meetings for the Working Group on Prevention and Control of Communicable Diseases and the Working Group on Inspection and Quarantine. The two sides discussed areas of cooperation in the fields of communicable disease control and port quarantine.



July 17,18

Disease control and prevention personnel from across the nation attended the 2014 National Epidemic Prevention Joint Meeting. They discussed epidemic prevention strategies and experiences.



August 8

The World Health Organization (WHO) declared the Ebola outbreak in West Africa a Public Health Emergency of International Concern (PHEIC). On the same day, Taiwan CDC established an "Ebola Emergency Response Task Force" and strengthen implementation of four major strategies: health education for outbound passengers, quarantine for incoming passengers, preparedness or drill performance, and international cooperation to fight the Ebola virus disease.

August 13

Taiwan CDC conducted a drill at Taiwan Taoyuan International Airport to strengthen national preparedness and response to the Ebola virus disease.



August 25

In response to the West African Ebola epidemic, Taiwan CDC dispatched two doctors to Nigeria to teach Taiwanese businessmen and Taiwanese living there how to deal with the threat of Ebola. The doctors also met with the experts dispatched by the World Health Organization (WHO) to gain a better understanding of the situation on the ground and response measures aimed at controlling the epidemic.



September 2

To achieve the goals of transparent information sharing and international collaboration in infectious disease prevention and control, Taiwan CDC has launched an English web interface for the "Taiwan National Infectious Disease Statistics System" to provide the latest infectious disease data to a wider audience.



September 11,12

The 11th Taiwan-Japan Bilateral Conference took place. Taiwan CDC invited domestic experts to join personnel from Japan's National Institute of Infectious Diseases and the Interchange Association in discussions centered on the conference theme, "New Technologies Applied to Public Health, Including Foodborne Diseases and Drug Resistance".



September 27

Taiwan CDC hosted the Symposium on Foodborne Diseases: Integrated Surveillance and Outbreak Management, which was attended by experts from the United States, Japan and South Korea.

October 1

Government-funded influenza vaccines were available from October 1. In line with WHO recommendations, qualified recipients included pregnant women, and the age for high-risk chronic disease patients to qualify for the vaccine was lowered to 50.



October 21

To prevent the transmission of Ebola virus, Taiwan CDC has requested travelers arriving on direct flights from Europe and Dubai to fill out the "Ebola Declaration Form", which is a travel history declaration form for Ebola -affected country within the past 21 days.

October 28

President Ma Ying-Jeou conferred the Order of Brilliant Star with Violet Grand Cordon on US doctors Michael Malison, James Lando and Shieh Wun-Ju for their contributions to the control of infectious diseases in Taiwan.



November 4-14

Initial expert assessments of the International Health Regulations (IHR) core capacity requirements were conducted at Taipei Songshan International Airport, Kaohsiung International Airport, Port of Taichung, Taichung Airport, and Port of Keelung.



November 16-22

The chief consultant epidemiologist from the Nigerian health ministry, Dr. Akin Oyemakinde, attended six discussion events held in Taiwan to share Nigeria's successes in battling the Ebola outbreak.



November 26-30

Taiwan donated 100,000 sets of personal protective equipment to West Africa to assist with controlling the Ebola outbreak.



November 22

A "Close the Gap" AIDS prevention educational exhibition was held by Taiwan CDC to mark the World AIDS Day. Pop culture elements were incorporated to encourage the public to take prevention measures against AIDS and show care for people who are already infected.





Centers for Disease Control 2015 Annual Report

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Message from the Director-General

As the leading public health authority in charge of the prevention and control of communicable diseases in the nation, the Taiwan Centers for Disease Control (Taiwan CDC) produced this English-language annual report to offer an extensive overview of the services it provides. The report offers a comprehensive portrait of major policies and disease prevention achievements over the past year.

Frequent international exchanges and travel in recent years have similarly increased opportunities for the import of communicable diseases. The dual threats of emerging diseases abroad and diseases at home present an immense challenge. Climate change, globalization and urbanization have significantly facilitated the occurrence of dengue. In 2014, radical increases in the numbers of dengue cases reported were observed in mainland China, Singapore and other Southeast Asian nations. Moreover, even Hong Kong and Japan were unable to maintain their spotless records after years of having zero indigenous cases. As dengue cases grow in numbers and spread to more regions, the likelihood of a major epidemic occurring in Taiwan is likewise elevated. To more effectively tackle dengue, Taiwan CDC has adopted an innovative approach through working with a medical research team to establish the Dengue Control Research Center. The center gathers experts in epidemiology, clinical medicine, and vector prevention and works on researches that develop and introduce new dengue control techniques in order to reduce the threat that dengue poses to health.

In early 2014, an outbreak of Ebola virus disease emerged in West Africa, which quickly spread in Sierra Leone, Liberia and Guinea. As people traveled from these regions, the disease spread



farther, sparking global fears, the World Health Organization (WHO) declared the outbreak as a Public Health Emergency of International Concern. After dealing with SARS in 2003, the H1N1 virus in 2009 and avian influenza A (H7N9) in 2013, Taiwan CDC has already built a robust response framework and has accumulated valuable experience related to epidemic response and preparedness. Therefore, when the Ebola threat emerged, Taiwan CDC was ready and immediately established an Ebola response task force. Based on the existing epidemic response efforts and medical care system, Taiwan CDC designated response hospitals and formulated standard care procedures to follow for treating Ebola cases. Infection control measures were also implemented to ensure the safety of frontline health care workers. To help stop further transmission of the epidemic, Taiwan CDC contributed to the international response by donating 100,000 sets of personal protective equipment, which were transported to West Africa for use by health workers on the frontlines by the United States .

This annual report also gives an introduction to disease control achievements relating to enterovirus, influenza, tuberculosis and HIV/AIDS to offer the reader a more detailed understanding of the work Taiwan CDC undertakes. As more communicable disease control challenges lie ahead, Taiwan CDC continues to improve performance at home by constantly updating information on the latest international outbreaks and responses. We wish to promote further exchanges with our international counterparts through this report.

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

About Taiwan CDC



▶ About Taiwan CDC

In 1999, the Taiwan Centers for Disease Control (Taiwan CDC) was established under the Organization Law of the Centers for Disease Control. The mission of Taiwan CDC is to protect people from the threats of communicable diseases. Taiwan CDC strives to accomplish its mission by:

1. Formulating policies, strategies and plans for the prevention and control of communicable diseases;
2. Guiding and assessing local authorities in the execution of matters concerning communicable disease control;
3. Establishing relief funds for compensating vaccine victims and related activities;
4. Conducting quarantines of international and specially designated ports;
5. Organizing international collaborative projects and exchanges on communicable disease control.

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

 **Figure 1-1 Organization**

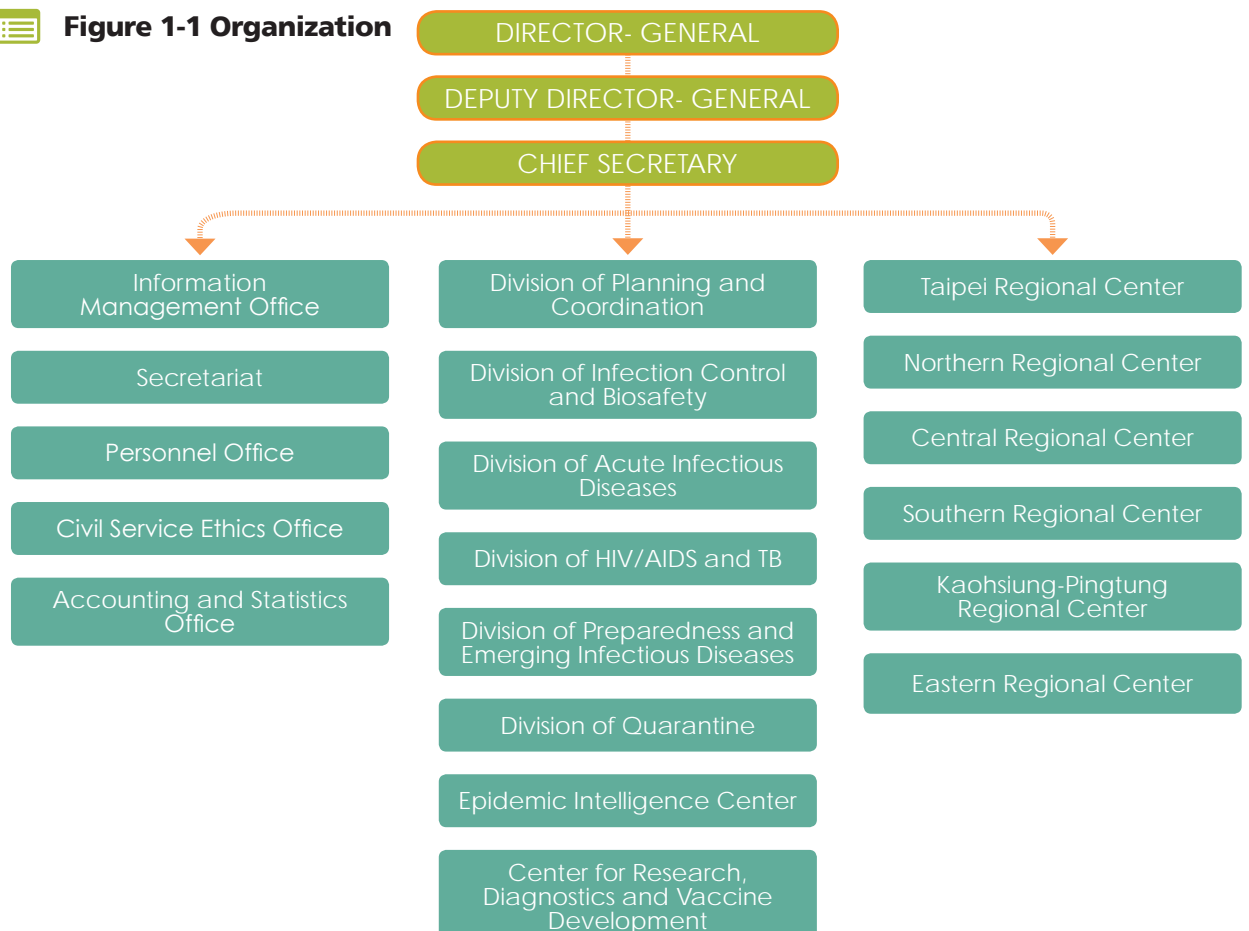


Figure 1-2 Regional Center Jurisdictions



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 HIV/AIDS and TB; Division of Preparedness and Emerging Infectious Diseases; Division of Quarantine
2. Two Centers: Epidemic Intelligence Center; Center for Research, 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
8%	28%	38%	22%	4%

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

Graduate School	University	College	High School or Under
50%	32%	11%	7%

Distribution of Employees by Gender, Age, and Education: At the end of December 2014, there were 765 Taiwan CDC employees, with a male to female ratio of 1:3.58. Average age was 42.8 with 74% under 49 years old. About 43% graduated from university or college while 50% 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 - Dengue Prevention and Control



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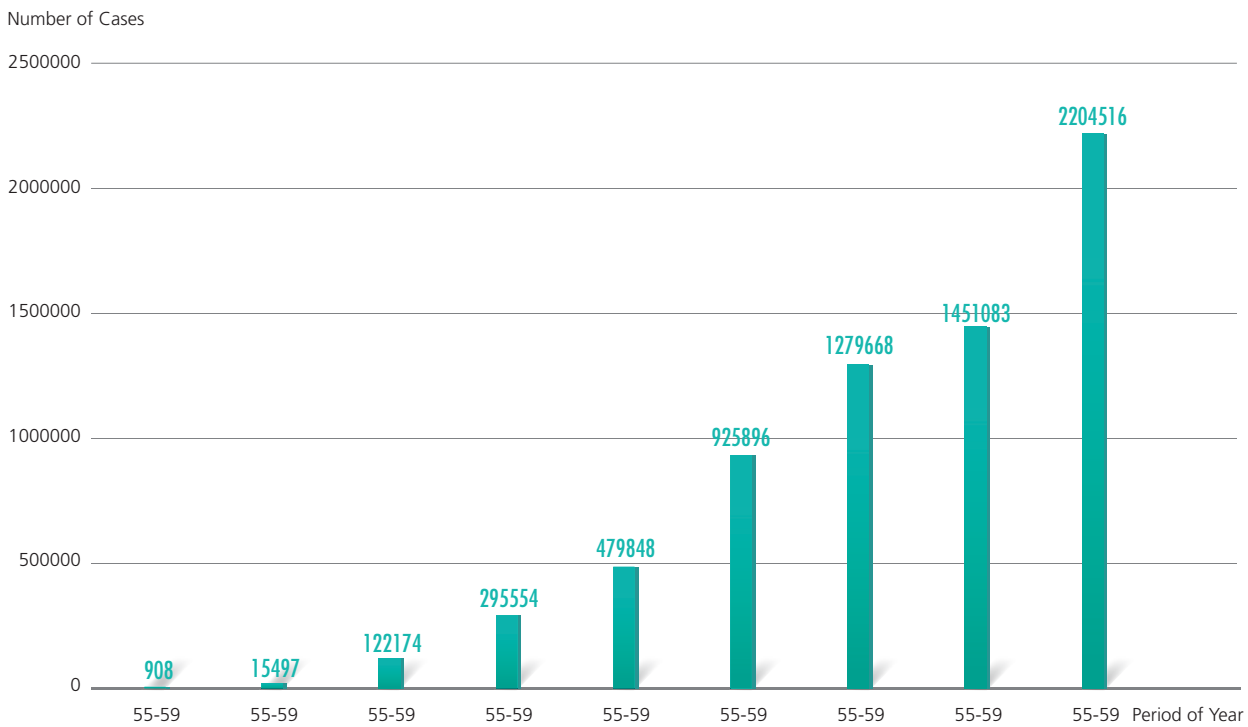
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2015 Focus - Dengue Prevention and Control

Background

Dengue is not only a major public health concern throughout tropical and sub-tropical regions. It is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold. The disease has spread to new countries and from urban to rural settings (Figure 2-1). More countries are reporting their first outbreaks. According to WHO statistics, some 50-100 million new infections occur annually in more than 100 countries. Close to 75% of the global population exposed to dengue is in the Asia-Pacific region. In response to this global threat, the WHO released the *Global Strategy for Dengue Prevention and Control, 2012 - 2020*. Taiwan must heed these strategies as it deals with an even greater risk of dengue ushered in by climate change, globalization and urbanization.

Figure 2-1 Average number of dengue and severe dengue cases reported to the WHO annually, from 1955-2007, and the number of cases reported in recent years (2008-2010).



Source: WHO, *Global Strategy for Dengue Prevention and Control, 2012-2020*, p 2.

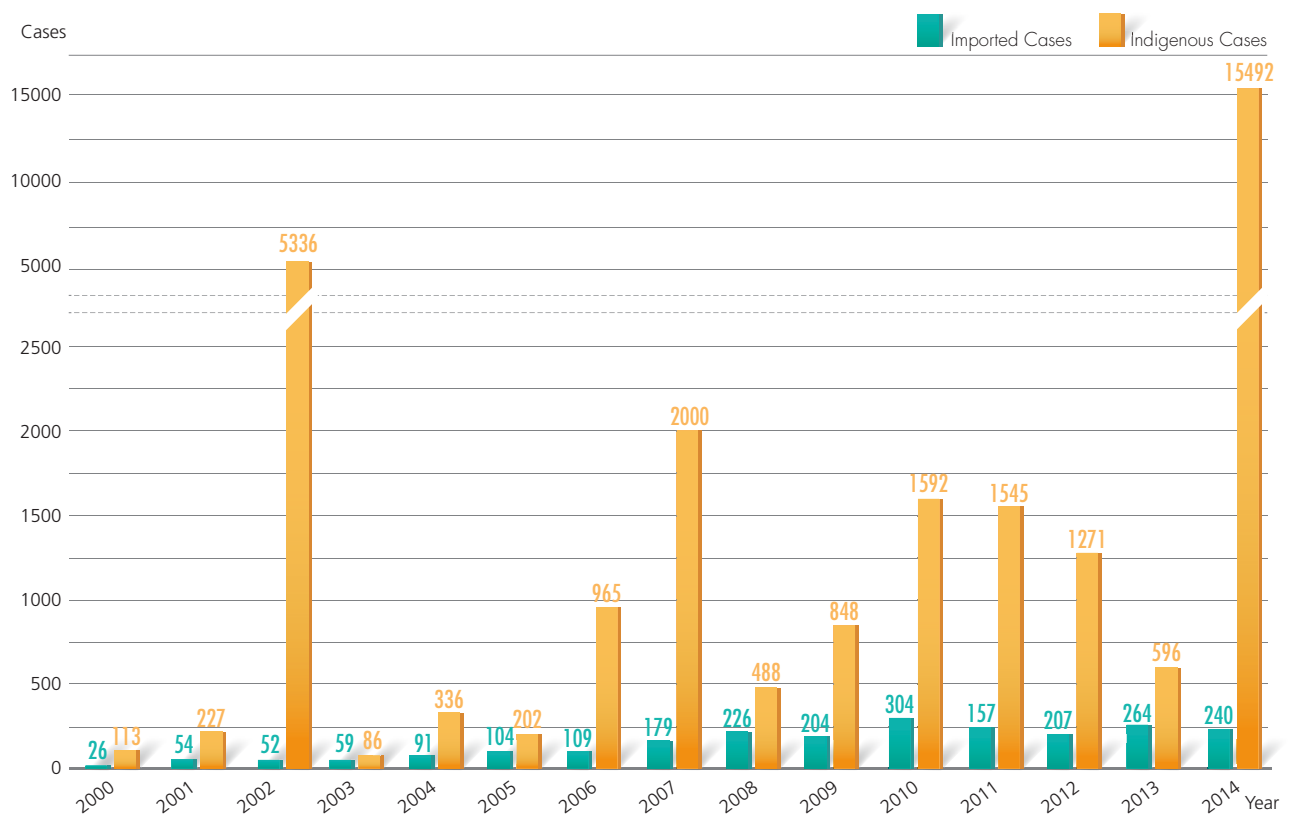
Current Status

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 2-2). Taiwan experienced another severe dengue outbreak in 2014, with 15,492 indigenous cases, including 136 cases of dengue hemorrhagic fever that caused 21 deaths.

Severe dengue epidemics in Southeast Asia in recent years have led to an increase of imported cases, including highs of 304 imported cases in 2010 and 240 in 2014.

Figure 2-2 Indigenous and imported dengue cases in Taiwan, 2000-2014.



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.



Members of Taiwan CDC conduct regular inspections of potential vector breeding sources



In 2014, disease prevention personnel from health bureaus across the nation participated in practical education and training for the prevention of dengue, chikungunya and scrub typhus (March 12-14, 2014)

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 dengue hemorrhagic fever diagnosis and treatment.
2. Organizing continuing education workshops for medical personnel to raise health care quality and lower mortality rates.

Accomplishments

In Taiwan, 15,492 people were infected with dengue in 2014, 97% of whom lived in Kaohsiung. Coordination between central and local governments, medical institutions, environment/health organizations, schools, villages and community members has effectively stopped further spreading of this disease. Below are major achievements.



A ceremony to mark the unveiling of the Dengue Control Research Center at Kaohsiung Medical University (February 4, 2015)

Primary Prevention

1. Distributed health education and promotional materials, including leaflets, posters, banners, the *Combat Manual for Dengue Fever*, and VCDs.
2. Produced promotional materials, such as epidemic control programming and newspaper ads, which 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.
3. Published the *Guidelines for Dengue Control* to serve as a reference for local health organizations.
4. Formulated the Community Mobilization Plan for Cleaning 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. Promoted dengue 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, thereby facilitating early detection of the disease. The physician or other medical worker who reported the year's first indigenous case in each city and county was awarded NT\$4,000, and those who found 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. In 2014, there were 117 imported cases (48.8%) reported by physicians and 526 indigenous cases (3.3%) among patients who volunteered to be tested.
2. Continued body-temperature monitoring at international airports and seaports to limit disease importation. In 2014, 118 dengue cases were detected at ports, accounting for 49.2% of the 240 imported cases (see Table 2-1).

 **Table 2-1 Serotypes and Origins of Imported Dengue Fever Cases, 2014**

Countries of Infection	Serotypes					Total
	I	II	III	IV	ND	
Malaysia	23	20	2	1	25	71
Indonesia	6	8	18	2	24	58
Philippines	7	4	1	2	19	33
China	4	0	0	0	19	23
Singapore	5	1	0	1	5	12
Thailand	1	3	0	1	5	10
Myanmar	2	2	0	1	5	10
Vietnam	2	1	0	1	5	9
India	1	0	0	0	2	3
Cambodia	1	0	1	0	1	3
Nauru	0	0	0	0	2	2
Bangladesh	0	0	0	0	2	2
Saudi Arabia	0	0	0	0	1	1
Tuvalu	0	1	0	0	0	1
French Polynesia	0	0	0	0	1	1
Japan	0	0	0	0	1	1
Total	52	40	22	9	117	240

Tertiary Prevention

More than 700 clinical physicians attended dengue diagnosis and treatment training courses in May and June 2014. There were also 18 case conferences to discuss the Kaohsiung dengue epidemic and methods for improving dengue health care quality.

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 2014, and the risk of dengue pandemic may increase significantly in the future. Taiwan CDC established the Center for Dengue Research, Prevention and Control in southern Taiwan to coordinate epidemiology, clinical health care and vector control experts as they seek to overcome control challenges. Their efforts focus on five main areas: 1. Environmental management and new vector control measures, 2. Authorized laboratory testing of dengue, 3. Research into dengue clinical characteristics and pathogenic mechanisms, 4. Dengue seroepidemiologic surveys and drug and vaccine pilot studies, and 5. International cooperation and exchange. The goal is to create a healthier living environment.



Minister Chiang Been-huang inspected dengue control efforts in southern Taiwan (November 26, 2014)

Domestic Epidemic Prevention and Control



Current Immunization Program & Vaccine Injury Compensation Program

National Immunization Programs

Current Status

The Taiwan government provides free immunizations to children up to 6 years of age, including BCG, 5-in-1 (diphtheria and tetanus toxoid with acellular pertussis, haemophilus 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 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	≥ 24hr	1 month	2 months	4 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 ¹				PCV13 1	PCV13 2		PCV13 3					
Varicella							Var					
Measles, Mumps, Rubella							MMR1				MMR2	
Japanese Encephalitis ²								JE1, JE2		JE3	JE4	
Influenza							Influenza (yearly)					Influenza (yearly)
Hepatitis A ³							HepA1		HepA2			

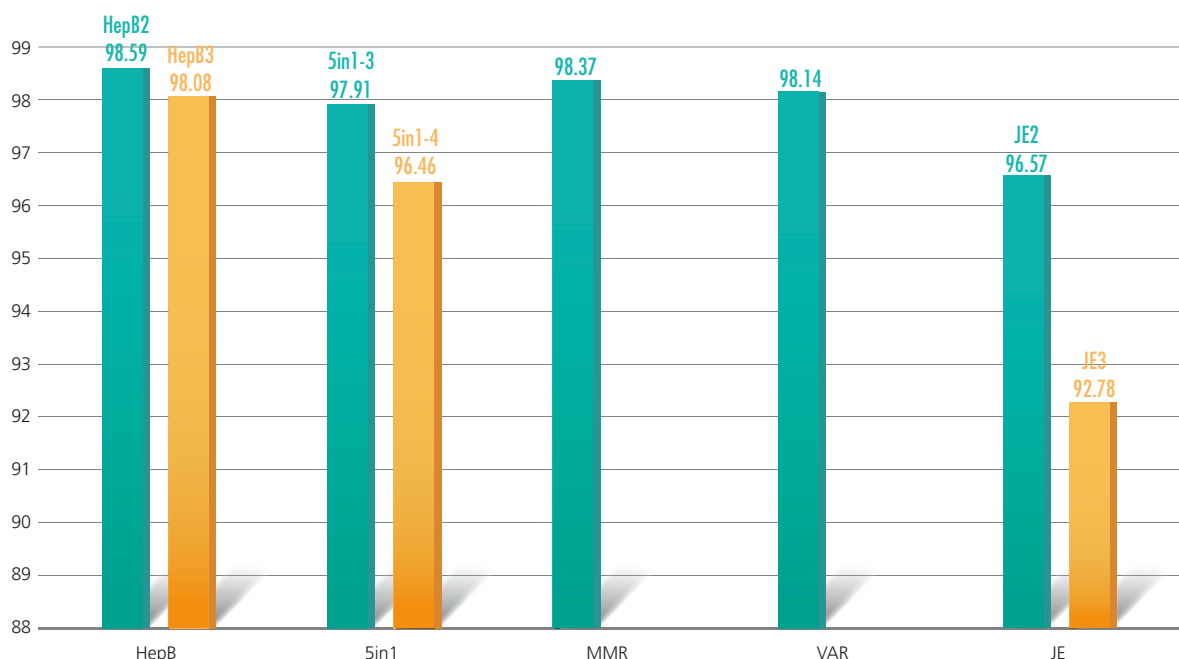
1: Eight weeks interval between dose1 and dose2

2: Two weeks interval between dose1 and dose2.

3: In selected aboriginal areas.

* Since January 2014 the recommended age for receiving the fourth dose of DTaP-Hib-IPV was revised from 18 months to 27 months due to the vaccine shortage.

Figure 3-1 National Immunization Coverage



Source: Values were calculated in December 2014 by compiling past immunization data from the National Immunization Information System

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

Accomplishments

1. The 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, new vaccine policies planned to be promoted include:

1. Provide pneumococcal vaccine for high-risk groups and elderly over 65 years of age.
2. Introduce cell-based JE vaccine to replace mouse-brain JE vaccine.

National Immunization Information System

Current Status

In 2004, Taiwan CDC established the National Immunization Information System (NIIS) to consolidate immunization data scattered among various health stations into one database. NIIS, together with household registration authorities and medical institutions, has improved the management of immunization operations and the efficiency of storage and retrieval of immunization information. Household data are obtained from the Department of 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 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. In 2014, a total of 13,595 such children were found, of which 9,111 were later vaccinated.

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 NIIIS immunization reminders to improve the coverage rate.
4. Undertake a comprehensive revision and upgrade to NIIIS in 2015 and 2016 to improve system capabilities and effectiveness.

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

Current Status

Taiwan launched polio, measles, congenital rubella syndrome (CRS), and neonatal tetanus (NT) eradication programs in 1991. 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 2014, there were twenty-six confirmed measles cases, eighteen of which were imported cases and three of which were importation-related cases and five 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 in patients born to foreign mothers. No confirmed CRS case has been reported since 2009. Rubella occurs worldwide; in 2014, there were seven confirmed cases in Taiwan, six of which were imported.

Accomplishments

1. In 2014, 29 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 report or an immunization certificate. This requirement is also included in the physical check for foreign laborers before entry.

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.

Vaccine Injury Compensation Program (VICP)

In response to a case in which a child received oral poliomyelitis vaccination and subsequently developed polio in 1986, the Ministry of Health and Welfare established a Vaccine Injury Compensation Fund in June 1988. The fund enables individuals to claim compensations 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 allocation 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.

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

Compensation Item	Designated Standards		Compensation Range (NT\$10,000)	
	Designation/Disability Level	Vaccination Link		
Mortality Payments	-	Related	50~600	
		Cannot Be Ruled Out	30~350	
Disability Payments	Types and levels handled in accordance with the People with Disabilities Rights Protection Act.	4- Severe	Related Cannot Be Ruled Out	50~600 30~350
		3- Serious	Related Cannot Be Ruled Out	30~500 20~300
	Does not include conversion disorder or other conditions attributed to mental causes.	2- Moderate	Related Cannot Be Ruled Out	20~400 10~250
		1-Light	Related Cannot Be Ruled Out	10~250 5~200
	Severe Illness Payments		Conditions not reaching disability standards and handled in accordance with rules governing major illnesses or injuries described in NHI regulations or Regulations Governing Reporting of Severe Adverse Reactions to Medicines.	Related
		Cannot Be Ruled Out		2~120
Other Adverse Reactions	Other Adverse Reactions that do not meet standards for severe illness. However, mild, frequent, or anticipated adverse reactions do not qualify for compensation.	Related/Cannot Be Ruled Out	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 Treatment Subsidies	Examination and treatment performed to help clarify the relationship between vaccination and symptoms.	-	0~20	
Stillbirth or Miscarriage Suspected to be Caused by Vaccination of the Mother and Underwent by Autopsy or Testing	Pregnancy after 20 weeks	-	10	
	Pregnancy at first 20 weeks	-	5	

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

In 2014, 88 cases were settled, a total of 1,428 claims had been reviewed since program inception, and compensation disbursement had reached NT\$ 99.67 million.

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

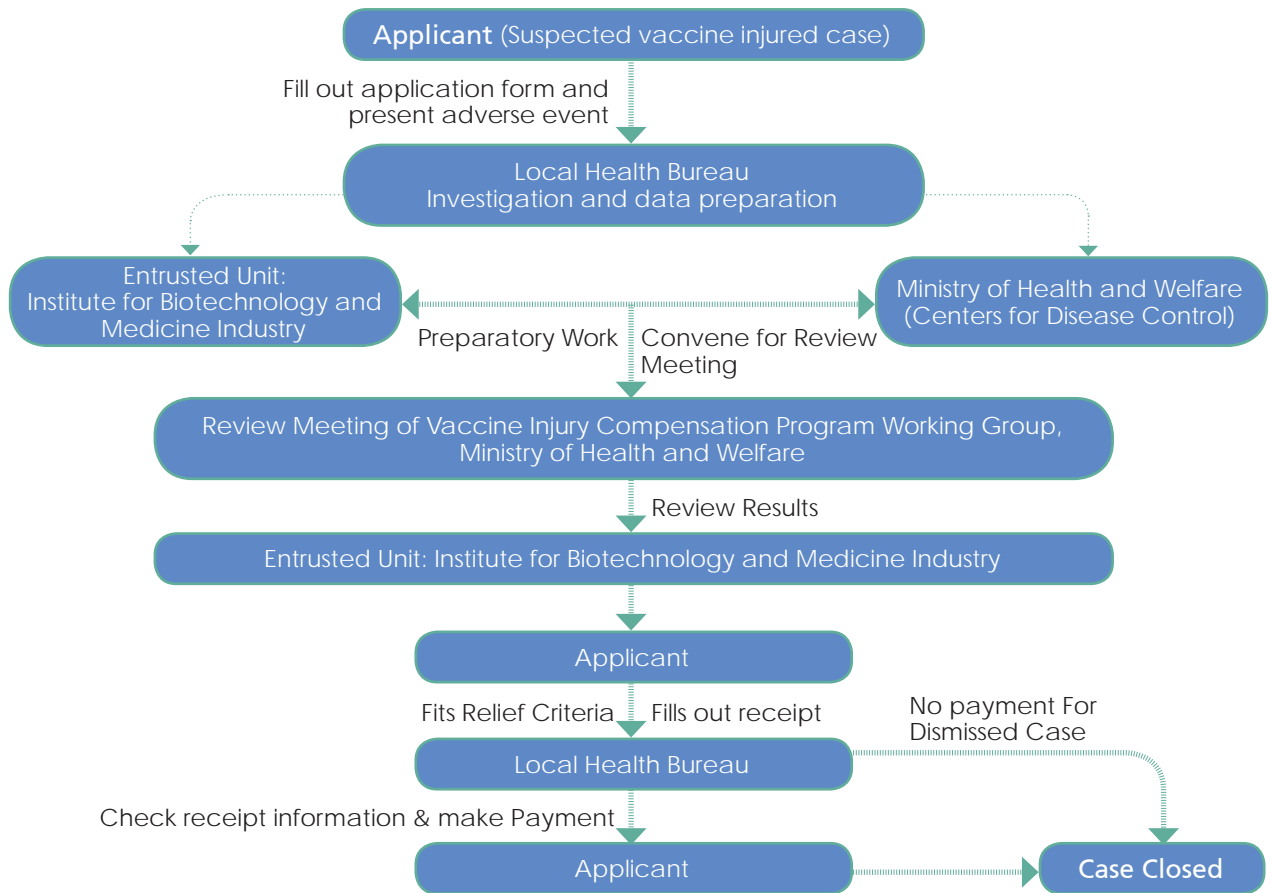
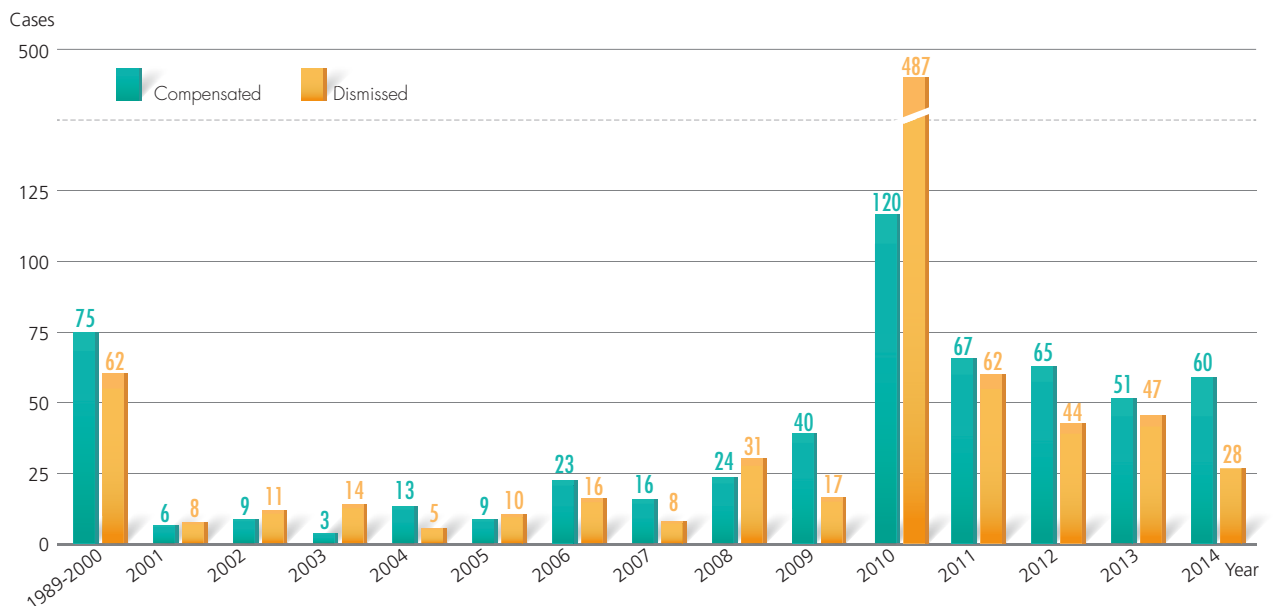


Figure 3-3 Total Number of Cases Settled Per Year from Program Inception in 1989 to 2014



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 transmission 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 and increasing user-friendliness of the system continued from 2011 – 2014.

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 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 2014, a total of 688 elementary schools enrolling students from kindergarten to 6th 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 by Taiwanese nationals facilitate transmission of communicable diseases across borders and raise challenges for disease prevention 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 communicable diseases from the outside 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.

Taiwan has a dense population. Aging of population, comorbidities with tuberculosis, frequent travel to high burden countries, foreign spouses and labors from high TB prevalence countries all are the factors that make TB control in Taiwan more challenging. To protect the health of the general public, Taiwan needs to find out more active and aggressive strategies for TB control.

Current Status

1. Incidence

There were 16,472 and 11,326 TB cases in 2005 and 2014, respectively. The incidence rate went from 72.5 to 48.4 persons per 100,000 over this time period, and there was a 2% drop between 2014 and 2013. (Table 3-3).

 **Table 3-3 Taiwan TB Incidence and Mortality Rate, 2005 – 2014**

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	-	-

2. Mortality Rate

TB claimed 609 lives in Taiwan in 2013, for a mortality rate of 2.6 per 100,000 population. It was the cause of 0.39% of total deaths. From 2005 – 2013, the mortality rate dropped by 40%.

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 64.9 % in 2012. It has not increased significantly due to population aging (ratio of people 65 years and older was 9.7% in 2005 and 11.2 % in 2012)

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 149 (91%) cases were managed in the MDR-TB system through the end of December 2014, leading to a steady decrease in the number of MDR-TB cases and a favorable outcome that about 70% of patients in 2012 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)

(2) During 2014, up to 5,500 contacts received LTBI treatment, and the DOPT rate reached 90%.

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. In 2014, 88% of new and retreatment TB cases reported having a known HIV status.



Figure 3-4: The press conference of World TB day in 2014

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) In year 2014, 112 sessions of cohort reviews have been conducted in 177 townships to educate staff about protocols and goals, and improving case management and prevention.



Figure 3-5: Managers of Vietnam national TB program visited Taiwan CDC on October 22, 2014.

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) During 2014, Taiwan CDC exchanged experiences of TB control with policymakers and health care workers from Swaziland, Vietnam and Korea.

Future Prospects

Achieve annual reduction of new TB cases and gradually eliminate TB by 2035.

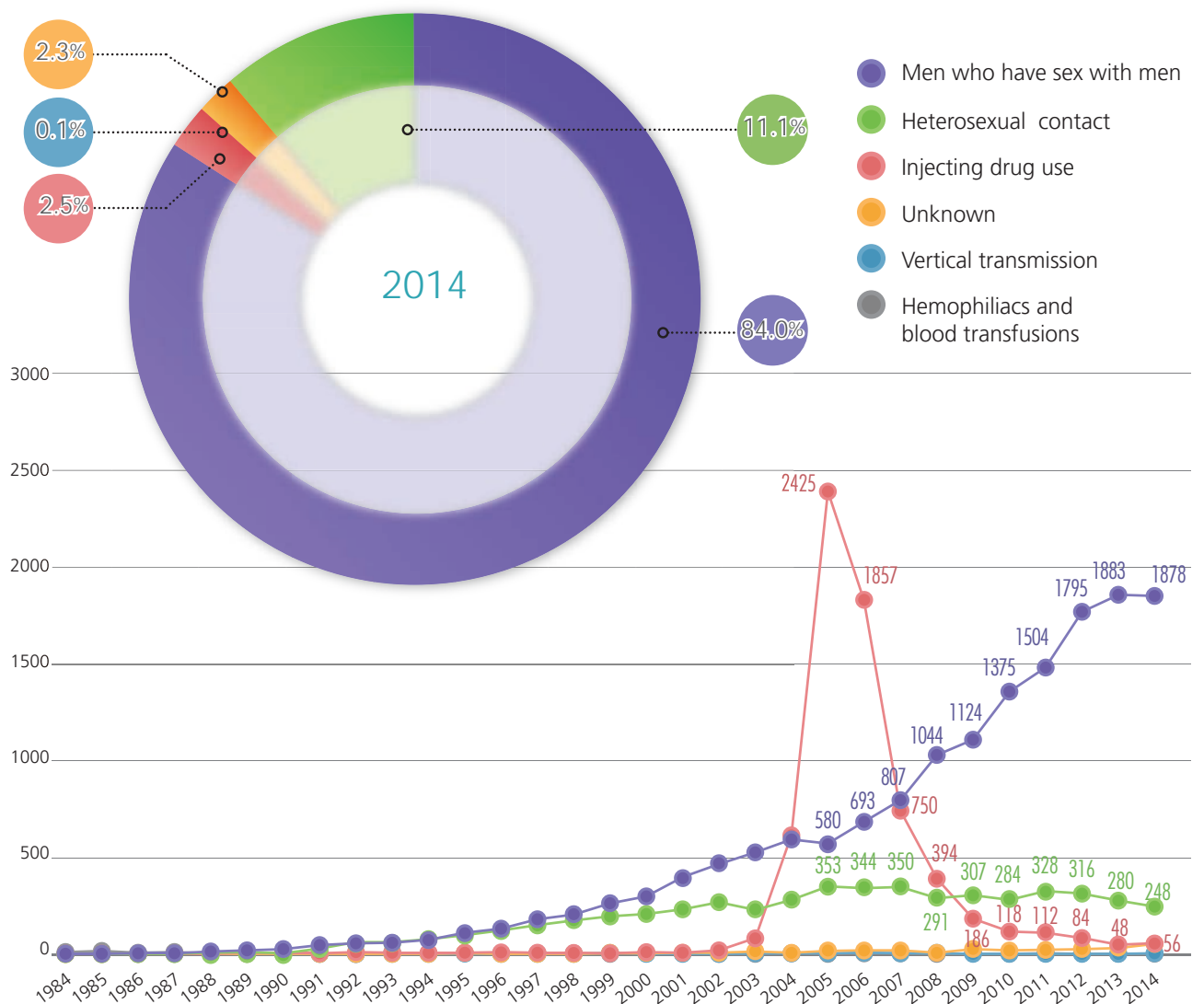
HIV/AIDS

Current Status

The first HIV case in Taiwan was reported in 1984. By 2014, there were an accumulated 28,710 patients (12,564 of whom had developed full-blown AIDS with 4,651 deaths). Infections surged in 2005 due to skyrocketing infections among injecting drug users (IDUs). Faced with this dire situation, Taiwan CDC cooperated 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 979, or 43.8%, of new infections diagnosed in 2014, more than any other group. The second largest group was the 15 to 24 age group, numbering 658, or 29.4%, 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 84.0% of all cases. The second largest proportion of infections was heterosexual contact, accounting for 11.1% of cases (see Figure 3-6). The three major transmission modes were sexual contact (MSM and heterosexual) and IDU. Of Taiwanese nationals diagnosed with HIV in 2014, 2,176, or 97.3%, were males and 60, or 2.7%, were females. The sex ratio of new diagnoses was 36:1.

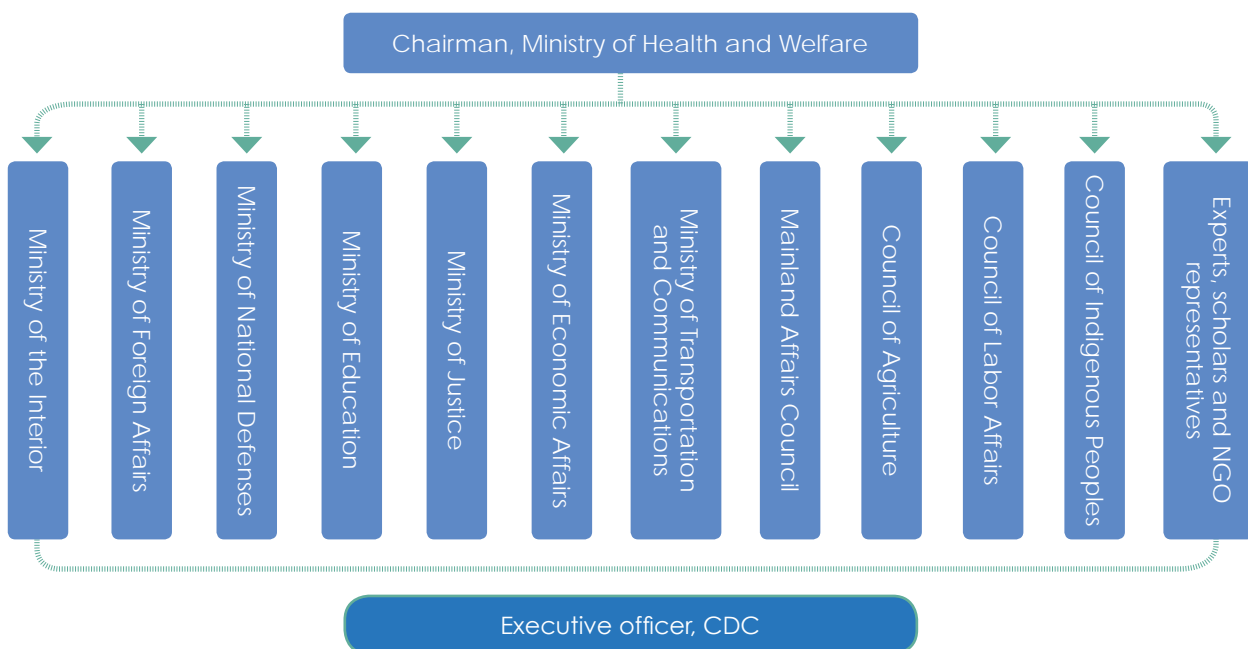
Figure 3-6 HIV Infection Risk Factors in Taiwan, 1984-2014



Accomplishments

1. The Committee for HIV Infection Control and Patient Rights Protection (see Figure 3-7) held two cross-ministerial meetings in 2014.
2. To ensure the dignity and rights of people living with HIV/AIDS (PLWHA), the AIDS Prevention and Control Act was amended in 2007. 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 2.5% in 2014.
4. Taiwan CDC promotes diversified prevention programs to confront the epidemic among MSM. Initiatives include (1) Establishment of an MSM Community Health Center that provides friendly and diversified services. (2) Implementation of health education and intervention services, such as online opinion leaders and internet monitors. (3) Providing voluntary HIV counseling and testing services at saunas and pubs in conjunction with NGOs. (4) Implementation of friendly, healthy, and safe labels for saunas frequented by MSM and the installation of automatic 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.

Figure 3-7 Committee for HIV Infection Control and Patient Rights Protection, Ministry of Health and Welfare, Executive Yuan



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 2014 (including 10 hospitals that have provided this service since 1997). They screened 37,808 people, with 757, 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.



3-8: A poster that promotes free and anonymous HIV counselling and testing services

6. 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 2014, 57 designated hospitals provided HIV/AIDS patients medical service and the rate of receiving medical care among HIV patients was 90.4%. Furthermore, for the need of long term care in HIV/AIDS patients, the government designated several nursing homes to provide services.

7. In 2014, Taiwan CDC implemented an online based peer educator training program that relied on 244 peer educator who sought to change attitudes toward HIV by enhancing knowledge of topics such as one-night stand safety, HIV prevention, and avoiding hazards associated with illegal drug use (amphetamines, ecstasy, ketamine, etc.).



3-10: A press conference to mark 2014 World AIDS Day

Future Prospects

According to statistics from the National Health Insurance Administration, medical expenses for HIV patients in 2014 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. In 2014, the rate of cost increase fell to 2.2% while growth of the treatment population rose to 18%.

Years of hard work led to remarkable results, but still, the number of new cases has not been brought under control. Taiwan CDC hopes that in the future, the cross-ministerial Committee for HIV Infection Control and Patient Rights Protection will make prevention the thrust of its efforts to stop the spread of HIV/AIDS.

Preparing for Influenza Pandemics

Current Status

When an avian influenza epidemic emerged at the end of 2003, Taiwan began to prepare for a potential pandemic. Based on the SARS experience in 2003, government agencies were highly supportive and open to appropriating necessary funding for each aspect of preparations.

Currently, two documents are used to guide preparedness planning: the National Influenza Pandemic Preparedness Plan and the Influenza Pandemic Strategic Plan. These include four major strategies: 1. Surveillance and assessment, 2. Interruption of transmission, 3. Antivirals, and 4. Influenza vaccine; and five lines of defense: 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

In 2005, the government organized pandemic influenza preparedness operations pursuant to the five-year National Influenza Pandemic Preparedness Plan (hereafter referred to as the 'Preparedness Plan'). On May 23, 2010, the Executive Yuan approved the Phase II plan as a continuation of the five-year plan. The Phase II plan upholds the "four major strategies" and "five lines of defense" for continued preparations and comprehensive evaluations.

The government has established three hierarchies of control plans and guidelines to foster influenza preparedness. In addition to the Preparedness Plan, it issued the Influenza Pandemic Strategic Plan (hereafter referred to as the 'Strategic Plan') and the Influenza

Control Guidelines (hereafter referred to as the 'Guidelines') for the preparation and management of stockpiles, pharmaceutical intervention, consolidation of healthcare resources, and mobilization of volunteer workers, exercise of response actions, risk communication and international cooperation. The government updates both the Strategic Plan and the Guidelines, and also published an English version of the Strategic Plan.

1. Vaccine Stockpile and Use

(1) Seasonal Influenza Vaccines

To pursue the goal of WHO's Action Plan for Pandemic Influenza Vaccines, Taiwan CDC increases the seasonal vaccine use gradually.

The seasonal influenza vaccination program, which began on October 1, 2014, prioritizes eight groups of people: 1. Elderly persons aged more than 65 years; 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 2015, Taiwan CDC expanded the program to those who had underlying medical conditions. The program continued a 2013 policy of not charging diagnostic fees for elderly persons aged 65 years above and preschool children receiving government-funded influenza vaccines. Influenza vaccines were given to school-aged children at school 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 2014, there were 649 confirmed cases of H5N1 in humans and 385 deaths (for a mortality rate of 59%). Faced with the threat of human H5N1 infections in neighboring nations and H5N2 outbreaks in domestic poultry, Taiwan CDC continued to act in accordance with the Phase II plan to strengthen health safeguards by raising immunity among high-risk groups. A total of 30,000 doses of H5N1 vaccines were stockpiled in 2014 in anticipation of a potential pandemic. And Taiwan CDC continued a voluntary A/H5N1 vaccine immunization program that covered high-risk groups: laboratory workers with potential exposure to HPAI H5N1 viruses, health care workers and public health personnel, poultry and livestock farmers and animal health inspectors, customs, immigration, quarantine and security (CIQS) personnel, and 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 season, usually from December 1 to March 31, Taiwan CDC expands target population for antiviral drug use and adjusts the duration based on actual conditions. There were more than 3,000 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.



3-11: Taiwan CDC PPE stockpiles

These measures ensure that new materials are always available and stockpiles are maintained by eliminating expired 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 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

Since 2003, Taiwan has built a communicable disease control medical network that divides the nation into six medical sub-regions with designated hospitals responsible for treating communicable disease patients. The objective, to build a communicable disease emergency preparedness system that integrates organizations specializing in medical and public health will raise effectiveness of hospitals responsible for infectious disease control. This will improve the diagnosis, care and control of infectious diseases to better ensure the health of all people.

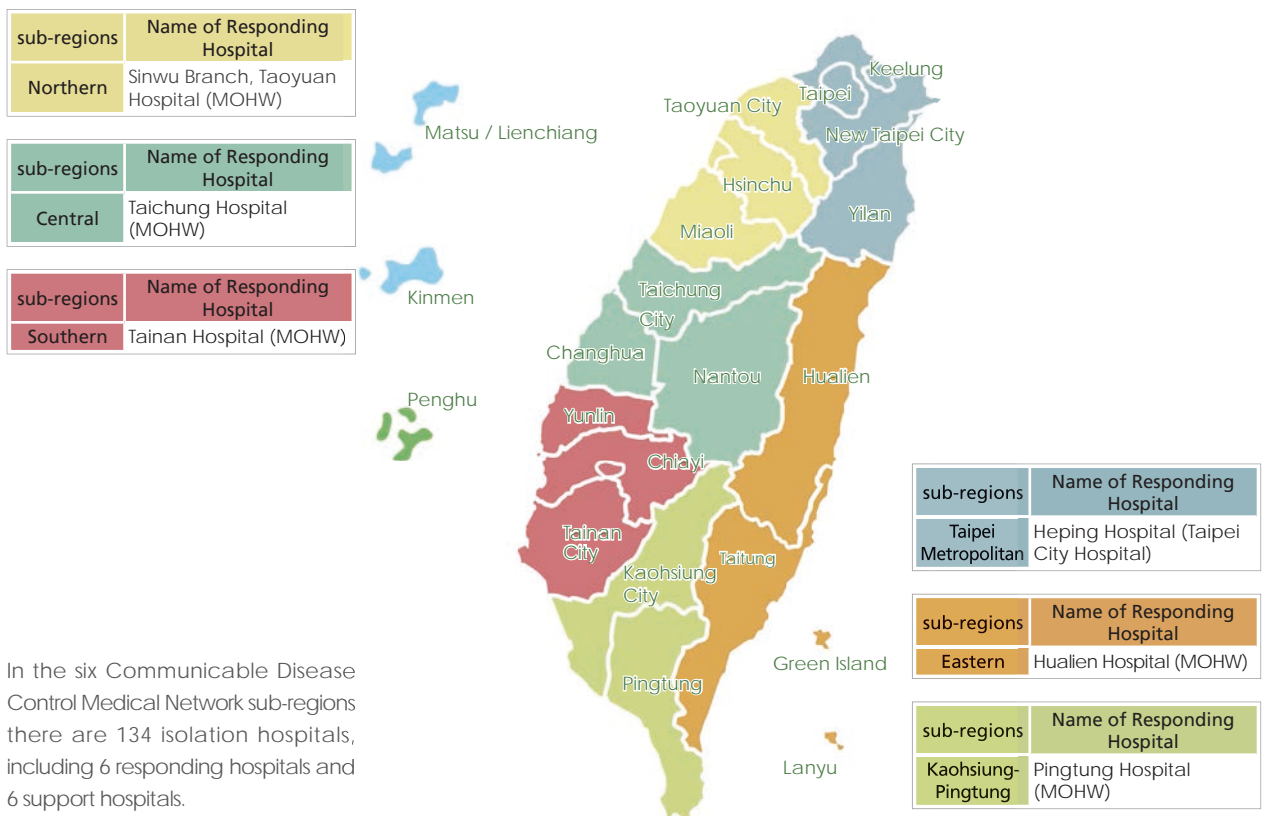
In 2014, the nation's communicable disease control network was divided into 6 sub-regions with 134 designated isolation hospitals for treating communicable disease patients.

Six leading hospitals from this group were chosen as communicable disease 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 193 communicable disease response training courses and 28 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.



3-12: Staff training and drills

Figure 3-13 Communicable Disease Control Medical Network



Future Prospects

There is no way to know when the next influenza pandemic will occur or to accurately simulate its transmissibility or seriousness. Our only option is to strictly monitor and prepare for potential outbreaks continuously. In accordance with the *Pandemic Influenza Risk Management, WHO Interim Guidance*, announced by the WHO on June 10, 2013, the future influenza pandemic preparedness in Taiwan will more rely on emergency risk management, focus upon risk assessment at the national level to guide national level actions, and under the Pandemic Influenza Preparedness Framework (PIPF). Taiwan CDC will also put effort to develop and strengthen existing pandemic strategies more flexibility. We expect that will pave the way for appropriate responses to coming pandemic in order to ensure people's health.

Enteroviruses

Enterovirus 71 (EV71) belongs to a group of small RNA viruses, including polioviruses, Coxsackie A viruses, Coxsackie B viruses, echoviruses, and other enteroviruses (EV68~). 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 survey data gathered over a period of several years by Taiwan CDC, the weekly consultation rate of enterovirus infection cases, as 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 3-14). 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.

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 2014, the EV71 epidemic was not as serious as in 2013 (see Figure 3-15). There were 6 confirmed cases of EVSC and one death.

Figure 3-14 RODS Weekly Consultation Rate of Enterovirus Infections in Taiwan, 2008-2014

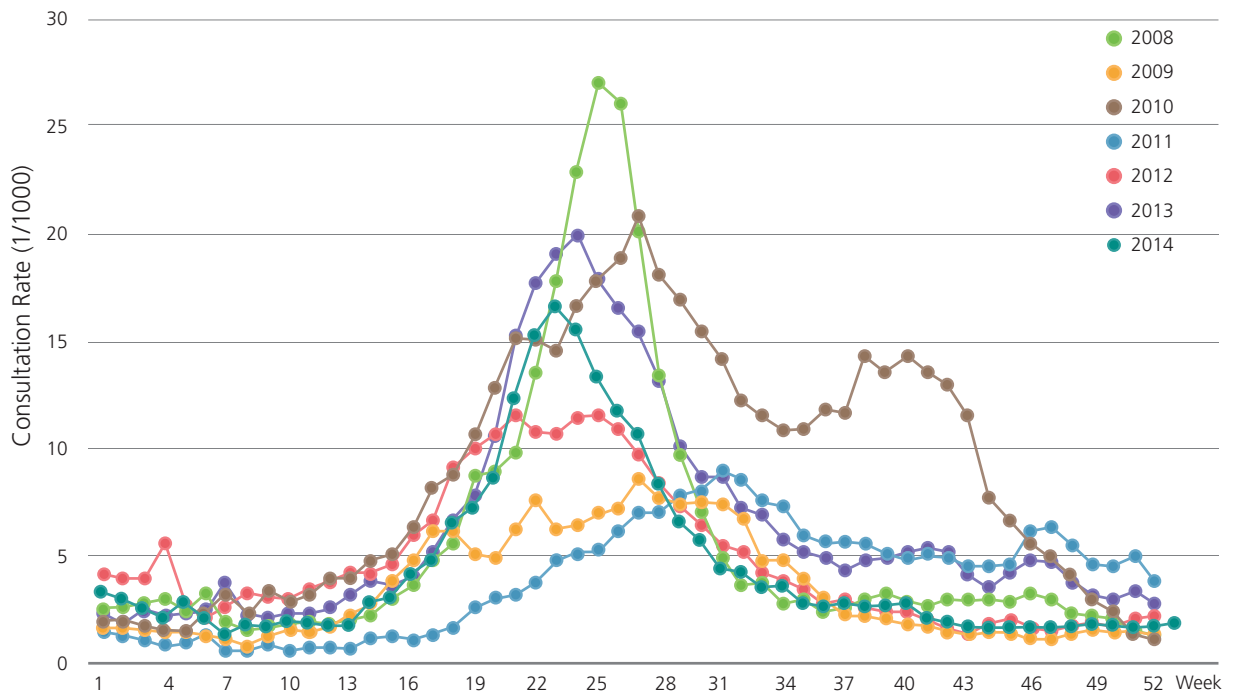
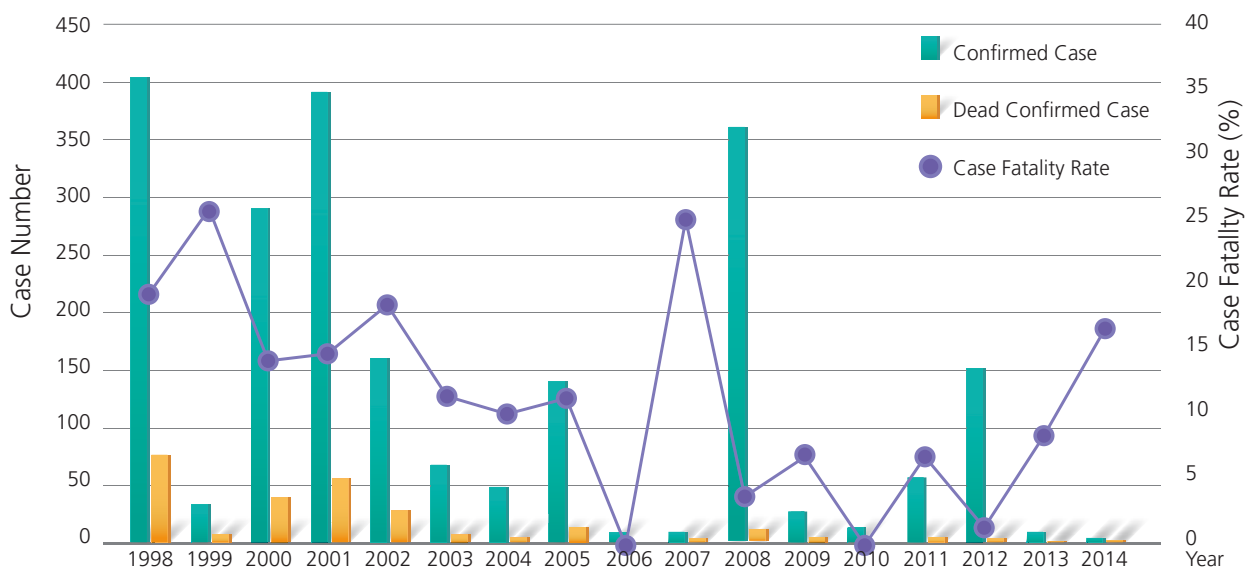


Figure 3-15 Volume of Cases and Case Fatality Rate of EVSC in Taiwan, 1998-2014



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, 75 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

Avian Influenza A (H7N9)

Accomplishments

- When an outbreak of avian influenza A (H7N9) emerged in mainland China in late March 2013, Taiwan was prepared. It quickly identified H7N9 as a category 5 notifiable disease and established the H7N9 Central Epidemic Command Center on April 3, 2013, under the approval of the Executive Yuan (see Figure 3-16). The Command Center arranged cross-departmental resources, equipment and personnel while ensuring a united response among agencies, groups and organizations responsible for direction, oversight and coordination. It continued to operate until April 11, 2014, when the end of the H7N9 outbreak allowed authority to return to regular agencies. Over the course of 374 days, the center held 24 meetings that were attended by members of 24 central government agencies, 22 local governments and the commanding and deputy commanding officers of each area of the communicable disease control network.
- In order to suppress the transmission of H7N9 by live poultry market, Taiwan announced a ban on the sale of live poultry and the slaughter of poultry in traditional markets, effective from May 17, 2013. Complementary measures included an inspection mechanism that relied on the establishment of joint inspection task forces by local governments. Since the ban took effect, 29,126 inspections of vendors uncovered a total of 61 violations (comprising two violations of the Communicable Disease Control Act and 59 violations of the Animal Industry Act). Several other steps were taken to strengthen management of human-poultry interface. Health authorities continued to use an “Executive Yuan Liaison meeting on the Control of Avian Influenza and Major Zoonosis Diseases” as a platform for research and discussion of related policies and a single window for information exchange and notification. Health monitoring of workers involved in the poultry industry allowed for early detection of potential poultry-human transmission so control measures could be implemented as soon as possible. These included the blocking of potential paths in order to minimize the risk of infection from avian sources. Dr. Shieh, Wun-ju, of the US Centers for Disease Control and Prevention (US CDC), was also invited to give a speech on “One Health” on December 25, 2014.
- In 2014, Taiwan conducted serological surveillance on poultry workers in areas that had



3-16: The H7N9 Central Epidemic Command Center (dissolved on April 11, 2014)

occurrences of H6N1 or H5N2 avian influenza, as part of the “Human Serological Surveys for H6N1 and Other Avian Influenza in Taiwan.” Low antibody positive rates suggested that the risk of transmission of these diseases to humans was low.

4. Through its national IHR focal point, Taiwan exchanges the latest influenza epidemic information with other nations in order to stay informed of international pandemics and control strategies. For the first time in 2013, Taiwan and mainland China exchanged a pathogen sample when the latter sent Taiwan an H7N9 virus strain. This cooperation was made possible under the Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs. The US CDC and the Japan National Institute of Infectious Diseases also agreed to share a candidate H7N9 vaccine strain with Taiwan. Through Arrangement No. 5 between Taiwan and the US CDC, communication channels were established to pass information related to epidemics and virus strains. Local officials use this arrangement to attend research and training events in the United States.

5. H5N1 and H7N9, both notifiable diseases and influenza A viruses, were grouped as “Novel Influenza A virus Infections” notifiable disease starting from July 1, 2014. Besides reducing confusion resulting from different novel influenza names that arises when physicians report a disease or discuss it with patients, the change consolidated information relating to novel influenza A viruses that can infect humans. Other steps taken by Taiwan CDC included compilation of the Novel Influenza A Virus Infections Control Handbook – which covered the reporting of case definitions; regulations governing the collection, examination and delivery of samples; and procedures for handling cases and contact tracing following exposure – along with the production of digital classes that sought to educate a wide range of audiences (see Figure 3-17).



Ebola Virus Disease

1. The WHO declared the Ebola outbreak in West Africa a Public Health Emergency of International Concern (PHEIC) on August 8th, 2014. On the same day, Taiwan CDC established the Ebola Virus Infection Emergency Response Task Force, which was based on Taiwan’s existing disease prevention foundation. 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.


- Taiwan CDC issued a level 3 travel notice for Ebola affected countries, to warn citizens to avoid all nonessential travel to Guinea, Liberia and Sierra Leone. It continued to update EVD section of its website with manuals, core teaching materials, Q&A as well as guidelines for the medical care of Ebola patients, specimen collection, transportation, and testing, and nosocomial infection control. And it kept publicizing EVD prevention among the general public through press conferences, newspaper and magazine articles, posters, online and video channels, and the communicable disease reporting and consultation hotline 1922.



The two Don'ts and one Do of Ebola Prevention: This poster advised against visiting Ebola affected areas in West Africa or coming into contact with patients at hospitals in Ebola affected areas. It encouraged attention to personal hygiene.


Ebola Virus Disease Travel Health Notice

Taiwan CDC recommends that you avoid nonessential travel to Ebola affected areas in West Africa. If you decide to travel to the affected areas, please practice good personal hygiene and avoid all direct contact with patients and sick animals. Upon your arrival in Taiwan, if you have experienced symptoms such as fever, vomiting, diarrhea or rash, please notify the quarantine officer at port of entry immediately. If you develop symptoms within 21 days after arrival, please call the toll-free hotline 1922 (or 0800-001922), put on a mask, seek immediate medical attention and inform the doctor of any recent travel and exposure history. For more information, please visit the Taiwan CDC website at www.cdc.gov.tw

 **Taiwan Centers for Disease Control**

Avis de voyage concernant la maladie à virus Ebola

Taiwan CDC déconseille tout voyage dans les pays touchés par le virus Ebola. Si vous décidez de voyager dans les zones touchées par le virus, veuillez appliquer les bonnes pratiques d'hygiène personnelle et éviter tout contact direct avec des personnes et animaux infectés. Dès votre arrivée à Taïwan, si vous présentez des symptômes tels que fièvre, vomissements, diarrhée ou éruptions cutanées, prévenez immédiatement l'agent de quarantaine à l'aéroport ou au port. Si vous développez des symptômes dans les 21 jours qui suivent votre retour, appelez le numéro gratuit 1922 (ou 0800-001922), mettez un masque, consultez immédiatement un médecin et informez-le de vos récents voyages et antécédents d'exposition au virus. Pour plus d'informations, consultez le site de Taiwan CDC à www.cdc.gov.tw

 **Taiwan Centers for Disease Control**

**伊波拉入境申報卡
Ebola Declaration Card**

— 電話 103-3614

姓 Family Name _____ 護照號碼 Passport No. _____

名 Given Name _____

請問您近 21 天內是否曾造訪伊波拉疫情流行國家(幾內亞、賴比瑞亞、獅子山共和國)?
Have you ever traveled to any Ebola-affected country, such as Guinea, Liberia and Sierra Leone, within the past 21 days?

否 No
 是 Yes, 國家 Country _____

勾選「是」者，請於下機時主動向疫管署檢疫人員申報，勾選「否」者，請將本卡攜同移民簽證紙交給通關。如未能配合而構成他人感染源者，將違反傳染病防治法第 59 條規定，處新台幣 1-15 萬元罰鍰。

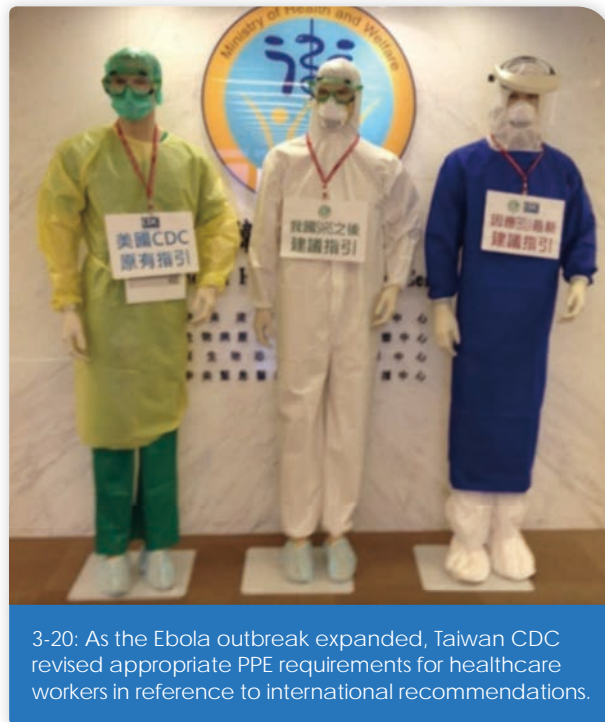
If you answered "Yes" to the above question, please contact the Taiwan CDC quarantine officer upon arrival. Otherwise, please submit the completed card to the immigration officer during the immigration inspection. Failure to do so that leads to the infection of other people is in violation of Article 59 of the Communicable Disease Control Act and may be fined NT\$10,000 up to NT\$150,000 according to the same Act.

旅客簽名 Signature _____ 日期/時間 Official Date/Time _____

 謝謝您的配合
Thank you for your cooperation

3-19: Ebola Declaration Card and Travel Health Notice Cards

3. Quarantine measures had been reinforced comprehensively, including enhanced immigration fever screenings, announcements on entering flights, the distribution of Travel Health Notice Cards to travelers from Ebola affected areas. Anyone who developed Ebola-like symptoms within 21 days of leaving an outbreak area was reminded to immediately contact quarantine officials or call the 1922 hotline. From October 21, 2014 to January 31, 2015, travelers arriving from Europe and Dubai were asked to fill out an Ebola Declaration Card. Passengers indicating a travel history to the Ebola affected areas were evaluated by quarantine officers who then offered health information and follow-up inquiries. Moreover, as long as the passport control officers from the National Immigration Agency encountered nationals from countries affected by an Ebola outbreak, Taiwan CDC airport quarantine officers were notified the immediate presence to conduct relevant quarantine measures.



3-20: As the Ebola outbreak expanded, Taiwan CDC revised appropriate PPE requirements for healthcare workers in reference to international recommendations.

As the Ebola outbreak expanded, Taiwan CDC revised appropriate PPE requirements for healthcare workers in reference to international recommendations.

4. Preparatory assistance was offered to hospitals. They were requested to display Ebola prevention posters in conspicuous areas of emergency department and clinics. The inspection of hospital IPC and EVD preparedness was accomplished by local health authorities. Furthermore, all front line health workers in regional level and above hospitals were asked to receive practical training on proper donning and doffing of personal protective equipment to ensure safety. Additional 1,985 training courses and drills, with a total of 138,924 attendees, were held.

5. Taiwan CDC conducted a nationwide inventory of PPE stockpiles (surgical masks, N95 respirators, coveralls), which included medical facilities, to ensure the capacity met regulatory standards. In December 2014, it completed procurement of all WHO-recommended PPE, such as face shields, waterproof aprons, hoods, and waterproof boots. These were distributed to six response hospitals in the national medical network and to response hospitals on outlying islands.

6. By obtaining firsthand epidemic control information from the WHO and other nations through the IHR Focal Point, the health representative in Geneva, Switzerland, 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.

7. At the end of August 2014, Taiwan CDC dispatched two medical officers to Nigeria to assist Taiwanese businesspeople and overseas governmental officials with disease prevention. In

addition, two other medical officers were sent to the US CDC for Ebola training course in November as the seed trainers. Accordingly it held an Ebola training camp in Taiwan and further expand international cooperation. Taiwan CDC also supported the US medical teams in West Africa through the provision of PPE, including 100,000 coveralls and 100,000 surgical masks.



3-21: At an Ebola emergency response center in Lagos, Nigeria, medical officers Dr. Philip Lo and Dr. Walter Tsai met with Nigeria FELTP branch chief Dr. Waziri and others.



3-22: Taiwan CDC expanded international cooperation when it sent two medical officers to the US CDC for Ebola training course for healthcare workers to work in Ebola Treatment Units (ETUs) in Africa.

► Infection Control and Biosafety

Healthcare-associated Infection Control

Current Status

The SARS outbreak highlighted the importance of infection control in hospitals. To improve patient safety by stopping nosocomial infections, Taiwan CDC coordinates annual inspection programs, gathers surveillance data on 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 monitor variations and evolving trends of the carbapenem-resistant gene in Enterobacteriaceae.
5. To implement the Antimicrobial Stewardship Program for the promotion of reasonable

antimicrobial use. This will improve patient safety and treatment quality by reducing antimicrobial resistance and nosocomial infections.

6. To promote infection control and reduce health care-associated infections in nursing facilities by implementing infection control inspections.

Accomplishments

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

(1) In 2014, Taiwan CDC released Ebola prevention guidelines, which included donning and doffing personal protective equipment (PPE), and it merged H7N9 and H5N1 recommendations to consolidate measures for influenza A viruses in healthcare settings.

(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 2014, of 424 hospitals inspected, five failed to meet requirements and were re-inspected within two months to track improvements.

3. Implementation of Central Line Bundle

The Center of Excellence for Central Line Bundle, which was established by seven medical centers and joined by 103 hospitals, is a national initiative to prevent central line-associated blood stream infection (CLABSI) and promote care bundles. The initiative can reinforce patient safety, improve healthcare quality and reduce medical costs.

4. Nosocomial Infection Surveillance and Reporting

In 2014, 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.



3-23: An awards ceremony to recognize central line care quality improvements. December 16, 2014

5. Surveillance of Carbapenem-resistant in Enterobacteriaceae

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

6. Nationwide Antimicrobial Stewardship Program

Three implementation levels – a program management center, demonstration centers, and participating hospitals – jointly operate the Antimicrobial Stewardship Program. The management center was established in 2013 to launch the program. Seven hospitals were selected to serve as regional demonstration centers that would assist with implementation and promotion and 54 hospitals were selected to participate in 2014. Antimicrobial stewardship summits and performance competitions were held for promotional purposes.



3-24: Antimicrobial Stewardship Program benchmark and an awards ceremony to recognize performance competitions, November 22, 2014

7. Infection Control Inspections in Nursing Facilities

In 2014, Taiwan CDC initiated infection control inspections of nursing facilities. Local health authorities and infection control experts inspected 456 facilities and conducted follow-up inspections at one audited facility that failed to meet requirements. The total pass rate was 99.8%.

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 2015 nosocomial infection control inspection quality improvement project based on implementation experiences from 2008 to 2014 and outside recommendations. It will arrange an inspection schedule based on the Ministry of Health and Welfare's medical investigation consolidation policy.
3. Besides the central line bundle, Taiwan CDC will start to promote the care bundles that prevent ventilator-associated pneumonia (VAP) and catheter-associated urinary tract infection (CAUTI). By reducing device-associated infections, hospitals can improve patient safety and healthcare quality while reducing medical costs.
4. Promote hospital participation in the TNIS system while strengthening surveillance of nosocomial infections and antimicrobial resistance.
5. Implement the Antimicrobial Stewardship Program to promote antimicrobial stewardship across the nation at hospitals and in communities.
6. Implement infection control inspections in nursing facilities and gradually extend the inspections to other types of long-term care facilities in order to improve health care quality and prevent outbreaks.

Laboratory Biosafety Management

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 2014, Taiwan CDC completed editing, revision, and announcement of the Regulations Governing Management of Infectious Biological Materials; Operation Directions Governing Management of Infectious Biological Materials, Ministry of Health and Welfare; Regulations for Import and Export of Infectious Biological Materials, Communicable Diseases Specimens, and Other Infectious Biological Materials; and Laboratory Biosafety Guidance for Conducting Testing for Ebola Virus Disease.



Biosafety Mechanism Registration

By December 2014, 501 organizations registered biosafety mechanisms to Taiwan CDC, of which 365 established biosafety committees and 136 designated an individual. These included 35 government organizations, 174 medical institutions, 53 academic research institutions and 239 other groups. In order to strengthen essential biosafety competencies of laboratory personnel, Taiwan CDC also held a biosafety laboratory competency competition for BSL-3 laboratories in 2014.

Biosafety Inspections of High-Containment Laboratories

Since 2006, Taiwan CDC has routinely inspected BSL-3 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 2014, Taiwan CDC inspected one BSL-4 laboratory, 19 BSL-3 laboratories and 12 TB-containment laboratories.

Laboratory Biosafety Education and Training

In 2014, Taiwan CDC organized eight biosafety training course sessions totaling 46 hours and with total attendance of 644.

Future Prospects

Taiwan CDC began development of a laboratory bio-risk management system in 2013 that will be applied to all BSL-3 and BSL-4 laboratories over the following four years. By focusing on continuous improvement and the Plan-Do-Check-Act (PDCA) cycle, the system will identify and monitor all aspects of laboratory biosafety and biosecurity. It will promote autonomous management at the institutional level as well as supervision and guidance by competent authorities.

➤ Outbreak Investigation

Current Status

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

In Taiwan, outbreaks are mainly detected through the following ways:

1. Pre-defined alerts of the National Notifiable Disease Reporting System and syndromic surveillance systems.
2. Active reports from physicians, facilities, laboratories, the public, and the media.

Once notified of a suspected outbreak, local public health professionals are required to register the outbreak into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated the outbreak with supervision provided from the Taiwan CDC's regional centers. Patient or parent interviews, questionnaire surveys, and environmental inspection are commonly conducted to identify source and extent of the outbreak. Laboratory testing on human and environmental specimens are conducted at TCDC's Research and Diagnostic Center to identify etiologic agents.

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 which emphasizes 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. FETP has become a mandatory training program for newly recruited medical officers.

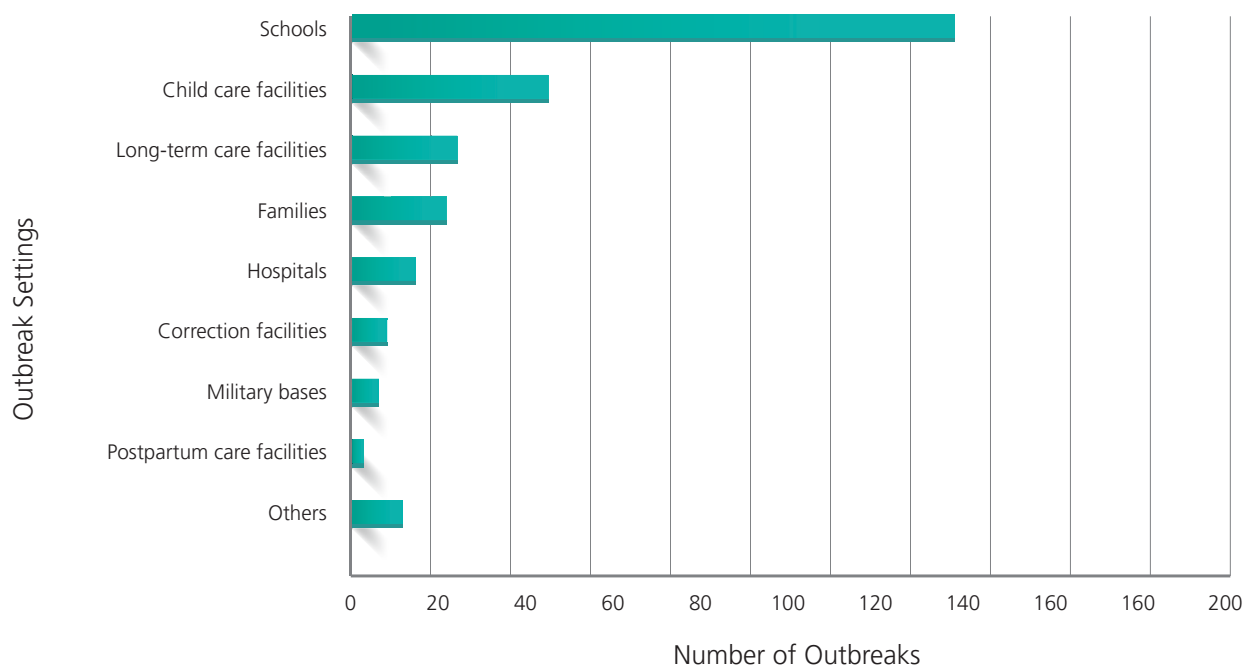
Accomplishments

1. In 2014, of 447 suspected outbreaks registered into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated by public health authorities, 299 (67%) were confirmed as outbreaks.
2. The top four reported diseases/syndromes of confirmed outbreaks were acute respiratory infection (n=93, 31%), varicella/chickenpox (n=72, 24%), acute diarrhea (n=59, 20%), and tuberculosis (n= 23, 8%) (Table 3-6).
3. The top four outbreak settings other than household cluster were schools (n=151, 51%), long-term care facilities (n=49, 16%), child care facilities (n=27, 9%), , and hospitals (n=16, 5%) (Figure 3-26).

Table 3-4 Number of reported diseases/syndromes of confirmed outbreaks — Taiwan, 2014

Reported disease/syndromes	Total number of outbreaks
Acute respiratory infection	93
Varicella/chickenpox	72
Acute diarrhea	59
Tuberculosis	23
Influenza-like illness	20
Pertussis	13
Dengue fever	8
Measles	4
Unknown cause of fever	2
Acute hepatitis A virus infection	2
Shigellosis	2
Typhoid/ paratyphoid fever	1
Total	299

Figure 3-26 Number of Outbreaks by Setting — Taiwan, 2014



4. Special events in 2014 included an investigation of outbreak of *Salmonella* Enteritidis infections associated with liquid eggs, measles outbreak in an aboriginal township, and outbreak of acute hepatitis A infection associated with shellfish.
5. By the end of 2014, there are 22 medical officers at Taiwan CDC. Their medical specialties include infectious diseases, internal medicine, family medicine, emergency medicine, pediatric gastroenterology, and pediatric cardiologist.

Future Prospects

1. Strengthen collaborations with partners including local health departments, food and agricultural authorities, and universities and other academic partners.
2. Enroll newly recruited medical officers and public health professionals of interest from Taiwan CDC and local health departments into the FETP.
3. Develop core FETP training modules to advance professional skills of FETP trainees and other public health professionals of interest from Taiwan CDC and local health departments.
4. Collaborate with international networks of FETP to rapidly respond in outbreak investigations and control and contribute to global health diplomacy.
5. Broaden curriculum to include topics on leadership, management, program evaluation, and health economics.
6. Improve selected domains of the program and focus on trainees' learning experiences.

International Health



International Cooperation

Current Status

Taiwan CDC has made great efforts to enhance international health exchanges related to infectious diseases by participating in international public health conferences and related activities, strengthening bilateral and multilateral relationships, helping allies raise their capacities for communicable disease control, and exchanging the latest technology and information with other countries. As a result, Taiwan CDC has many impressive achievements in disease control and has been able to share its unique experiences with the rest of the world as it endeavors to achieve the goal of Health for all.

Accomplishments

Promotion of Bilateral and Multilateral Cooperation

1. The Americas:

(1) For the Cooperative Program in Public Health and Preventive Medicine with the US CDC, Taiwan CDC continued Implementation Arrangement No. 4 (a Taiwan-US EIS training plan). Through Taiwan's representative office in the United States and the American Institute in Taiwan, Taiwan CDC and the US CDC signed Implementation Arrangement No. 5 – Influenza Cooperation in 2014. The two sides also exchanged influenza reference reagents standardized by the WHO and two strains of imported H7N9 influenza virus.

(2) Two Taiwan CDC officials attended safety training held by the US CDC for health workers going to West Africa to assist with the Ebola outbreak.

(3) Taiwan CDC donated 100,000 sets of PPE and 100,000 masks to help West African nations cope with the Ebola outbreak. The PPE was sent to Liberia with the assistance of the American Institute in Taiwan for use by international teams on the front lines of the Ebola fight.



2. Europe:

Taiwan CDC deployed staff to the Austrian Agency for Health and Food Safety (AGES) for European CDC 2013-2015 EPIET training program.

3. Asia:

Years of cooperation between Taiwan CDC and Japan's National Institute of Infectious Diseases (NIID) have fostered a stable, friendly relationship. In September 2014, 15



11th Taiwan –Japan bilateral symposium, Sep 11-12, 2014

Japanese experts came to Taiwan for the 11th Taiwan-Japan Bilateral Symposium. Besides these regular symposiums, in 2014 the two sides engaged in seven joint research cooperation projects as part of frequent exchanges and visits.

International Exchanges in 2014

1. A total of 105 guests from 14 different countries visited Taiwan CDC.
2. Taiwan CDC participated in WHO conferences and related activities, including attending the 67th World Health Assembly (WHA) as an observer, the 65th Regional Committee for the Western Pacific and 5 technical meetings.
3. Taiwan CDC joined 4 APEC Conferences, including the 2014 1st and 2nd APEC Health Working Group Meeting, the 4th APEC High Level Meeting on Health and Economy, the LSIF Special Session Meeting and the Healthy Woman, Healthy Economies: Enhancing Women's Economic Participation through Better Health initiative.



Experts from "2014 Taiwan-U.S. Health and Welfare Policy Symposium" visited Taiwan CDC, May 14, 2014



Experts from The Miriam Hospital visited Taiwan CDC, May 26, 2014

4. Taiwan CDC participated in 19 international conferences, sent 34 staff overseas, and dispatched 29 employees to join 20 the short-term study programs and another 2 employees for long-term EPIET and EIS training.

5. Taiwan CDC published 59 SCI papers.

Future Prospects

Increasing international contact and transit have made global cooperation even more vital in the fight against communicable diseases. Taiwan CDC strives to strengthen cooperation with other countries and international health care institutions. Encouraged by results of training and educational programs, Taiwan CDC will cooperate with other countries in forming a global surveillance network for the prevention and control of communicable diseases. In addition, the next stage for Taiwan CDC is to train personnel specializing in international public health and emerging infectious disease prevention and to seek full involvement in international communicable disease prevention projects. Future efforts include:

1. Continuing to participate in conferences and other events organized by international institutions and forums, including the WHO and APEC.
2. Establishing more bilateral and multilateral cooperation projects with other countries, especially with developed countries and Southeast Asian countries.
3. Taking part in international humanitarian relief efforts and dispatching more epidemiologists and experts to needy areas to provide disease prevention support.



Experts from "2014 Global Health Forum in Taiwan" visited Taiwan CDC, Dec.2 2014

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 2014, Taiwan CDC acquired 46 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 prevent 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 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 report 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 and it is confirmed that there is no danger of importing a disease.
- (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 2014:

Quarantine at International Ports in 2014

Regional Center	Quarantine Office	Ships	Passengers	Aircraft	Passengers
Taipei	Keelung	5,039	236,630	-	-
	Suao	603	94,565	-	-
	Taipei	2,986	35,356	-	-
	Kinmen	10,062	758,519	2	15
	Matsu	817	22,445	0	0
	Songshan	-	-	9,294	1,647,982
Northern	Taoyuan	-	-	84,685	14,810,879
Central	Taichung*	6,969	75,575	5,529	774,543
Southern	Mailiao	2,887	36	-	-
	Tainan	-	-	401	39,052
Kaohsiung-Pingtung	Kaohsiung*	15,355	66,991	12,054	542,179
	Makung	266	2,820	0	0
Eastern	Hualien*	1,074	97,151	91	13,798
	Taitung	-	-	3	222
Total		46,058	1,390,088	112,059	17,828,670

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

3. Crew and Passenger Quarantine

Early detection and prevention of communicable diseases requires all arriving passengers to have their body temperature scanned with infrared thermal apparatus. Only passengers showing symptoms are required to fill out the Communicable Disease Survey Form. Depending on the severity of symptoms and travel history, those individuals must give an on-site specimen and/or submit to follow-up tests by local health authorities.

Of the 21,707,379 passengers who arrived in Taiwan last year, 15,280 showed symptoms and were put on the local quarantine follow-up list. Arriving passengers who became ill after entry were encouraged to seek medical advice and inform their doctor of recent travel history.

Last year, through body temperature scans Taiwan CDC found 118 cases of dengue fever, two cases of shigellosis, and three cases of chikungunya.

4. Control of Disease Vectors in Ports

Taiwan CDC adopted several measures to control vector density (i.e., any infectious disease carrier such as rats or mosquitoes) at ports.

(1) Rat Control:

- A. Anticoagulant bait, placed where rats are most active, is replenished every 10 to 15 days to ensure efficacy.

B. Monitoring of rats in port areas includes examining captured rats for parasites and testing their blood serum for *Rickettsia typhi*, plague and hantavirus.

(2) Mosquito Control:

Mosquitoes are vectors of several communicable diseases, including yellow fever and dengue fever, and their population density is closely related to the development of epidemics. To understand mosquito variety and quantity, the following methods were adopted:

A. Controlling the Breeding of Dengue Fever Vectors: Empty containers that are prone to retain water (bottles, jars, tires, etc.) are checked monthly to track the breeding of mosquitoes.

B. Setting Ovitrap: Cloth traps moistened with temephos are placed around ports/airports for mosquitoes to lay eggs. After the eggs hatch, the larvae are killed with insecticide. The traps are replaced monthly, and the number of eggs laid is used to calculate the mosquito index in port areas.



A quarantine worker conducts a mosquito sweep on a passenger jet

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

(3) Organizing International Port Sanitary Groups: Groups are selected by Taiwan CDC's regional centers from personnel of the port authority, the port police, the customs office, the cargo transportation station, and other related organizations. Depending on circumstances, representatives meet every three to six months to plan, coordinate and implement matters concerning port sanitation.



Experts assessed progress in implementing IHR core capacities at the Port of Taichung

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, were follow-up external assessments undertaken by two Australian experts. The performance not only ensured that improvement efforts were consistent with IHR core capacity requirements but also demonstrated that capabilities at designated PoE were on par with those of the most advanced nations. To pass 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 second-phase PoE to establish core capacities. Self-assessments and initial internal assessments were carried out by domestic experts in 2014. Several gaps were identified and action plans were developed to implement the IHR (2005). Expectations were high for follow-up external assessment in 2015. Seven designated PoEs has cover over 95% passengers/cargos movement of Taiwan.

6. Other Sanitation Control Measures:

(1) Shipboard Sanitation Control: To prevent the spread of disease 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 gives these documents a six-month period of validity to identify and record all areas of ship-borne public health risks together with any required control measures.

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

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

7. Promoting Travel Health

A total of 26 travel clinics, distributed throughout every city and county, provide pre-travel health consultations and vaccinations. Taiwan CDC established the Training Center for Travel Medicine to promote education and research activities, and it provides up-to-date travel health information via an official health website.

Future Prospects

1. Increasing manpower and equipment to strengthen quarantine functions. Conducting quarantines to stop the import of disease.
2. Fostering professional quarantine personnel, encouraging the development of new quarantine techniques, and raising the quality of quarantine officers and their work.
3. Improving the eradication of vectors on ships and monitoring rat and mosquito populations in port areas to prevent the spread of communicable diseases.
4. Building core capacities at five more designated PoE based on IHR (2005) in order to improve national capabilities and prevent the spread of disease.

Scientific Research and Development



▶ Research, Development and Manufacturing

Research and Diagnostic Center

The Research and Diagnostic Center, which comprises 12 laboratories and three service sections, employed 153 individuals and received and processed 112,018 diagnostic specimens in 2014. 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.

2013-2014 Accomplishments

National Influenza Center (NIC)

1. We reported the world's first human case infected with avian influenza A (H6N1) virus in 2013. The genomic sequences of the isolated virus revealed that the H6N1 virus with a unique G228S substitution of the HA protein has been circulating in poultry in Taiwan. Our report highlighted the need to prepare for a pandemic of unpredictable complex avian influenza.



2. Through extensive surveillance, four laboratory-confirmed H7N9 cases imported from China have been identified in Taiwan during 2013-2014. It is important to strengthen surveillance of influenza and to share viral genetic data in real-time for reducing the threat of rapid and continuing evolution of H7N9 viruses.

Viral Respiratory Diseases Laboratory

1. New variants of influenza A (H1N1)pdm09 and A (H3N2) viruses with mutated M genes were detected in Taiwan between 2012 and 2013. We established a real-time RT-PCR assay using degenerate nucleotide bases in both the primers and probes and successfully increased the sensitivity of the assay to detect circulating variants of the human influenza A viruses. Observations highlight the importance of simultaneous use of different gene-targeting real-time RT-PCR assays in the clinical diagnosis of influenza.

2. Twenty-six measles cases were confirmed from 133 reported cases in 2014 and the available viruses were characterized as four genotypes: B3 (n=12), D8 (n=4), D9 (n=1) and H1 (n=5). In 2014, the most common genotype was genotype B3.

3. Seven rubella cases were confirmed from 78 reported cases in 2014 and the available viruses were characterized as two genotypes: 1E (n=2) and 2B (n=5).

Viral Enteric and Diarrhoeal Diseases Laboratory

1. Norovirus(NV) was the major cause of AGE outbreaks in Taiwan. In 2013-2014, a novel norovirus GII.6 emerged. Both NV GII.4 Sydney and GII.6 strains were the major pathogen causing diarrheal outbreak which mostly occurred in school and long-term care facility.
2. Establishment and application of molecular detection methods to confirm viruses of reported diarrhea syndrome cluster and foodborne related outbreaks. Successfully identified novel picobirnavirus and further sequence-based genotyping from positive samples.
3. Identified novel rotavirus strains from enrolled AGE hospitalized children pre- and post-vaccine licensure.
4. An indirect IFA kit was developed for detecting recent coxsackievirus B3 that were untypeable by commercial kits. In addition, the IFA kits for human parechovirus 1 and human parechovirus 3 were also developed.
5. Enterovirus D68, including cluster 1 and cluster 3 viruses, has been endemic in Taiwan for some years despite a small number of positive cases.
6. Twenty-two isolates of Saffold virus type 3 were identified from the specimens that showed negative results in the tests of influenza and enterovirus.

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 evaluated by WHO reference laboratory.
2. Involved in a National Foodborne Illness Surveillance and Study associated with viral pathogens, including HAV and HEV.
3. Strengthened our ability to detect rabies virus in response to re-emergence of rabies in Formosan ferret badgers in 2013 and to detect Ebola virus emerging in West Africa in 2014.
4. Continue national HIV drug resistance surveillance survey among treatment naïve patients and conduct incidence study in different risk groups associated with HIV infections.

Vector-Borne Viral and Rickettsial Diseases Laboratory

1. Established and maintained an arboviral 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 arbovirus infections.
3. Established surveillance and molecular diagnostic systems for the detection of emerging and re-emergent arbovirus infections.
4. Conducted a mosquito surveillance program for monitoring emerging and re-emerging arboviral diseases.

Bacterial Respiratory Diseases Laboratory

1. In 2013-2014, a total of 1,212 cases of invasive pneumococcal disease (IPD) were notified. The incidence was 2.6 cases per 100,000 population, and the case fatality was 10.7%. Among invasive *Streptococcus pneumoniae* strains, the most prevalent serotypes were serotypes 19A, 3, 14, and 23F. Toward penicillin, cefotaxime, and erythromycin, 61.8%, 79.2%, and 8.1% strains were susceptible, respectively. Serotype 19A strains showed the most resistance.
2. In 2013-2014, a total of 248 cases of Legionnaires' disease were laboratory-confirmed, including 193 male and 55 female. In 2013, the first two neonate cases in Taiwan were identified who were associated with infant formula prepared using contaminated water in hospitals.

Bacterial Enteric and Emerging Diseases Laboratory

1. Surveillance of carbapenem resistant Enterobacteriaceae suggested most KPC-KP isolates were clonally related (similarity $\geq 80\%$).
2. Establishment of multiplex real-time RT-PCR for detection of pathogens that cause encephalitis, pathogen detection rate ranged from 20.9-30.2% during 2012-2014.
3. Employed high-throughput sequencing for unknown pathogen discovery.

Mycobacterial Diseases Laboratory

1. Developed and evaluated a new oligonucleotide array and an automatic reader to rapidly detect rifampicin, isoniazid and multidrug resistance in *Mycobacterium tuberculosis* isolates. The array can directly reveal transmission-associated mutations, which are useful for epidemiological investigations. The turnaround time of the array test is 6-7 hours.
2. Established a multiplex real-time PCR for rapid differentiation of *Mycobacterium tuberculosis* complex, *Mycobacterium bovis* and *Mycobacterium bovis*-BCG.
3. Conducted drug-resistant surveillance of multidrug-resistant tuberculosis and observed decreasing trend of case numbers from 2008 to 2013. Significant decreases of resistance to pyrazinamide ($p < 0.01$), ofloxacin ($p < 0.01$) and para-aminosalicylate ($p < 0.01$) were found.

Parasitic Diseases Laboratory

1. Found a continuous increase of amoebiasis case numbers among foreign laborers.
2. Cooperated with Japan NIID to study genetic diversity and drug action mechanisms of *Entamoeba histolytica* clinical isolates.
3. Conducted the surveillance of *Angiostrongylus cantonensis* and its snail and rodent vectors in Taiwan. The results achieved will also provide Taiwan Centers for Disease Control to exchange experience in the cooperation issues of the "cross-strait medical

and health cooperation agreement”, and to assist the Angiostrongyliasis control and prevention in both sides.

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.
3. Established novel multiplex bead array platforms to rapidly detect clinically important fungi, nosocomial pathogens and sexually transmitted pathogens.

Vector Biology Laboratory

1. Established a molecular epidemiological surveillance for tick-borne emerging and zoonotic diseases especially tick-borne virus diseases.
2. Determined the most appropriate spraying concentration for each insecticide used in southern Taiwan to assist local governments with dengue control.
3. Designed “Insecticide Recording Sheets” to assist local governments in southern Taiwan with insecticide management mechanisms (covering kind, quantity, concentration, spray method, etc.)
4. Assessed benefits of insecticide bioassay tests against the dilution ratio (DR) and cost to save money and strengthen dengue control strategies of local governments in southern Taiwan.
5. Conducted genetic studies of mosquitoes to understand the taxonomic status of *Culex annulus*, origin of invading *Culex pipiens* form *molestus* and capability of *Anopheles sinensis* to transmit *Plasmodium vivax*.

Establishment and Application of a Pathogen Genome Sequence Database in Taiwan

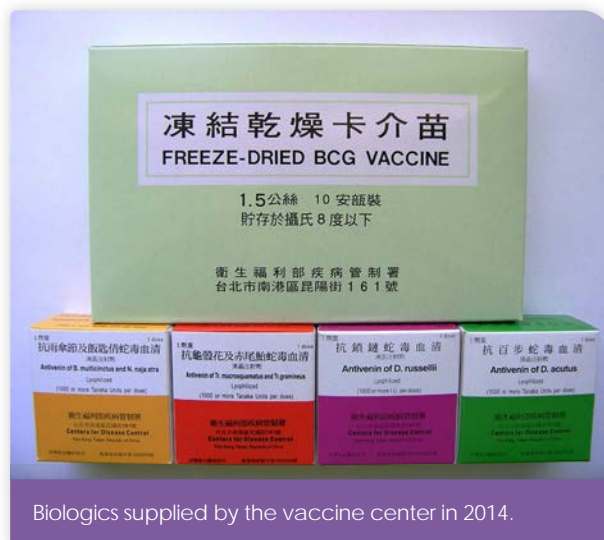
Taiwan Pathogenic Microorganism Genome Database (TPMGD)-open version (http://tpmgd.cdc.gov.tw/tpmgd_public/) is accessible to the general public online. Anyone can surf and download from the website or do contrastive analysis of 28,323 pathogen sequence data and simple epidemiological information.



▶ Manufacturing of Serum and Vaccines

Production of Bio-Products

1. A total of 314.5 liters of antivenom serum, which is manufactured using horse serum, was produced in 2014.
2. A supply of 525,436 doses of vaccines and antivenoms was available in 2014. Income from sales of these biologics totaled more than NT\$42.6 million.
3. Laboratory animals such as mice, guinea pigs, rabbits, poisonous snakes and horses are supplied and raised.
4. Taiwan CDC published the book *100 Years of Glory and Century of Continuity – A Centennial History of Government-Manufactured Vaccine Production in Taiwan*.
5. The National Anti-venom Horse Farm, which started operations in February 2014, offers comprehensive services: feeding horses, establishing farm SOPs, validating cleaning rooms, compiling GMP documents of plasma collection, and GMP staff training of manufacturing procedure.



Development of Bio-Products

1. In response to the emergence of new Enterovirus 71 subgenotypes and subgenotype B4 and C4 formalin-inactivated vaccine R&D needs, Taiwan CDC continued to strengthen screening platforms for Enterovirus 71. Four subgenotypes – B5, C2, C2-like and C5 – selected using internal Enterovirus monitoring data, were used to build a seed bank stocked with 15 Enterovirus 71 strains. Analysis of virus growth characteristics and antigen quantity for reference in future vaccine trials and mass production using cytopathic effect (CPE) time, TCID₅₀, ELISA and western blot analysis was followed by animal trials (mice and rabbits). After determining the extent of immunogenicity and cross neutralization, candidate C2 subgenotype vaccines (E12-20) were selected based on effectiveness in neutralizing subgenotypes B4, B5, C2, C4 and C5.
2. Established analytical methods and specifications for lyophilized snake venom in order to confirm biochemical characteristics and toxicological activities, thereby ensuring quality and compliance with WHO recommendations. The venom species is identified by high-performance liquid chromatography (HPLC) and double immunodiffusion testing. An assessment of biological activity is evaluated by determining the lethal activity of the

venom using the median lethal dose (LD₅₀) assay or minimum lethal dose (MLD) assay.

3. Alternative Venom Procurement Plan for the Production of Antivenom: This plan proposes field procurement, repeated procurement, and small-scale pens as complements or replacements to milking caged snakes for the procurement of venom supplies required by Taiwan CDC. These alternative methods would not only be more compassionate and fulfill animal conservation needs but also save expenses and manpower used to cage raise snakes. Findings are being incorporated into Taiwan CDC's future venom supply source planning.

4. Analyzing Causes of Snake Death and Evaluating New Venom Extraction Technology: Aims included finding safe new handling skills for milking and using necropsy to understand causes of snake death. Research suggests that handling snakes exclusively by hand is the fastest method. Using a modified restraint tube is the safest method but is less efficient. Use of anesthesia and low temperatures also works but cannot replace skill of the handler and requires more attention on recovery. Necropsy revealed parasite infections, reddish wet lungs, and multifocal yellowish pinpoint spots on the liver. Histopathological exams showed pneumonia, gastritis and hepatitis.



Controlling the snake and extracting venom by hand. The snake is pressed against the extraction vessel. As it bites a paraffin wax membrane, venom is released.



A modified tube is used in extraction. After locking the snake's head in place with a bolt, the snake is made to bite a paraffin wax membrane to release venom.

Marketing and Publications

Close The Gap

愛無異 心更近

2014年世界愛滋病日記者會

臺灣疾病管制署 TAIWAN CDC



疾病管制署
2014世界愛滋病日

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 event 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 established to enhance communication of communicable disease control policies. In 2014, a total of 5,836 related news had been reported, in response to 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, 73 press conferences had been held, 343 press releases had been issued, and 1,329 news reports had been made.



2. Integrated Disease Prevention Marketing

In 2014, Taiwan CDC focused on AIDS, tuberculosis, seasonal influenza, enterovirus, H7N9, dengue fever, and rabies 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.

In response to World AIDS Day, starting from November 22, 2014, Taiwan CDC held a three-week “Close the Gap” AIDS prevention promotional and educational exhibition in the Bopiliao area of Wanhua District, Taipei. It cooperated with the well-known online comic artist Mr. H.H to bring the popular character Mei Mei into the AIDS prevention fold through installation art. AIDS prevention and compassion campaigns took place in Bopiliao historic district, Taichung’s Caowu Square, Kaohsiung’s National Science and Technology Museum, and Hualien’s Old Railway Walkways.

Several initiatives were launched in response to the international Ebola outbreak. Each week Taiwan CDC held regular news conferences and issued press releases in which experts offered simple, clear communication to provide the general public with accurate epidemic prevention information and corrector refute any falsities or rumors. A drill on August 13, 2014, simulated a response to a suspected Ebola patient emerging at an international airport. Epidemic prevention doctors who traveled to Nigeria to teach Taiwanese businesspeople and other nationals how to avoid the dangers



of Ebola held a press conference on September 5, 2014, upon their return. Apart from strengthening preparation and response capabilities, the media exposure offered another method of guarding against Ebola.



(2) Community Mobile Promotions: On March 21, 2014, Taiwan CDC held a news conference to promote a series of World Tuberculosis Day activities.

Performance artists, enlisted to portray historic figures who had the disease, including Mozart, Lu Xun and Lin Daiyu, used action art to travel through time and show people that a bit of knowledge is enough to brush away fears associated with TB. These mobile performances were held in Taipei, Taichung, Kaohsiung and Hualien.

(3) 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 provides hard copies to members of the general public (see appendix).



3. Communicable Disease Reporting and Counseling Hotline, 1922

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

In 2014, the hotline received 70,494 calls and made 46,025 referrals. Since January 1, 2010, a surveys to investigate customer service satisfaction has investigated four main topics: waiting time, service attitude, clarity of explanation and timely response. In 2014, 97.05% of the 6,963 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 2014, 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 and 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 53,000 fans. Besides daily epidemic information, the page offers lifestyle news such as weather reports along with epidemic prevention info, comics, and themed fan activities.

- (3) Innovative Videos: Creative videos posted on YouTube attracted more than 190,891 views in 2014.



Innovative Videos: Creative videos posted on YouTube attracted more than 190,891 views in 2014.

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 2014, Taiwan CDC sent out 39 medical correspondences and reached 8,422 regular subscribers, including 61 hospitals, school and guilds.

6. Disease Prevention Awards

To encourage people who made major contributions to disease prevention research, strategies, and efforts along with groups or individuals who were particularly, successful in conducting communicable disease control work, on October 3 Taiwan CDC held the 2014 Disease Prevention Awards Ceremony. In total, it gave disease prevention awards to 46 public and private organizations and individuals. The theme of this year's awards ceremony was "Disease Prevention Stars," highlighted the professional contributions and hard work of disease prevention workers in a diverse range of fields while recognizing the commitment of local disease prevention personnel



Awards were presented to "Disease Prevention Stars" whose hard work and outstanding contributions in a diverse range of fields contributed to disease prevention efforts. Also recognized were lower level disease prevention workers who remained committed to their posts.

7. 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.



8. 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.



The director-general of Taiwan CDC presented an award to Formosa Plastics Group in recognition of its donation of pneumococcal vaccine.

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.

CF

Health education promotional materials on HIV/AIDS, dengue, Enterovirus and Ebola control



Posters

AIDS, travelers' diseases, healthy habits, rabies and influenza vaccine promotions



Pamphlets



Signs



2014 Publications



AIDS: One for All, All for One



Laboratory Biosafety Management: A Compilation of Regulations and Administrative Guidance



Guidelines for Dengue/Chikungunya Control



Manual of Standard Operation Procedure of Communicable Diseases



Infection Control Manual for Medical Care Facilities



HIV/AIDS Prevention and Control Manual



Combat Manual for Dengue Fever/Chikungunya Fever



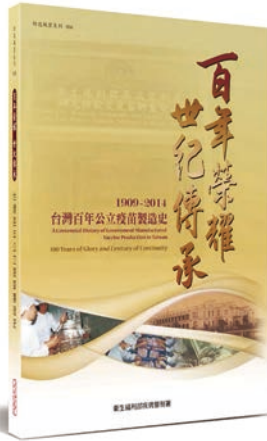
What is Tuberculosis(TB)?



Handbook of Tuberculosis Contact Investigation



Manual for Infectious Specimen Collection



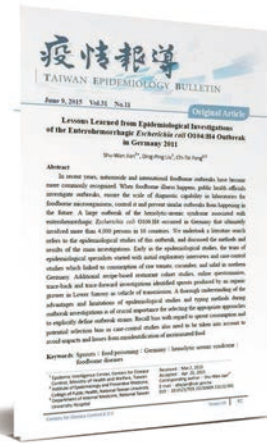
100 Years of Glory and Century of Continuity: A Centennial History of Government-manufactured Vaccine Production in Taiwan



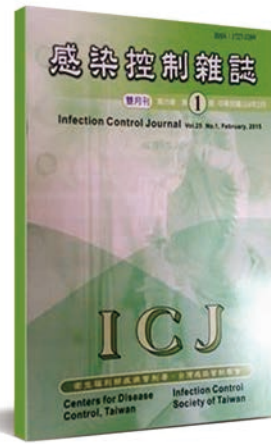
Taiwan's Response Efforts to the 2013 Rabies Outbreak



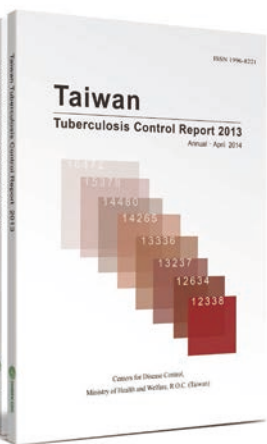
Educational Videos for PPD Testing and BCG Vaccination



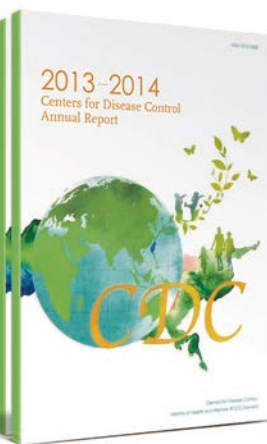
Taiwan Epidemiology Bulletin



Infection Control Journal



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2015 Annual Report

Disease prevention should be regarded as a battle.
Unity, professionalism and swift action are the keys to success.
Website: <http://www.cdc.gov.tw>
Counseling Hotline: 1922



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