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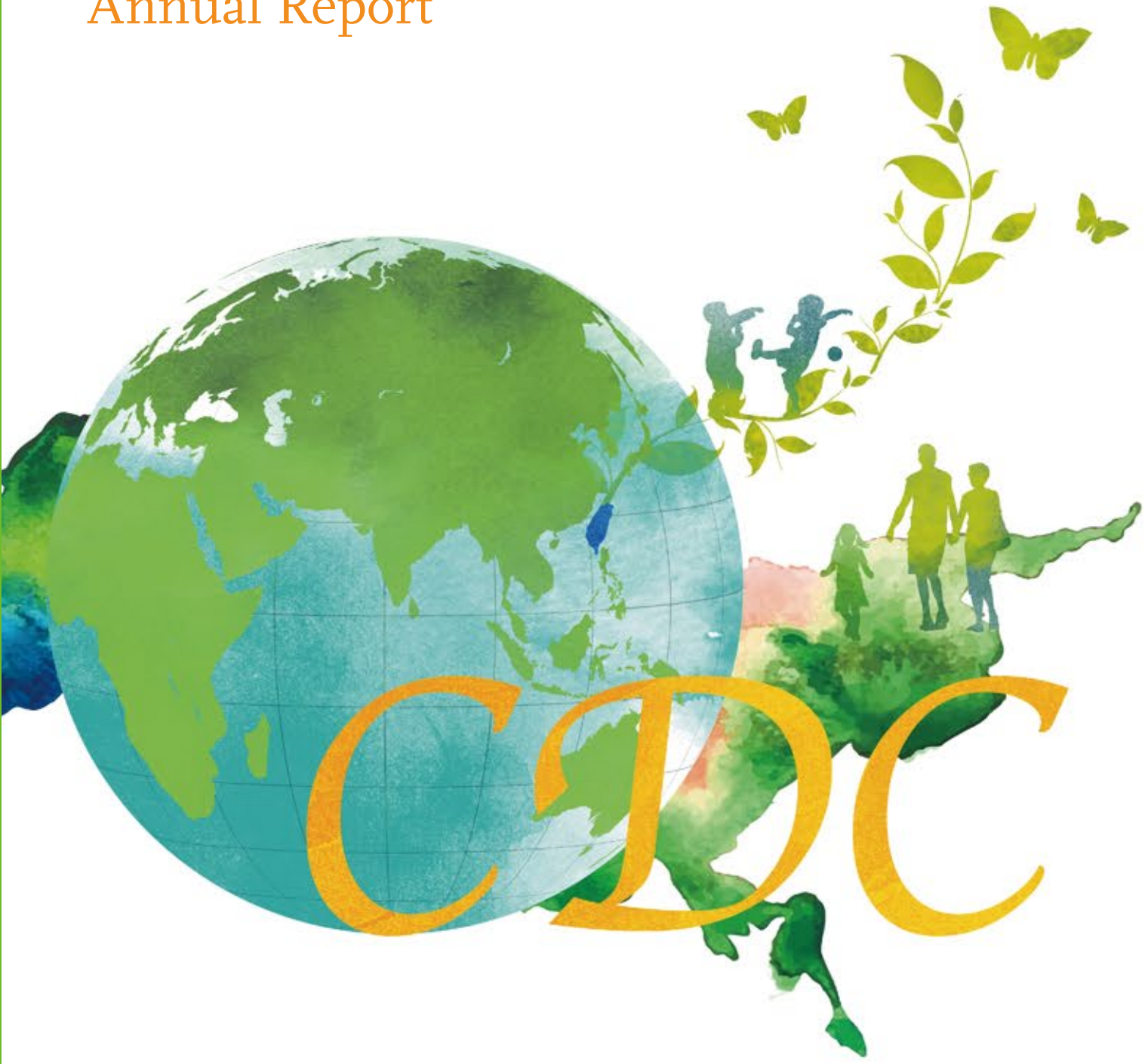
2013–2014
Centers for Disease Control Annual Report



Centers for Disease Control,
Ministry of Health and Welfare, R.O.C.(Taiwan)

2013–2014 Centers for Disease C Timeline

February 18

Taiwan CDC and the Taiwan Accreditation Foundation signed a memorandum of cooperation to promote accreditation of institutions that test for communicable diseases. This not only raised the testing quality and capabilities of such institutions but also contributed to establishment of a premium testing network.

March 8

In Kaohsiung, Taiwan CDC hosted a 2012 wor academic conference on dengue fever con health bureau representatives from across th and vector control experts were invited to at review and practical exchange of control eff shared research achievements.

June 6,7

Taiwan CDC hosted the "2013 National Communicable Disease Control Meeting" in Tainan. Over 100 public health officials joined to discuss implementation of communicable disease control.

July 5, 6

Taiwan CDC hosted the APEC Conference on t Achievement and Sustainable Development in Emergency Response Systems 10 Years After the Epidemic. Gathered were 30 delegates from 14 economies, one delegate from the United Kingd about 90 domestic experts discussed achievem post-SARS public health emergency response sy

August 30, 31

Taiwan CDC and the Bureau of Animal and Plant Health Inspection and Quarantine jointly hosted an international experts conference on rabies. It aimed to share international epidemic prevention experiences that could serve as a reference for mid-term and long-term government epidemic prevention planning.

September 8, 9

Taiwan CDC and the MOHW NTU Infectious Dise Research and Education Center co-hosted the International Conference on HIV/AIDS. The them the Tide, Stop on Me." A total of 27 international invited to speak to strengthen international coop exchange in HIV/AIDS control.

November 20

Taiwan CDC and the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China held a working group meeting to discuss inspections and quarantine under the Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs. To exchang views on port quarantine and inspection of cosmetic products.

November 26

Taiwan CDC conducted an awards ceremony achievements in infection control at long-term institutions and among biosafety quality control laboratories. It encouraged those institutions to efforts in infection control and biosafety manag

Control

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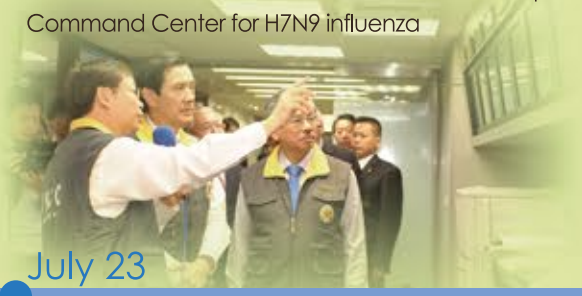
April 3

In response to the H7N9 avian influenza human influenza outbreak in China, the MOHW (then DOH) convened an experts meeting to list "H7N9 influenza" as Category V Notifiable Disease and established the Central Epidemic Command Center for H7N9 influenza



May 25

Taiwan CDC and the National Taiwan University (NTU) Infectious Diseases Research and Education Center co-hosted a conference on influenza H7N9 control. Among the 291 participants were clinical practitioners, health unit representatives and academics who discussed influenza H7N9 control strategies, monitoring, quarantine, diagnosis and treatment.

July 23

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In light of the organizational reform of the Executive Yuan, Taiwan CDC was placed under the newly formed Ministry of Health and Welfare (MOHW). It implemented necessary structural changes to ensure seamless transition according to the Organic Act of the Ministry of Health and Welfare implemented on July 23, 2013. On the same day, an unveiling ceremony was held to commemorate the occasion.

July 24

In response to animal rabies outbreak among animals, the MOHW and Council of Agriculture established a rabies prevention inter-ministerial working group to coordinate rabies management and ensure health and well being of the general public.

September 11 – 14

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Taiwan CDC and Japan National Institute of Infectious Diseases held the 10th Taiwan-Japan Bilateral Symposium The theme of the conference was "Vaccine Preventable Diseases, Vector-Borne Diseases and Collaborative Project Reports."

September 27

In order to encourage those who make significant contributions to the area of epidemic prevention and to praise the individuals or groups who make outstanding achievements in carrying out communicable disease control, Taiwan CDC held a special awards ceremony. It conveyed gratitude for each person's hard work and contributions.

November 30

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ement.

In celebration of World AIDS Day, Taiwan CDC created a giant red ribbon in front of the Presidential Office in Taipei. Taiwan CDC and 2012 Taiwan Series MVP Lin Chih-Sheng led 200 Taiwanese young baseball players to form the symbolic emblem in front of the building, raising awareness of AIDS prevention and treatment.

December 31

Taiwan CDC held a press conference to share the results of the WE-CHECK for Our Brave Companions campaign. It awarded organizations and individual WE- LEADERS for their distinguished contributions. The three-month campaign achieved remarkable gains in the number of anonymous HIV screenings, testing a total of 36,280 people for HIV, twice the number of people who participated in the campaign the previous year.

Humanity

Professionalism

Proactivity

Teamwork

Communication

2013–2014
Centers for Disease Control
Annual Report

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Ministry of Health and Welfare, R.O.C.(Taiwan)

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30 July 2014

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2013 - 2014

Annual Report

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Message from the Director-General

The Taiwan Centers for Disease Control (Taiwan CDC) is one of the major operating components of the Ministry of Health and Welfare (MOHW) and is recognized as the nation's premier communicable disease control, prevention, and preparedness agency. This report outlines how Taiwan CDC fulfilled our responsibility to protect all people in Taiwan from the threats of communicable diseases and gives an overview of our major events and achievements in 2013.

In a time of tremendous change and challenge presented by emerging and re-emerging infectious diseases, it is crucial to strengthen inter-sectoral and inter-organizational cooperation to combat infectious diseases. A clear example of such concerted cooperation is the fact when we successfully curb the first animal rabies outbreak in Taiwan in July 2013 since the official declaration of rabies free status in Taiwan in 1959. When the animal rabies outbreak occurred, we immediately activated the Central Epidemic Command Center (CECC) for rabies to coordinate cross-ministry efforts. All government sectors and local governments worked diligently together with the cooperation of the public to promptly address the challenges posed by cross-species infections and implement relevant control measures. In addition, several international experts assisted us in investigating the outbreak and evaluating related control measures. As a result, the animal rabies outbreak has been brought under control and we believe that with our continuous efforts, Taiwan can be listed as a rabies free country again soon.

As a member of the international community, we seek opportunities to strengthen cooperation with other countries as well as other international organizations. Since 2013

marks the 10-year anniversary of the SARS epidemic, Taiwan CDC organized the "APEC Conference on the Innovation, Achievement and Sustainable Development in Public Health Emergency Response System 10 Years after the SARS Epidemic" during July 5-6, 2013 to gather international experts to exchange information and share experiences of respective member economy's public health preparedness system. The conference has successfully improved all APEC member economies' capacity building for the surveillance, preparedness and response of emerging infectious diseases.

Meanwhile, we actively managed to deal with many other challenges posed by infectious diseases such as tuberculosis, influenza, dengue fever, and enterovirus infection. When H7N9 influenza emerged in China in March 2013, Taiwan CDC implemented the preparedness and response plan for influenza pandemics and activated the CECC for H7N9 influenza to closely monitor the situation. We stuck with the framework of the "Strategic Pandemic Influenza Preparedness Plan", which includes 4 major strategies and 5 lines of defense, to gather timely epidemic intelligence and prevent importation of the disease and further transmission in the community through the use of antivirals and isolation of patients. Concerns about the spread of H7N9 influenza, a permanent ban on slaughtering live poultry at traditional markets was imposed from May 17, 2013. All poultry vendors and the public were encouraged to support and cooperate with the government. Those measures effectively minimized the spread of H7N9 and reduced the socio-economic impact of the disease.

Over the last year, Taiwan CDC has been through a lot and has continued to received criticism and advice from all sectors. We believe both will inspire us to change, to grow, and to become better public health workers. Looking ahead, there are a number of challenges to face. We must remain vigilant and continue to strengthen and improve our capacity building for infectious diseases in order to ensure the health and wellbeing of all people.

This annual report is dedicated to our partners and those who are in the battle against infectious epidemics with us. I sincerely hope you will find this report to be informative and helpful.

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

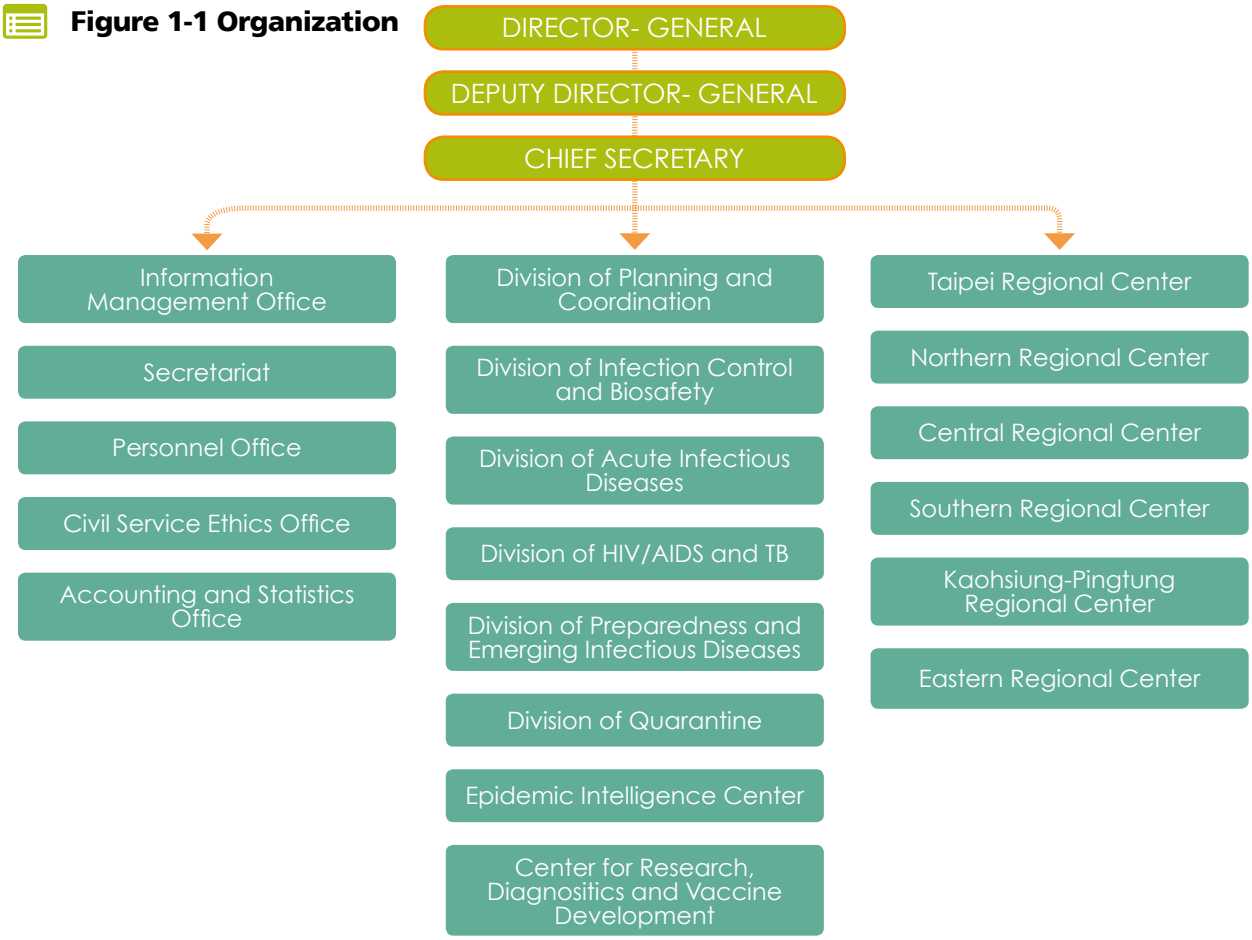


Figure 1-2 Regional Center Jurisdictions

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
7%	25%	37%	26%	5%

Table 1-2 Education Level of Taiwan CDC Employees

Graduate School	University	College	High School or Under
43%	30%	15%	12%

Distribution of Employees by Gender, Age, and Education: At the end of December 2013, there were 811 Taiwan CDC employees (those employed by Taiwan CDC but not including mechanics, laborers, or drivers), with a male to female ratio of 1:4. Average age was 43.9 with 69% under 49 years old. About 45% graduated from university or college while 43% 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.

2013 Focus - Rabies Prevention

2013 Focus - Rabies Prevention

Background

Figure 2-1: Domestic discovery of animals infected with rabies led the Executive Yuan to launch the Central Epidemic Command Center. It gathered information from related departments and implemented rabies prevention tasks.

Since 1900, and during the Japanese colonial period, there were 11 events of human rabies recorded spread across both northern and southern Taiwan. After Japanese rule ended, in 1947 an imported case of rabies from Shanghai caused an epidemic, which peaked in 1951 and 1952, when there were 238 and 102 human cases, respectively. Subsequently, animal reservoirs were controlled through a combination of canine vaccines, the culling of stray dogs, and related immunization and prevention. Starting in 1959, Taiwan underwent a long period of zero native cases of human rabies and three imported cases: one each in 2002 and 2012 from Mainland China and one in 2013 from the Philippines. For more than half a century between 1961 and 2012, monitoring of cats, dogs, and other animals did not uncover any cases of rabies, making Taiwan one of the few rabies-free countries in the world.

Current Status

In 2011, the Council of Agriculture began to commission monitoring of wild animals, and it expanded that monitoring in 2013 included rabies. In June of the same year, a suspected case of rabies in a ferret badger was detected and later was confirmed by the council's Animal Health Research Institute. On July 16, Taiwan announced discovery of the infected animal, and the following day reported the incident to the World Organization for Animal Health (OIE). As the council designated jurisdictions where rabies was detected and other mountainous townships as primary and secondary risk regions, respectively, the OIE designated Taiwan as a rabies-infected area starting from May 23, 2012, when the first dead rabid ferret badger was found.

Goal and Strategies

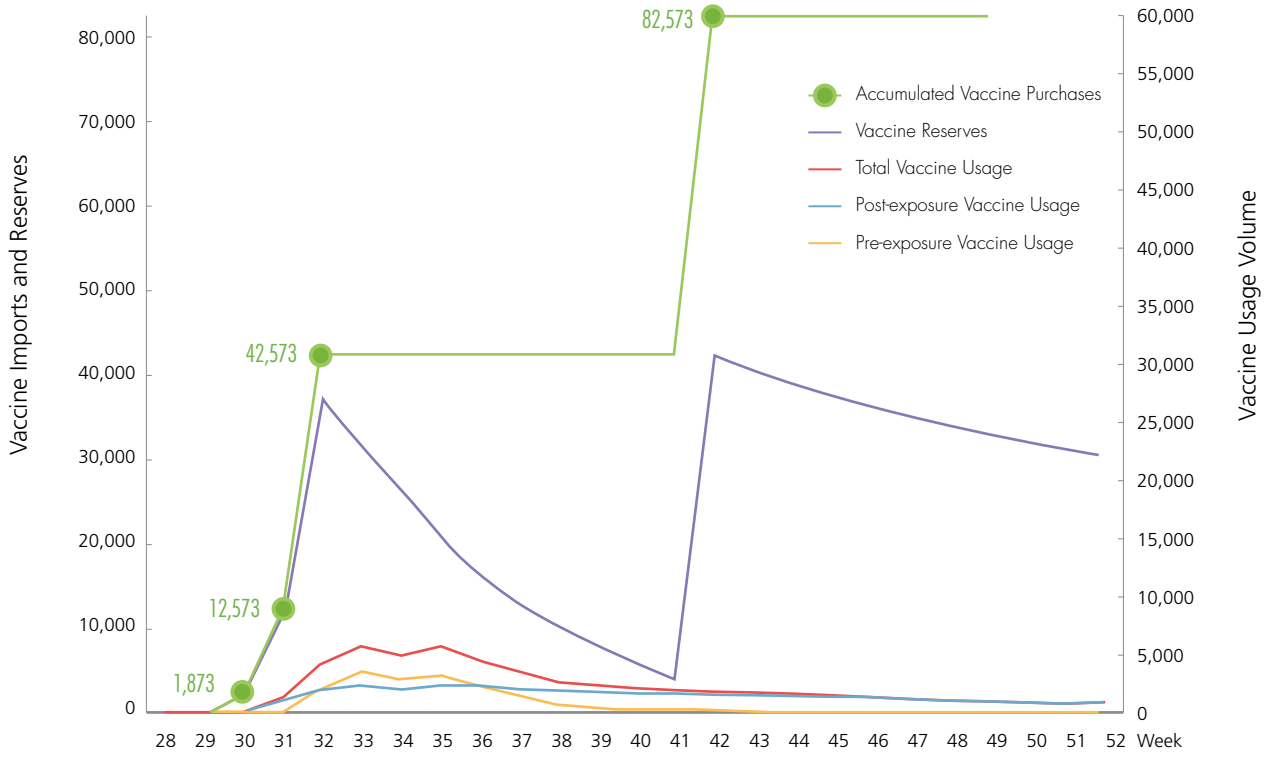
Discovery of the rabid ferret badger led the Executive Yuan to launch the Central Epidemic Command Center, in accordance with the Communicable Disease Control Act. Benefits were manifold: understanding of epidemic development, prevention of the continued spread of rabies among animals, and prevention of rabies incidence in humans. The deputy premier headed the command center to strengthen cross-departmental communication and accelerate prevention tasks. Meanwhile, the Ministry of Health and Welfare, the Council of Agriculture, and related agencies cooperated to minimize spread of the epidemic

and the risk of transfer to humans by vaccinating pet dogs and cats, vaccinating humans at high risk of rabies exposure, and providing necessary medical treatment to people scratched or bitten by animals. Highlights of epidemic prevention measures by the Ministry of Health and Welfare and related agencies included the following:

1. In the early stages of the rabies epidemic, Taiwan CDC convened the Advisory Committee on Immunization Practices and another committee on infection control. Using Council of Agriculture animal monitoring data, the committees established recommendations for the provision of human rabies vaccine and immunoglobulin. Reserves of post-exposure vaccine and immunoglobulin were prioritized for people scratched or bitten by high-risk animals in order to prevent the onset of human rabies; at the same time authorities launched a special initiative to import stockpiles of pre- and post-exposure rabies vaccine in order to ensure sufficient supply.

2. Announcement of clinical guidelines for bites and scratches by animals suspected of carrying the rabies virus. Authorities worked closely with medical associations to conduct education and training courses for medical professionals to strengthen the ability of doctors to handle related cases. Nationwide, the number of hospitals that stockpile rabies vaccines was increased to 60, and fully subsidized post-exposure vaccines and immunoglobulin were provided to qualifying patients. Between July and December 2013, about 6,500 patients scratched or bitten by animals received a vaccination and related treatment, reducing the risk of rabies incidence in humans.

Figure 2-2 Status and projections of human rabies vaccine usage (December 20, 2013)



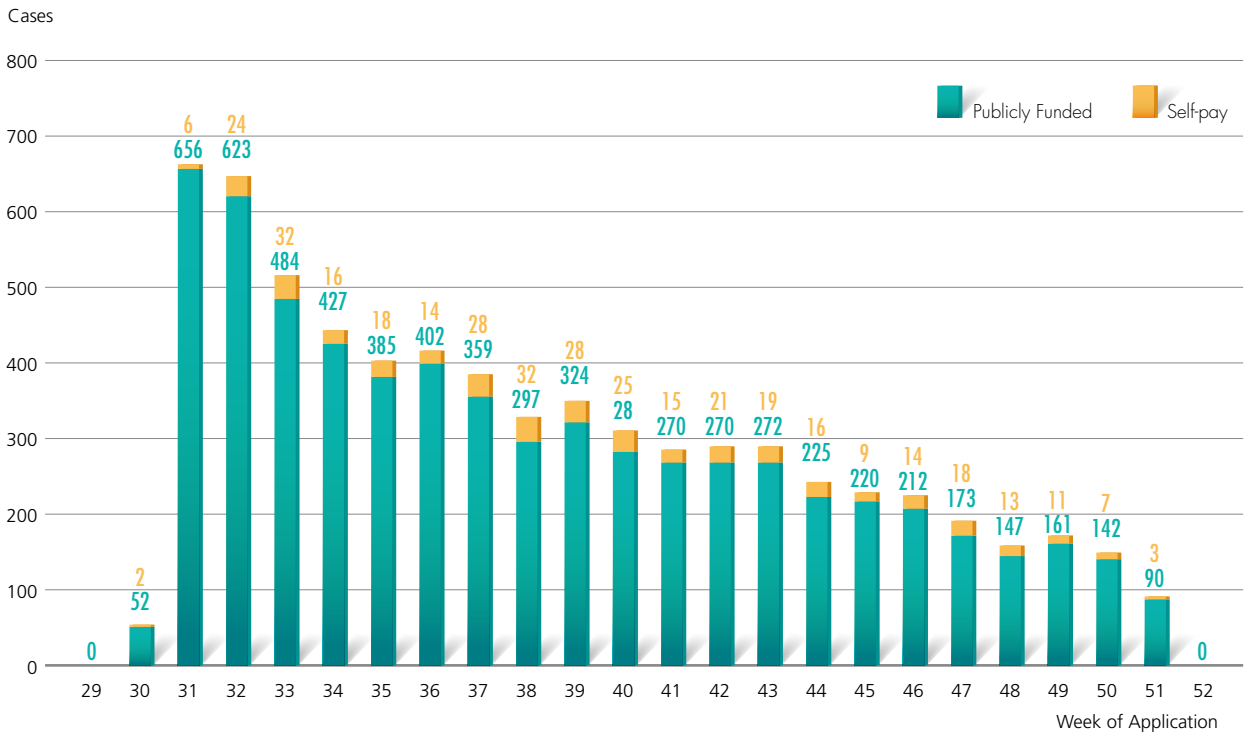
3. In order to ensure safety of workers carrying out public duties, recommended pre-exposure rabies vaccine for front-line animal epidemic prevention workers, staff in rabies laboratories, as well as workers who could come into contact with infected animals, including firefighters, sanitation workers, and mountain patrol officers. From July to December 2013, approximately 4,000 high-risk workers received pre-exposure rabies vaccination.

4. Held an international rabies conference toward the end of August 2013 attended by experts from the United States, France, the Philippines, and Mainland China. Topics included: the role of wild animals around the world; challenges associated with prevention of the rabies epidemic; clinical determinants in diagnosis of rabies viral encephalitis; disease pathogenesis; response and challenges for rabies in Taiwan; protecting the health of Taiwanese citizens in the face of the rabies outbreak; analysis and planning of oral vaccines for wild animals; cats, dogs, and wild animals rabies survey; pre- and post-exposure immunity risk analysis and strategies. The conference was a valuable policymaking reference for officials from the Ministry of Health and Welfare and the Council of Agriculture.

5. In order to provide updated epidemic information and accurate prevention knowledge to the general public, the Ministry of Health and Welfare and the Council of Agriculture formed a joint health promotion task force. By targeting different groups through diverse communication channels, the agencies communicated risk, prevented fear, and strengthened health concepts. Taiwan CDC also established a public rabies section on its website and established the 1922 hotline to provide 24-hour epidemic reporting and consultation services.

Figure 2-3: In 2013, while the Central Epidemic Command Center for rabies was still in session, Taiwan CDC held the International Expert Meeting – Challenges and Opportunities in the Prevention and Control of Rabies. Epidemic prevention experiences gained during the meeting served as a reference for mid-to-long-term government epidemic prevention planning.

Figure 2-4 A week-by-week account of rabies vaccination applications among patients scratched or bitten by animals (July 21 – December 21, 2013)



6. In order to ensure human rabies vaccine and immunoglobulin for patients scratched or bitten by animals that pose a rabies risk, since January 2014 the National Health Insurance Administration has covered these agents under the National Health Insurance system. To meet emergency protection needs, Taiwan CDC has continued to maintain a safe supply of the agents.

Accomplishments

Rather than expanding, the rabies epidemic is currently confined to wild animals in central, southern, and eastern mountainous regions. Ferret badgers remain the primary host, and the disease has not spread to dogs, cats, or people, showing the effectiveness of epidemic prevention.

Future Prospects

Prevention of rabies has progressed from short-term emergency response to mid-to-long-term prevention. Normal epidemic prevention measures resumed in January 2014 with the closure of the Central Epidemic Command Center for rabies. In the future, the Ministry of Health and Welfare and related agencies will continue to act in accordance with animal monitoring data gathered by the Council of Agriculture. When appropriate, it will modify rabies control strategies for animals and humans with the ultimate goal of returning Taiwan to rabies-free status.

Domestic Epidemic Prevention and Control

Current Immunization & Vaccine Injury Compensation Programs

National Immunization Program

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; varicella; measles, mumps, rubella (MMR); Japanese encephalitis; tetanus; diphtheria toxoids; acellular pertussis and inactivated polio vaccine (Tdap-IPV); and influenza. The current immunization schedule is shown in table 3-1. Parents of newborns are given a children's health handbook with a recommended immunization schedule. Children can receive vaccinations at 373 health stations and more than 1,600 contracted hospitals and clinics across Taiwan.

Health stations regularly carry out health promotion programs for improving the 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 above 95% (see Figure 3-1).

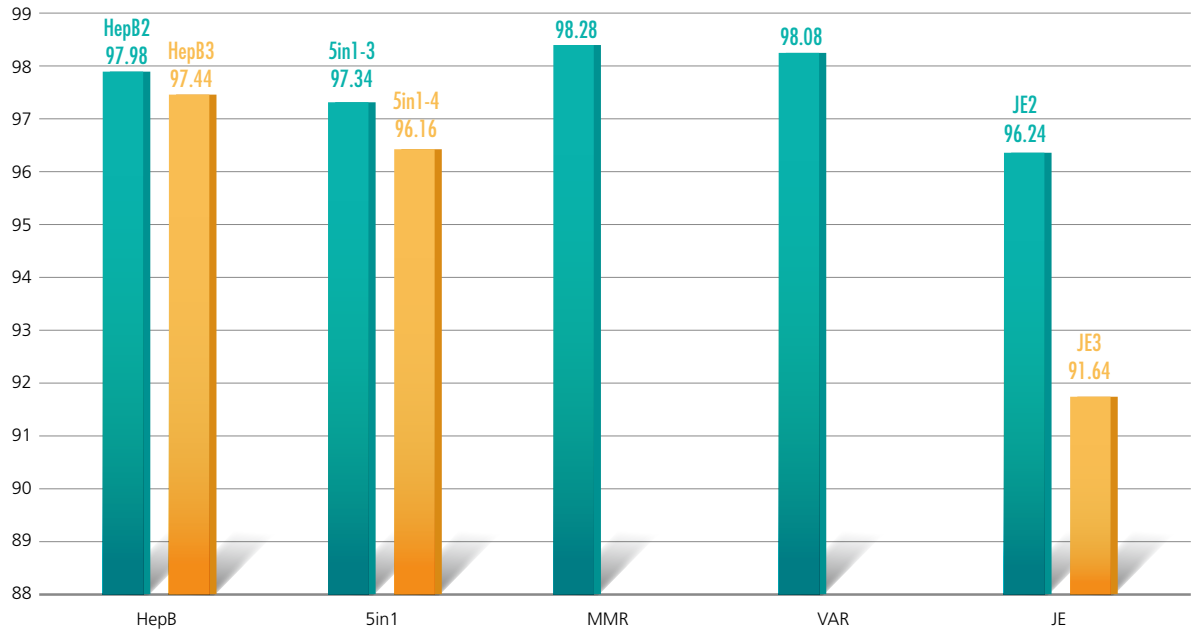
Table 3-1 Current Immunization Schedule in Taiwan

	<24hr	≧ 24hr	1 month	2 months	4 months	6 months	12 months	15 months	18 months	24 months	27 months	30 months	36 months	5 years	≧ 65 years
BCG		BCG													
Hepatitis B	HepB1		HepB2			HepB3									
Diphtheria Tetanus. Pertussis, Hib,Polio				DTaP-Hib-IPV1	DTaP-Hib-IPV2	DTaP-Hib-IPV3			DTaP-Hib-IPV4					Tdap-IPV	
Varicella							Var								
Measles, Mumps, Rubella.							MMR1							MMR2	
Japanese Encephalitis**								JE1, JE2			JE3			JE4	
Influenza						Influenza (yearly)									Influenza (yearly)
Hepatitis A#							HepA1		HepA2						

** Two-week interval between dose1 to dose2

In selected aboriginal areas

Figure 3-1 National Immunization Coverage



Source: Values were calculated in December 2013 by compiling past immunization data from the National Immunization Information System

Footnote:
- Hep B: Hepatitis B vaccine
- 5 in 1: DTaP-Hib-IPV
- MMR: Measles, mumps and rubella combination vaccine
- VAR: Varicella vaccine
- JE: Japanese encephalitis vaccine

Accomplishments

1. A vaccine fund was launched in 2010 based on Article 27 of the Communicable Disease Control Act.
2. The 5-in-1 vaccine was launched to replace the traditional DTwP vaccine in March 2010 for reducing adverse reactions such as fever and redness or swelling where the shot is administered.
3. In 2011, Tdap-IPV was given to new primary school enrollees instead of 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 expanded pneumococcal conjugate vaccine (PCV) vaccination targets to include more high-risk groups, such as children under 5 who live in mountainous areas or offshore islands or are from low-to-medium 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.

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. Planned vaccine policies include:

1. Introduce PCV into routine immunization schedule in 2015.
2. Provide pneumococcal vaccine for seniors 65 years of age or older.
3. Introduce cell-based JE vaccine to replaced 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 information storage and retrieval. Household data obtained from the Department of Civil Affairs, Ministry of the Interior are updated daily and transmitted to NIIS. Authorities then remind parents via text and e-mail of their children's immunization schedule, thereby improving coverage rates.

Accomplishments

1. Enhancing the functions and efficiency of the central database to handle yearly increases in data quantity and improve management efficiency.
2. Use of different methods 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 those who did not receive the MMR vaccine. Local health agencies then arrange vaccination. In 2013, a total of 13,901 such children were found, of which 8,888 were later vaccinated.

Future Prospects

1. Promote the use of vaccination records contained in National Health Insurance IC cards; report immunization information at contracted 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 NIIS immunization reminders to improve the coverage rate.

Vaccine Injury Compensation Program (VICP)

VICP claim evaluation committee meeting

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 compensation from their local health bureau in the event of death, disabilities, serious illnesses, or adverse reaction resulting from vaccination. Review of claims by the Vaccine Injury Compensation Working Group ensures validity and eliminates vaccination worries, thereby raising the coverage rate.

For effective use of vaccine injury compensation resources and to strengthen protection of compensation rights and guarantees, amendments were made to the Regulations Governing Collection and Review of Relief Fund for Victims of Immunization. Highlights are 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 testing and treatment needs. 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.
2. In order to ensure effective use of resources, added conditions for not providing compensation in cases of compensation for vaccine injury.

Claim processing time varies according to complexity. In 2013, 98 cases were settled with an average processing time of 155 days from the date of acceptance. As of the end of 2013, a total of 1,343 claims had been reviewed since program inception, and compensation disbursement had reached NT$90.11 million.

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. Does not include conversion disorder or other conditions attributed to mental causes.	4- Severe	Related	50~600
			Cannot Be Ruled Out	30~350
		3- Serious	Related	30~500
			Cannot Be Ruled Out	20~300
		2- Moderate	Related	20~400
			Cannot Be Ruled Out	10~250
		1-Light	Related	10~250
			Cannot Be Ruled Out	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	2~300
			Cannot Be Ruled Out	2~120
Other Negative Responses	Other negative responses that do not meet standards for severe illness. However, mild, frequent, or anticipated negative 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 Autopsy or Testing	Pregnancy of at least 20 weeks		-	10
	Pregnancy of fewer than 20 weeks		-	5

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

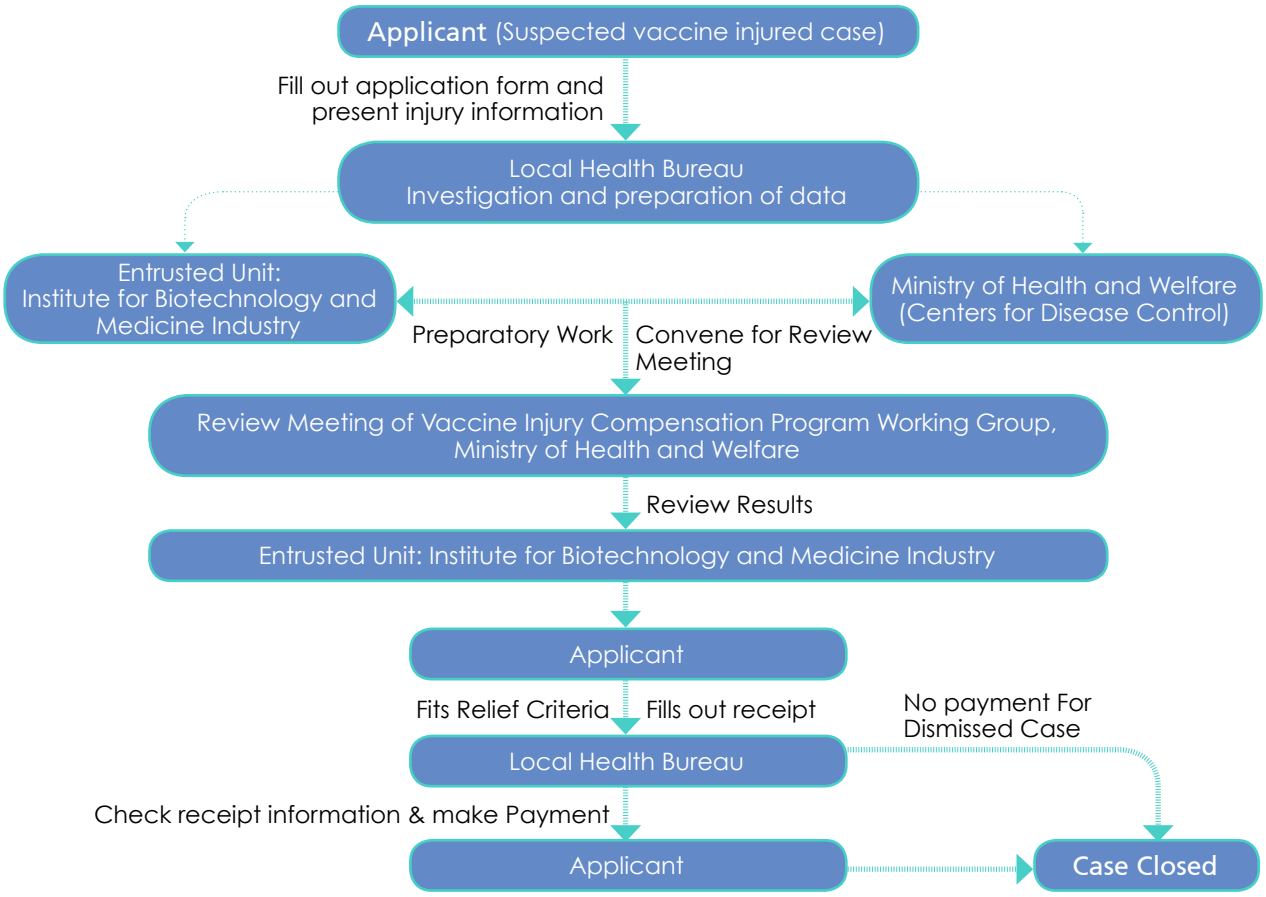
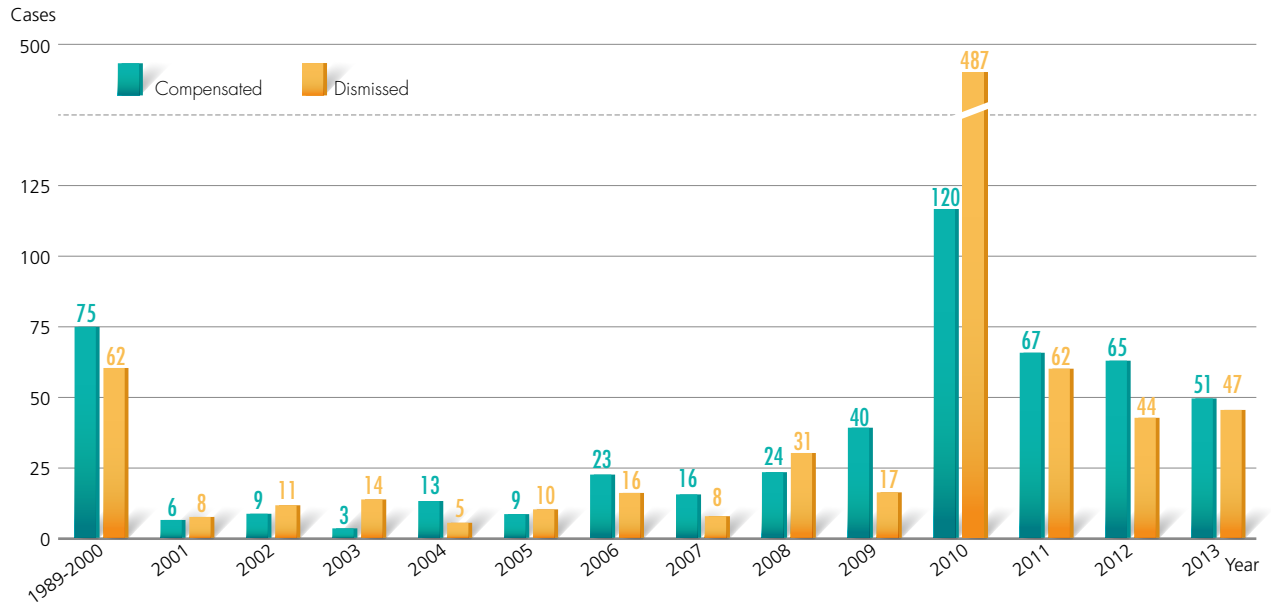


Figure 3-3 Total Number of Cases Settled Per Year from Program Inception in 1989 to 2013



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 2013, there were eight confirmed measles cases, six of which were imported cases and two of which were imported-virus cases. The incidence rate for indigenous 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 2013, there were seven confirmed cases in Taiwan, six of which were imported.

Accomplishments

1. In 2013, 32 AFP (acute flaccid paralysis) cases under the age of 15 were reported and investigated. The investigation completion rate within 48 hours was up to 97%. 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 1 in 2013 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to 0.5 in 2013.

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 2012 were 98.0% and 97.4%, respectively.
3. Hepatitis B vaccination rates were 98.2% for the second dose and 97.7% for the third dose among first-graders in 2013.

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 began offering free hepatitis B screenings for these children at age 1. It will continue to raise screening coverage and study effectiveness of the vaccination.

Communicable Disease Surveillance System

Current Status

Following reorganization of Taiwan CDC in July 1999, responsibility for infectious disease surveillance was handed to the National Communicable Disease Surveillance and Response Systems. The systems began with surveillance of notifiable diseases plus sentinel surveillance to detect epidemics, and later were expanded to facilitate collection of timely, complete and precise information on infectious diseases. Taiwan CDC envisions these systems monitoring national health status and rapidly detecting outbreaks by integrating various infectious disease surveillance networks.

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 – 2013.

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
	H5N1 Influenza	
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	Brucellosis
	Creutzfeldt-Jakob Disease	
V	Rift Valley Fever	Marburg Fever
	Yellow Fever	Ebola Fever
	Lassa Fever	H7N9 Influenza
	Middle East Respiratory Syndrome Coronavirus Infections	

School-Based Surveillance System

Taiwan CDC implemented the School-Based Surveillance System in 2001. As of 2013, 674 elementary schools (25.7% of the country's total) enrolling students from kindergarten to grade 6 in 98.1% of cities and towns had joined. Taiwan CDC collects information on medical issues such as ILI, HFMD, herpangina, diarrhea, fevers and acute hemorrhagic conjunctivitis (AHC) on a weekly basis. It then analyzes trends at the school and regional levels in order compile regular reports issued to participating schools as well as educational and public health authorities.

The School-Based Surveillance System enables Taiwan CDC to understand epidemic trends and predict possible outbreaks. Through early surveillance of communicable diseases and epidemics, appropriate epidemic prevention measures can be adopted to prevent the spread of communicable diseases on campus.

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 suspected H5N1 influenza cases, influenza-like illness clusters, fevers of unknown etiology, diarrhea, coughing persisting for more than three weeks, upper respiratory tract infections, 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, scarlet fever was added to the disease watch list.

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 Management and Analysis

1. Taiwan CDC used the Geographical Information System (GIS) in conjunction with the Notifiable Diseases Surveillance System and Syndrome Surveillance System to analyze epidemic data and develop a disease prediction model for estimating the distribution of predicted 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 surveillance more effective, Taiwan CDC established several web pages for users to upload information.

Systems Integration

To enhance presentation and application, Taiwan CDC combined information and analysis and improved 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 and the Influenza

Express, which are available online. Daily reports on international epidemics are forwarded to related authorities, while regular collaboration with academics assists with evaluation and new systems/methods development. Key tasks include collection, evaluation and dissemination of information to the public, local health departments and governing authorities.

Training and Education

Taiwan CDC offers training to system users so they remain informed of new epidemic surveillance 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 and mobile population. A high level of development has caused distant personal relationships, and an abundance of medical resources can sometimes make it difficult for patients to choose the best treatment option. These factors make detection and management of TB more difficult compared to rural societies. Recently, TB has begun to rise globally, and local control is complicated by factors such as foreign labor, international travel and HIV-related complications. To protect the health of the general public, Taiwan needs to use more active and aggressive methods when faced with new challenges in TB control.

Current Status

1. Incidence

There were 16,472 and 11,528 TB cases in 2005 and 2013, respectively. The incidence rate went from 72.5 to 49.4 persons per 100,000 over this time period, and there was a 7% drop between 2013 and 2012. The gradual decline is attributed to active control measures, such as directly observed treatment (DOTS) (Table 3-4).

Table 3-4 Taiwan TB Incidence and Mortality Rate, 2005 – 2013

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	11528	49.4	-	-

2. Mortality Rate

TB claimed 626 lives in Taiwan in 2012, for a mortality rate of 2.7 per 100,000 population. It was the cause of 0.42% of total deaths. From 2005 – 2012, the mortality rate dropped by 37%.

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 smear positive TB cases was about 70 % in 2011. It has not increased significantly due to population aging (ratio of people 65 years and older was 9.7% in 2005 and 10.8 % in 2011)

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 164 (89%) cases were managed in the MDR-TB system through the end of December 2013, leading to a steady decrease in the number of MDR-TB cases and a favorable outcome that about 78% of patients 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 2013 up to 5,410 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.

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.

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 with other countries.

(2) External review of the "Halving TB in 10 Years Program in Taiwan, 2006 – 2015": Taiwan CDC invited six international experts to evaluate the Taiwan TB control program from February 24 – March 4, 2013.

Future Prospects

Achieve annual reduction of new TB cases and lower the incidence rate to 36 per 100,000 population by 2015.

HIV/AIDS

Current Status

The first case of HIV in Taiwan was reported in 1984. By 2013, accumulated HIV cases reached 26,475 (11,176 of whom developed full-blown AIDS with 4,171 deaths). The number of HIV infections surged in 2005 due to a major increase in infections among injecting drug users (IDU). Faced with this serious situation, Taiwan CDC worked with other departments to dedicate a tremendous amount of effort and resources to harm reduction programs. Total reported cases dropped in 2006, which was the first trend reversal since 1984. In 2008, the epidemic took a turn, with new infections mainly occurring among men who have sex with men (MSM), making the most pressing course of action reinforcement of health education and intervention for the MSM group.

In terms of age, the largest number of infections diagnosed in 2013 was in the 25 to 34 age group, accounting for 1,059, or 47.2%, of all cases, followed by the 15 to 24 age group, numbering 587, or 26.2%, of all cases. An analysis of risk factors showed that in 2013, the highest proportion of HIV infections was a result of unsafe sexual contact, with MSM accounting for 79.7% of all cases. The second largest proportion of infections was heterosexual contact, accounting for 12.4% (see Figure 3-4). The three major transmission modes for infection are MSM, IDU, and heterosexual intercourse. Of Taiwanese nationals infected by HIV in 2013, 2,191, or 97.7%, were males and 52, or 2.3%, were females, for a sex ratio of 42:1.

Figure 3-4 Statistics on Risk Factors of HIV Infections in Taiwan, 1984-2013

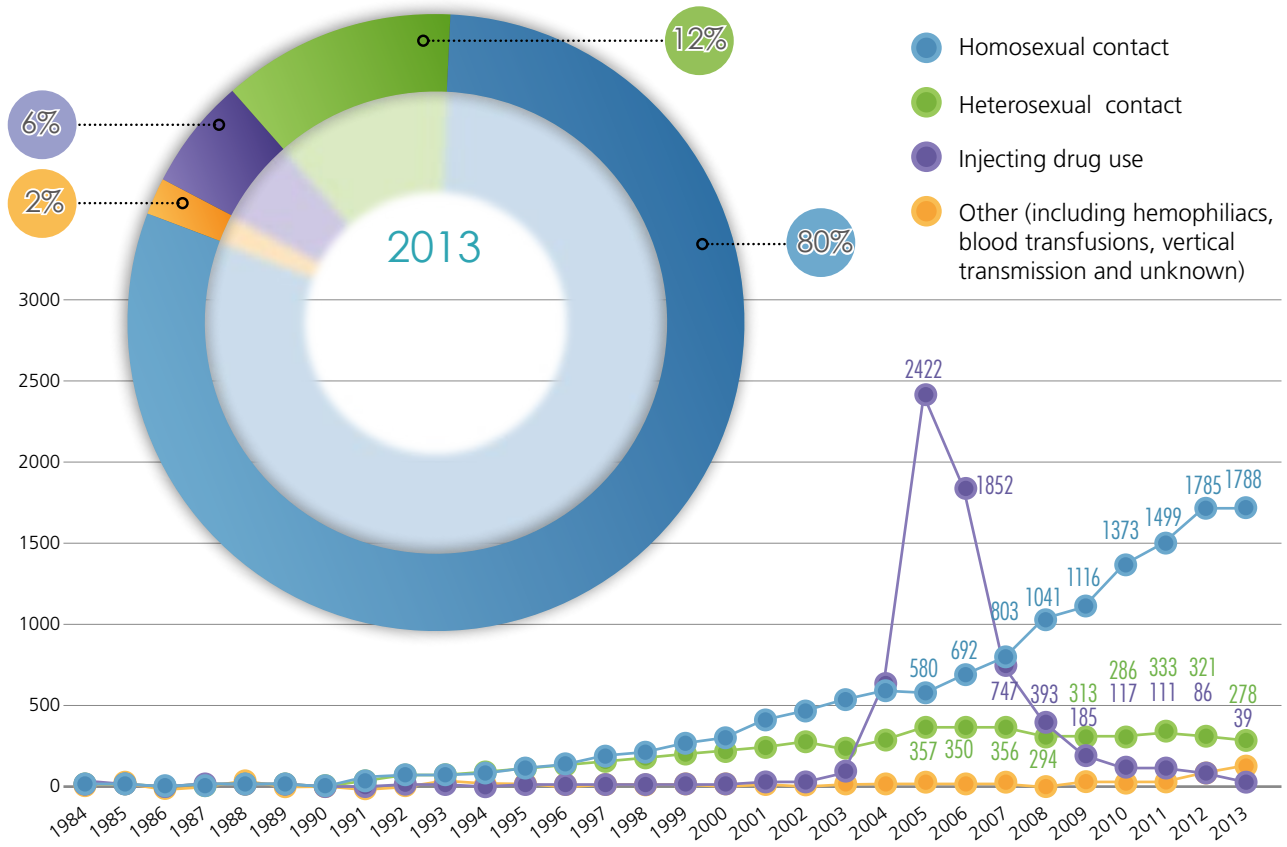
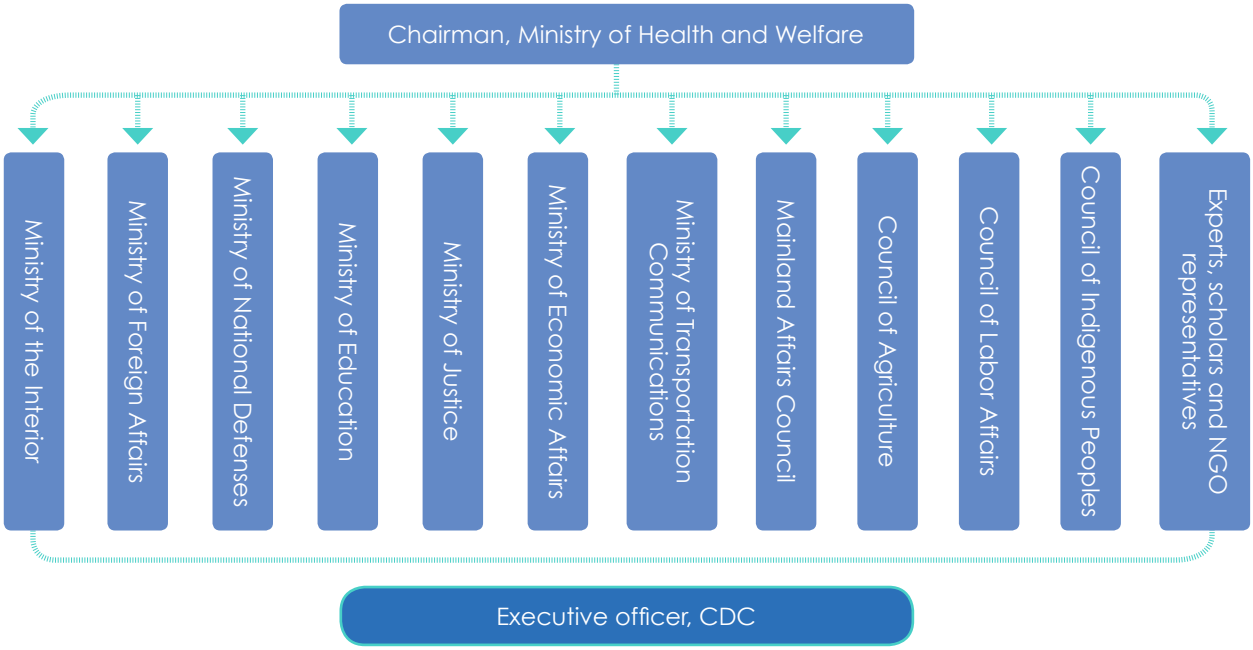


Figure 3-5 Committee for HIV Infection Control and Patient Rights Protection, Ministry of Health and Welfare, Executive Yuan



Accomplishments

1. The Committee for HIV Infection Control and Patient Rights Protection (see Figure 3-5) held two cross-ministerial meetings in 2013.

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 also amended and announced.

3. In order to urge everyone to take action to prevent HIV/AIDS, on August 13, 2013, Taiwan CDC joined six regional centers of Taiwan CDC, 22 local governments, educational organizations, NGOs and related organizations in urging the general public to integrate HIV/AIDS education into family, social and school settings.

4. The harm reduction program has made significant progress.

   The reported number of HIV infections dropped in 2006, and toward the end of 2010 Taiwan saw an effective reduction in the number of HIV infections, with the largest decline among IDU. In addition, the percentage of newly reported cases attributed to IDU fell from a high of 72% in 2005 to only 1.7% in 2013.

5. Taiwan CDC promotes a diversified prevention project for homosexuals to confront the epidemic among MSM.

   The project includes: (1) Establishment of the MSM Community Health Center for providing friendly and diversified services. (2) Implementation of health education and intervention services, such as internet opinion leaders and internet monitors. (3) Providing voluntary HIV counseling and testing services at saunas and pubs in cooperation with NGOs. (4)

Implementation of friendly, healthy, and safe labels for MSM saunas and installation of automatic condom vending machines in venues generally frequented by the gay population. (5) Establishment of a free health information hotline for MSM to provide immediate and accurate health information and counseling on HIV-related matters.

6. To enhance disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, prison inmates in 1990, and foreign laborers in 1991. Ten hospitals have provided anonymous HIV blood-screening services since 1997. To increase accessibility of HIV screening services, 42 hospitals that provided anonymous HIV testing in 2013 screened 32,770 people, with 773 found to be HIV positive, accounting for 2.4% of the total. Furthermore, to cope with the increase in female HIV patients and mother-to-child transmission, an HIV screening plan was established for pregnant women. Thus far, it has detected 88 positive cases (21 of whom were foreign nationals). Between 2009 and 2013, there was no child born with HIV in Taiwan, marking five consecutive years of zero mother-to-child transmissions.

7. The Taiwan government has provided HIV/AIDS patients with free medical treatment since 1988 and free highly active antiretroviral therapies (HAART) since 1997. At the end of 2013, 52 designated hospitals provided treatment to HIV/AIDS patients. The rate of receiving medical care of HIV infection has achieved to 89%. Nations around the world encourage HIV patients to return to their homes and communities. If HIV patients follow their medication schedule, their immune systems can be maintained and they can avoid coming down with AIDS. They will be able to lead a nearly normal life. The government subsidizes private institutions to take care of HIV patients who are rejected by their families. These institutions, which include the Garden of Mercy Foundation, the Harmony Home Association, and the Lourdes Association, provide care and compassion to HIV patients.

8. Taiwan CDC introduced the three-months "We-Check" campaign to promote screening via social networks. In three months, out of 36,280 people who participated in We-Check, 364 tested newly positive for HIV and 241 were successfully referred for medical treatment after consultation.

   The campaign included: (1) Establishment of 173 We-Check Recruitment Centers and 424 We-Check Consulting and Inspection Centers through which 337 young people were recruited as new We-Leaders. (2) Inviting partners of those living with HIV to become "We-Mates" and visit counseling and inspection centers for services with their significant other to decide – together or separately – whether to get tested anonymously.

Taiwan CDC cooperates with hospitals, local public health centers and NGOs to set up recruitment offices and We-Check Counseling and Inspection Centers. The We-Check campaign is voluntary, private and emphasizes consultation and testing. Taiwan CDC urges those who practice unsafe sex to join We-Check.

9. On September 8 and 9, 2013, Taiwan CDC hosted the 11th Taipei International Conference on HIV/AIDS. Through the theme "Turn the Tide, Stop on Me," local experts shared prevention experiences with conference participants from other countries, brainstormed innovative ideas, and formulated culture-specific approaches and strategies.

Future Prospects

According to statistics from the Bureau of National Health Insurance, medical expenses for HIV patients in 2013 totaled about NT$3.36 billion. Other AIDS-related costs for education, screenings, clinical examinations, psychological consultations, etc. also increased immensely. To mitigate the increases, since 2011 Taiwan CDC has applied multiple medical expense control plans.

At the onset of the world AIDS epidemic, the Ministry of Health and Welfare rallied medical and health experts and private institutions in an effort to prevent and control the disease. After years of hard work, it achieved remarkable results but was unable to bring the number of new cases 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.

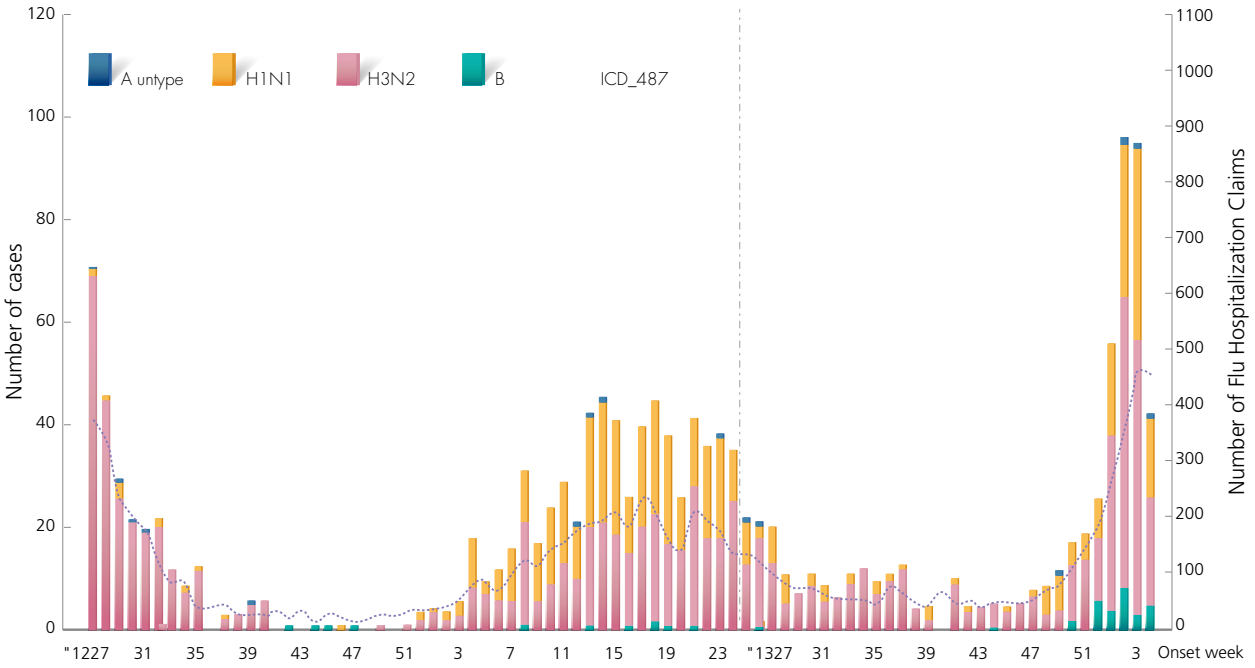
Influenza

Current Status

In the previous influenza season (2012 – 2013) there was a total of 968 confirmed cases of complicated influenza with a fatality rate of 7.13%. Influenza A (H3N2) was predominant in terms of both confirmed cases and deaths. During the current influenza season (2013 – 2014), as of December 31, 2013, there were 270 confirmed cases of complicated influenza and 21 deaths, placing fatality rate at around 7.78%. Once again, type A(H3N2) was dominant in terms of both confirmed cases and deaths (see Figure 3-6 for surveillance data of confirmed cases of complicated influenza).

Although the overall seasonal influenza epidemic in 2013 was mild compared to previous years, Taiwan CDC still closely monitored the epidemic situation, adopted the prevention measures and implemented health education to ensure public health.

Figure 3-6 Confirmed Cases of Complicated Influenza



Accomplishments

1. The annual seasonal influenza vaccination program had been lauched since October 1, 2013, covering seven groups of people: Elders aged more than 65 years; pre-school children aged six months through six years and elementary school students; people with catastrophic illness; residents and staff in nursing homes and other long-term care facilities; healthcare workers and public health personnel; poultry and livestock farmers and animal health inspectors; and people aged 60 to 64 years who had underlying

medical conditions. In January 2014, Taiwan CDC expanded the program to include people aged 50 to 59 years who had underlying medical conditions. As with elders aged more than 65, the program continued a 2012 policy of not charging diagnostic fee for preschool children receiving government-funded influenza vaccines.

2. The government stockpiled antiviral drugs, which covered 10-15% of the total population. To control seasonal influenza and prevent outbreaks of H7N9 influenza, starting from December 1, 2012, Taiwan CDC not only expanded target population of the government-funded antiviral drugs, but also increased the number of locations offering the drugs to more than 3,100.

3. Conducted health education and promotion through a variety of channels.

4. Utilized a diverse surveillance system in order to remain updated on the epidemic situation.

5. In 2013, experts and scholars from a range of fields attended eight sessions of the "Infectious Disease Control Advisory Committee of the Ministry of Health and Welfare" for discussion and evaluation of critical control policies.

6. Publication in October 2013 of the Practical Guidelines for Prevention and Control of Seasonal Influenza (see Figure 3-7) provided medical treatment and epidemic prevention workers with an important reference to use during control efforts.

7. Conducted an incentive program to award provision of care by hospitals during influenza epidemic peak period. The incentives were for hospitals to open influenza clinics on weekends and holidays during peak period (or in line with medical needs), and to encourage making such clinics regular practice. In 2013, 37 hospitals participated in this program and held influenza clinics on weekends and holidays from January 18 to February 9, 2014 (including the Lunar New Year holiday period). This alleviated surge and prevented cross-infection caused by influenza patients visiting emergency rooms.

Figure 3-7 Practical Guideline for Prevention and Control of Seasonal Influenza

Future Prospects

The best prevention tools for influenza remain maintainance of personal hygiene and increasing influenza-related health knowledge. Therefore, Taiwan CDC will continue to conduct related health education and promotional activities.

Other important influenza tasks include close monitoring of domestic and foreign epidemic situations and making best use of vaccine and antiviral resources.

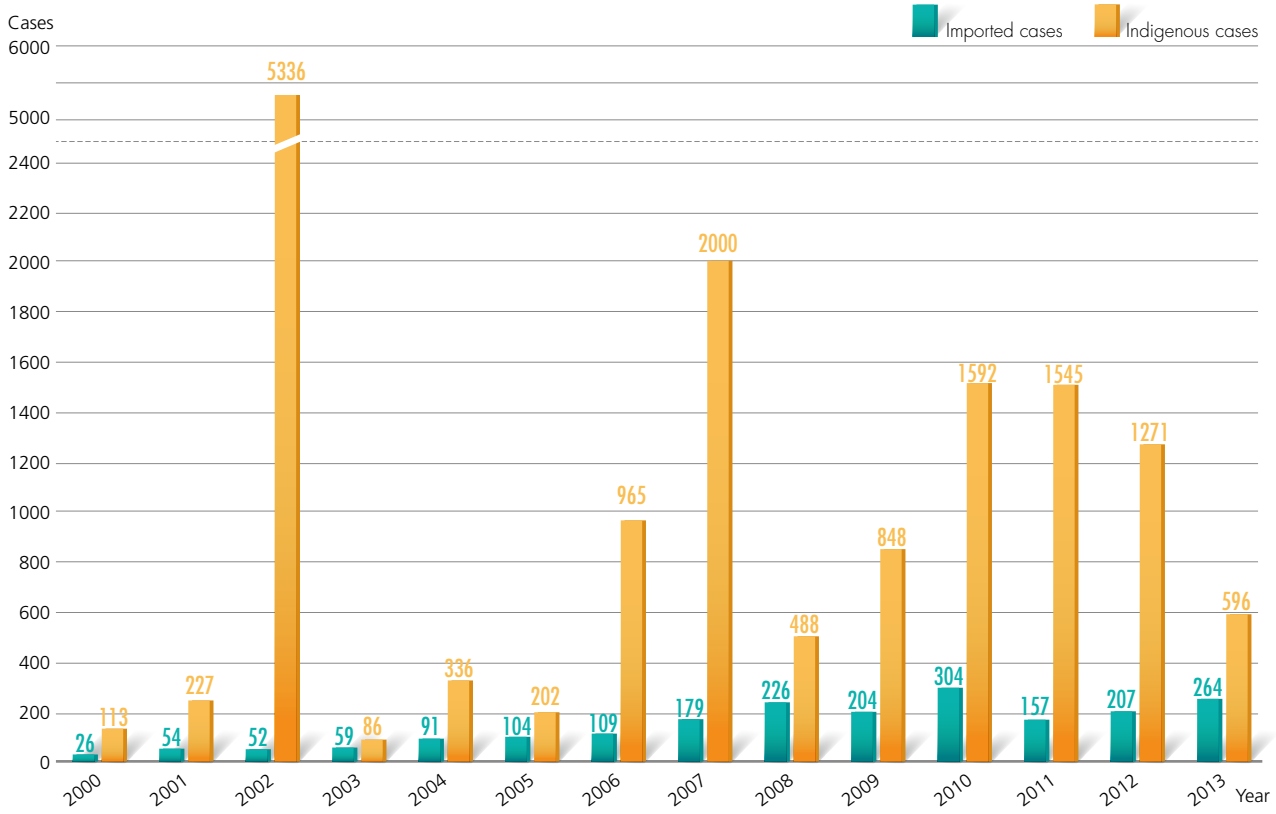
Dengue Fever

Current Status

The WHO has declared the ever-worsening threats of global warming and climate change to be new public health challenges. Climate change endangers people's health through natural disasters, such as heat waves and floods, which foster communicable diseases and raise the prevalence of dengue fever. The severity of dengue fever in Southeast Asia in recent years has led to an increase in imported cases in Taiwan, with 264 cases in 2013 (second high only to a record number of 304 cases in 2010). The situation has made it more difficult to control dengue fever locally.

In 2013, there were 596 indigenous cases of dengue fever in Taiwan, including 14 cases of dengue hemorrhagic fever (DHF). The disease was concentrated mainly in Pingtung County.

Figure 3-8 Dengue Fever Confirmed Cases, 2000 – 2013



Goals & Strategies

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

Taiwan CDC has devised a three-stage prevention strategy for controlling the dengue fever 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 various communication channels to promote dengue fever and dengue hemorrhagic fever (DHF) 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 a record of these places for future inspections.
4. Strengthening education and training for disease prevention workers and volunteers.
5. Setting up a vector surveillance mechanism to check places with a high mosquito density probability and promptly wipe out vector sources.




Secondary Prevention

1. Constructing a disease surveillance mechanism for prompt control of suspected cases, strengthening disease surveillance and disease trend evaluation through official epidemic reporting systems and emerging disease surveillance, as well as public reporting and symptom declaration forms.

2. Setting up emergency/contingency mechanisms to promptly investigate suspected transmission sources and spraying insecticide to eliminate those sources, and publicizing the importance of eliminating vector-breeding sites to prevent possible infection.

Tertiary Prevention

1. Establishing guidelines for dengue hemorrhagic fever (DHF) diagnosis and treatment.
2. Organizing continuing education workshops for medical personnel to raise health care quality and lower mortality rate.

Accomplishments

In Taiwan, 596 people were infected with dengue fever in 2013. Coordination between central and local governments, medical institutions and environmental/health organizations, and villages, schools and community members, has effectively stopped further spreading of the disease. Below are major achievements.

Primary Prevention

1. Continue body-temperature monitoring at international airports. In 2013, 113 cases of imported dengue fever were detected, accounting for 42.8% of the total number of 264 imported cases (see Table 3-5). This measure effectively limited importation.
2. Distribute health education and promotional materials, including leaflets, posters, banners, the Combat Manual for Dengue Fever, and VCDs.
3. Produce promotional materials, such as recordings, epidemic control programming and newspaper ads, which call on the general public to eliminate dengue fever vector breeding sources. These include TV commercials and short films for screening in TV slots reserved for public service announcements.
4. Publish the Guidelines for Dengue Control to assist health organizations in the fight against the epidemic.
5. Formulate the Community Mobilization Plan for Cleaning Up Breeding Sources of Dengue Fever Vectors. Taiwan CDC encouraged community organizations in southern Taiwan to propose plans to CDC units and organize volunteer teams to exterminate mosquitoes.
6. Encourage scholars and experts to implement studies in insecticide efficiency and resistance of dengue fever vectors to assist in the procurement of insecticides.
7. Promote dengue fever vector mosquito surveys and the Dengue Fever Control Plan. Implementation was entrusted to the health bureaus of high-risk counties and cities in southern Taiwan (areas infested with *Aedes aegypti* mosquitos). The frequency of dengue fever vector density surveys and investigations was increased to one per month for every village where dengue fever was prevalent.

Table 3-5 Serotypes and Origins of Imported Dengue Fever Cases, 2013

Countries of Infection	Serotypes					
	I	II	III	IV	ND	Total
Indonesia	12	9	11	0	39	71
Thailand	7	10	2	3	41	63
Philippines	4	2	0	7	25	38
Malaysia	9	5	1	2	9	26
Vietnam	4	1	1	2	9	17
India	2	4	1	0	3	10
Singapore	7	0	1	0	2	10
Myanmar	3	2	0	0	4	9
Cambodia	2	0	0	0	5	7
Sri Lanka	0	0	0	0	4	4
China	0	0	0	0	3	3
Laos	0	0	0	0	2	2
Saint Lucia	0	0	0	1	0	1
Brazil	0	0	0	1	0	1
Solomon Islands	0	0	1	0	0	1
Fiji	0	0	0	0	1	1
Total	50	33	18	16	147	264

Secondary Prevention

1. Establish an incentive system to encourage physicians and the general public to report cases, thereby facilitating early detection of the disease. NT$2,500 to NT$4,000 was awarded to the physician or other medical worker who reported the year's first indigenous case of dengue fever and to individuals who found an imported case. If an individual volunteers for dengue fever testing and is subsequently determined to be an imported case or the first indigenous case in the village or township of residence, the individual is awarded NT$2,500.

2. To understand the shifts in insecticide resistance of vectors, Taiwan CDC sent vector experts to areas where emergency spraying was conducted.

Future Prospects

To strengthen dengue fever control, Taiwan CDC proposed a five-year program (starting in 2011) for eliminating vector-breeding sources and indigenous dengue fever to be jointly implemented by Taiwan CDC, the Environmental Protection Administration (EPA), local governments and NGOs. Efforts will be made to popularize health education and encourage the general public to get involved in maintaining environmental and household sanitation. Taiwan CDC and the EPA will construct a real-time disease surveillance and response mechanism in an attempt to wipe out vector sources, thereby eliminating indigenous dengue fever.

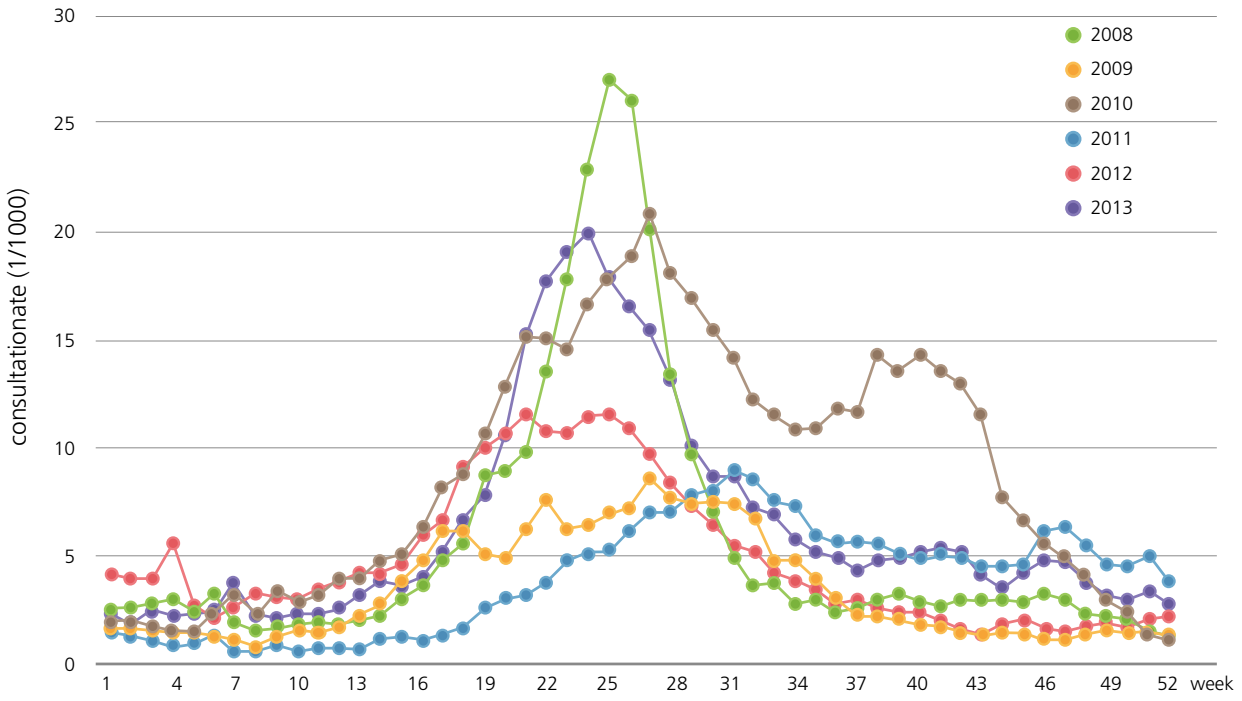
Enteroviruses

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, a 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 3-9). Many types of enteroviruses exist around the world. Humans appear to be the only known host and source of transmission. There are currently no preventive vaccines for non-polio enteroviruses and no known highly efficacious medicine to eliminate the virus once it is inside the human body. Therefore, enteroviruses will continue to pose a threat to human health for the foreseeable future.

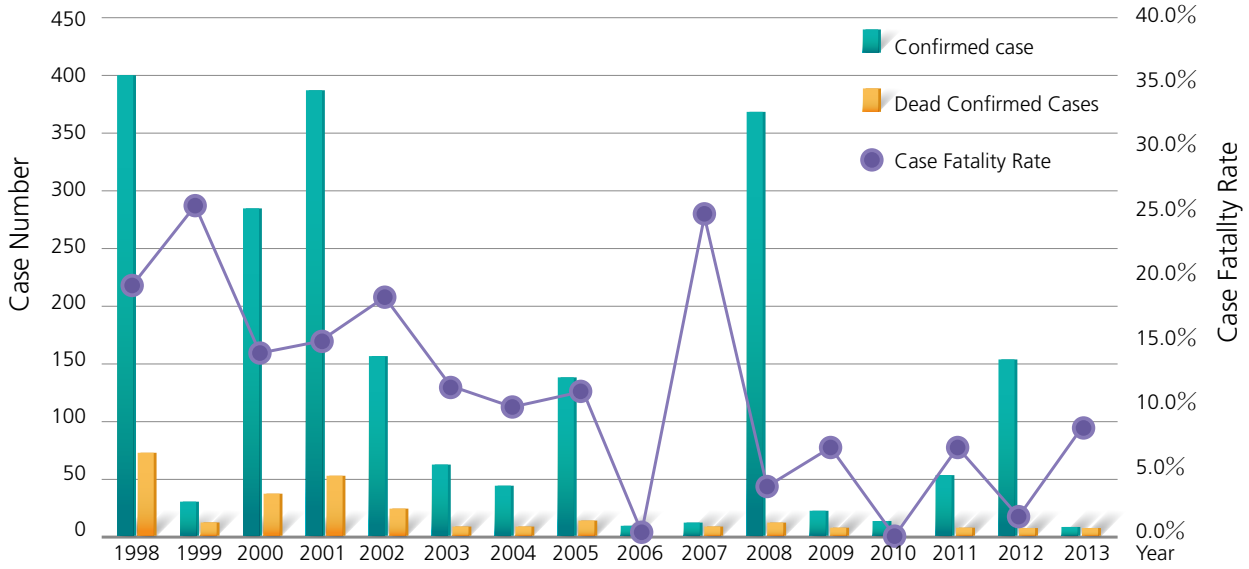
Figure 3-9 RODS Weekly Consultation Rate of Enterovirus Infections in Taiwan, 2008-2013



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 2013, the EV71 epidemic was not as serious as in 2012 (see Figure 3-10). There were 12 confirmed cases of EVSC and one death.

Figure 3-10 Cases Number and Case Fatality Rate of EVSC in Taiwan, 1998-2013



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, 71 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.

Emergency Preparedness & Response

Current Status

At the end of 2003 when the avian influenza epidemic emerged, Taiwan began to prepare for a potential pandemic. The recent SARS experience led government agencies to give strong support to the effort and appropriate necessary funding for each aspect of preparations.

Currently, two documents guide preparedness planning: the National Influenza Pandemic Preparedness Plan and the Influenza Pandemic Strategic Plan. These include four major strategies – surveillance and assessment, interruption of transmission, antivirals, and influenza vaccines – and five lines of defense: containment abroad, border control, community epidemic control, maintenance of medical system functions, and individual and family protection. The measures minimize the mortality rate, economic losses and impact of novel influenza viruses.

Accomplishments

1. 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 paved the way for continuation of the five-year plan by approving the Phase II plan. This upholds the "four major strategies" and "five lines of defense" for preparations and continued comprehensive evaluations.

2. The government has established three hierarchy 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, and exercise of responses action, risk communication and international cooperation. When necessary, the government updates both the Strategic Plan and the Guidelines, and also published an English-version of the Strategic Plan.

3. At the end of March 2013, an influenza H7N9 epidemic emerged in Mainland China. In accordance with its preparatory foundation, Taiwan quickly declared influenza H7N9 as a Category V notifiable disease and, following Executive Yuan approval, established the Central Epidemic Command Center for H7N9 influenza (see Figure 3-11). The center consolidated interdepartmental resources, equipment and staff, while providing a unified system for command, oversight, and coordination of various agencies, organizations and groups. Other steps included launch of a comprehensive surveillance system, establishment and improvement of laboratory diagnosis techniques and capacity, implementation of border control, launch of the communicable disease control medical network, and continued risk communication and public opinion management. Establishment of a working platform and systematic communication channels with the China Center for Disease Control and Prevention facilitated information exchange as well as the reporting and handling of emergency situations. Taiwan CDC also provided targeted risk communication and health education to various groups in order to warn the general public and doctors to be on alert and report suspected cases (see Figure 3-12).

Figure 3-11 A meeting of the Central Epidemic Command Center for H7N9 influenza

Figure 3-12 A short video to promote influenza H7N9 control

4. On May 17, 2013, Taiwan announced a new policy banning the slaughter of

poultry in traditional markets. Complementary measures included establishment of joint investigation task forces by local governments to assist in preventing the spread of influenza H7N9 via traditional markets. Control of animal (avian)-human interface was strengthened through a series of initiatives: participating in Executive Yuan avian influenza control Cross-sectoral meetings to formulate avian influenza policies, use of a single window for information exchange and news notification, and health monitoring of poultry workers to detect possible cases of avian-human transmission. Early detection would facilitate prevention measures to containment transmission and minimize the risk of avian-borne disease.

5. Through its designated IHR National Focal Point, Taiwan could share the latest influenza epidemic information and gain insight into the global pandemic situation and prevention strategies. Implementation of the Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs paved the way for Taiwan to share pathogen specimens with Mainland China, allowing it to gain access to influenza H7N9 virus strains. The US CDC and Japanese NIID also agreed to share the influenza H7N9 candidate vaccine virus with Taiwan.

Future Prospects

It is impossible not only to predict when an influenza pandemic will occur but also to simulate the degree of infection or the seriousness of condition. As the influenza H7N9 epidemic developed in 2013, authorities did not know if it would progress from an epidemic to a pandemic like influenza H1N1 in 2009, or if it would act more like influenza H5N1, which had avian-to-human transmissions over an extended period of time and a few number of limited human-to-human transmissions. The only option was to continue rigorous surveillancing and preparations, so as the epidemic did progress, officials were ready with control measures. Also, based on the Pandemic Influenza Risk Management: WHO Interim Guidance, announced on June 10, 2013, Taiwan decided to continue developing and strengthening existing influenza pandemic preparations in accordance with national-level risk assessments, emergency risk management for health concepts, and the Pandemic Influenza Preparedness Framework. Flexibility would remain a key element of planning in order to respond appropriately to national epidemics and local needs, thereby ensuring citizen's health.

Infection Control and Biosafety

Nosocomial Infection Control

Current Status

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

Our goals are:

1. To plan interventions and infection control guidelines for reducing nosocomial infections and fulfilling WHO patient safety principles.
2. To boost the quality of the nosocomial infection control inspection program and share experiences on nosocomial infection control practices through on-site audits, thereby improving the performance of infection control programs in hospitals.
3. To continue promoting hospital participation and strengthen data quality in the Taiwan Nosocomial Infection Surveillance (TNIS) System.
4. To monitor variations and evolving trends of carbapenem-resistant gene in Enterobacteriaceae.
5. To implement the Antimicrobial Stewardship Program for the promotion of reasonable use of antimicrobials. This will mitigate antimicrobial resistance and reduce nosocomial infections, thereby improving patient safety and treatment quality.

Accomplishments

1. Compilation of Infection Control Guidelines and Publication of the Infection Control Journal

(1) In 2013, Taiwan CDC released guidelines for preventing influenza H7N9, rabies and novel coronavirus (MERS-CoV) in healthcare facilities along with recommendations for EMS personnel during influenza H7N9 patient transit and ambulance decontamination. Taiwan CDC also updated healthcare personnel vaccination recommendations and recommendations for linen processing 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 an infection control inspection quality improvement project. Experienced infection control practitioners and medical officers joined local health authorities in conducting on-site inspections. Follow-up inspections at two of 338 hospitals that failed to meet standards in 2013 tracked improvements.

3. Implementation of Central Line Bundle

After seven medical centers established the Center of Excellence for Central Line Bundle, 57 hospitals were selected to participate. The aim is to promote care bundles and decrease the incidence of central line-associated blood stream infection (CLABSI), thereby reinforcing patient safety, improving healthcare quality and reducing medical costs.

4. Nosocomial Infection Surveillance and Reporting

In 2013, about 420 hospitals reported data to the TNIS system. Taiwan CDC produced a nationwide nosocomial infection quarterly report to provide periodic feedback and strengthen communication with hospitals.

5. Surveillance of Carbapenem-resistance in Enterobacteriaceae

In Taiwan CDC, cases infected with bacteria carrying KPC (Klebsiella pneumonia carbapenemase) and NDM (New-Delhi metallo beta-lactamase) are recorded in two ways: the multidrug resistant bacteria monitoring system and the scientific research program. Taiwan CDC makes prevention and treatment guidelines to help hospitals enhance infection control measures, to minimize the spread of multi-drug resistant bacteria and to 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 program management center was established in 2013 to launch the program. Seven hospitals were selected to serve as regional demonstration centers that would assist with program implementation and promotion and 55 hospitals were selected to participate in the program in 2014. Antimicrobial stewardship summit and performance competition were also held to promote the program.

Future Prospects

1. Based on recommendations announced by the WHO and leading countries, Taiwan CDC will continue to draft and implement nosocomial infection control regulations and revise infection control guidelines. The information it gathers from around the world on policies,

laws, regulations and implementation results will serve as a reference for policymaking.

2. To improve nosocomial infection control inspections, Taiwan CDC will draft the 2014 nosocomial infection control inspection quality improvement project based on its implementation experiences from 2008 to 2013 and recommendations from various organizations. Moreover, it will arrange an inspection schedule based on the Ministry of Health and Welfare's medical investigation consolidation policy.
3. Taiwan CDC will continue promoting hand hygiene programs to build a hand hygiene culture in the health care system, as well as promoting central line bundle to decrease the incidence of CLABSI, thereby reinforcing patient safety, improving healthcare quality and reducing medical costs.
4. Taiwan CDC will continue to promote hospital participation in the TNIS System while strengthening surveillance of nosocomial infections and antimicrobial resistance.
5. To continue implementing the Antimicrobial Stewardship Program. The program promotes antimicrobial stewardship across the nation at hospitals and in communities.

Laboratory Biosafety Management

Current Status

Legislative and Regulatory Changes

Taiwan CDC began revising the Regulations Governing Management of Infectious Biological Materials and Collection of Specimens starting in 2009. It added selected 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 an amendment to the Communicable Disease Control Act it will jointly announce these revisions. In 2013, Taiwan CDC completed editing, revision, and announcement for the Safety Guidelines for Animal Biosafety Level 1 to Level 3 Laboratory 1st edition.

Registration of Organizations Practicing Biosafety

By December 2013, 498 organizations registered biosafety mechanisms to Taiwan CDC, of which 313 set up biosafety committees and 185 designated an individual. These included 39 government organizations, 185 medical institutions, 53 academic research institutions and 221 other groups. In order to improve biosafety committee operations and functions, along with emergency response capabilities of laboratories, Taiwan CDC also held a biosafety quality control circle (QCC) competition for institutions with biosafety committees.

Biosafety Inspections of High-Containment Laboratories

Since 2005, Taiwan CDC has inspected BSL-3 laboratories to monitor operations and ensure safety. In 2009, culture manipulation for identification and drug-susceptibility testing was

added to inspections of TB-containment laboratories. In 2013, besides inspecting four BSL-3 laboratories and five TB-containment laboratories, in order to cope with the influenza H7N9 epidemic Taiwan CDC inspected biosafety preparations at six virology contract laboratories and six BSL-3 laboratories. It also published the "inspection operating regulations of biosafety level 3 and above laboratories" to improve inspection mechanisms for BSL-3 and above laboratories.

Laboratory Biosafety Education and Training

In 2013, Taiwan CDC organized 19 biosafety training course sessions totaling 36 hours. Total attendance was 1,426.

Future Prospects

Taiwan CDC developed its own Laboratory Bio-risk Management system starting in 2013, and over the following four years it will apply the system to all BSL-3 laboratories and above.

By focusing on continuous improvement and the PDCA (Plan-Do-Check-Act) cycle, Taiwan CDC will identify and monitor all aspects of laboratory biosafety and biosecurity.

By implementing its laboratory bio-risk management system, Taiwan CDC will promote autonomous management at the institutional level as well as supervision and guidance by competent authorities. This will raise laboratory biosafety to levels achieved in Europe and the United States.

Outbreak Investigation

Current Status

One of the core capacities of public health departments is investigating disease outbreaks in order to institute control and prevention measures. Outbreak investigations are challenging because the cause and source are frequently unknown and there is potential for public concern and anxiety. Hostility and denial could occur when an individual, product, or institution is suspected of being the source of the outbreak. In such pressure-packed settings, public health investigators must remain calm, professional and objective.

In Taiwan, outbreaks are mainly detected through the following:

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 would conduct the investigation and Taiwan CDC's branch offices would provide supervision and register the outbreak investigation into Taiwan CDC's Epidemic Investigation Report Files Management System. Patient or parent interviews, questionnaire surveys, and environmental inspection are commonly conducted to identify the source and extent of the outbreak. Laboratory testing on human and environmental specimens are conducted at Taiwan CDC'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 involves two-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 to assist with preparations for emerging infectious diseases, and FETP is now part of their mandatory training.

Accomplishments

1. In 2013, 297 of 497 (60%) suspected outbreaks registered into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated by public health professionals at local health departments were confirmed as outbreaks.

2. The top four reported diseases/syndromes of confirmed outbreaks were varicella/chickenpox (34.7%), acute diarrhea (21.5%), acute respiratory infection (21.5%), and influenza-like illness (5.4%) (Table 3-6).

Table3-6 Confirmed Outbreaks of Reported Diseases/Syndromes — Taiwan, 2013

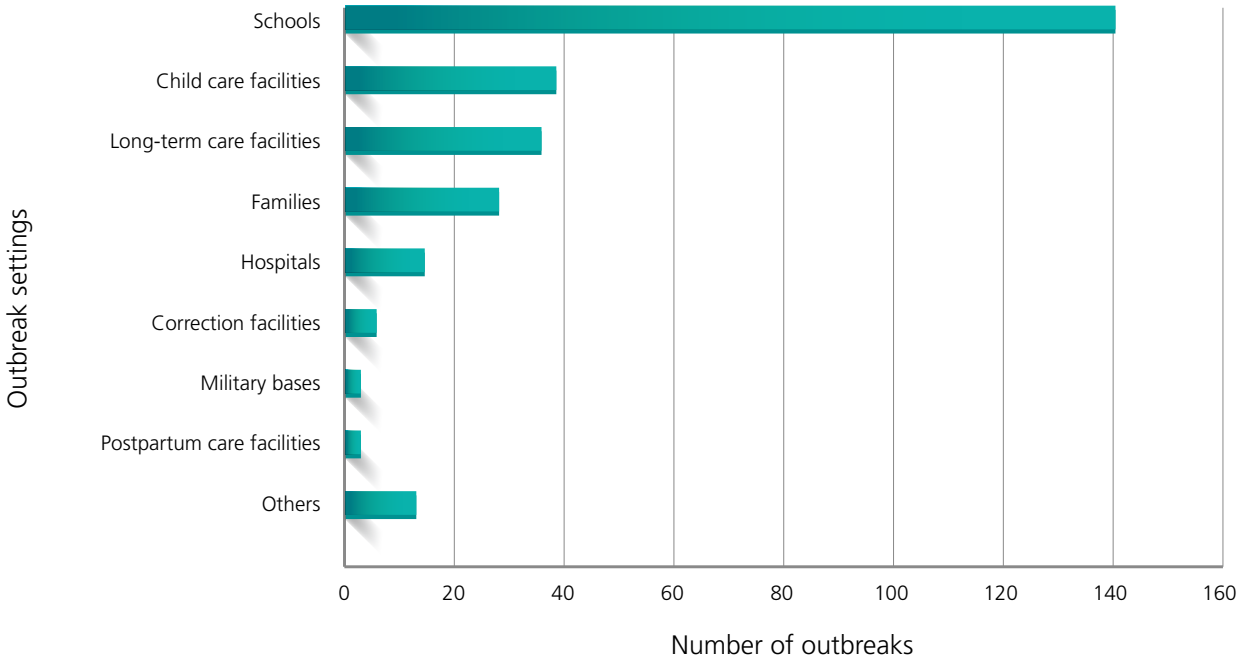
Reported Disease/Syndromes	Total Number of Outbreaks
Varicella/chickenpox	103
Acute diarrhea	64
Acute respiratory infection	64
Influenza-like illness	16
Tuberculosis	12
Dengue fever	10
Pertussis	10
Unknown cause of fever	6
Typhoid/ paratyphoid fever	3
Enterovirus infection	2
Amoebiasis	2
Shigellosis	2
Acute hepatitis A virus infection	2
Chikungunya	1
All	297

3. The top four outbreak settings other than household cluster were schools (48.5%), child care facilities (13.8%), long-term care facilities (12.8%), and hospitals (5.4%) (Figure 3-13).

4. Special events in 2013 included an investigation of *Mycobacterium bovis* infection associated with deer farming, case and contact investigations of human infections with avian influenza A (H7N9) and A (H6N1) virus, and risk assessment of rabies exposure.

5. At the end of 2013, there were 21 medical officers at Taiwan CDC. Their medical specialties included infectious diseases, internal medicine, family medicine, emergency medicine, and pediatric gastroenterology.

Figure 3-13 Number of Outbreaks by Setting — Taiwan, 2013



Future Prospects

1. Strengthen collaborations with food authorities at the national and local levels in foodborne disease outbreak investigations and relevant training activities.

2. Collaborate with the Bureau of Animal and Plant Health Inspection and Quarantine of the Council of Agriculture in zoonosis outbreak investigations.

3. Enroll newly recruited medical officers and public health professionals of interest from Taiwan CDC and local health departments into FETP.

4. 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.

5. Collaborate with international FETP networks to rapidly respond in outbreak investigations and control.

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

Organizing International Conferences

1. 2013 marks the 10-year anniversary of the SARS outbreak. On this occasion, Taiwan CDC held the "APEC Conference on the Innovation, Achievement and Sustainable Development in Public Health Emergency Response Systems 10 Years After SARS Epidemic" in order to provide all APEC member economies with a platform to share and discuss the public health emergency response systems they implemented after the 2003 SARS outbreak. A total of 31 representatives from 15 economies and 90 experts from Taiwan participated. The conference focused on three main topics: "Innovation and Application in Health Information Technology," "Public Health Human Resource and System Reform," and "Sustainable Development in Prevention and Control of Emerging Infectious Diseases."

2. To learn from other countries' experiences in rabies prevention and control and obtain expert advice, Taiwan CDC and the Council of Agriculture co-organized the "International Expert Meeting – Challenges and Opportunities in the Prevention and Control of Rabies." Experts shared their experiences and information related to rabies prevention and control. In addition, about 160 foreign and domestic experts in public health, medicine and agriculture participated.

Promotion of Bilateral and Multilateral Cooperation

1. The Americas:

(1) For the Cooperative Program in Public Health and Preventive Medicine with USCDC, Taiwan CDC continued Arrangement No. 3 (a TB prevention project) and Arrangement No. 4 (a Taiwan-US EIS training plan).

(2) President Ma Ying-jeou presented the Order of Brilliant Star with Grand Cordon to Donald A. Henderson, professor of medicine and public health at the University of Pittsburgh School of Medicine, on July 4, 2013, in recognition of his distinguished contributions to the development of biomedical technology in Taiwan. In addition, Professor Henderson gave a keynote speech at the "APEC Conference on the Innovation, Achievement and Sustainable Development in Public Health Emergency Response System 10 Years After the SARS Epidemic" after being invited by Taiwan CDC.

(3) The US Centers for Disease Control and Prevention (CDC) and US Department of Agriculture (DA) offered immediate assistance when Taiwan faced its first animal rabies outbreak since 1959. Besides the two organizations participating in a teleconference with Taiwan CDC and the Bureau of Animal and Plant Health Inspection and Quarantine, Council of Agriculture, the CDC sent two medical epidemiologists, one veterinary epidemiologist, and one wildlife ecologist to assist agriculture and health agencies in relevant prevention and control efforts, including assessing the risk of transmission among humans and wildlife species, providing recommendations concerning rabies surveillance activities of wild animals, and evaluating the feasibility of oral rabies immunization of wild animals. In addition, five CDC experts and one DA expert were invited as speakers at the "International Expert Meeting – Challenges and Opportunities in the Prevention and Control of Rabies" in Taipei on August 30 and 31, 2013, to share their experiences of human and animal rabies control.

(4) Taiwan CDC continued to work with Haiti's National Public Health Laboratory to improve its capacity and assist in control and prevention of communicable diseases. Achievements included teaching 2 students laboratory-related skills.

2. Europe:

(1) Taiwan CDC deployed staff to the Austrian Agency for Health and Food Safety (AGES) for European CDC EPIET training and sent a staff member to the 2013-2015 EPIET programs.

(2) In February 2013, the expert from Public Health England (PHE) visited the Taiwan CDC to discuss prevention of diseases such as AIDS and tuberculosis, nosocomial infections, and pandemic influenza preparedness. Taiwan CDC also

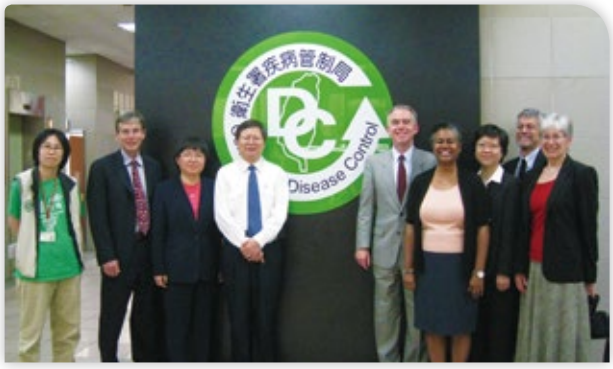
accepted an invitation from PHE to develop a surveillance application for mass gatherings, which was successfully tested at the Glastonbury Festival.

3. Asia:

Years of exchanges between Taiwan CDC and Japan's National Institute of Infectious Diseases (NIID) facilitated a strong cooperative relationship and goodwill. Besides annual symposiums, such as the 10th Taiwan-Japan Bilateral Symposium held in Tokyo in September 2013, during the past three years a total of seven members of Taiwan CDC visited NIID over the course of five joint projects while 14 experts from Japan visited Taiwan. In response to Taiwan's first imported case of influenza H7N9 virus in April 2013, Japan's Ministry of Health, Labour and Welfare joined a video conference to share related information.

International Exchanges in 2013

1. A total of 93 guests from 18 countries visited Taiwan CDC.
2. Taiwan CDC participated in WHO conferences and related activities, including attending the 66th World Health Assembly (WHA) as an observer, the 64th Regional Committee for the Western Pacific, and five technical meetings.
3. Taiwan CDC joined four APEC Conferences, including the 2013 1st and 2nd APEC Health Working Group Meeting, the APEC High Level Meeting on Health and Economy, and the APEC Expert Forum: International Campaign Program to Control Antimicrobial Resistance in Asia.



4. Taiwan CDC participated in 23 international conferences, sent 31 staff overseas, and dispatched 31employees to join 19 short-term study programs and another three employees for long-term EPIET and EIS training.

5. Taiwan CDC also published 65 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 institutes. 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 institutes 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.

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 Department of Health, the Taiwan Food and Drug Administration (TFDA), the Atomic Energy Council, 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 2013, Taiwan CDC acquired 42 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, Taiwan is vulnerable to various tropical diseases. The threat is especially strong because of Taiwan's thriving international tourism and trade. To prevent the import of diseases and ensure public health, the government has set up quarantine offices at airports (Songshan, Taoyuan, Taichung and Kaohsiung), seaports (Keelung, Suao, Taipei, Taichung, Mailiao, Kaohsiung, and Hualien), and the three terminals (Kinmen, Matsu and Makung) of the "Mini Three Links" with China.

To meet WHO's International Health Regulations (IHR, 2005) and to prevent the importation 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, including:

1. Improving Information Management: Improving the one-stop information system for

quarantine operations along with making the quarantine process and information management more efficient.

2. Streamlining and Standardizing Operations: Calling for timely revision and standardization of operational procedures by reacting 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. Developing IHR Core Capacities at Designated Points of Entry (PoE): Assessing progress in implementing core capacities at PoE and making efforts to meet related IHR (2005) requirements.

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 are required to notify Taiwan CDC and document the event. Taiwan CDC will take appropriate measures.

(2) Any ship arriving at a port in Taiwan is required to 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 the ship to implement quarantine measures.

a. An inbound ship has not applied 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 is abnormal death of animals.

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

The following table shows the state of quarantine in 2013:

Quarantine Work at International Ports in 2013

Branch	Quarantine Office	Ships	Passengers	Aircraft	Passengers	Cargo Planes	Tonnage of Cargo
1st	Keelung	5,002	214,417	-	-	-	-
	Suao	470	477	-	-	-	-
	Taipei	2,645	11,846	-	-	-	-
	Kinmen	10,368	680,255	0	0	0	0
	Matsu	1,147	23,576	0	0	0	0
	Songshan	-	-	8,438	1,488,228	0	0
2nd	Taoyuan	-	-	64,162	10,862,845	8,999	2,915,768
3rd	Taichung*	7,277	85,115	5,304	548,825	0	0
4th	Mailiao	2,850	65	-	-	-	-
	Tainan	-	-	68	6,788	0	0
5th	Kaohsiung*	15,698	30,541	11,646	1,579,315	0	0
	Makung	315	1,000	0	0	0	0
6th	Hualien*	1,100	28,865	168	25,559	2	0
	Taitung	-	-	35	3,946	0	0
Total		46,872	1,076,157	89,821	14,515,506	9,001	2,915,768

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 are required to give an on-site specimen and/or submit to follow-up tests by local health authorities.

Of the 19,072,276 passengers who arrived in Taiwan last year, only 12,924 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 115 cases of dengue fever, 23 cases of shigellosis, 17 cases of chikungunya and four cases of chickenpox. Among non-notifiable communicable diseases, Taiwan CDC found one case of Vibrio parahaemolyticus and four cases of norovirus.

4. Control of Disease Vectors in Ports

The purpose is to control vector density (i.e., any infectious disease carrier such as rats or mosquitoes) at ports to stop the spread of communicable diseases. Taiwan CDC has taken the following measures to stop the breeding of vectors.

(1) Rat Control:

A. Placing anticoagulant bait year-round where rats are most active. The bait is replenished every 10 to 15 days to ensure its efficacy.

B. Monitoring the parasites and infectious serum of rats in port areas. Captured rats are examined for parasites and blood serum is tested 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 an epidemic. Therefore, it is necessary to understand the variety and quantity of mosquitoes. The following methods have been 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 vector mosquitoes.

B. Setting Ovitraps: 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 for calculating the mosquito index in the port areas.

C. Surveying Mosquitoes: Lamps are hung in selected places for trapping mosquitoes 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.

5. IHR Core Capacities at Designated PoE

After the Executive Yuan approved protocol aimed at achieving core capacity requirements at designated points of entry, a cross-government platform was established to facilitate related activities. Besides self assessments at Taoyuan International Airport and Port of Kaohsiung, external experts conducted an initial assessment. Plans of action to implement IHR (2005) were developed for gaps. In mid-March, two experts from Australia who undertook a follow-up external assessment awarded Taoyuan International Airport a full 100 and Kaohiung Port 99.9. The excellent performance not only ensures that improvement efforts are consistent with IHR core capacity requirements, but also demonstrate that capabilities at designated PoE are on par with those of other advanced nations.

6. Other Sanitation Control Measures

(1) Shipboard Sanitation Control: To prevent the spread of disease on ships on international routes, Taiwan CDC imposes control of ships 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 the mooring cable, a rat guard must be hung on the cable. 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 have conducted additional quarantine work to prevent transmission of communicable diseases.

Future Prospects

1. Increasing manpower and equipment to strengthen quarantine functions, and conscientiously conducting quarantine 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 avoid the spread of communicable diseases.
4. Building core capacities at five more designated PoE based on IHR (2005), to extensively 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 148 individuals and received and processed 90,880 diagnostic specimens in 2013. 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.

2012-2013 Accomplishments

National Influenza Center (NIC)

1. Based on influenza surveillance data, influenza A (H3N2) and (H1N1)pdm09 viruses co-circulated in Taiwan in 2013. The influenza B virus was only detected sporadically.

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

3. Among 475 reported cases of influenza A (H7N9) infection in 2013, two cases from China tested positive for influenza A (H7N9) virus on April 24 and December 27, 2013.

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 probe 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. Eight measles cases were confirmed from 93 reported cases in 2013 and the available viruses were characterized as two genotypes: H1 (n=5) and D8 (n=2). In 2013, the most common genotype was re-converted to genotype H1.

3. Seven rubella cases were confirmed from 76 reported cases in 2013 and the available viruses were characterized as two genotypes: 1E (n=1) and 2B (n=5).

Viral Enteric and Diarrhoeal Diseases Laboratory

1. Establishment and application of molecular detection methods to confirm viruses of reported diarrhea syndrome cluster and foodborne related outbreaks. Successfully identified astrovirus and picobirnavirus from samples without definite detection results.

2. In 2012, novel norovirus strain GII.4/Sydney caused 37% of reported diarrhea syndrome cluster and foodborne related outbreaks in Taiwan. This strain, which was first discovered in March, displaced all other noroviruses around September.

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 Norovirus, Rotavirus, HAV and HEV.

3. Strengthened our ability to detect rabies virus in response to re-emergence of rabies in Formosan ferret badgers in 2013.

Vector-Borne Viral and Rickettsia Diseases Laboratory

1. Rapid environmental change and global travel and trade speed up the transmission of vector-borne infectious diseases. It is necessary to establish a laboratory-based surveillance system for monitoring emerging and re-emerging infectious diseases.

2. Established and maintained an arboviral and rickettsia reference laboratory to provide laboratory standards and diagnostic services to domestic and international health agencies.

3. Developed immunochromatographic test (ICT)-based rapid detection kits for the detection of dengue and chikungunya virus infections.

4. Established surveillance and molecular diagnostic systems for the detection of emerging and re-emergent arboviral infections.

5. Conducted a mosquito surveillance program for monitoring emerging and re-emerging arboviral diseases.

Bacterial Respiratory Diseases Laboratory

1. A total of 1,374 cases of invasive pneumococcal disease (IPD) were notified in 2012-2013. The incidence rate was 2.9 cases per 100,000 population, and the case fatality was 14.4%.

2. The most prevalent serotypes for invasive *S. pneumoniae* strains were serotypes 19A, 14, 3, and 23F. Serotype 19A became the most prevalent serotype in 2011.

3. Among invasive *S. pneumoniae* strains, 61.7%, 75.6%, and 8.0% were susceptible to penicillin, cefotaxime, and erythromycin, respectively. Serotype 19A strains showed the lowest susceptibility to all three antimicrobial agents.

4. A total of 203 cases of Legionnaires' disease were laboratory-confirmed in 2012-2013, including 163 male and 40 female patients. The first two neonate cases in Taiwan were identified in 2013.

Bacterial Enteric and Emerging Diseases Laboratory

1. Conducted conventional diagnoses of *Vibrio cholerae*, *Salmonella typhi*, *Salmonella paratyphi*, *Salmonella* spp, *Shigella* spp, Enterohaemorrhagic *Escherichia coli* (EHEC), *Burkholderia pseudomallei*, *Yersinia pestis*, *Leptospira interrogans*, *Borrelia burgdorferi*, *Francisella tularensis*, *Brucella* spp, and Carbapenem Resistant *Enterobacteriaceae*.

2. Surveillance of carbapenem resistant Enterobacteriaceae suggested most KPC-KP isolates were clonally related (similarity ≧ 80%).

3. Establishment of multiplex real-time RT-PCR for detection of pathogens that cause encephalitis.

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

Mycobacterial Diseases Laboratory

1. To understand the extent and to explore the trend of resistance to second-line drugs among multidrug-resistant tuberculosis cases, we conducted a population-based analysis from 2007-2012. We observed significant decrease of *pyrazinamide* resistant rate ($P<0.01$), ofloxacin resistant rate ($P<0.01$) and para-aminosalicylate resistant rate ($P<0.01$). Continuous surveillance of drug resistance reveals the effectiveness of our TB control program. Trend analysis suggests that MDR-TB can be managed when a proper policy decision and effective measures are implemented.

2. To rapidly detect rifampicin, isoniazid and multidrug resistance in *Mycobacterium tuberculosis* isolates, an oligonucleotide array was developed and evaluated. The array can directly reveal transmission-associated mutations, which are useful for epidemiological investigations. The turnaround time of the array test was six to seven hours.

Parasitic Diseases Laboratory

1. Found a continuous increase of amoebiasis case numbers among foreign laborers.

2. Applied phylogenetic methods to investigate the amebic species among suspected amoebiasis patients by microscopy, and found new types of *Entamoeba polecki* and E. *hartmanni* that might be related.

3. Identified *Naegleria fowleri* from hot springs linked to the first primary amebic meningoencephalitis patient in Taiwan.

4. Applied loop-mediated isothermal amplification for malaria diagnosis during a follow-up study in São Tomé.

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 using a bioinformatic approach.
3. Studied clinical manifestation, resistance and molecular epidemiology of *Nocardia brasiliensis* cutaneous infections in Taiwan during 2002-2012.
4. 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. We found high *Anaplasma phagocytophilum* infection in ticks and small mammals in Taiwan, especially in Kinmen and Lienchiang counties.
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 *Culex vishnui* subgroup and *Culex pipiens* complex and avian malaria in Taiwan.

Establishment and Application of a Pathogen Genome Sequence Database in Taiwan

Taiwan CDC established a Taiwan Pathogenic Microorganism Genome Database (TPMGD)-open version (http://tpmgd.cdc.gov.tw/tpmgd_public/), which is accessible to the general public online. Anyone can surf and download from the website or do contrastive analysis of 26,739 pathogen sequence data (regarding influenza virus, enterovirus, and adenovirus) and simple epidemiological information.

Taiwan Pathogenic Microorganism Genome Database

Manufacturing of Serum and Vaccines

Production of Bio-Products

1. Antivenom serum is manufactured using horse serum. A total of 149.7 liters of antivenom horse serum was produced in 2013.

2. A supply of vaccines, toxoids, and antivenoms, totaling 953,992 shots, was available in 2013.

   Income from sales of these biological products totaled more than NT$46.4 million.

3. Laboratory animals such as mice, guinea pigs, rabbits and poisonous snakes are supplied and raised.

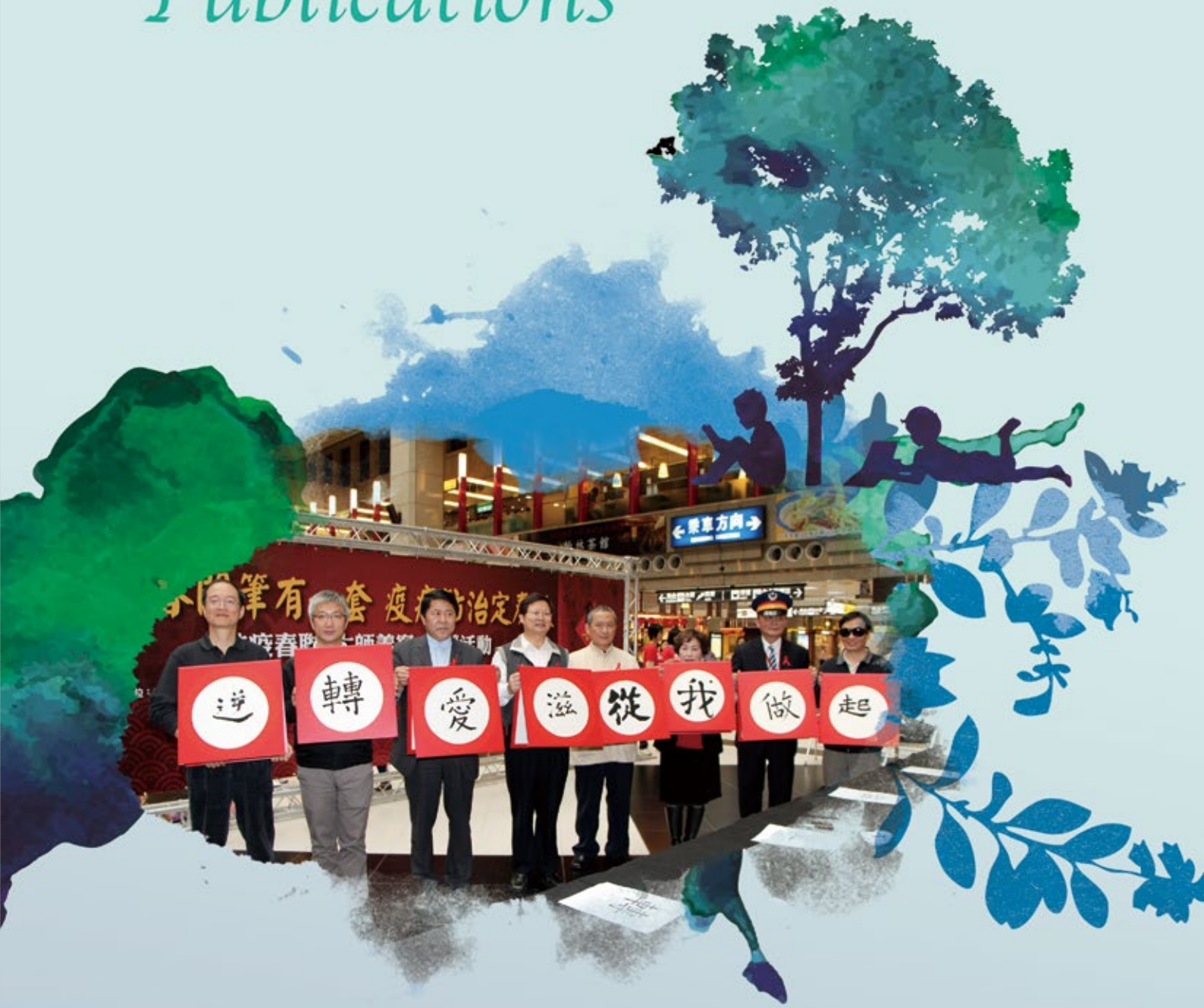
Development of Bio-Products

1. Taiwan CDC moved cultures growing in roller bottles to 50 L tide cell fermenters using a serum-free medium. In consistency tests, it manufactured six batches of subgenogroup C4 strain of human enterovirus 71. In animal studies, the formaldehyde-inactivated prototype vaccine achieved a neutralization titer of 1:79.

2. Established water determination methods for lyophilized snake antivenom in order to effectively monitor residual moisture content of products, thereby ensuring quality and compliance with WHO recommended standards.

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

Marketing and Publications



Health Marketing

Current Status

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

Goals

To strengthen communication between the government and citizens on the risks of communicable diseases, 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 2013, a total of 5,337 news stories reported disease control concerns. Competent authorities held 124 press conferences, issued 352 press releases and produced 1,125 news reports.

2. Integrated Marketing of Disease Prevention

In 2013, 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 issue, Taiwan CDC aims to attract media attention and spread its message to every household in the nation.

On November 30, 2013, the eve of World AIDS Day, Taiwan CDC Director-General Feng-Yee Chang and local pro home run king Chih-Sheng Lin led 200 baseball players in forming a massive red ribbon in front of the Presidential Office. They sought to express the importance and care Taiwan places on AIDS prevention and care.

In 2013, Taiwan CDC convened the Central Epidemic Command Center for influenza H7N9 on April 3 and the Central Epidemic Command Center for rabies on August 1. The centers held regular press conferences to explain epidemic situations while providing up-to-date information and prevention response strategies. Better outreach facilitated provision of health education promotions and epidemic prevention knowledge to the general public.

(2) School Promotions: In 2013, Taiwan CDC cooperated with Rock Records Co. to hold AIDS prevention rock concerts on school campuses. The shows, which included a special AIDS-prevention theme song, not only raised awareness of the importance of AIDS prevention and safe behaviors but also were well received by students.

(3) Community Promotion: Entertainers joined a special anti-tuberculosis campaign that drew on epidemic prevention alliance strategies and targeted middle-aged and senior residents. Nationwide public performances incorporating tuberculosis messages gained community-wide approval. By spreading correct tuberculosis control knowledge, Taiwan CDC turned tuberculosis prevention into a community-wide effort.

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

3. Communicable Disease Reporting and 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, users can receive 24-hour disease reporting service, communicable disease counseling, prevention policy promotion and control measure information throughout the year.

In 2013, the hotline received 82,326 calls and made 53,778 referrals. Since January 1, 2010, a survey to investigate customer service satisfaction has investigated four main topics: waiting time, service attitude, clarity of explanation and timely response. In 2013, 97.7% of the 6,314 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 2013, 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, Plurk, Twitter and blogs. 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 45,000 fans. Besides daily epidemic information, the page offers lifestyle news such as weather reports along with epidemic prevention info, comics, and themed fan activities. A new addition this year is a quiz game that takes place once every two weeks. Besides offering a chance to win prizes, the quizzes promote interaction among page users.

Creative epidemic prevention videos from Taiwan CDC sparked discussion among YouTube viewers and attracted more than 50,000 hits in 2013.

(3) 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 Bureau of National Health Insurance, medical hospitals, schools and guilds. In 2013, Taiwan CDC sent out 55 medical correspondences and reached 8,161 regular subscribers, including 61 hospitals, schools and guilds.

(4) E-cards: On New Year's Eve, Taiwan CDC sent a red e-card to local and international disease control partners express appreciation for their support over the past year and to wish good health and happiness in the coming year.

(5) 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 September 27 Taiwan CDC held the 2013 Disease Prevention Awards Ceremony. In total, it awarded 50 public and private organizations and individuals. The theme of this year's ceremony was "Thank You for Your Help in Disease Prevention". The ceremony focused on the hard work of each award winner and praised grassroots level personnel who spared no effort in preventing disease.

5. CDC Exhibition Center

In 2000, Taiwan CDC established the country's first CDC exhibition center at its Taipei office with the theme of infectious disease prevention. The playful yet educational approach of the exhibit has won widespread praise and made it a favorite attraction for schoolchildren.

6. Corporate Cooperation

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

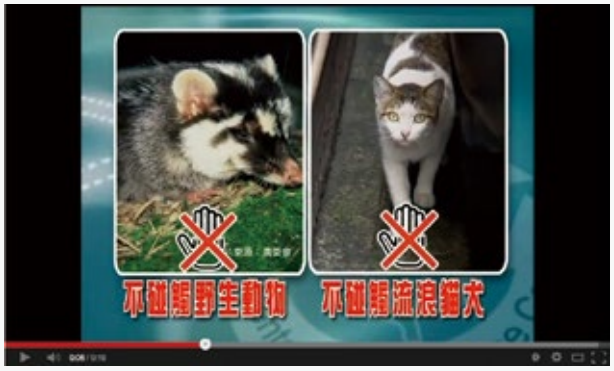
Donation of pneumococcal vaccine by the Formosa Plastics Group.

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

Influenza H7N9 and Rabies



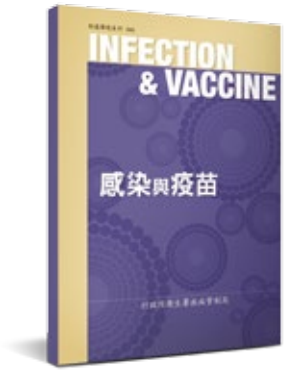
Posters

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

Pamphlets

Banners

Periodical and Books



Infection and Vaccine

Creutzfel-Jakob Disease and Other Human Transmissible Spongiform Encephalophathies-Guideline on Patient Managementand Infection Control (3E)

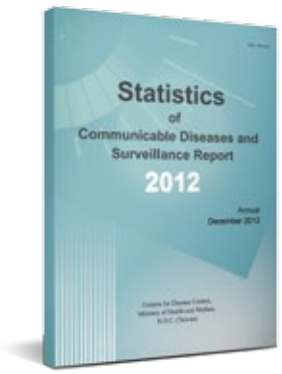
A Decade After SARS: Lessons Learned and Prepareness

Clinical Manifestions, Diagnosis and Treatment of Dengue Fever / Dengue Hemorrhagic Fever (5E)

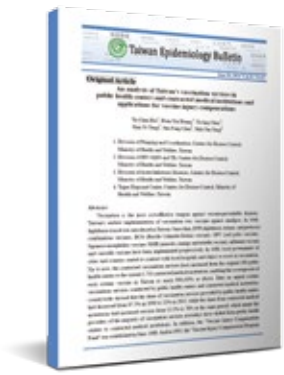
Taiwan Guidelines for TB Diagnosis & Treatment (5E)

Guidelines for Diagnosis and Treatment of HIV/AIDS (4E)

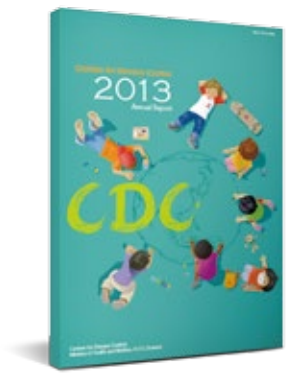
Practical Guideline for Prevention and Control of Seasonal Influenza



Statistics of communicable diseases and surveillance report



Taiwan Epidemiology Bulletin



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TB Control on Campus

2013–2014
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