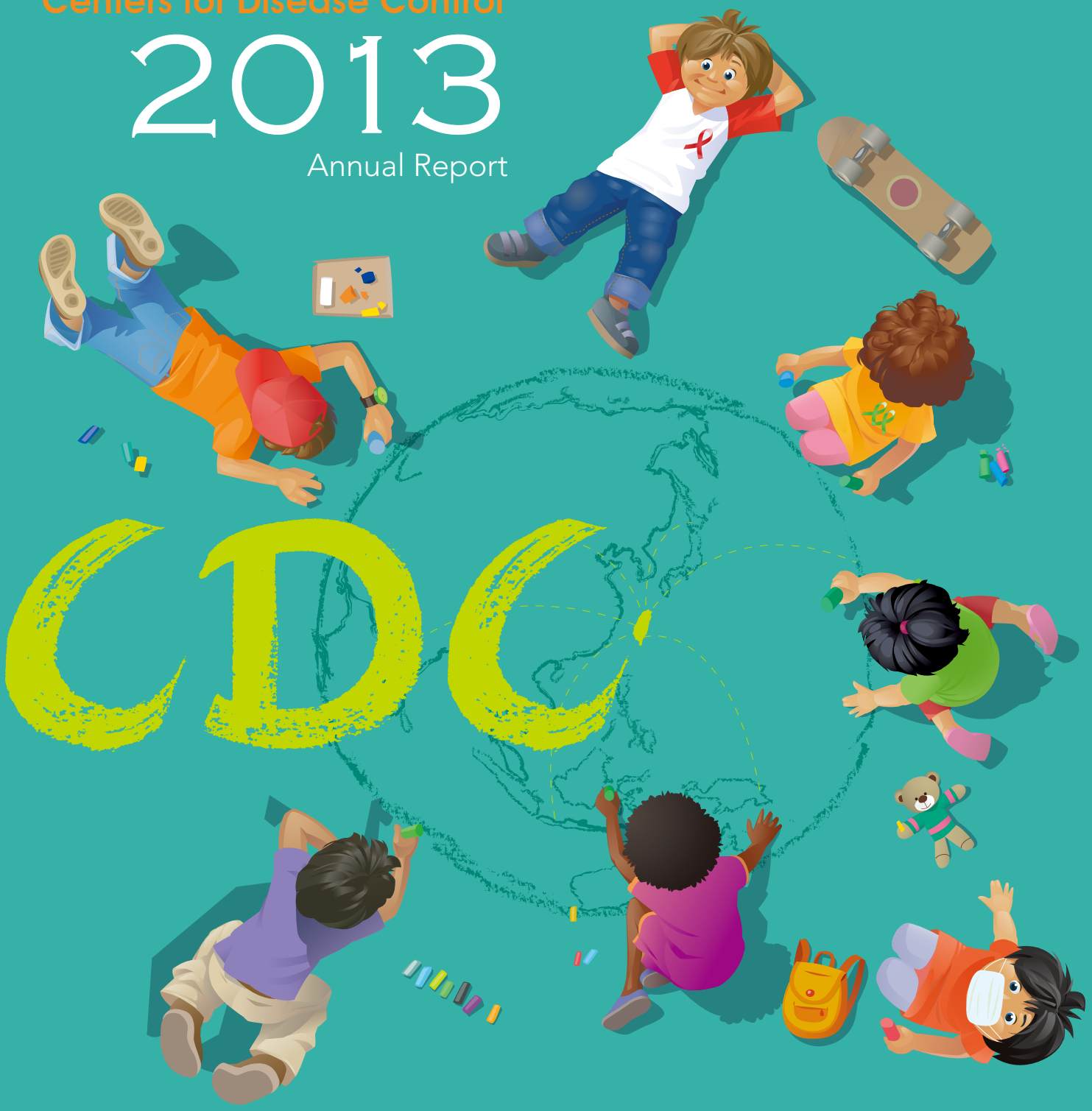
ISSN:1813-3428

Centers for Disease Control

2013

Annual Report



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

Timeline 2012 Centers for Disease C

Jan. 1

To reduce the incidence of Streptococcus pneumonia infections among children from disadvantaged families, Taiwan CDC expanded the use of government-subsidized pneumococcal conjugate vaccine (PCV).

Jan. 9

To raise the credibility of Taiwan's communicable disease reports, Taiwan CDC applied to the Taiwan Accreditation Foundation (TAF) for the ISO 15189 medical laboratory accreditation in June, and received its approval on December 6, 2011.

Jul. 18 – 20

Taiwan CDC hosted the APEC Workshop on Influenza Vaccine Policies and Strategies in Post-Pandemic Era at the National Taiwan University Hospital International Convention Center. Attending were 25 representatives from 13 APEC member countries, including the United States, Australia, Korea and China etc., as well as 74 local experts. Among the topics discussed were vaccination policy formulation, vaccination program implementation, vaccine safety monitoring, and communication for vaccination programs.

Sep. 20 – 21

Taiwan CDC hosted The 9th Taiwan-Japan Symposium on Emerging, Re-emerging and Disaster-associated Infectious Diseases & Cooperative Project Reports. More than 90 experts from Taiwan and Japan's National Institute of Infectious Diseases attended, and discussing prevention, monitoring and response mechanisms for emerging, re-emerging and disaster-associated infectious diseases.

Dec. 1

Taiwan CDC held a special event to promote its Fighting HIV/AIDS: It Starts with Me campaign and to commemorate World AIDS Day. Focusing on the day's "getting to zero" theme, Director-General led participants in giving an oath and signing a banner based on the pledge: "Stop AIDS, I Promise: Zero New HIV Infections, Zero Discrimination and Zero AIDS-Related Deaths."

Dec. 4 – 6

Experts from the Center for Biosecurity of the University of Pittsburgh Medical Center (UPMC) came to Taiwan to assess Taiwan's handling capabilities and response measures for major public health emergencies.

ontrol

Jan. 18

Taiwan CDC developed a new test for the IgM antibodies that reveal the presence of enterovirus 71. The 30-minute test provides a valuable screening tool for early detection.

Feb. 7

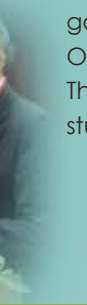
In recent years there have been several brucellosis outbreaks around the world, and these cases demonstrate that such events pose a threat locally. After three decades of no brucellosis outbreaks, there were five imported cases of brucellosis patients in 2010. Taiwan CDC therefore listed brucellosis as a Category 4 Notifiable Infectious Disease.

May 7 - 9

Taiwan CDC sent representatives to Russia to attend the first APEC Health Working Group (HWG) meeting of the year, and reported on preparations for the APEC Workshop on Influenza Vaccine Policies and Strategies in Post-Pandemic Era.

Oct. 1

Based on that flu season usually starts to peak at the end of November, and immunizations take about a month to be effective, Taiwan began to offer government-funded vaccines on October 1.
This year a new group qualified: students in the fifth and sixth grade.



Oct. 3

Taiwan CDC announced the listing of severe acute respiratory disease associated with novel coronavirus as a Category 5 Notifiable Infectious Disease, and its prevention and treatment measures.

Oct. 20

"The seminar Development of EV71 Vaccine — the Present and the Future" was held at the National Taiwan University Hospital International Convention Center. A total of 301 experts discussed research into enterovirus 71 vaccines, rapid screening reagents and other disease prevention topics.

Dec. 11

The 2012 Project for Development of Core Capacity of International Health Regulations (IHR) Designated Ports' Implementation Outcome Review and Future Outlook Forum was co-held at Kaohsiung's Garden Villa, by the Executive Yuan's Office of Homeland Security, the Ministry of Transportation and Communications, and the Department of Health. Forum participants discussed the nuclear and biochemical disaster control and response capabilities of designated ports as well as the development of partnerships with other IHR designated ports.

Humanity

Professionalism

Proactivity

Teamwork

Communication

Centers for Disease Control

2013

Annual Report

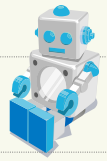
Edited by Centers for Disease Control,
Ministry of Health and Welfare, R.O.C.(Taiwan)

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

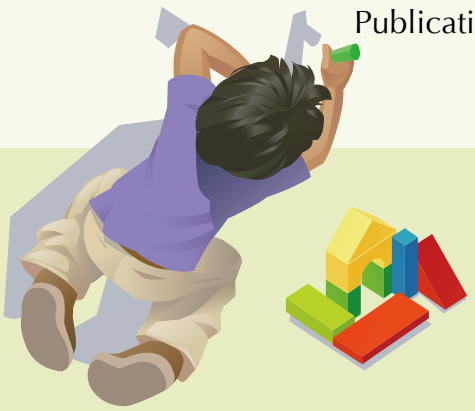
30 July 2013

Centers for Disease Control 2013 Annual Report

CONTENTS





Message from the Director-General

Welcome to the 2013 annual report of the Taiwan Centers for Disease Control (Taiwan CDC).

Over the last few years, Taiwan has been in the process of government reorganization to increase the effectiveness of the government administration. In July 2013, in view of the fact that health and social problems are highly related, the Department of Health and the Department of Social Affairs of the Ministry of the Interior were consolidated into the Ministry of Health and Welfare. As a part of the Department of Health, Taiwan CDC, accompanying with slight adjustment of the organization, is also now under the Ministry of Health and Welfare.

Taiwan CDC is the leading public health agency in Taiwan that plays a key role in protecting all people in this country from the threats of communicable diseases. The 2013 annual report aims to provide the reader with an overview of Taiwan CDC's major events and achievements in 2012. In this report, you will see how Taiwan CDC's employees work together to ensure a healthier environment for the people in Taiwan and a safer place for people all around the world.

In 2012, sporadic cases of novel coronavirus infection were confirmed in the Middle East. In response to the potential threat posed by novel coronavirus, Taiwan CDC promulgated the inclusion of "Middle East respiratory syndrome coronavirus" in the list of Category V Notifiable Infectious Disease, and formulated relevant guidelines concerning specimen collection procedures, recommendations on infection control in healthcare settings. At the end of 2012, to evaluate our emergency preparedness and

responses system to public health events, experts from the Center for Biosecurity at the University of Pittsburgh Medical Center were invited to conduct an external review for us, and they praised our rapid responses to the emergence of the novel coronavirus.

To tackle the threat posed by HIV/AIDS, Taiwan CDC continued to develop diverse strategies. Over the recent years, the spread of HIV among men having sex with men (MSM) group has reemerged as a major threat in curbing this epidemic. Several MSM-targeted HIV programs have been implemented, including the establishment of free health information hotline for MSM, the implementation of the friendly, healthy, and safe label for MSM saunas, the installation of automatic condom vending machines in venues frequented by MSM, and voluntary HIV counseling and testing services at sauna centers and pubs through cooperation with NGOs. Furthermore, Taiwan CDC hosted the I-CHECK campaign in 2012, through mobilizing the social network, to provide free, voluntary and private HIV testing and counseling services that are intended to reduce high-risk behavior and the spread of HIV, you may see the 2012 Focus for further information of the campaign.

Meanwhile, we actively seek ways to deal with many other challenges posed by infectious diseases such as tuberculosis, influenza, dengue, and enterovirus infection. Last year, for the purpose to reduce the incidence of Streptococcus pneumoniae infections and severe complicated influenza cases, we expanded the free service of government-subsidized pneumococcal conjugate vaccine (PCV) for children from disadvantaged families, and began to offer government-funded flu vaccines to the students in the fifth and sixth grades.

In this age of globalization, recognizing the importance of participating in international collaborative projects, Taiwan CDC has joined several international activities and hosted international conferences to cooperate with global partners to achieve the goal - “Health for all”. In 2012, Taiwan CDC held the “2012 APEC workshop on Influenza Vaccine Policies and Strategies in Post-pandemic Era”, which focused on discussing ”Vaccination Policy Formulation”, “Vaccination Program Implementation“, “Vaccine Safety Monitoring” and “Communication for Vaccination Program” to help the APEC member economies strengthen their response capacities to pandemic. In addition, we has also hosted the “International Symposium of Catheter Association Blood Stream Infection” and the “International Conference of Development of EV71 Vaccine-the Present and the Future” to deal with the problems related to health associated infection and share the experiences on developing EV71 vaccines. Through these various activities, Taiwan CDC is not only able to share our own experiences, but also our accomplishments with the rest of the world.

Therefore, I would like to dedicate this CDC annual report, detailing our endeavors and accomplishments during 2012, to our partners and supporters. I sincerely hope you will enjoy reading this report and continue to support us with your recommendations and feedbacks.

Feng-Yee Chang, MD, PhD
Director-General
Taiwan Centers for Disease Control

About Taiwan CDC

CDC's monkey mascot, "Ji-Guan-Ji"

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 specifically 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 director-general and a chief secretary.

Since July 2013, due to the government reform, Taiwan CDC is composed of six divisions, 2 centers, five offices and six regional centers.

Figure 1-1 Organization

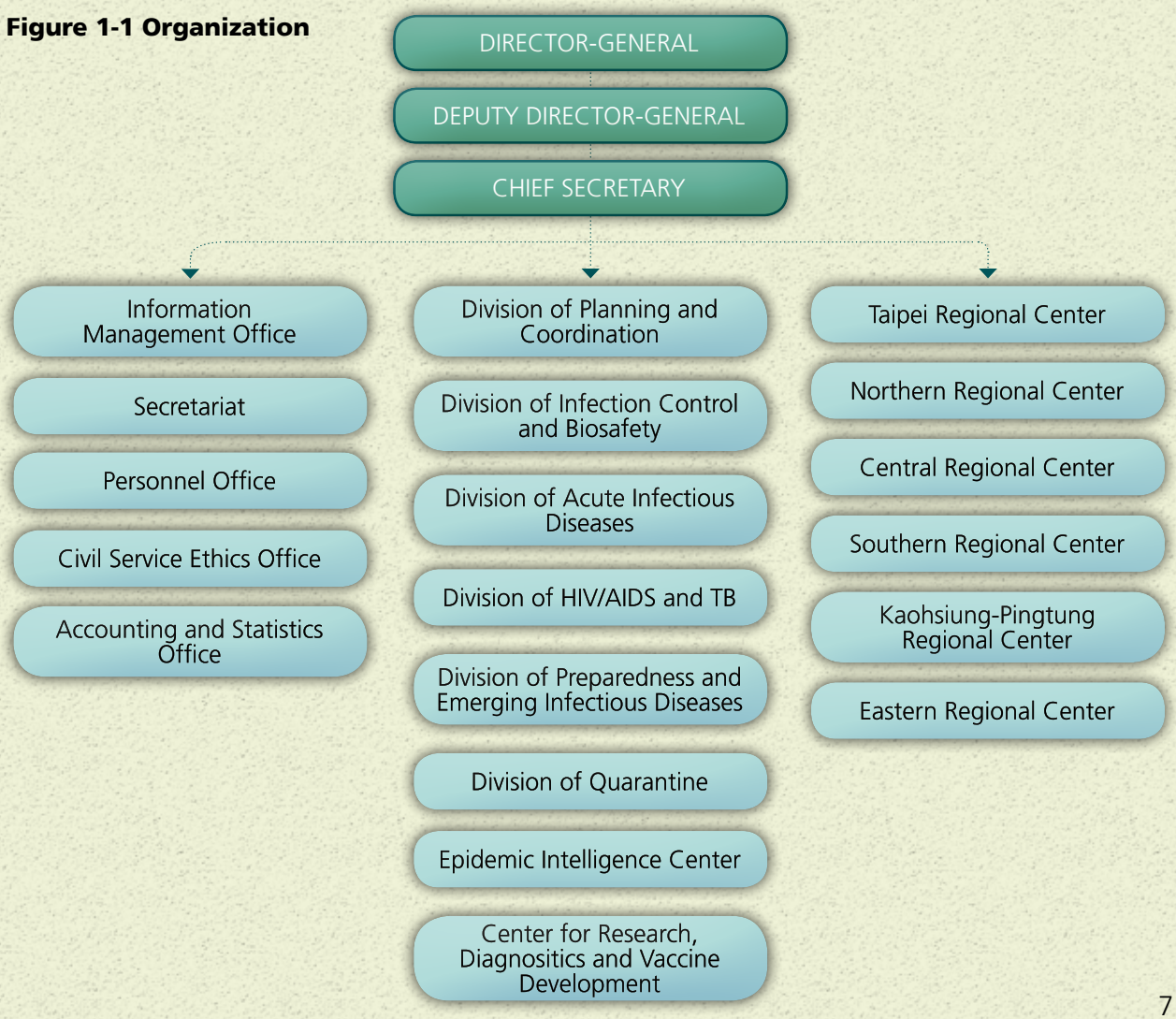


Figure 1-2 Regional Center Jurisdictions

Table1-1 Age Distribution of Taiwan CDC Employees

Under 29 years	30-39 years	40-49 years	50-59 years	60-65 years
7%	26%	38%	25%	4%

Table 1-2 Education Level of Taiwan CDC Employees

Graduate School	University	College	High School or Under
41%	30%	16%	13%

Taiwan CDC has 806 employees and a male to female ratio of 1:4.The average age of the employees is 43.8 years old, with about 70% younger than 49. In terms of educational background, 46% of the staff have received a college or university education and 41% hold an advanced degree (see Table 1-1 and 1-2). The total budget of Taiwan CDC was NT$6 billion (US$200 million) in 2012.

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 agencies, 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. Their teamwork involves rallying together and cooperating. 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:** The elements of effective communication include listening and empathy, with the latter serving as a foundation for the former. Both traits are needed to listen to others' opinions and fully capture what they have to say. Communication is not only an internal but also external affair, expert opinions must be presented in ways that are widely understood, meanwhile, people must be able to believe that they are valued, trusted and respected.

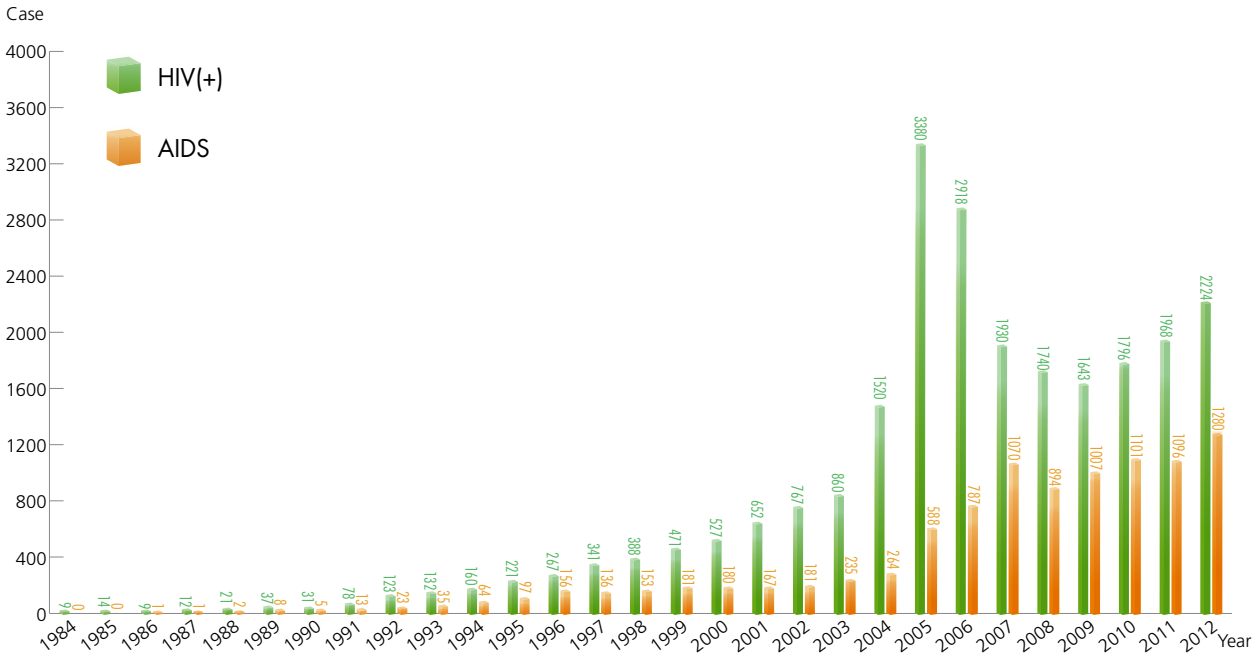
2012 Focus -
"Turn the Tide, Stop with Me."

"Turn the Tide, Stop with Me."

Current Status

The first HIV case in Taiwan was reported in 1984. By 2012, the number of HIV patients had accumulated to 24,239 (9,725 of whom had developed full-blown AIDS with 3,771 deaths). The number of HIV infections surged in 2005 due to a major increase of infections among injecting drug users (IDUs). Facing with this serious situation, Taiwan CDC worked with other department 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 (See Figure 2-1). In 2008 and thereafter, the epidemic took a turn; infections were mainly noted among men who have sex with men (MSM). In face of the rising AIDS epidemic, the most pressing course of action is the reinforcement of the health education campaign and intervention programs for the MSM group.

Figure 2-1 Reported Cases of HIV/AIDS by Year of Diagnosis in Taiwan, 1984-2012



HIV (+): The number of newly reported HIV cases.
AIDS: The number of newly reported AIDS cases may include HIV cases reported in previous years.

In terms of age, the largest number of infections in 2012 was in the 20 to 29 age group, accounting for 1,089, or 49.0%, of all cases. The second largest group was the 30 to 39 age group, numbering 676, or 30.4%, of all cases (see Table 2-1). An analysis of risk factors showed that in 2012, the highest proportion of HIV infections was a result of unsafe sexual transmission, with men who have sex with men (MSM) accounting for 77.2% of all cases. The second largest proportion of infections was heterosexual contact, accounting for 14% (see Figure 2-2). In total three major transmission routes for infection are the MSMs, IDUs, and heterosexuals. Of Taiwanese nationals infected by HIV in 2012, 2,151, or 97%, were males and 73, or 3%, were females. The ratio of infected males to females was 30:1.

Table 2-1 Age Distribution of HIV Patients in Taiwan

	2011		2012		1984-2012	
Age	Cases	Percentage	Cases	Percentage	Cases	Percentage
0-9	1	0.05%	1	0.04%	40	0.17%
10-19	63	3.20%	78	3.51%	629	2.59%
20-29	974	49.49%	1,089	48.97%	9,741	40.19%
30-39	543	27.59%	676	30.40%	8,255	34.06%
40-49	257	13.06%	261	11.74%	3,695	15.24%
50-59	93	4.73%	77	3.46%	1,271	5.24%
60-69	22	1.12%	27	1.21%	408	1.68%
70-79	13	0.66%	10	0.45%	171	0.71%
Over 80	2	0.10%	5	0.22%	29	0.12%
Total	1,968	100.00%	2,224	100.00%	24,239	100.00%

Figure 2-2 Statistics on Risk Factors of HIV Infections in Taiwan, 1984-2012

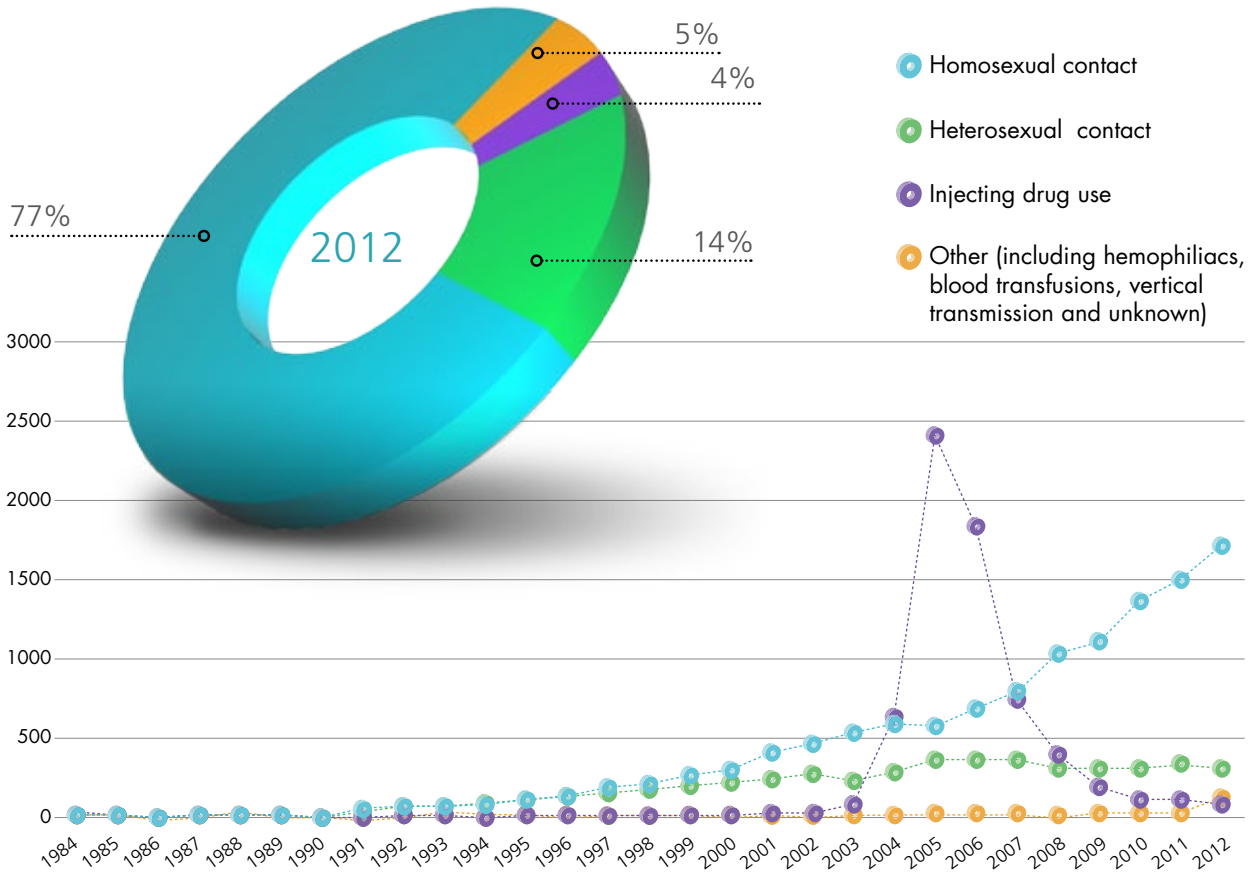
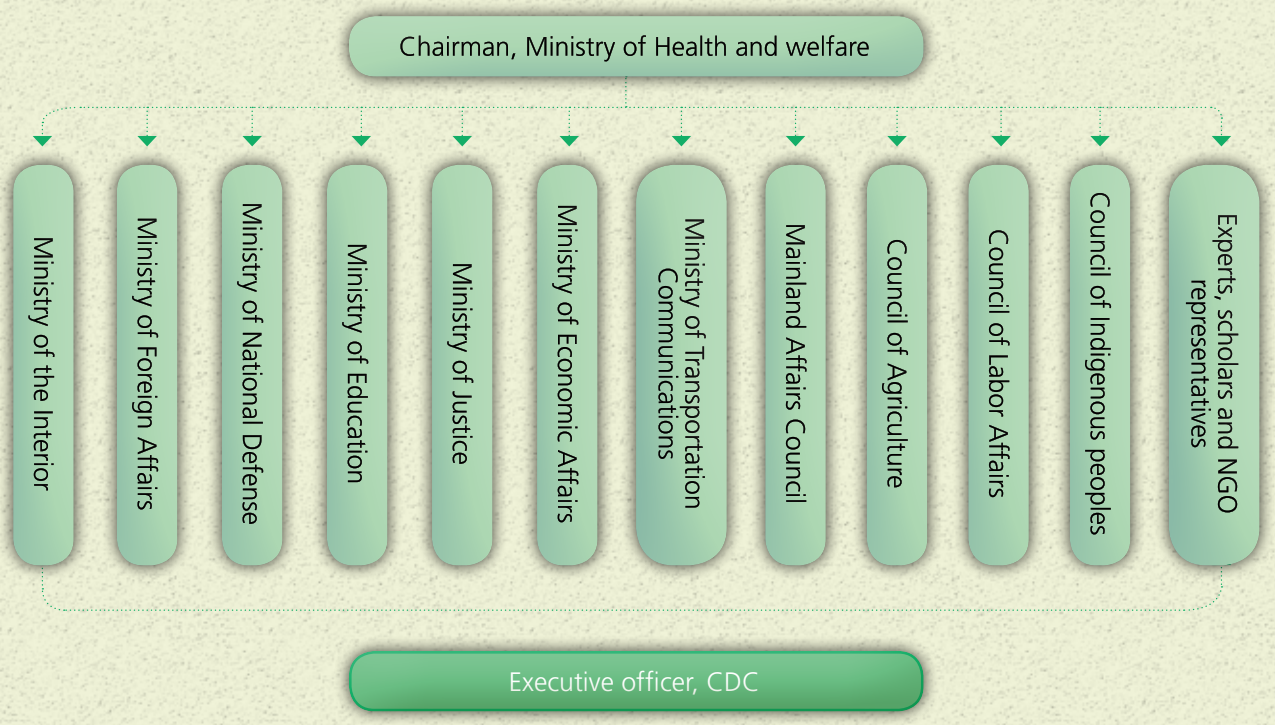


Figure 2-3 Committee for HIV Infection Control and Patient Rights Protection, Ministry of Health and Welfare, Executive Yuan



Accomplishments

1. The Committee for HIV Infection Control and Patient Rights Protection (see Figure 2-3) held two cross-ministerial meetings in 2012.
2. To ensure the dignity and rights of people living with HIV/AIDS (PLWHA), the AIDS Prevention and Control Act was amended in 2007. The related regulations were also amended and announced.
3. The harm reduction program has made significant progress.

   The reported number of HIV infections dropped in 2006, toward the end of 2010, Taiwan saw an effective reduction in the number of HIV infections, with the largest decline among IDUs. In addition, the percentage of all newly reported cases attributable to IDU fell from a high of 72% in 2005 to only 3.6% in 2012.
4. 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 to MSM. (2) Implementation of health education and intervention services, such as the internet opinion leader and internet monitor. (3) Providing voluntary HIV counseling and testing services at sauna centers and pubs via NGOs'

cooperation. (4) Implementation of the friendly, healthy, and safe label for MSM sauna and the 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 them with immediate and accurate health information and counseling on HIV related matters.

5. To enhance disease surveillance, Taiwan began to screen blood donors in 1988, draftees in 1989, prison inmates in 1990, and foreign laborers in 1991. Ten hospitals have provided anonymous HIV blood-screening services since 1997. To increase accessibility of HIV screening services, 34 hospitals provided anonymous HIV testing in 2012. They screened 29,427 people, with 715 found to be HIV positive, accounting for 2.4% of the total. Furthermore, to cope with the increase in female HIV patients and the issue of mother-to-Child transmission of HIV/AIDS, an HIV screening plan was established for pregnant women. Thus far, it has detected 85 positive cases (21 were foreign nationals). Between 2009 and 2012, there is no child born with HIV in Taiwan. Taiwan has prevented mother-to-Child transmission of HIV/AIDS for four consecutive years.

6. 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 2012, 47 designated hospitals provided treatment to HIV/AIDS patients. The rate of receiving medical care within 3 months after diagnosis of HIV infection has achieved to 87%. Nations around the world encourage HIV patients to return to their homes and communities. If HIV patients take their medication according to the prescribed schedule, their immune systems can be maintained at a certain level, allowing them to 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.

7. In the area of scientific research and development, Taiwan CDC conducted 12 projects in 2012 and continued to commission National Taiwan University Hospital to establish an AIDS treatment center. The center trains physicians to build a specialist medical corps for bringing HIV/AIDS under control.

8. Taiwan CDC introduced "I-Check" campaign to promote screening through social network from Oct.15 to Dec.15, 2012.

The campaign includes (1) Established 101 I-LEADER recruitment centers and 439 I-CHECK Consulting and Inspection Centers through, which they recruited 342 young people as new I-LEADERS. (2) Inviting partners of those living with HIV to become "I-Mates" and visit counseling and inspection centers for services with their significant other to decide – together or separately – to get tested anonymously. (3) For those who cannot go to a counseling and inspection center in person can still get tested for HIV through "I-at Home". Individuals can send in saliva samples using mouth swabs from prepared home kits for assessment and receive preliminary screening results before going to an actual center for counseling.

This campaign is comprised of three main components, mainly uses interpersonal networks to influence individual to utilize anonymous testing. Taiwan CDC cooperates with hospitals, local public health center and non-government organization to set up recruitment offices and I-Check Counseling and Inspection Centers. I-Check campaign emphasis on voluntary and privacy, and the consultation is the key service other than testing. Taiwan CDC encourages those who practice unsafe sex to join I-Check campaign.

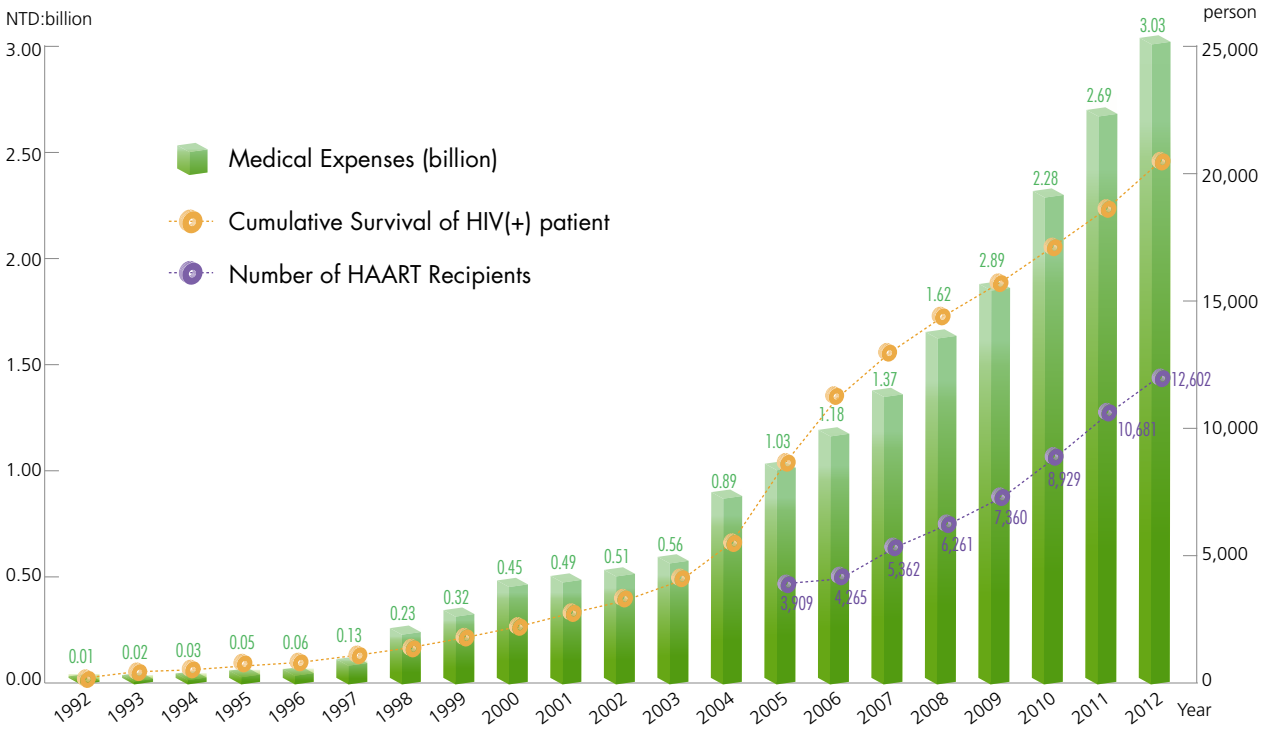
In two months, out of 15, 621 who participated in I-CHECK, 193 or 1.24% tested positive for HIV and 108 (56%) were successfully referred to medical treatment after consultation. Furthermore, 4 out of 589 who opted to use the saliva test tested positive for HIV and accepted referrals for medical treatment.

Future Prospects

According to statistics from the Bureau of National Health Insurance (NHI), medical expenses for HIV patients in 2012 totaled about NT$3.03 billion (see figure 2-4). Furthermore, other AIDS-related costs, such as popular education and screenings plus other medical costs (clinical examinations and psychological consultations) also increased immensely. For this reason, Taiwan CDC has applied multiple medical expense control plans to curb the increase of medical cost since 2011.

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 has achieved remarkable results but has been 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.

Figure 2-4 Annual AIDS Related Medical Expenses of Taiwan, 1992 – 2012



International Health

International Cooperation

Current Status

Over the past several years, Taiwan CDC has worked hard to enhance international exchanges on health affairs related to infectious diseases. Its efforts include participating in international public health programs and conferences, strengthening bilateral and multilateral relationships, helping allies raise their capacities for communicable disease control, and exchanging advanced technology 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 - Health for all.

Accomplishments

1. Organizing International Conferences

(1) To deal with the problem related to health associated infection, Infection Control Society of Taiwan and Taiwan CDC co-hosted "International Symposium of Catheter Association Blood Stream Infection".

(2) DOH-NTU Infectious Disease Research and Education Center and Taiwan CDC co-hosted "Development of EV71 Vaccine-the Present and the Future" conference on October 20th to share the experiences on developing EV71 vaccines and the related regulation amendment.

(3) Not only to help APEC members to build its own capacity but also to share experiences, Taiwan CDC held 2012 APEC workshop on Influenza Vaccine Policies and Strategies in post-pandemic era. A total of 26 representatives from 13 economies, and 84 experts from Taiwan participated in this conference. The conference focused on "Vaccination Policy Formulation", "Vaccination Program Implementation", "Vaccine Safety Monitoring" and "Communication for Vaccination Program".

2. Promotion of Bilateral or Multilateral Cooperation

(1) Americas countries:

A. 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).

B. Taiwan CDC invited experts from the Center for Biosecurity of Medical Center at University of Pittsburgh to conduct an external review on the emergency preparedness and responses system in Taiwan.

C. 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, and has trained 6 technicians with laboratory related skills.

(2) European countries:

A. Taiwan CDC deployed staff to the Australian Gynaecological Endoscopy Society (AGES) for European CDC EPIET training.

B. Expert from Health Protection Agency (HPA) visited Taiwan in June, 2012 and invited Taiwan CDC to participate in the London 2012 Olympic and Paralympic Games International Mass Gatherings Health Observer Programme and Health Protection 2012 held by HPA. Moreover, the communication between Taiwan FETP and UK FETP has begun, and exchanged staffs from each side to learn communicable disease prevention and control experiences.

(3) Asian countries:

A. Taiwan CDC held the 9th Taiwan-Japan Bilateral Symposium on Emerging, re-emerging, and post – disaster infectious diseases, the participants were about 90 persons.

B. Taiwan CDC conducted 7 bilateral cooperation projects on the diagnosis or mechanism of Sapovirus, Brucellosis and Leptospirosis, Entamoeba Histolytica, Vector-borne pathogens, Bordetella Pertussis, Tuberculosis,as well as Leprosy with Japan National Institute of Infectious Diseases (NIID).

(4) Multilateral Cooperation:

Taiwan CDC continued the cooperation on "Research on Proteomics of Snake Venom in *Trimeresurus mucrosquamatus and Trimeresurus stejnegeri*" with the Institute of Buomedicine of Valencia in Spain and the University of Costa Rica, and published a paper named "Snake venomics and antivenomics of Protobothrops mucrosquamatus and Viridovipera stejnegeri from Taiwan: keys to understand the variable immune response in horses".

3. International Exchanges in 2012

(1) A total of 221 guests from 25 different countries visited Taiwan CDC.

(2) Taiwan CDC participated in WHO conferences and related activities, including attending the 65th World Health Assembly (WHA) as an observer, the 65th Regional Committee for the Western Pacific and attended 3 technical meetings.

(3) It joined 2 APEC Conferences, including the 2012 1st and 2nd APEC Health Working Group Meeting, and purposed a plan on "The Innovation, Achievement and Sustainable Development in Public Health Emergency Response System 10 Years after the SARS Epidemic"

(4) It participated in 21 international conferences, sending 39 staff overseas, and dispatching 25 employees to join 21 the short-term study, 1 is for long-term study- EPIET training.

Future Prospects

Increasing international contact and transport 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 the accomplishments 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 or other events organized by international institutes and forums, including the WHO and APEC.
2. Establishing more bilateral or multilateral cooperation projects with other countries.
3. Taking part in international humanitarian relief efforts and dispatching more epidemiologists and experts to needy areas to provide disease prevention support.

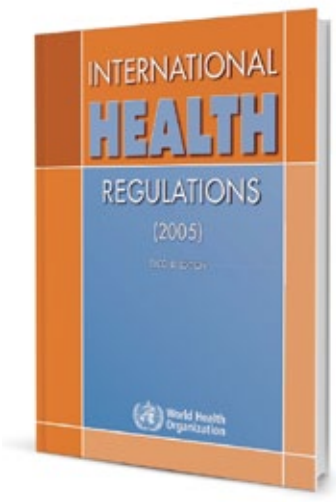
Implementation of the IHR

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 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 which have the potential to become an international concern.

Following the IHR, Taiwan CDC works with the WHO and other countries to conduct prevention and control measures for communicable diseases and other major public health events.



Operations of IHR Focal Point in Taiwan

1. Receiving information on epidemics or public health incidents that meet WHO IHR standards for reporting:

   WHO established the Event Information Site (EIS) for IHR National Focal Points (NFPs) and granted Taiwan access in 2009. If an epidemic or public health incident occurs that meets IHR standards for reporting, WHO uses IHR channels to alert each country, including Taiwan.

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

   A cross-departmental contact point has been established in Taiwan CDC to facilitate timely correspondence with WHO IHR on information regarding major public health incidents. Agencies with available counterparts include bureaus within the Ministry of Health and Welfare, the Taiwan Food and Drug Administration (TFDA), the 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.

Accomplishments

Within 2012, Taiwan CDC acquired 30 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. Therefore, in 2012, Taiwan finished the evaluation of core capacity requirements described in the Annex 1 of IHR (2005), and had collated related stakeholders' comments and opinions of government authorities, and then concluded that Taiwan is capable to implement the capacities according to 1A: "Core Capacity Requirements for Surveillance and Response" and 1B:"Core Capacity Requirements for Designated Airports, Ports and Ground Crossings". The document, 2012 Questionnaire of IHR Core Capacity Monitoring Framework, had also been submitted by IHR focal point.

International Ports Quarantine Activities

Current Status

Situated in a subtropical zone, Taiwan is vulnerable to the invasion of various tropical diseases. This is especially obvious because of its thriving international tourism and trade. To prevent the import of diseases and ensures 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 has revised the Regulations Governing Quarantine at Ports. These regulations 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 Process Operations: Calling for timely revision and standardization of operational procedures by reacting to the latest epidemic information while benefiting from historical precedence.
3. Quarantine Procedure Follow Through: 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 the progress in implementing core capacities at PoE and making efforts to meet IHR (2005) requirements in this field.

Accomplishments

1. One-Stop Information Service: Establishing a one-stop information system for all information regarding quarantine operations. This included quarantine operations for aircraft and ships, ship sanitation certificates, vaccinations, fee collection, online checks statistics, and etc.
2. Aircraft and Ship Quarantine:

   (1) Any aircraft with crew or passengers exhibiting communicable disease-like symptoms or dead

is required to notify Taiwan CDC and document the event. Taiwan CDC will take adequate measures according to the situation.

(2) Any ship arriving at a port in Taiwan is required to report the state of its sanitation and the passengers' health before arrival via telegraph, telex, fax, mobile phone, or e-mail to apply for review. Permission to enter the port is granted after reviewing the report and confirming there is no danger of importing a disease.

(3) There are some possible scenarios for on-board quarantine:

A. For aircraft: according to the event and the 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 the 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 patient or death on the ship.

The following table shows the state of quarantine in 2012:

Regional Center Work at International Ports in 2012

Regional Center	Quarantine Office	Ships	Aircraft	Passengers	Cargo Planes	Tonnage of Cargo	Percentage
Taipei	Keelung	5,014	159,506	-	-	-	-
	Suao	559	1	-	-	-	-
	Taipei	2,453	2,028	-	-	-	-
	Kinmen	10,216	722,879	1	2	0	0
	Matsu	1,385	20,136	-	-	-	-
	Songshan	-	-	8,052	1,368,953	0	0
Northern	Taoyuan	-	-	78,885	12,908,707	11,534	3,446,447
Central	Taichung*	6,799	69,570	4,707	455,135	0	0
Southern	Mailiao	2,387	58	-	-	-	-
	Tainan	-	-	2	278	0	0
Kaohsiung-Pingtung	Kaohsiung*	15,545	17,173	10,505	1,599,359	2	787
	Makung	341	280	0	0	0	0
Eastern	Hualien*	1,027	9,105	132	15,301	0	0
	Taitung	-	-	43	4,707	0	0
Total		45,726	1,000,736	102,326	16,352,423	11,537	3,447,234

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 the 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 17,491,283 passengers who arrived in Taiwan last year, only 14,556 showed symptoms and were put on the local quarantine follow-up list. Arriving passengers who become ill after entry are encouraged to seek medical advice and inform their doctor of recent travel history.

   Last year, through body temperature scans, Taiwan CDC found 89 cases of dengue fever, 18 cases of shigellosis, 7 cases of chickenpox and one case of chikungunya. In addition, in the section of communicable diseases not included on the list of notifiable communicable diseases, Taiwan CDC found 1 case of Vibrio parahaemolyticus and 1 case of salmonella.

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 takes 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. The rats caught are examined for parasites, furthermore, its blood serums are examined for evidence of Rickettsia typhi, plague and hantavirus.

   (2) Mosquito Control:

   Mosquitoes are vectors of several communicable diseases, including yellow fever and dengue fever. The mosquito population density is closely related to the development of an epidemic. Therefore, it is necessary to understand the variety and quantity of mosquitoes because controlling the population can prevent an epidemic. 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: Traps are placed around the port/airport for mosquitoes to lay eggs. They are pieces of coarse cloth moistened with temephos. 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 their types and track their activities.

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

5. IHR Core Capacities at Designated PoE: The protocol aimed at achieving core capacity requirements at the designated points of entry in Taiwan was granted by the Executive Yuan. A cross-government platform was established in order to facilitate according activities. Designated Taoyuan International Airport and Port of Kaohsiung had conducted the self-assessment and an initial assessment was carried out by the external expert. Through the approach, several gaps were identified and a plan of action was therefore developed for further accommodating the implementation of the IHR (2005). A symposium was organized jointly with Executive Yuan and Ministry of Transportation and Communication in the end of 2012. Through animatedly sharing of experiences, participants unanimously agreed that the cooperation of all involved stakeholders is fundamental for developing core capacities. Consensus achieved in this symposium will thereby boost more active participation in the preparedness for the projected assessment, which aims to verify our improvement can be consistent with IHR core capacity requirements by external experts in March, 2013.

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 the WHO IHR (2005) and the Regulations Governing Quarantine at Ports.

A. IHR (2005) has been entered into force since June 15, 2007, through the required sanitary documents for international shipping, including the Ship Sanitation Control Exemption Certificate/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 necessary quarantine work at the ports to prevent transmission of communicable diseases.

Future Prospects

1. Increasing manpower and equipment to strengthen quarantine functions, and conscientiously conducting the 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 the monitoring of rat and mosquito populations in port areas to avoid the spread of communicable diseases.
4. Building core capacities at designated PoE based on the IHR (2005).

Domestic Epidemic Prevention –

From Cradle to Tomb, from Individual to Community.

Health Marketing

Goals

To let the general public know communicable disease related policies, make everyone be a part of the battle against epidemics, and to support Taiwan CDC's actions, we developed a series of interactive health marketing programs to promote disease prevention.

Accomplishments

1. Monitoring and Immediate Responses to Disease Prevention

News monitoring and alert mechanisms enhance communication of communicable disease control policies.

In 2012 Taiwan CDC released 4,991 reports in response to public concerns over disease control conditions. Authorities hold press conferences and issue press releases to inform the public and publicize policy.

Last year Taiwan CDC held 80 press conferences while issuing 269 press releases and newspapers published over 872 news reports.

2. Integrated Marketing of Disease Prevention

By focusing on specific issues, Taiwan CDC aims to attract media attention and spread its message to every household in the nation.

In 2012, Taiwan CDC held the following disease prevention campaigns:

(1) Integrated AIDS Prevention Marketing

HIV/AIDS prevention and treatment in Taiwan focuses on youths and homosexual contact. In 2012 Taiwan CDC hosted a range of activities, including online promotions, to target these groups, giving them a better understanding of HIV/AIDS prevention and treatment concepts.

This year Taiwan CDC cooperated with VM Theatre to turn its stage musical "Daylight" into a film. The play uses drama to convey accurate HIV prevention concepts to youths and was provided to schools nationwide to enhance sex education.

An important part of HIV prevention is bridging the gap between youths who know that they should use condoms and those who actually use them. Therefore during summer vacation Taiwan CDC launched an online game called "Creature Detector". Players input simple

information about themselves to find out what kind of "creature" they are while learning the same information for their Facebook friends. The game provides personalized information to players while using the power of the internet to spread ideas for achieving "zero" HIV transmission and the proper method for using condoms. Online game lets youths shed their defenses and become more accepting of using a condom. The goal is for them to commit to the slogan "HIV, Stop With Me" by rejecting temptations, remaining faithful to one sexual partner, and using a condom throughout intercourse. The game also encourages people not to discriminate against those already infected. It spread a message of acceptance and care as a part of the joint effort to prevent and treat HIV and AIDS.

A. World AIDS Day: The WHO has called on nations around the world to work toward the goals of zero new HIV infections, zero discrimination and zero AIDS-related deaths. Taiwan CDC contributed to these efforts through a cross-departmental mobilization program called "START Screenings, STOP AIDS," which gained the support of the Ministry of Education, the Taipei City Health Bureau and the Taipei Department of Education. Joined by Standard Chartered Bank, Taiwan CDC led 1,076 students from KaiNan Vocational High School in lining up to form a human AIDS-ribbon pattern on the school grounds. Together, they announced their determination to prevent the spread of HIV and AIDS.

B. Former Health Minister Yaung Chih-liang attended a stage production of "Daylight" with an HIV patient whom he helps as mentor. The pair called on the public to confront AIDS issues and work together to prevent further spread of the disease. Together with Taiwan CDC they urged the public to reject temptations, remain faithful to sexual partner, and practice the correct use of condoms. Their goal was to promote the slogan "AIDS, Stop with Me"

C. Recognizing that HIV had begun to infect a greater share of youths, entertainer Frankie Gao and his son played a condom game with general public and urged families to discuss safe sex. They believe that parents must communicate with youths and provide them with accurate HIV prevention information. Also during summer vacation in 2012 Taiwan CDC hosted an event centered on the theme of safe online relationships for a well-spent youth. The event, which took place at Red House Square in Taipei's Ximending, focused on HIV prevention and encouraged parents to heed the seriousness of the issue.

D. Taiwan CDC uses Condoms to Build a 'Noah's Ark of Love'. In 2012 the world faced predictions of its demise on December 21 based on interpretations of the Mayan calendar. Ahead of this fateful "doomsday" date, Taiwan CDC used condoms to build a Noah's Ark of love. It encouraged youths celebrating the end of the year to stay safe by using condoms when having sex. Then, in case the end of the world failed to arrive, they would not have to live with HIV or another sexually transmitted disease.

(2) Integrated Marketing of Tuberculosis Prevention

A. World Tuberculosis Day

Ahead of the March 24 World TB Day, Taiwan CDC held a news conference to kick off the campus-based "Hold Out Against TB, Say 'No' to Infection" activity. A National Taiwan University student who had overcome the disease discussed why there is no need to fear TB. He said as long as patients adhere to their treatment schedule, they should be able to return to a normal life. Students at Shih Hsin University also formed a special band which used music to encourage classmates to become advocates of TB prevention.

B. Diverse Promotions to Battle TB

Taiwan CDC and the Ministry of Education joined for a TB campaign. On 19 university and technical school campuses they installed 3D floor art featuring five themes: superman, kung fu training posts, weights,

open mouths and hand signs. Campus groups contributed by encouraging students to take photos on the 3D art and post the images online. Creativity led to student participation, thereby raising knowledge of TB prevention and treatment.

C. Call for Submissions to Stop TB

To celebrate the 130th anniversary of discovering the bacterium that causes TB, Taiwan CDC called for creative submissions that followed the World TB Day theme of "Stop TB in My Lifetime." Anyone with a moving story about TB or an innovative idea for preventing or treating the disease was welcome to participate, whether they were public health officials or medical personnel, students or teachers, or simply members of the general public. Taiwan CDC published 33 of the 72 stories and ideas it received.

(3) Integrated Marketing of Influenza Prevention

To kick off the season for government-funded influenza vaccines, on October 1 Director-General Chang Feng-Yee rolled up his sleeve and received the first shot. The government provided the vaccines to high-risk groups. Taiwan CDC urged others who felt they needed immunization along with people at moderate risk, such as patients suffering from chronic diseases or pregnant women, to get vaccinated at their own expense.

Unfounded fears are an obstacle to immunizations. Taiwan CDC therefore launched a family-based website that recruited doctors, parents and representatives of children's health groups to dispel common myths by answering five questions: 1. Are influenza vaccines safe? 2. Do influenza vaccines prevent all colds? 3. My baby is healthy, so why does he/she need a shot? 4. If I've had influenza before do I need another shot? And 5. If I had been vaccinated last year, do I need another shot this year? The website urged parents to bring their children in for a vaccine before the arrival of peak influenza season.

When government-funded vaccines are available, Taiwan CDC also cooperates with well-known doctors who double as bloggers. They have the knowledge and reputation to effectively spread correct vaccine-related information. Readers learn that influenza vaccines are both safe and effective.

(4) Integrated Marketing of Enterovirus Prevention

An outbreak of enterovirus emerged in the spring and summer of 2012. To educate parents and caregivers about treatment, Taiwan CDC invited former Legislator Cheng Yun-Peng and a boy who had overcome a severe case of enterovirus to attend a news conference to share their experiences. Taiwan CDC, Dr. Lu Chun-Yi of National Taiwan University Hospital and the boy's father reminded parents to check their children daily for signs of enterovirus infections, such as hand, foot and mouth disease or herpangina. They said if children tested positive for enterovirus, it was important to keep a close watch for any symptom changes. They also urged everyone to wash their hands and keep the home environment clean.

(5) Integrated Marketing of Dengue Fever Prevention

To stop the spread of dengue vectors (mosquitoes), Taiwan CDC used a promotional campaign to urge people to clean or dispose of containers and other vessels from indoor and outdoor areas. People spending time in southern Taiwan or other affected parts of Southeast Asia should take extra precautions against mosquitoes. While anyone experiencing dengue fever symptoms such as a high temperature, headache, retro orbital pain, muscle pain, joint aches or rash should seek immediate medical attention.

3. Communicable Disease Reporting and Counseling Hotline: 1922

To provide a convenient channel for communicable disease reporting and counseling, Taiwan CDC has operated the easy-to-remember, toll-free 1922 hotline since 2003. It provides 24-hour, year-round service for disease reporting, communicable disease counseling, prevention policy promotion and control measures to educate the public.

1922 疫情通報及關懷專線
Communicable Disease Reporting and Consultation Hotline

In 2012, the 1922 hotline received 72,197 calls and referred 36,228 cases for handling. Since January 1, 2010, a survey has been conducted on user satisfaction toward the hotline covering four main topics: waiting time, service attitude, clarity of explanation and timely response. Among 3,671 responses gathered in 2012, 96.2% of people said they were satisfied.

4. Other Social Marketing Channels

To promote its cause to different groups, Taiwan CDC constantly looks for new marketing channels. In 2012, it continued to improve marketing via traditional channels such as print and broadcast media while also developing interactive online marketing.

Taiwan CDC's marketing channels include:

(1) The Internet:

The influence of internet is far-reaching, making it an important part of Taiwan's media and a powerful marketing tool. Taiwan CDC's websites are available in various formats, with versions for the general public and health professionals, mobile phone users and English readers. In 2012 it added a new website specifically geared toward children while continuing to update the easy-to-use websites for the general public and the information-rich websites for professionals.

Taiwan CDC has established an online disease prevention community. Its 1922 hotline disease prevention information banks on Facebook, is very popular, and more than 50,000 people have accessed its blogs. These sites serve as a bridge to spread communicable disease control ideas online. The blogs also feature weekly lifestyle articles that stimulate discussion among disease prevention workers.

Taiwan CDC strived to boost promotion of its 1922 hotline in 2012. A Facebook page dedicated to the hotline surpassed 40,000 fans, growing by 25,000 in 2012. The Facebook page not only spreads disease prevention information online but also holds special activities to boost disease prevention publicity campaigns.

(2) Media and Other Promotion Channels:

When announcing disease prevention measures or new communicable diseases, Taiwan CDC sends press releases to print and electronic media while releasing posters, fliers and airport advertisements to raise knowledge.

Previously Taiwan CDC relied on posters and comics to spread its message of disease prevention. This year it expanded its online reach through the weekly health horoscope and other online activities. It also designed new forms and pictures, and took photos of news conferences and special events. By keeping its messages up-to-date and relevant to people's lives while spreading information through the news and blogs, Taiwan CDC achieved greater visibility. It escaped the relatively rigid nature of traditional disease prevention educational materials, instead communicating in a practical, novel and interesting way.

A. Innovative Practices-Weekly Health Horoscopes

The 1922 Facebook page added a weekly health horoscope in 2012. Taiwan CDC invited expert astrologers to determine the weekly health fortunes for each of the zodiac signs. These included disease prevention information, pictures and brief descriptions, providing a personalized method for interacting with Facebook followers while urging them to prevent the spread of disease and heed their health. Fans could share these horoscopes with friends. Through the power of social media, Taiwan CDC expanded its disease prevention message.

B. Video News Reports

As media broadcasts focus more on video, Taiwan CDC has developed and promoted disease prevention videos. Adding video to its news reports lets Taiwan CDC better serve news agency needs and meet the demands of online broadcasts and other special media formats. It hopes to do a faster, more effective job of conveying disease control ideas.

C. Medical Correspondence Letters

To provide up-to-date information to medical personnel on communicable diseases, clinical treatments and disease prevention policies, Taiwan CDC sends special correspondence letters. It also conveys information through its electronic reporting system, the Bureau of National Health Insurance, hospitals, schools and guilds. In 2012, Taiwan CDC sent out 36 medical correspondences to 7,816 regular subscribers, including 59 hospitals, schools and guilds. The response was positive.

D. E-card

On New Year's Eve, Taiwan CDC sent an e-card to local and international disease control partners to thank them for their support over the past year and wish them good health and a happy coming year.

The card's design features a red and gold theme, colors that express joy and prosperity in the east. The photo shows a group of students forming a red ribbon on World AIDS Day 2012, while the style of "2013" is reminiscent of a snake, to commemorate the Year of the Snake.

E. Disease Prevention Awards

To honor people who made major contributions to disease prevention research and strategies along with groups or individuals notable for their communicable disease control work, on September 19 Taiwan CDC held the 2012 Disease Prevention Awards. At the ceremony, which was based on the theme "courage and action in the face of disease," 47 public and private organizations and individuals were honored for their contributions to disease prevention.

The event focused on the hard work each award winner put into disease prevention and praised grassroots level personnel who spared no effort in preventing disease.

F. CDC Exhibition Center

Taiwan CDC established the country's first CDC Exhibition Center at its Taipei office in 2000. The playful yet educational exhibit, which was based on the theme of infectious disease prevention, won widespread praise and became a favorite attraction for schoolchildren.

G. 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.

Future Prospects

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

Current Immunization Program & Vaccine Injury Compensation Program

National Immunization Programs

Current Status

Vaccination is one of the most cost-effective strategies in the fight against communicable diseases. Immunizations have been available since 1948, and now the Taiwan government provides free immunizations to children, 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, MMR (measles-mumps-rubella), Japanese encephalitis, Tdap-IPV (tetanus, diphtheria toxoids, acellular pertussis and inactivated polio vaccine) and influenza. Eight kinds of vaccines are available to children by 6 years of age. The current immunization schedule is shown in table 4-1.

Table 4-1 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									
Tetanus. Pertussis, Hib,Polio				DTaP-Hib-IPV1	DTaP-Hib-IPV2	DTaP-Hib-IPV3			DTaP-Hib-IPV4					Tdap-IPV	
Varicella*							Var								
Measies, 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

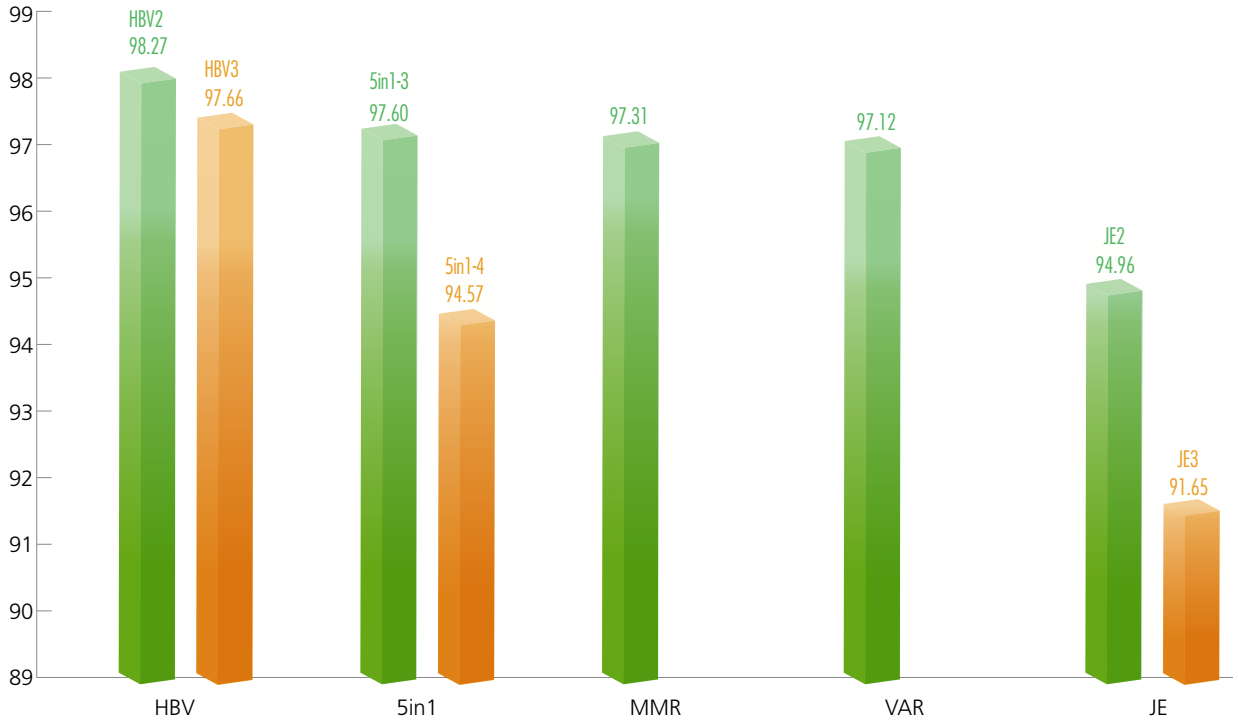
In selected aboriginal areas

Taiwan CDC is devoted to enhance the effectiveness of immunization and health care for children. Parents of newborns are given a children's health handbook with a recommended immunization schedule. User-friendly immunization-related materials are included to ensure that information is accessible and clear. Providing convenient immunization services helps to improve the coverage rate. To date, children can receive vaccinations at 372 health stations and more than 1,600 contracted hospitals and clinics across Taiwan. In 2009, more than 4,000 hospitals and clinics participated in the influenza immunization program, including providing vaccinations for children.

For the purpose to increase the immunization coverage rate, health stations regularly carry out health promotion programs, including mailing reminder postcards, making notification phone calls, scheduling home visits and providing media announcements, all aimed at informing parents of the importance of completing their child's immunization. Moreover, to ensure that children complete the vaccination series, 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.

Convenient service and policy promotion have helped improve the immunization coverage rate, which is now as high as above 95%. (see Figure 4-1)

Figure 4-1 National Immunization Coverage in 2012



Source: The values were calculated in May 2013 by compiling retrospectively the immunization data of National Immunization Information System

Footnote: 1. HepB: Hepatitis B vaccine
2. 5in1:DTaP-Hib-IPV
3. MMR-Measles, mumps and rubella combination vaccine
4. JE-Japan encephalitis vaccine
5. VAR-varicella vaccine

Accomplishments

1. To ensure vaccine quality and maintain effectiveness of immunizations, Taiwan CDC launched a vaccine fund in 2010 based on Article 27 of the Communicable Disease Control Act.
2. Taiwan CDC will continue to promote immunization policies and introduce new vaccines into routine immunization schedule. The 5-in-1 (DTaP-Hib-IPV) vaccine was launched to replace the

traditional DTwP (diphtheria, tetanus toxoid with whole cell pertussis) vaccine in March 2010. The switch reduces the chance of adverse reactions such as fever and local reaction such as redness or swelling where the shot is given.

3. Children under 5 years of age in high-risk groups have been given pneumococcal conjugate vaccine (PCV) since July 2009. In addition, children under 5 years of age who live in mountainous areas and offshore islands or who are from low-income families have been given PCV since January 2010. Further, children under 5 years of age from medium-low income family have been given PCV since 2012.
4. In 2011, Tdap-IPV was given to new enrollees in primary schools to replace Tdap and OPV. This policy improved vaccination convenience and successfully switched to IPV in accordance with the suggestion of WHO to cease the use of OPV after polio eradication.
5. To further improve the quality of vaccination service, Taiwan CDC revised the schedule of receiving MMR2 and Tdap-IPV from entrance into elementary school to 5 years old which encourage preschool children vaccinate in contract hospital/clinics instead of in school in April 2012. Therefore children can acquire immunity earlier.
6. Local health bureaus and health stations received subsidies to renew and replace their cold chain and storage facilities to ensure the quality of vaccines and maintain the effectiveness of immunization. Taiwan CDC held education and training seminars on the cold chain system, storage management, National immunization information system and immunization practices to ensure vaccine quality and professional knowledge of medical personnel.

Future Prospects

1. Build a safe vaccine supply system and increase coverage by implementing immunization services to effectively control communicable diseases and protect public health.
2. Introduce new vaccine policies on the EPI-recommended vaccine list after: (1) Reviewing communicable disease control; (2) Assessing the effects on public health, social economics and medical costs; (3) Updating vaccine R&D, production and supply information; and (4) Allocating the health fiscal budget for vaccine purchase.
3. Promote e-management of immunization programs to strengthen information management and analysis, improve service capabilities, integrate information on immunization, accelerate resource sharing and enhance efficiency, in order to be on par with other advanced nations.
4. Develop and promote an appropriate immunization program for the elderly to reduce mortality and morbidity rates from complications of vaccine-preventable diseases.
5. With a stable source of support from the vaccine fund, Taiwan CDC will gradually add new vaccines to the routine immunization schedule based on cost effectiveness and recommendations of the Advisory Committee on Immunization Practices. In the future, new vaccine policies planned to be promoted include:

(1) Pneumococcal conjugate vaccine (PCV) for children aged 1-2 years old in 2014, and introduce into routine immunization schedule in 2015.

(2) Provide the elderly over 65 years of age with pneumococcal vaccine.

(3) Introduce cell-based JE vaccine to replace originally used mouse-brain JE vaccine.

National Immunization Information System

Current Status

To handle a variety of situations, including immunization work demands and the enhancement of data bank efficiency, and to keep pace with rapid advances in information and network technologies, Taiwan CDC established the National Immunization Information System (NIIS). In 2004, Taiwan CDC used the system to consolidate immunization data scattered among various health stations into one database. This has greatly improved work efficiency because authorities can directly manage operations that take place within their jurisdictions.

NIIS, together with household registration authorities and medical institutions, has used functions such as the computerization of case referrals and allocations, along with real-time establishment of databases, to improve the management of immunization operations and the efficiency of storage and retrieval of immunization information.

Household data are obtained from the Department of Civil Affairs, Ministry of the Interior. The information is updated daily and collected for transmission to NIIS. This immunization data distributed throughout the health stations can be consolidated for registration, eliminating the need for separate data storage, lowering referral consolidation expenses and raising cost effectiveness.

Through NIIS, authorities can contact parents by text and e-mail to remind them of their children's immunization time, thereby improving immunization coverage rates.

Accomplishments

1. Completion of immunization electronic reporting operations for contracted medical institutions (about 1,600).
2. Progressive replacement of magnetic strip cards with the National Insurance IC cards used by contract hospitals/clinics to report immunization information. Up to 2012, approximately 570 contract hospitals/clinics have completed the changeover.
3. Enhancing the functions and efficiency of the central database to handle yearly increases in data quantities, improving management efficiency.
4. Use of different ways to trace and urge the unvaccinated people to get vaccinated, reducing delays and raising the coverage rate. Also, when Taiwan CDC personnel find high-risk household cases, they referred to social welfare agencies to take over.

5. For children entering the country, Taiwan CDC compared entry information from the National Immigration Agency, Ministry of the Interior with NIIS data on children who had not received the MMR vaccine. It then informed local health agencies to find these children and arrange for vaccination. In 2012, a total of 4,975 such children were found, with 2,627 having been vaccinated after tracking. The coverage rate reached above 52%.
6. Vaccine operational procedures have been computerized to increase efficiency.

Future Prospects

1. Taiwan CDC will continue to promote the use of vaccination records in National Insurance IC cards to report immunization information in contract hospitals/clinics, strengthen the functions of NIIS and classification of information on immunization target groups to improve the accuracy, completeness and timeliness of immunization data.
2. Taiwan CDC will continue to 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. Taiwan CDC will seek feasible channels for completing immunization of such high risk groups.
3. Taiwan CDC will integrate various databases and systems (household registration, foreign spouses, reporting of communicable diseases) to improve the coverage rate, conduct follow-up efficacy assessments, report adverse reactions and monitor the efficacy of vaccines in disease prevention.
4. Diversify NIIS immunization reminders. Through text messages and e-mails, parents are reminded of the immunization time for their children, thus improving immunization coverage rates.
5. In order to eliminate measles, Taiwan CDC cross match the entry information of the National Immigration Agency, Ministry of the Interior with immunization information of NIIS to track those who who go to China and Southeast Asia frequently and do not receive MMR vaccine on schedule. In addition to MMR, Taiwan CDC also plans to expand to other routine vaccines this year to maintain high coverage rate.

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

Current Status

Taiwan launched polio, measles, congenital rubella syndrome (CRS), and neonatal tetanus (NT) eradication programs in 1991. The goal of polio eradication was achieved on October 29, 2000. Currently, the epidemic areas are confined to only four countries worldwide. In Taiwan, more than 98% of infants receive three doses of polio immunization (DTaP-Hib-IPV), to be in accordance with the suggestion of WHO to cease the use of OPV after polio eradication, Tdap-IPV was given to new enrollees in primary schools to replace Tdap and OPV in 2011. Although Taiwan has eradicated polio, it has to maintain vigilance. Measles can be eliminated through vaccination and thus, is the primary elimination target after polio.

In 2012, there were nine confirmed measles cases, five of them were imported cases, four of them were importation-related, and the incidence rate for indigenous cases was under 1 per 1 million. No confirmed NT case has been reported since 1996, the exception case was an isolated case involving a child born to a foreign mother in 2001. Since 1994, five cases of congenital rubella syndrome (CRS) have been confirmed. Four of five patients' mothers were foreigners. In 2012, no reported and confirmed rubella case was found.

Rubella, commonly known as German measles, occurs worldwide, in 2012, there were 12 confirmed cases and 6 of them were imported cases.

This indicates that the latent danger of communicable diseases cannot be ignored, especially in view of frequent business exchanges, booming tourism, import of foreign labor, and the increasing number of marriages between Taiwanese and new female immigrants from Southeast Asia or Mainland Chinese. It is, therefore, necessary to continue the eradication program for polio, measles, CRS, and NT.

Accomplishments

1. In 2012, 62 AFP (Acute Flaccid Paralysis) cases under the age of 15 were reported and investigated. The investigation completion rate within 48 hours was up to 98%. None of the cases were polio or polio compatible.
2. Since January 1, 2009, all foreigners applying for a residence or settlement are required to submit an antibody positive of measles / rubella report or immunization certificate. Also, since September 1, 2009, the physical check for foreign laborers before entry has included an item of "an antibody positive report of measles/ rubella or the immunization certificate."
3. In 2011, Taiwan ACIP (The Advisory Committee on Immunization Practices) recommended that a soldier stationed in surrounding islands should get one dose of MMR before arriving in the island.
4. In 2012, Taiwan ACIP recommended that health care workers should get two doses of MMR except that they have antibody positive of measles or immunization certificate.

Future Prospects

1. Prevent the importation of polio to maintain the eradication of the disease and complete strategic planning of the global polio eradication program.
2. Implement active surveillance for measles, identify cases of measles infection and complete measles elimination certification in accordance with the WHO schedule.
3. Complete rubella elimination certification in accordance with the WHO schedule.

Hepatitis Immunization Program

Current Status

To strengthen viral hepatitis control, Taiwan CDC proposes a five-year program (starting in1982) at every 5-year interval. The priorities are: improving the surveillance system for acute cases, severing hepatitis A infection paths, enhancing health education on liver disease control, improving blood transfusion management, and raising hepatitis examination quality. Taiwan CDC will move in the following directions: early detection and screening of hepatocellular carcinoma, and seeking effective hepatitis treatment.

Accomplishments

Hepatitis A

Confirmed cases of acute viral hepatitis A in aboriginal regions were reduced from 183 in 1995 to 0 in 2012 and the incidence rate was lowered from 90.74 out of 100,000 people in 1995 to 0 in 2012.

Hepatitis B

1. The carrier rate of children at age six had 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 2010 are 97.9% and 96.9%, respectively.
3. Hepatitis B vaccination rates are 99.6% for the second dose and 99.4% for the third dose among first-graders in 2011.

Future Prospects

1. Among infants born to a mother who is with e antigen positive, there is a 10% chance that they will become chronic carriers of hepatitis B even after receiving hepatitis B immunoglobulin (HBIG) and three doses of immunoprophylaxis. For these children at a high risk of vertical transmission, Taiwan CDC has begun offering free hepatitis B screenings at age 1 and is working to understand the effectiveness of the vaccination series. It will continue to provide information to parents to raise the percentage of children who are screened.
2. Establish the Platform of Integrated Screening Information for Chronic Hepatitis B and C to promote the surveillance of chronic hepatitis B and vaccine cost-effectiveness assessment, to formulate and operate policies concerning hepatitis and hepatoma, and to minimize expenditures for the repeated screening of high-risk groups.
3. There are approximately 2.5 million Hepatitis B carriers and 400,000 people infected with Hepatitis C among adults in Taiwan. To give appropriate treatment to the infected population and reduce the incidence rate of liver cirrhosis and hepatoma, the Bureau of National Health Insurance continued to promote an Enforce Hepatitis B and C Trial Treatment Program. In addition, it maintained funding for the program so more people could benefit.

Vaccine Injury Compensation Program (VICP)

A VICP claim evaluation committee meeting in progress

In response to the 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 for compensation with their local health bureaus in the event of death, physical or mental impairments, serious illnesses, or adverse reaction resulting from vaccination. Claims are reviewed by the Vaccine Injury Compensation Working Group to ensure that individuals gain expedited and rational compensation and eliminate public doubt towards vaccination, and thereby increase the general vaccination rate.

Claim processing time will vary according to the complexity of the claim. In year 2012, 112 cases were settled with an average processing time of 103 days from the date of acceptance. As of the end of year 2012, a total of 1,249 claims had been reviewed since program inception, and compensation disbursement had reached NT$82.73 million dollars.

Table 4-2 Types of Compensation and Maximum Amounts Payable by the Program in connection with vaccine injury

Injury or condition covered by VICP	Compensation Classification	Max. Compensation Payment
Death	Vaccination is related to the cause of death	NT$ 6 million
	Vaccination is possibly related to the cause of death	NT$ 3.5 million
Physical or mental impairment	Vaccination is related to the cause of the physical or mental impairments	NT$ 5 million
	Vaccination is possibly related to the cause of the physical or mental impairments	NT$ 3 million
Serious illness	Vaccination is related to the cause of serious illness	NT$ 1 million
	Vaccination is possibly related to the cause of the serious disease	NT$ 0.6 million
Adverse reaction	Vaccination is related to or possibly related to the cause of adverse reactions	NT$ 0.2 million
Funeral subsidy	An autopsy is conducted on the corpse to assist in determining whether or not the death could be attributable to vaccination	NT$ 0.3 million
Medical Allowance	Medical examination done to verify the correlation between the individual's medical condition and vaccination	NT$100,000
Subsidy for embryo test after miscarriage or fetus autopsy	Miscarriage or fetal death on or after the 20th week of pregnancy	NT$100,000
	Miscarriage or fetal death before the 20th week of pregnancy	NT$50,000

Figure 4-2 Flowchart of Vaccine Injury Compensation Claim Evaluation Process

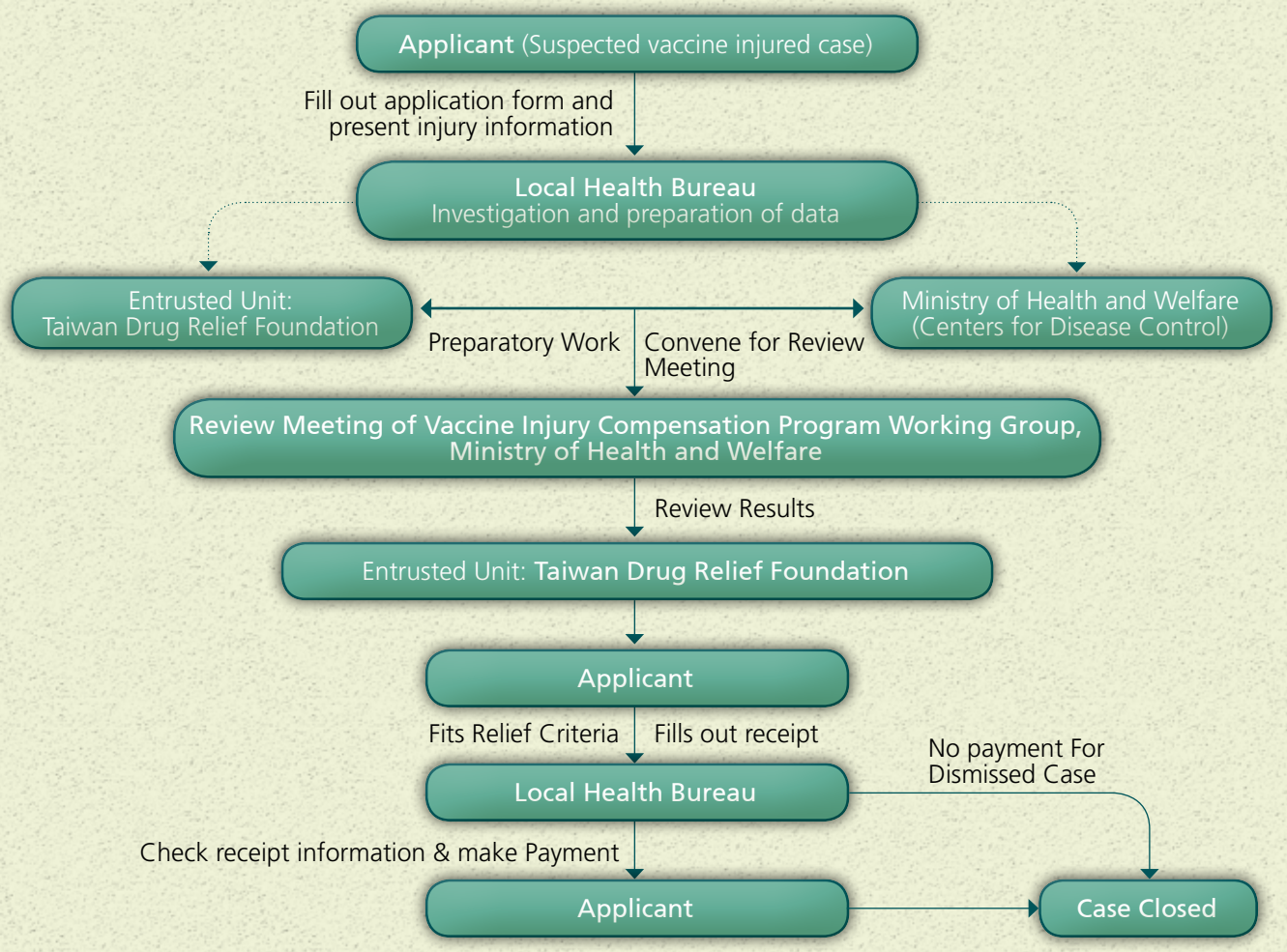
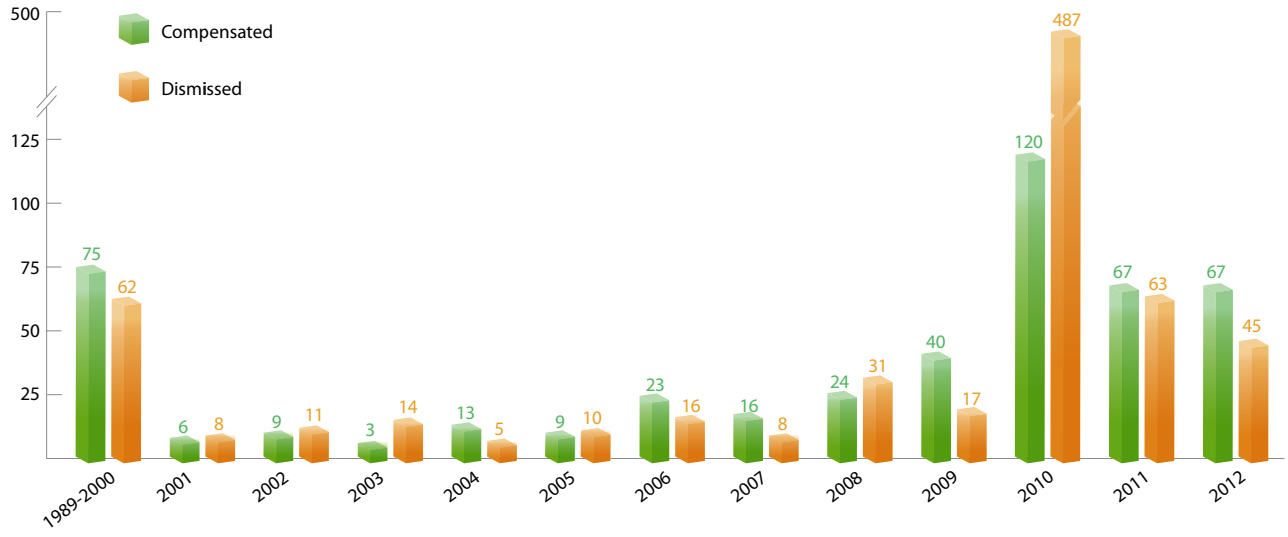


Figure 4-3 Total number of cases settled per year from program inception, 1989 - 2012



National Communicable Disease Surveillance Systems

Current Status

Ever since Taiwan CDC was reorganized in July 1999, responsibility for infectious disease surveillance was handed to the National Communicable Disease Surveillance Systems. The systems began with surveillance of notifiable diseases plus sentinel surveillance to detect epidemics, and later on several systems were built to collect timely, complete and precise information on infectious diseases. Taiwan CDC's vision of these systems is to monitor the nation's health status and detect outbreaks rapidly by integrating various infectious disease surveillance networks.

The work Taiwan CDC carried out included:

(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

1. Notifiable Diseases Surveillance System

If a doctor treats a suspected patient who has come down with a notifiable infectious disease, the doctor must report the case within a certain time. Taiwan CDC established the Notifiable Disease Surveillance System to give medical personnel across the country and provide a platform for reporting diseases and grasping information related to communicable disease occurrences immediately.

By using the system, the medical personnel can make early informed decisions on assigning the appropriate amount of manpower and resources to carrying out disease prevention, thereby keeping diseases from spreading.

The first stage of the Notifiable Diseases Surveillance System was to establish a web-based version, and it was finished in July 2001, enabling easier and more detailed transmission of reported information. The second stage, completed in September 2004, was to strengthen the surveillance system. In September 2006 the third stage, integrated the Notifiable Disease Surveillance System, was accomplished. The fourth stage, finished in June 2008, built a single reporting gateway and increased user-friendliness of the systems. Taiwan CDC maintains these systems and increases their user-friendly functions.

The following table4-3 shows the five categories of notifiable diseases in Taiwan.

Table 4-3 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	Acute Hepatitis Unspecified
	Mumps	Legionellosis
	Invasive Haemophilus Influenzae Type B Infection	Syphilis
	Gonorrhea	Enteroviruses Infection with Severe Complications
	HIV Infection	AIDS
IV	Herpesvirus B Infection	Leptospirosis
	Melioidosis	Botulism
	Invasive Pneumococcal Disease	Q Fever
	Endemic Typhus Fever	Lyme Disease
	Tularemia	Scrub Typhus
	Varicella	Cat-Scratch Disease
	Toxoplasmosis	Complicated Influenza
	Brucellosis	New Delhi metallo--lactamase 1 Enterobacteriaceae
	Creutzfeldt-Jakob Disease	Brucellosis
V	Rift Valley Fever	Marburg Fever
	Yellow Fever	Ebola Fever
	Lassa Fever	Middle East respiratory syndrome coronavirus (MERS-COV)

2. School-Based Surveillance System

Taiwan CDC implemented the School-Based Surveillance System in 2001. As of 2012, 659 elementary schools (25% of the country's total) had joined the program, covering students from kindergarten to grade 6 in 97% of cities and towns. Medical issues monitored under the system include ILI, HFMD, herpangina, diarrhea, fevers and acute hemorrhagic conjunctivitis (AHC). Through the system, Taiwan CDC collects information from schools weekly, analyzes trends at the regional level and in each school, and regularly provides reports to participating schools as well as educational and public health authorities.

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

3. Symptom Surveillance System

International contact and travel by Taiwan nationals are on the rise, easing transmission of communicable diseases across borders and challenging disease prevention workers. For example, in the summer of 2008, 10 out of 11 people in a religious group were shown to have come down with dengue fever on a trip to Myanmar. To prevent the entry of emerging communicable diseases like dengue fever, and to facilitate early public health monitoring and implement epidemic prevention measures, Taiwan CDC established the Symptom Surveillance System. In addition, in 2006 Taiwan CDC integrated several active surveillance systems to enhance the monitoring of the travelers at airports and harbors for diseases contracted abroad. These steps strengthened the efforts to battle communicable diseases from the outside while controlled cluster incidents and launched prompt disease prevention mechanisms.

Disease categories under surveillance include persons under investigation for H5N1 influenza, clusters of influenza-like illness cases, fevers of unknown etiology, diarrhea, coughing persisting for more than three weeks, upper respiratory tract infections, and clusters of enterovirus infection cases.

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 epidemic prevention measures.

4. 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 respiratory disease case is found among inhabitants or workers, the facility must file weekly online reports, confirm the data reported and report the number of people under its care.

5. Real-time Outbreak and Disease Surveillance (RODS)

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

6. Sydromic surveillance using the National Health Insurance data

Daily aggregate number of outpatient clinic, hospitalization, and emergency room cases of specific diseases from IC card information of the National Health Insurance Bureau are used to monitor trends of influenza-like illness, enterovirus infection, and diarrhea since April 2009. In year 2011, scarlet fever was included in the disease watch list.

7. Pneumonia and Influenza Mortality Surveillance

The daily updated death certification reports of pneumonia and influenza from the Statistics Office of the Ministry of Health and Welfare were applied to monitor the mortality trends of pneumonia and influenza as reference for future influenza prevention and control.

8. 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 the establishment of the Disease Reporting and Consulting Center to the telecom industry. The public can dial 1922 to report communicable diseases and obtain consultation and information on communicable disease policies. Taiwan CDC assigned full-time personnel to answer calls and take caller messages, developing the center into a communication platform.

9. Reporting via the Internet

To make operations of surveillance more effective, Taiwan CDC established several web pages on its systems for users to upload information.

10. Systems Integration

To enhance presentation and application, Taiwan CDC combined information and analysis and improved integration of its surveillance systems, including the Notifiable Disease Surveillance System, the Symptom Surveillance System and the Syndrome Surveillance System. This task was completed in September 2006.

11. Information Sharing

Taiwan CDC weekly generates the School-based Surveillance Weekly Report and the Influenza Express which are available online. In addition, daily updated reports on international epidemics are generated and forwarded to related authorities. Taiwan CDC regularly collaborates with academics

to conduct surveillance evaluation and develop new systems/methods. The collection, evaluation and dissemination of information to the public, local health departments and governing authorities, along with information sharing, are keys to complete this task.

12. Training and Education

Taiwan CDC offers training to system users so they keep remain informed of new epidemic surveillance information.

Reducing Key Infections

Tuberculosis

Tuberculosis has always been Taiwan's most dangerous communicable disease. Taiwan's per capita GDP has reached US$20,000, but there are still over 12,000 new cases of tuberculosis every year, making it a greater threat than all other communicable diseases combined. Although health workers in Taiwan have been working hard to control tuberculosis for over half a century, and the prevalence of the disease has been reduced. However, when compared with other advanced countries, Taiwan is still decades behind and needs to make more efforts to catch up.

Taiwan has a dense and mobile population. The highly developed nature has caused estranged personal relationships, and the abundance of medical resources let patients have too many options when they come to medical services. These two factors make detection and management of patients more difficult compared to rural societies. Recently, tuberculosis has begun to rise globally again, and factors such as, foreign labor, international travel and HIV-related complications make dealing with the disease more difficult locally. Therefore, to protect the health of the general public, Taiwan needs to use more active and aggressive methods when faced with new challenges in tuberculosis control.

Current Status

1. Incidence

There were 16,472 and 12,300 tuberculosis cases in 2005 and 2012, respectively. The incidence rate went from 72.5 to 53.0 (estimation) persons per 100,000 over this time period, which was 3% lower than the rate in 2011. This indicates that the number of tuberculosis cases is gradually decreasing with more active control measures, such as directly observed treatment (Table 4-4). In 2011, the proportion of smear-positive and laboratory confirmed new TB cases were 38% and 78%, respectively.

The data showed that the incidence rate of tuberculosis rose with age. Among new patients, 52% were over 65 years old. New tuberculosis cases tended to appear in urban areas. In 2011, the cities or counties with the highest number of new tuberculosis patients were New Taipei City (2,009 cases, 15.9%) and Kaohsiung City (1,949, 8.2%). Also, the incidence rate in eastern Taiwan was higher than the west, and the south higher than the north. The incidence rate was the highest in Pingtung County (97.5 per 100,000 population) and followed by Taitung County (97.2 per 100,000 population). In mountainous regions, the incidence rate of tuberculosis was 205.6 per 100,000 population, which was 3.8 times higher than all regions.

Taiwan's incidence rate in 2012 of 53.0 (estimation) per 100,000 population was 16.0 times higher than the United States and 3.0 times higher than Japan (rate of 2011). The main goals of Taiwan's TB policies are to lower the incidence rate of tuberculosis and protect residents' health, thereby improving quality of life.

Table 4-4 Taiwan Tuberculosis Incidence and Mortality Rate, 2005-2012

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(estimation)	12,300	53.0	630	2.7

2. Mortality Rate

Tuberculosis claimed 630 (estimation) lives in Taiwan in 2012, giving a mortality rate of 2.7 (estimation) per 100,000 population. The mortality rate of tuberculosis dropped by 37% from 2005 to 2012.

Among tuberculosis-related deaths in Taiwan in 2011, the number of deaths among males was 479, 3.0 times higher than that of females, which was 159. The mortality rate of tuberculosis also rose with age, with 85.6% of deaths in people aged 65 years and above. This shows that in Taiwan, the population group threatened most by tuberculosis is the elderly. Geographically speaking, mortality rates in eastern Taiwan were higher than in the west, while the south was higher than the north. The rates were lower in cities. The mortality rate of tuberculosis was the highest in Lien-chiang County, at 10.0 per 100,000 population (due to TB cases of Lien-chiang were rare). Taitung County followed at 7.4 per 100,000. In mountainous regions, the mortality rate was 14.5 per 100,000, which was 5.3 times higher than all regions (2.8 per 100,000).

Goals

1. To implement active strategies and enhance contact investigation to detect infected persons as early as possible.
2. To provide comprehensive medical treatment for TB patients and individuals with latent TB infection (LTBI). Prevent individuals with LTBI from developing into active TB and halve the number of TB cases.
3. To implement directly observed treatment short-course (DOTS) and directly observed preventative therapy (DOPT) to increase the completion of treatment and cure rate to stop TB from spreading.

Accomplishments

1. Improving Surveillance and Monitoring

National Tuberculosis Reporting and Management System

(1) Collects and documents information of tuberculosis patients

(2) Case management and epidemiological analysis

(3) Strengthens tuberculosis monitoring among high-risk group

2. Establishing a High Quality and Rapid TB Testing Network

(1) Emphasis of certification of network and improve quality of laboratories

(2) Monitoring and training of staff members

(3) Organization of reports on susceptibilities of drug

3. Directly Observed Treatment Short-Course (DOTS) Improving

"National Mobilization Plan to Halve TB in 10 Years"(implemented in 2006)

(1) DOTS coverage was at 100% in Taiwan from 2006.

(2) Treatment success rate for smear positive TB cases was about 66% in 2010, and not increased significantly. (Due to population aging: ratios of aged 65 years and above was 9.7% in 2005 and 10.7% in 2010)

4. Quality of TB Diagnosis and Treatment; Nosocomial Infection Control

(1) Quality of diagnosis and treatment: Taiwan CDC worked with medical association.

(2) Nosocomial infection control: Taiwan CDC worked with the Bureau of National Health Insurance on the prescription drug inspection system.

5. Establishing the Multi-Drug Resistant TB (MDR-TB) Medicare System

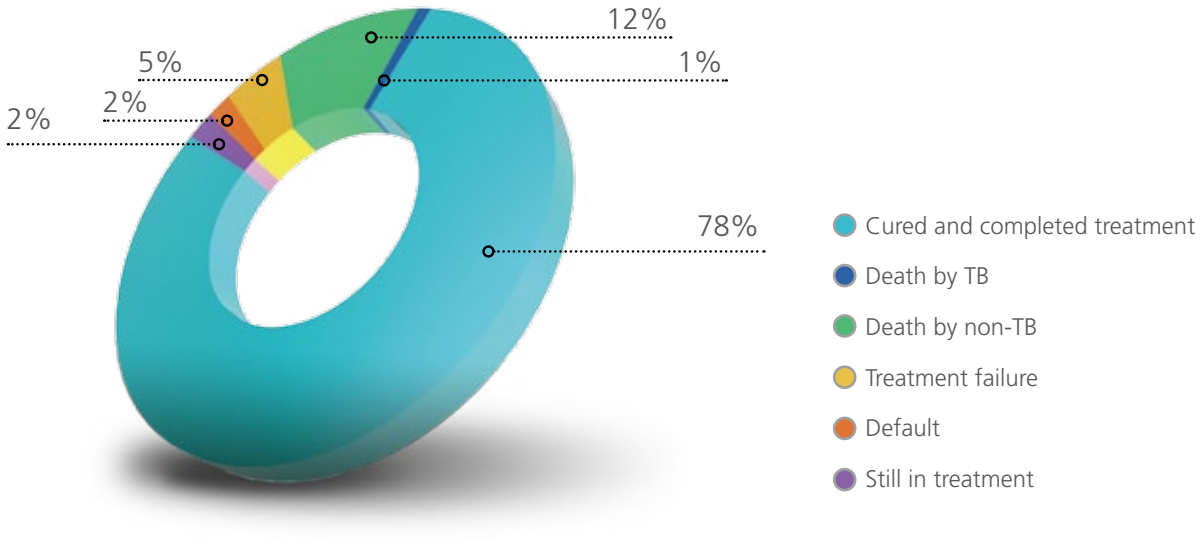
(1) "The Multi-Drug Resistant TB (MDR-TB) Medicare System" (established in May 2007)

(2) Taiwan CDC provides resources and designates teams to offer treatment according to the WHO clinical guide.

(3) After admission, MDR-TB teams actively treat each patient for two years, and community health workers provide personal care via the DOTS Plus program.

(4) A total of 179 (90%) cases were managed in the MDR-TB medicare system through the end of Dec 2012, leading to a steady decrease in the number of MDR-TB cases and a favorable outcome of about 78% at 24 months for patients who cured and completed treatment (Figure 4-4).

Figure 4-4 Treatment Outcome of Second Line Anti-TB Drugs at 24 months



6. Latent TB Infection (LTBI) Treatment Program (Initiated on April, 2008)

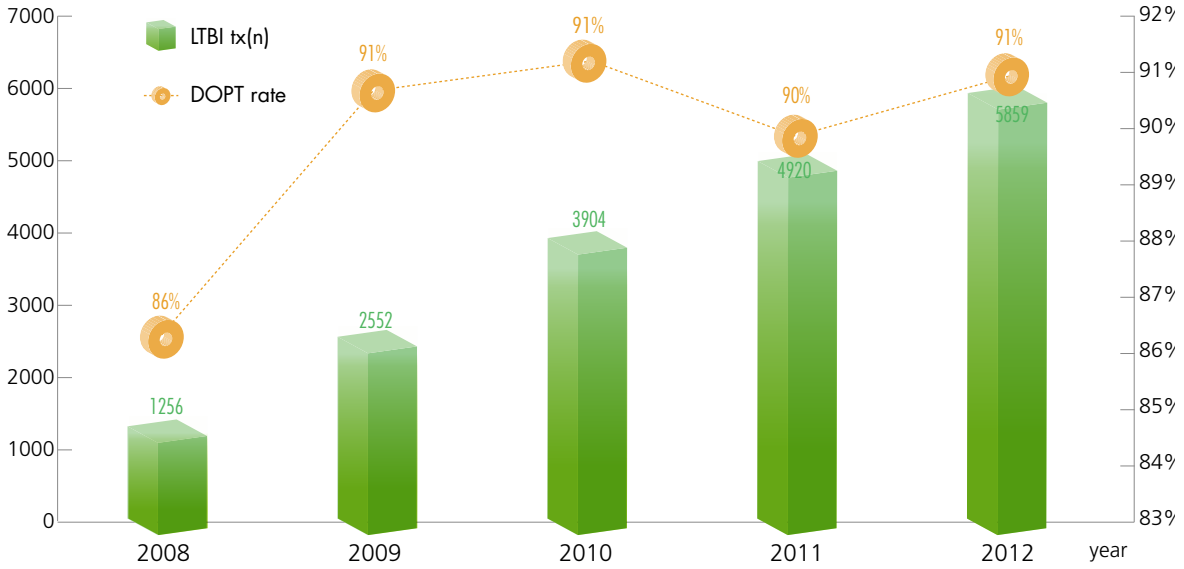
(1) The target population with transmitted case were:

A. Child contacts < 13 years old

B. Contacts over 13~ Born in 1986 & after (expanded since 2012)

(2) LTBI treatment and DOPT rates from 2008 to 2012 increased gradually (Figure 4-5).

Figure 4-5 LTBI Treatment and DOPT Rates in Taiwan, 2008-2012



7. Mandatory isolation of Infectious Pulmonary TB Patients

By regulations of the Communicable Disease Control Act, patients with infectious tuberculosis (especially patients whose sputum smear positive or patients of MDR-TB) will be placed undermandatory isolation care if the physician determines it is the most favorable way preventing transmission or if the patient does not take his or her medicine regularly and refuses the recommendation of hospital care.

8. Training, Research and International Cooperation

Taiwan CDC has worked with other government agencies, such as the Ministry of Foreign Affairs, to plan various international projects.

Future Prospects

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

Influenza

Current Status

In the 2011-2012 influenza season, confirmed cases of complicated influenza totaled 1,704 with a mortality rate of 9.04 %. Among confirmed cases that led to death, Influenza B was the primary virus type. In the current influenza season (2012-2013), as of December 31, 2012, confirmed cases of complicated influenza totaled 273 with 25 deaths, or a mortality rate of 9.16 %. Among confirmed cases that led to death, Influenza A/H3N2 was the primary virus type.

Also in 2012, seasonal influenza caused a small-scale summer epidemic with Influenza A/H3N2 as the primary virus type. As winter began, the influenza epidemic situation was relatively benign compared to previous years. Nevertheless, in light of the approaching influenza season Taiwan CDC continued to closely surveillance so it could protect public health. It used a variety of prevention and control measures, and promote the health education to public that incorporated a health promotion campaign.

Accomplishments

1. Since October 1, 2012, Taiwan CDC has implemented its annual seasonal influenza vaccination campaign, targeting on elderly people aged 65 and older, people with major illness/injury, people with rare disease, residents and personnel at nursing institutes, children aged 6 months through 6 years, elementary school students from grade 1 through 6, health care and public health personnel, poultry farmers and animal health inspectors. It expanded the program on January 1, 2013, to include people aged 50 to 64 with diabetes, chronic liver diseases, cardiovascular diseases, and chronic pulmonary diseases, and starting from December 26, 2012, it began to subsidize the full immunization and diagnosis fees for children aged six months to six years old. Previously, only seniors age 65 and up were eligible for the subsidy.
2. Antivirals play an important part of early treatment. Starting from December 1, 2012, Taiwan CDC expanded use of publicly funded influenza antivirals and increased their availability to 3,013 clinics and hospitals.
3. Taiwan CDC renders health education and promotion to the general public via various channels.
4. Taiwan CDC has a diverse system in place for real-time surveillance.
5. To discuss important policies, experts from a range of fields gathered to form the MOHW infections Disease Control Advisory Committee-Influenza canted group.
6. Taiwan CDC revised the "Practical Guidelines for Prevention and Control of Seasonal Influenza" (Figure 4-6) in November 2012. The guidelines serve as a reference for first-line health and epidemic response personnel.
7. To alleviate the surge of patients with mild symptoms in emergency rooms, Taiwan CDC encouraged hospitals to set up influenza-like clinics during the Lunar New Year holiday. Keeping these influenza patients out of emergency rooms is an effective means of preventing cross-infection. Also Taiwan CDC continued to promote the health education and risk communication for general public.

Figure 4-6 Practical Guidelines for Prevention and Control of Seasonal Influenza

Future Prospects

The most important part of influenza prevention is to foster of pubic hygiene habits improve. Therefore the government will continue to hold related educational and promotional activities.

Other important strategies in the future are keeping close surveillance of international and domestic epidemic situations as well as using of vaccine and antivirals.

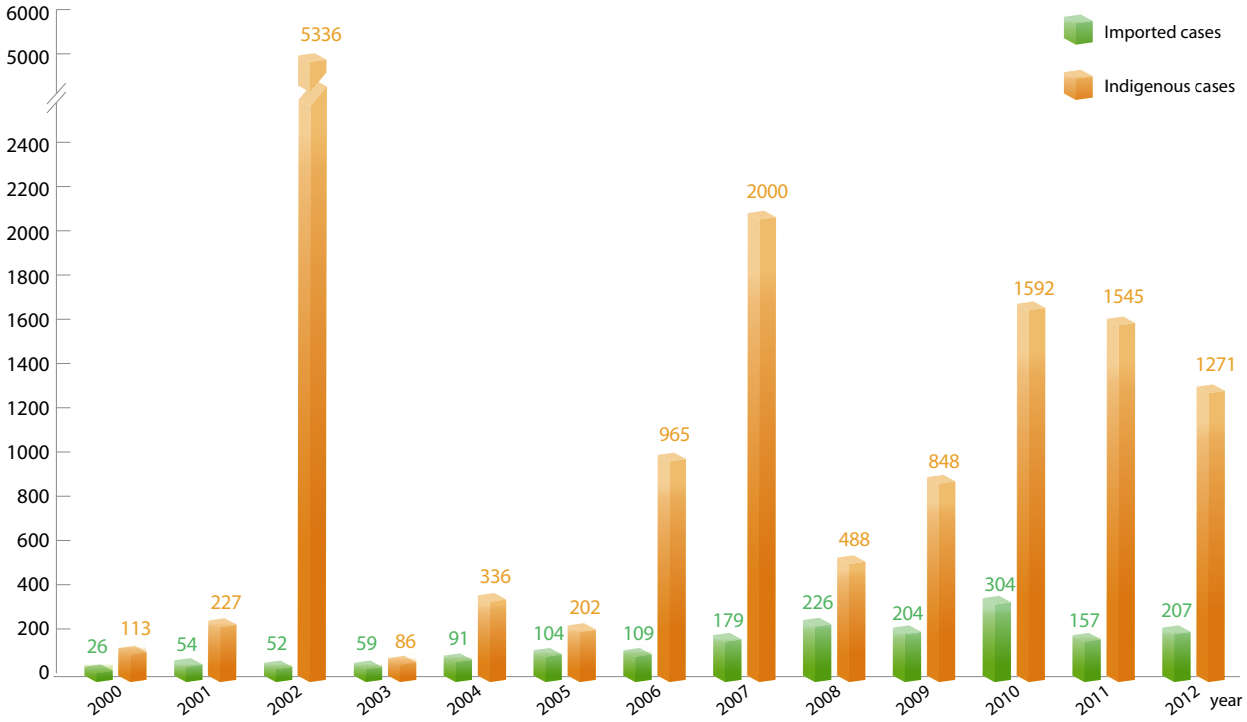
Dengue Fever

Current Status

The WHO has declared global warming and climate change to be new challenges of public health, and these threats are becoming more serious. 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 the third record high of 207 in 2012 (The first record high of 304 in 2010). The situation still has made it more difficult to control dengue fever locally.

There were 1,271 indigenous cases of dengue fever in 2012 in Taiwan. Among them, 35 cases were dengue hemorrhagic fever (DHF) and seven cases died. The cases were concentrated mainly in southern Taiwan, including Tainan City and Kaohsiung City. However, a small outbreak caused from imported cases also occurred in Taoyuan County in 2012.

Figure 4-7 Number of Dengue Fever Confirmed Cases, 2000-2012



Goals & Strategies

Control dengue fever in Taiwan by thoroughly 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 prevention measures cover disease surveillance and an emergency/contingency mechanism. Tertiary prevention involves controlling the number of deaths from the illness.

1. 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 keep a record of these places for future inspections.

(4) Strengthening the education and training to 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.

2. Secondary Prevention

(1) Constructing a disease surveillance mechanism for prompt control of suspected cases. To strengthen 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 an emergency/contingency mechanism to promptly investigate suspected transmission sources and spray insecticide to eliminate those sources and educating the importance of eliminating vector-breeding sites to prevent possible infection.

3. Tertiary Prevention

Establish guidelines for DHF diagnosis and treatment. To organize continuing education workshop for medical personnel to raise health care quality and lower mortality rates.

Accomplishments

In Taiwan, 1,271 people were infected with dengue fever in 2012. As a result of the coordination between the central and local governments, as well as medical institutions and environmental/ health organizations, and the cooperation of villages, schools and community members, effectively stopped further spreading of the disease. Below is the list of major achievements.

1. Primary Prevention

(1) Continuing body-temperature monitoring at international airports. In 2012, 82 cases of imported dengue fever were detected, accounting for 39.61% of the total number of 207 imported cases (see Table 4-5). This measure effectively limited importation.

Table 4-5 Serotypes and Origins of Imported Dengue Fever Cases, 2012

Countries of Infection	Serotypes					
	I	II	III	IV	ND	Total
Philippines	18	3	6	11	36	74
Indonesia	4	17	5	6	13	45
Vietnam	7	10	0	2	11	30
Thailand	5	5	3	0	7	20
Malaysia	4	0	1	3	6	14
Cambodia	1	0	0	0	9	10
Myanmar	0	0	1	0	4	5
India	1	0	1	0	2	4
Papua New Guinea	1	0	0	0	1	2
Bangladesh	2	0	0	0	0	2
Singapore	0	0	0	0	1	1
Total	43	35	17	22	90	207

(2) Distributing materials of health education and promotion, including leaflets, posters, banners, the Combat Manual for Dengue Fever and VCDs.

(3) Producing promotional materials with mass media, such as recordings, epidemic control programming and newspaper ads. These include TV commercials and short films for screening in TV slots reserved for the Government Information Office to make public service announcements. These materials call on the public to eliminate dengue fever vector breeding sources.

(4) Publishing the Guidelines for Dengue Control to assist the health organizations in their fight against the epidemic.

(5) Formulating the Community Mobilization Plan for Cleaning Up the Breeding Sources of Dengue Fever Vectors. Taiwan CDC encouraged community organizations in counties and cities in southern Taiwan to propose plans to CDC units, and further organized volunteer teams to exterminate mosquitoes.

(6) Inviting scholars and experts in insecticide efficiency and resistance studies of dengue fever vectors. The findings were referenced in the procurement of insecticides.

(7) Promoting 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 in and around the areas in southern Taiwan where dengue fever was prevalent.

2. Secondary Prevention

(1) Establishing an incentive system to encourage physicians and the public to report cases, which facilitates early detection of disease transmission. NT$2,500 to NT$4,000 was awarded to the physician or other medical worker who reports the year's first indigenou case of dengue fever and to individuals who found an imported case. If an individual volunteer for dengue fever testing and the case 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 to evaluate the insecticide resistance of dengue fever vectors.

Future Prospects

To strengthen dengue fever control, Taiwan CDC proposes a five-year program (starting in 2011) for eliminating vector-breeding sources and eliminating indigenous dengue fever. Taiwan CDC, the Environmental Protection Administration (EPA), local governments and NGOs will jointly implement it. 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.

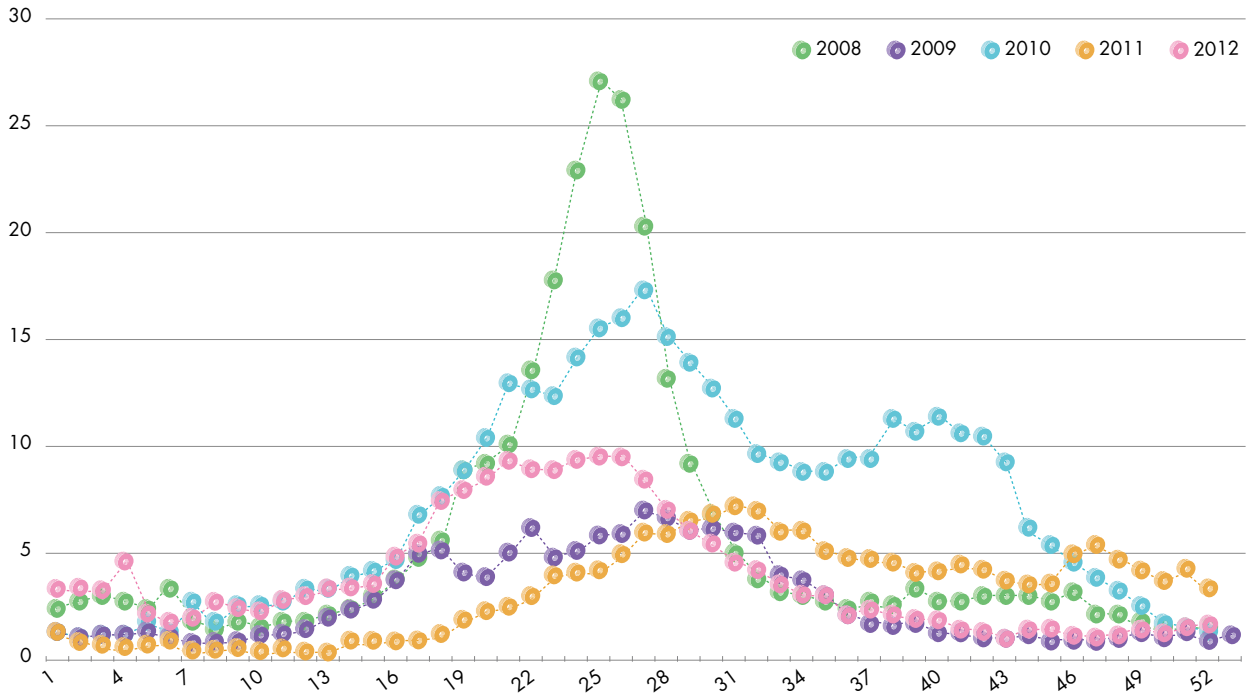
Enteroviruses

Enteroviruses belong 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 among 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 from several years provided by Taiwan CDC, the weekly consultation rate of enterovirus infection cases collected by the real-time outbreak and disease surveillance system (RODS) increases in late March every year and peaks around mid-June. It decreases after mid-June. There is usually another smaller outbreak of enterovirus infection when schools reopen in September (see Figure 4-8). Many types of enteroviruses exist around the world and they live inside humans. 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 that lives inside the human body. Therefore, enteroviruses will continue to pose a threat to human health for the foreseeable future.

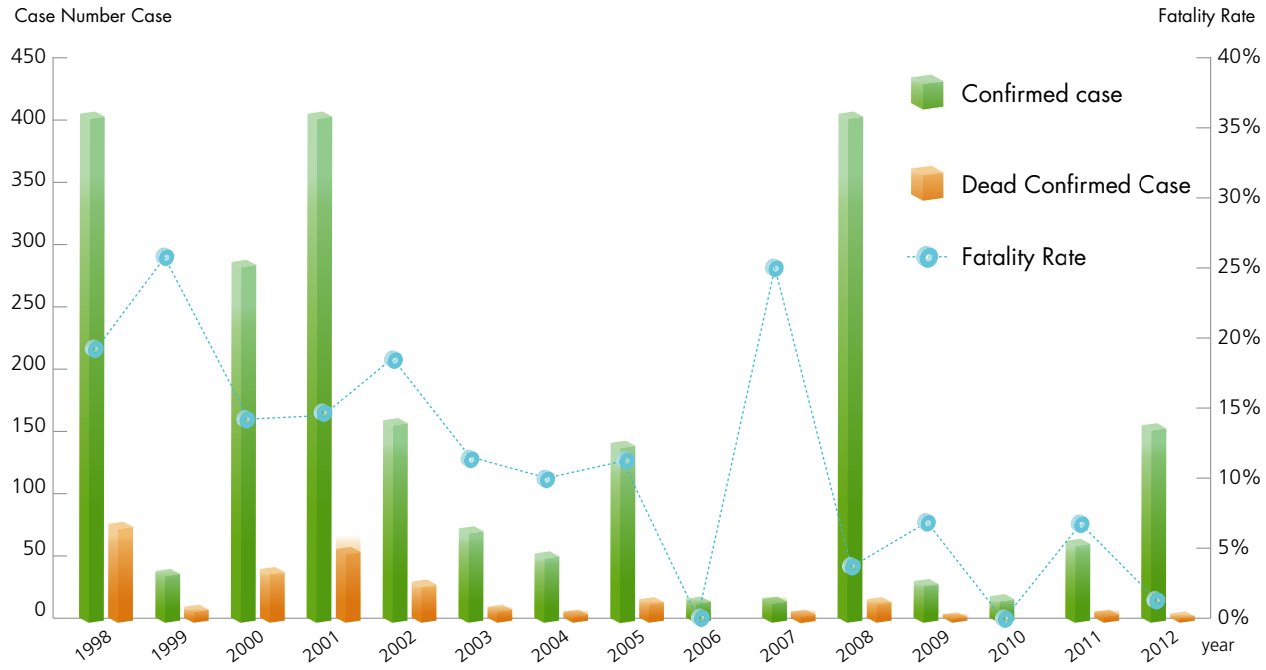
Figure 4-8 RODS Weekly Consultation Rate of Enterovirus Infections in Taiwan, 2008-2012



The peak season for enterovirus infections in temperate regions is summer. According to various surveys, trends in enterovirus infections suggest that children under the age of 5 are more prone to critical complications and death from enterovirus infections. 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 2012, the EV71 epidemic was more serious than the previous two years (see Figure 4-9). The number of EVSC increased from 2011 late fall, peaked in 2012 June then declined gradually. There were 153 confirmed cases of EVSC and 2 deaths resulted. Learning from the 2008 EV71 outbreak, Taiwan CDC has been adopting control and prevention measures actively since the latter half of 2011. With the assistance of surveillance systems, Taiwan CDC can take control measures in advance and minimize the social impact made by the disease.

Figure 4-9 Cases Number and Case Fatality Rate of EVSC in Taiwan, 1998-2012



Accomplishments

1. Taiwan CDC established multiple and real-time surveillance systems for enterovirus infections, covering HFMD and herpangina, severe cases, clustering, virus isolation and typing
2. It constructed a medical service network, including six regional chiefs, 72 responsible hospitals and 8 contract laboratories.

3. Finished EV71 vaccine phase I clinical trials in 2012.
4. 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 facilities for washing hands.
5. Taiwan CDC has established consultation channels by recruiting clinical professionals. The professionals provide clinical health care consultation and construct guidelines for treating enterovirus complications. Providing primary care to patients with complications can effectively lower the mortality rate.
6. "The Manual for Enterovirus Prevention" and "The Handbook for Enterovirus Prevention for Child Care Workers" list all necessary precautions. Those materials are provided on the website and updated annually.
7. Workshops are held on the clinical treatment of critical enterovirus complications to enhance doctors' skills in treating the disease, raising treatment quality and reducing mortality rates and sequelae.
8. Taiwan CDC developed an EV71 immunochromatographic (ICT) IgM rapid test in 2010, then, transferred the technology to biotechnology company in 2011, and completed kit commercialization (whole blood) in Oct, 2012.

Future Prospects

1. Enterovirus Prevention Enhancement

(1) Intensify 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 throughout the area to assess treatment criteria of severe enterovirus cases.

3. Accelerate Development of the EV71 Vaccine

Finish the Investigational New Drug (IND) process for the EV71 vaccine to get the vaccine license.

Emergency Preparedness & Response

Current Status

At the end of 2003, when the avian influenza epidemic emerged, Taiwan began to prepare for a potential influenza pandemic. Because the country had recently passed through the SARS epidemic, government agencies gave strong support to the effort, appropriating necessary funding for each aspect of preparations.

Currently, two documents guide preparation 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; as well as five lines of defense: containment abroad, border control, community epidemic control, maintenance of medical system functions, and individual and family protection. These 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"). Thereafter, on May 23, 2010, the Executive Yuan approved the Phase II plan for the continuation of the five-year plan. The Phase II plan upheld the "four major strategies" and "five lines of defense" for preparations and continued comprehensive evaluations.

2. The government has established three levels of control plans/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. These facilitate responses, risk communication and international cooperation. The government also updates both the Strategic Plan and Guidelines. Also, Taiwan CDC published the English-version of Third Edition in July 2012 (see Figure 4-10).

Figure 4-10"Influenza Pandemic Strategic Plan — Third Edition" (English Version)

3. Taiwan CDC held the APEC Workshop on Influenza Vaccine Policies and Strategies in Post-Pandemic Era from July 18 to 20, 2012. Attending the workshop were 26 representatives from 13 APEC members: Australia, Brunei, Hong Kong, China, Indonesia, Japan, South Korea,

Malaysia, Papua New Guinea, the Philippines, Thailand, the United States and Vietnam, along with 74 local experts (see Figure 4-11). Influenza experts from APEC member countries gave speeches and participants joined in small group discussions and reports. By experiences sharing, member countries reinforced their vaccine policies and strategies.

4. Taiwan CDC continued to participate in the Executive Yuan Avian Influenza Control Cross-sectoral Meeting. The meeting serves as a platform for discussing avian influenza strategies and a one-stop window for information exchange and notification.
5. Taiwan CDC issued the "H5N2 Avian influenza Prevention Guidelines for personnel" in March 2012, as part of its response to the outbreak of H5N2 avian influenza during the first quarter of 2012.
6. Taiwan CDC launched an H5N1 vaccination program during March to August for specific high risk groups in 2012.
7. Taiwan CDC conducted the Serological Survey for Avian Influenza Viruses among Poultry Workers in Taiwan.
8. Taiwan CDC completed ISO 9001 certification for its major (including emerging) communicable disease emergency response procedures as well as its stockpile and commissioned storage.
9. The Ministry of Health and Welfare commissioned the Center for Biosecurity of UPMC to assess Taiwan's public health emergency preparedness programs, 10 years after SARS.

Figure 4-11 The APEC Workshop on Influenza Vaccine Policies and Strategies in Post-Pandemic Era, held from July 18 to 20, 2012

Future Prospects

There is no way to predict when an influenza pandemic will occur, or whether the next pandemic will have a higher contagious and severity than the H1N1 influenza pandemic in 2009. The activate of response mechanisms are more timeless, flexible under the experience of influenza H1N1 pandemic. It also must continue to use diverse methods to closely surveillance international and domestic epidemic situations while forging ahead with its years of preparedness. Key strategies include:

1. Updating strategies when information becomes available.
2. Maintaining management of stockpiles.
3. Providing adequate provisions of vaccines and antivirals.
4. Strengthening the quantity and quality of manpower.

Maintaining these preparadeness while refining response mechanisms are important tasks, Taiwan CDC uses seasonal influenza outbreaks as a drill to test preparedness and rehearse response. It will also continue to carry out various drills at the central and local government levels as well as in medical institutions. When the need arises, it will conduct or participate on the international or domestic assessment when necessary.

Infection Control

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 promote international collaboration in hand hygiene and implement WHO hand hygiene toolkits for reducing nosocomial infections.
4. To continue promoting hospital participation and strengthen data quality in the Taiwan Nosocomial Surveillance System.
5. To monitor carbapenem-resistance gene variations and trends in *Enterobacteriaceae*.

Accomplishments

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

(1) In 2012, Taiwan CDC updated guidelines for preventing Norovirus gastroenteritis in healthcare facilities and recommendations for using personal protective equipment. Specifically considering influenza pandemics, it compiled infection control guidelines for healthcare facilities along with recommendations for Emergency Medical Services personnel during patient transit and ambulance decontamination. Taiwan CDC also provided infection control advice for novel coronavirus.

(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

(1) To protect patient safety and guard against nosocomial infections, Taiwan CDC encouraged stronger regulations through revisions to the Communicable Disease Control Act. Its actions led to an amendment announced in July 2007 and formulation of the Regulations Governing Inspection of the Implementation of Infection Control Measures in Medical Care Institutions,

in accordance with Paragraph 2, Article 32 of the act. The regulations, promulgated in January 2008, explicitly state infection control measures to be implemented by medical institutions and criteria for inspections by competent authorities.

(2) 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. In 2012, two of 489 hospitals inspected failed to meet standards. Local health departments tracked improvements through follow-up inspection.

3. Hand Hygiene Promotion

(1) Taiwan CDC popularized the WHO's Save Lives: Clean Your Hands initiative by publicizing the "My 5 Moments for Hand Hygiene." It also promoted the use of alcohol-based hand rubs by health care workers.

(2) To implement the second phase of the Hand Hygiene Improvement Program, Taiwan CDC funded three medical centers that aimed to become centers of excellence for hand hygiene. Furthermore, 311 of 325 hospitals that applied for the hand hygiene certification program were certified.

4. Nosocomial Infection Surveillance and Reporting

In 2012, about 420 hospitals reported data to the Taiwan Nosocomial Infection Surveillance System (TNIS), 35 of which used electronic data interchange modules. Taiwan CDC also produced a nationwide nosocomial infection quarterly report to provide periodic data feedback and strengthen communication with hospitals.

5. Surveillance of Carbapenem-resistance in *Enterobacteriaceae*

In 2012 Taiwan CDC used two channels to record 959 cases of drug-resistant bacteria: its multi-drug resistant bacteria monitoring system and its technology outsourcing plan. These included 122 examples of drug resistant genes in KPC (*Klebsiella Pneumoniae* Carbapenemase) and three examples in NDM-1 (New-Delhi metallo beta-lactamase-1). Besides helping hospitals enhance infection control measures, Taiwan CDC set prevention and treatment guidelines that raised treatment quality by minimizing the occurrence of multi-drug resistant bacteria.

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 policy making.
2. To improve nosocomial infection control inspections, Taiwan CDC will draft the 2012 nosocomial infection control inspection quality improvement project based on its implementation experiences from 2008 to 2011 and recommendations from various organizations. Moreover, it will arrange an inspection schedule based on the MOHW's 2011 medical investigation consolidation policy.
3. Taiwan CDC will continue promoting hand hygiene programs to build a hand hygiene culture in the health care system. To evaluate this culture it will use external assessments of hand hygiene infrastructure and compliance.
4. Using funding from Taiwan CDC, seven medical centers established the Center of Excellence for Central Line Associated Blood Stream Infection (CLABSI) Improvement Program. Taiwan CDC then selected 57 hospitals to participate. Its aim is to promote care bundles and decrease the incidence of CLABSI, thereby reinforcing patient safety, improving healthcare quality and reducing medical costs.
5. Together with three medical centers Taiwan CDC published the "Manual for the Implementation of Hand Hygiene Improvement Strategy." This helps hospitals improve patient safety and decrease the incidence of healthcare associated infections.
6. Taiwan CDC will continue to promote hospital participation in the Taiwan Nosocomial Infection Surveillance System while strengthening surveillance of nosocomial infections and antimicrobial resistance.

Laboratory Biosafety Management

After a SARS laboratory infection occurred in Taiwan in December 2003, laboratory biosafety became a major area of concern. Taiwan CDC created laws to regulate infectious materials, strengthen the inspection of biosafety level 3 (BSL-3) laboratories, improve training and drills for accidents, and establish an autonomous biosafety management system. These measures built a better oversight mechanism for laboratory biosafety. Taiwan CDC believes that laboratories can reach the goal of zero infections if industry, government and academia work together. It envisions a first-rate biosafety culture on par with advanced European and North American countries.

Current Status

1. Legislative and Regulatory Changes

To meet regulatory needs for infectious materials, Taiwan CDC drafted an amendment to Article 4 of the Communicable Disease Control Act. The draft amendment, which was completed in 2011, revised the legal definition of "infectious materials" to include risk group 1 (RG1) infectious materials.

Taiwan CDC began revising the Regulations Governing Management of Infectious Biological Materials and Collection of Specimens starting in 2009. It added some RG1 infectious materials, 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.

2. Registration of Organizations Practicing Biosafety

To implement an autonomous management mechanism for biosafety, any organization that holds or uses infectious materials belonging to risk group 2 (RG2) or above and employs five or more laboratory personnel to handle the materials must establish a biosafety committee. Laboratories with fewer than five laboratory personnel handling the materials need to designate a specific person to be responsible for biosafety management. By December 2012, 554 organizations registered biosafety mechanisms to Taiwan CDC, of which 355 set up biosafety committees and 199 designated an individual. These included 74 government organizations, 209 medical institutions, 56 academic research institutions and 215 other groups.

3. Biosafety Inspections of High-Containment Laboratories

Since 2005 Taiwan CDC has inspected BSL-3 laboratories to monitor their operations and ensure safety. In 2011 it inspected 44 BSL-3 laboratories that stored and/or used RG3 biological materials.

4. Laboratory Biosafety Education and Training

Since 2005 Taiwan CDC has held professional training courses and conferences for staff in BSL-2 and above laboratories. To improve laboratory management and staff training, Taiwan CDC created 28 hours of laboratory biosafety digital coursework beginning in 2010. The coursework is available on Taiwan CDC's e-learning website.

5. Management of Infectious Materials

Organizations have reported 138 types of RG2 infectious materials and 19 types of RG3 infectious materials to Taiwan CDC authorities.

For export and import of infectious materials, Taiwan CDC established the Infectious Materials Customs Approval System in 2007, in line with the Ministry of Economic Affairs' policy of making trade faster and more convenient.

Organizations that receive or ship infectious materials belonging to RG3 or above must first receive permits from their own biosafety committee then apply for assessment from the responsible central government authority. Taiwan CDC began to offer online applications for RG3 materials or above in 2012.

Future Prospects

In recent years laboratory biorisk management systems have become an important part of biosafety management. In 2008, the European Committee for Standardization (CEN) developed the CWA 15793:2008 Laboratory Biorisk Management Standard as a reference to promote the system.

Taiwan CDC plans to develop its own Laboratory Biorisk 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 biorisk management system, Taiwan CDC will promote autonomous management at the institutional level and supervision and guidance from competent authorities. This will raise laboratory biosafety in Taiwan to levels achieved in Europe and the United States.

Outbreak Investigation

Current Status

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

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

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

Once notified of a suspected outbreak, local public health professionals are required to register the outbreak into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated the outbreak with supervision provided from the Taiwan CDC's branch offices. Patient or parent interviews, questionnaire surveys, and environmental inspection are commonly conducted to identify source and extent of the outbreak. Laboratory testing on human and environmental specimens are conducted at 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 is a 2-year on-the-job training which emphasizes hands-on field investigations and analysis of public health surveillance data. In 2005 Taiwan CDC began to recruit medical officers in preparation for emerging infectious diseases. FETP has become a mandatory training program for newly recruited medical officers.

Accomplishments

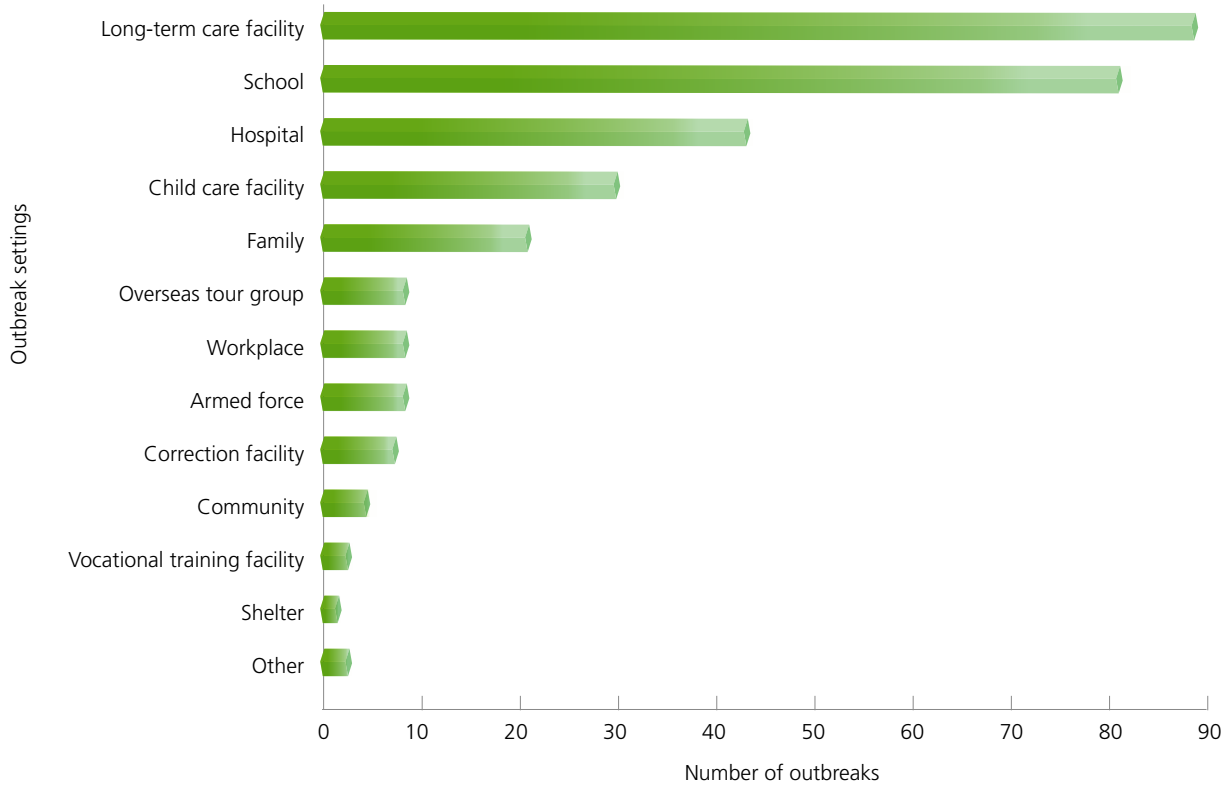
1. In 2012, of 448 suspected outbreaks registered into Taiwan CDC's Epidemic Investigation Report Files Management System and investigated by public health professionals at local health departments, 301 (67%) were confirmed as outbreaks.
2. The top four etiologic agents of confirmed outbreaks were norovirus (29.9%), influenza virus (28.6%), varicella-zoster virus (8.3%), and Mycobacterium tuberculosis (7.6%) (Table 4-6).

3. The top four outbreak settings were long-term care facilities (29.6%), schools (26.9%), hospitals (14.0%), and childcare facilities (9.6%) (Figure 4-12).
4. By the end of 2012, 229 FETP trainees have been recruited and 125 have successfully completed the training program. Since establishment, FETP trainees have investigated at least 300 outbreaks. Currently there are 21 medical officers at Taiwan CDC. Their medical specialties include infectious diseases, internal medicine, family medicine, emergency medicine, and pediatric gastroenterology.

Table 4-6 Number of Outbreaks and Outbreak-Associated Cases by Etiologic Agents — Taiwan, 2012

Etiologic agent	Total number of outbreaks	Total number of outbreak-associated cases
Adenovirus	2	6
Dengue virus	10	39
Entamoeba histolytica	1	2
Enterovirus	1	9
Hepatitis A virus	1	2
Human metapneumovirus	1	22
Influenza virus	86	1,535
Norovirus	90	1,457
Orientia tsutsugamushi	1	4
Bordetella pertussis	12	41
Rotavirus	2	21
Respiratory syncytial virus	3	21
Nontyphoidal Salmonella	3	61
Shigella spp.	3	63
Mycobacterium tuberculosis	23	99
Varicella-zoster virus	25	174
Vibrio cholera O1	1	2
Unknown	36	527
All	301	4,085

Figure 4-12 Number of Outbreaks by Settings — Taiwan, 2012



Future Prospects

1. Improve timeliness of outbreak notification and specimen collection to reduce the rate of undetermined etiology of outbreaks.
2. Strengthen collaborations with food authorities at the national and local levels in foodborne disease outbreak investigations and relevant training activities.
3. Collaborate with the Bureau of Animal and Plant Health Inspection and Quarantine of the Council of Agriculture in zoonosis outbreak investigations.

4. Enroll newly recruited medical officers and public health professionals of interest from Taiwan CDC and local health departments into the FETP.
5. 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.

Scientific Research and Development

Research and Diagnosis

Research and Diagnostic Center

In 2012, the Research and Diagnostic Center employed 151 individuals and received and processed 121,312 diagnostic specimens. Facing emerging and re-emerging communicable diseases, the center emphasized international collaboration, focusing on information exchange and laboratory technology advances. In addition, center laboratories were accredited by TAF (Taiwan Accreditation Foundation) since December, 2011 and regularly took proficiency tests (CAP) to assure the quality and accuracy of their diagnostic results. The center consists of 11 laboratories and three service sections.

2011-2012 Accomplishments

1. National Influenza Center (NIC)

July 5, 2006, marked the third anniversary of Taiwan's removal from the WHO list of SARS-affected areas, and Taiwan CDC chose this day to hold the inauguration of a new affiliate called the Taiwan National Influenza Center (Taiwan NIC) at its Kunyang facility. Thus far, Taiwan NIC has achieved the following in 2012:

(1) From January to February 2012, influenza B Yamagata lineage virus was predominant in Taiwan. After March, influenza A H3N2 virus became predominant. The influenza A(H1N1)pdm09 was only detected sporadically in Taiwan. The influenza A(H1N1)pdm09 and H3N2 viruses circulating in 2012 are antigenically similar to recommended influenza vaccines for use in the 2012-2013 northern hemisphere influenza season, A/California/7/2009 (H1N1), A/Victoria/361/2011, respectively.

(2) We analyzed the sequences of 4,386 influenza B viruses collected in Taiwan from 2004 to 2012. The data that provided detailed insight into the flux patterns of multiple genotypes and demonstrated that the large influenza B epidemic of 2011-2012 was caused by Yamagata lineage TW08-I viruses that were derived from TW04-II viruses in 2004-2005 through genetic drifts without detectable reassortments.

(3) The TW08-I viruses isolated in both 2011-2012 and 2007-2009 were antigenically similar, indicating that an influenza B virus have persisted for 5 years in antigenic stasis before causing a large epidemic.

2. PulseNet Taiwan

PulseNet Taiwan, a national molecular subtyping system for surveillance of bacterial infectious diseases, was established for early detection of infection clusters by comparison of DNA fingerprints of bacterial isolates. The system can be applied in food safety surveillance systems for early detection of food-borne disease outbreaks and can serve as a platform for academic study and disease surveillance for domestic and international public health institutions.

3. Viral Enteric and Emerging Diseases Laboratory

(1) Applied molecular diagnosis to discover novel viral pathogens and successfully identify Aichivirus and Salivirus/Klassevirus from samples without definite detection results.

(2) 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.

(3) Developed an EV71 IgM rapid test (ICT) and approved by Taiwan Food and Drug Administration.

(4) Establishment of the hospital-based surveillance system for monitoring the microbial etiology of acute gastroenteritis in children <5 years, investigating the risk factors of rotavirus infected cases and related social costs (economic and physical burden), evaluating the cost-effectiveness of rotavirus vaccination in Taiwan.

4. Viral Respiratory Diseases Laboratory

(1) The genotypes of 40 cases of measles virus detected during 2010-2011 were investigated and analyzed. In 2010, the most common genotype changed from H1 (3/40) to D9 (35/40). In 2011, genotype H1 was not detected, and genotype D4 first appeared and was imported from Europe.

(2) The rubella viruses from 124 confirmed cases from 2005 to 2011 were characterized, and the data revealed that these viruses were distributed in the following four genotypes: 1E (n=56), 1h (n=1), 1j (n=4) and 2B (n=63).

(3) Among 1335 influenza A(H1N1)pdm09-positive cases in Taiwan tested for the H275Y mutation in the neuraminidase (NA) gene that confers resistance to oseltamivir, 15 patients (1.1%) were found to be infected with H275Y virus.

(4) In addition to the emergence of new variants with mutations or reassortments, other factors, including the interference of multi-types or lineages of influenza viruses and the accumulation of susceptible hosts, can also affect the scale and time of an influenza B epidemic in Taiwan.

5. Vector-Borne Viral and Rickettsial Diseases Laboratory

(1) Because the international close commercial link, modern transportation, and the impact of global warming, vector-borne infectious diseases have gradually invaded to new geographic territories and the number of cases has also increased rapidly. It is necessary to establish a laboratory-based diagnosis and surveillance system of vector-borne infectious diseases.

(2) We established and maintained an arboviral and rickettsial reference laboratory to provide laboratory standards and diagnostic services to domestic and international health agencies.

(3) We conducted routine diagnoses of dengue fever, Japanese encephalitis, yellow fever, West Nile fever, chikungunya, hantavirus infection, scrub typhus, epidemic and endemic typhus fever.

(4) We conducted a mosquito surveillance

Dengue NS1 antigen rapid test kit

program to understand the genetic variation of Japanese encephalitis virus strains currently circulating in Taiwan.

(5) We have also developed an immunochromatographic test (ICT)-based dengue NS1 antigen rapid detection kit for early detection of dengue virus infections.

6. Bacterial Respiratory Diseases Laboratory

(1) A total of 3,659 cases of invasive pneumococcal disease (IPD) gave viable *Streptococcus pneumoniae* strains from 2008 to 2012. The incidence was 3.2 cases per 100,000 population, and the case fatality rate was 9.2%.

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

(3) Among children <5 years, the percentage of invasive *S. pneumoniae* strains preventable by PCV7 decreased significantly from 2008 to 2012 while the percentage preventable by PCV13 stayed stable in 2008-2011, and decreased significantly in 2012.

(4) Among invasive *S. pneumoniae* strains, 54.7%, 68.8%, and 9.5% was susceptible to penicillin, cefotaxime, and erythromycin, respectively. Serotypes 19A strains showed the lowest susceptibility to all three antimicrobial agents.

7. Bacterial Enteric and Emerging Diseases Laboratory

(1) Conducted conventional diagnoses of Vibrio cholerae, Salmonella typhi, paratyphi, Salmonella spp, Shigella spp, Enterohaemorrhagic Escherichia coli (EHEC), Burkholdera pseudomallei, Yersinia pestis, Leptospira interrogans, Borrelia burgdorferi, Bartonella henselae, Francisella tularensis, Brucella spp, and NDM-1 producing Enterobacteriaceae.

(2) Performing surveillance of carbapenem resistant Enterobacteriaceae resulted in the first detection of inter and intra hospital dissemination of KPC-2 KP in Taiwan.

(3) Establishment of multiplex real-time RT-PCR for detection of pathogens resulted in detection of parvovirus B19 in a concerned vaccine adverse event and declared the irrelevance to the influenza vaccine.

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

8. Mycobacterial Diseases Laboratory

(1) Characteristics of outbreaks of tuberculosis in Taiwan during 2006-2011: We found most of the clusters were notified from families, health care facilities and schools. 23.4% of clustered isolates were resistant to isoniazid. Predominant genotypes of *Mycobacterium* in the clustered episodes were BEIJING, Haarlem and T.

(2) Pyrazinamide susceptibility testing and its clinical implementation: Pyrazinamide resistance in new tuberculosis cases was 0.9%; while in multidrug resistant tuberculosis cases was approximately 39%.The Wayne test was recommended to be included in routine clinical services with the pncA gene sequencing as a supplement or directly adopted the pncA gene sequencing.

(3) Establishment of a diagnosis system for leprosy: A real-time PCR and a nested PCR were established for detecting *Mycobacterium leprae* and its resistance to dapsone, rifampicin and ofloxacin. Results of real-time PCR were consistent with histological classification of lepromatous leprosy. Two dapsone-resistant leprosy cases showed significant improvement after treating with new regimens.

9. Parasitic Diseases Laboratory

(1) Found the first Thai laborer with neurognathostomiasis in Taiwan.

(2) Applied a phylogenetic method to investigate the molecular epidemiology of amebic infection and indicated at least two specific genotypes transmitted in two different men who have sex with men groups.

(3) Found the first case of primary amebic meningoencephalitis caused by the free-living ameba *Naegleria fowleri* after hot spring exposure.

(4) Completed a seroprevalence survey of Toxoplasmosis among blood donors in Taiwan and indicated the risk factors such as raw meat consumption.

10. 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* infection.

(2) Carried out G-NICE (gonococci-National Isolate Collection for Epidemiology) for the surveillance of resistance trend and a molecular epidemiology study on *Neisseria Gonorrhoeae*. Traced the dissemination of a NG-MAST ST1407-related clone in Taiwan. ST-1407 has been reported to be with reduced susceptibilities to third generation cephalosporins and cause treatment failure in many countries.

(3) Identified the first human psittacosis case in Taiwan in 2012.

(4) Finished the whole genome sequence of an MDR *N. gonorrhoeae* strain and an MDR *Acinetobacter baumannii* strain and conducted comparative genomic studies.

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

11. Vector Biology Laboratory

(1) Established a molecular epidemiological surveillance for tick-borne emerging and zoonotic diseases. Publishing "Cascading effect of economic globalization on human risks of scrub typhus and tick-borne rickettsial diseases" on journal "Ecological Applications", the main discover was evaluated how abandonment of rice paddies in Taiwan after joining the World Trade Organization, along with periodic plowing, an agricultural policy to reduce farm pests in abandoned fields can unexpectedly influence risks to diseases transmitted by ticks and chiggers (larval trombiculid mites), which we collected from their small-mammal hosts. This report was press released by Ecological Society of America, and was used as News forum on journal "Environmental Health Perspectives".

(2) Monitored insecticide efficacy and resistances of *Aedes aegypti* from several high risk areas of Dengue in southern Taiwan.

(3) Determined the most appropriate spraying concentration for each insecticide using in Southern Taiwan, and post it on web page every month to assist local governments in controlling dengue fever.

(4) Established Standard Operation Procedures of Emergency Spray Evaluation and Outdoor Insecticide Dilution with Safety Use for chemical control.

(5) Evaluated insecticides efficacy and graded them by KR50 and RR99 to assist government purchase insecticides and set up strategies for dengue control.

12. Establishment and Application of Pathogen Genome Sequence Databases 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 25,235 pathogen sequence data (regarding influenza virus, enterovirus, and adenovirus) and simple epidemiological information. The website also has programs for primer design, genotyping enterovirus 71, and blast search with influenza vaccine strains.

Development and Manufacturing of Serum and Vaccines

Production of Bio-Products

1. Antivenom serum is manufactured using horse serum. A total of 243.2 liters of antivenom horse serum was produced in 2012.
2. A supply of vaccines, toxoids, and antivenoms, totaling 2,896,916 shots, was available in 2012. Income from sales of these biological products totaled more than NT$64.5 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 20L and 50L tide cell fermenters using a serum-free medium successfully. In trial production tests it manufactured nine batches of subgenogroup C4 strain of human enterovirus 71.
2. Taiwan CDC created a plan to study the effects of freeze-dried protectants on the snake venom of Trimeresurus mucrosquamatus, including the venom's immunogenicity and minimum lethal dose. It found that when the venom was preserved in a freeze-dried state, whether stored at 4 ℃ or 37 ℃ the minimum lethal dose after 90 days of storage was generally lower than the minimum lethal dose after 30 days storage. In horse immunity experiments the researchers did not find any significant difference between injecting snake venoms containing freeze-dried protectants and simply injecting crude venom.
3. Taiwan CDC also tested the stability of lyophilized snake antivenom products to monitor the ongoing stability of snake antivenom products once they reach the marketplace. The tests were to ensure compliance with PIC/S GMP regulations and to confirm the shelf life of these products.
4. Preliminary results are positive in the switch from using snake venom obtained from non-milking methods to produce antivenoms instead of snake venom obtained by milking. There is no significant difference between minimum lethal dose of these snake venom types, and besides venom from Protobothrops mucrosquamatus, more than a year's supply is available. In the future Taiwan CDC plans to expand testing areas and conduct in-depth component analysis.

Commissioned Production of BCG and Antivenoms

New regulations will require that domestic manufacturers of western pharmaceuticals adhere to the PIC/S GMP (PIC/S: Guide to Good Manufacturing Practice for Medicinal Products). Also plans are underway to renovate the health park where Taiwan CDC's immunization producing facilities are located. To prevent potential shortages of biologic agents, Taiwan CDC decided to outsource production of five biologic agents, including BCG and purified antivenoms, to domestic or foreign producers. It announced the plan on August 31, 2012, then signed a contract on December 6, 2012, for the National Health Research Institutes to produce the agents.

Publications

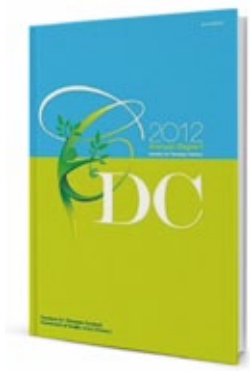
Manual for Infectious Specimen Collection (5E)

Guidelines for Dengue Control

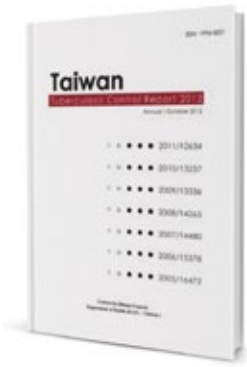
Influenza Pandemic Strategic Plan

Biological Disaster Prevention and Response Plan

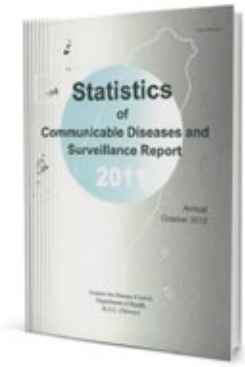
Practical Guideline for Prevention and Control of Seasonal Influenza



CDC Annual Report 2012



Taiwan Tuberculosis Control Report 2012



Statistics of Communicable Diseases and Surveillance Report 2011

Infection Control Journal

Warriors VS Tu-Bo Da Wang Hygiene Education animation of Tuberculosis

Dengue Fever Prevention

DAYLIGHT

Centers for Disease Control

2013

Annual Report

Frequency	Annual
Editor	Centers for Disease Control, Ministry of Health and Welfare, R.O.C.(Taiwan)
Editors	F.Y. Chang, J.H. Chou, J.H. Chuang, Y.H. Chen, T.J. Chien, S.H. Tseng, C.C. Yen, C.H. Chen, C.H. Yang, Y.C. Wu, D.P. Liu, H.S. Wu, A.H. Cheng, Y.F. Ke, Y.H.Lee, H.Y. Huang
Publisher	Centers for Disease Control, Ministry of Health and Welfare, R.O.C.(Taiwan)
Address	No.6, Linshen S. Road, Taipei, Taiwan 100
Telephone No.	886-2-23959825
Website	http://www.cdc.gov.tw
Printer	4point Design
Address	5F.-4, No.100, Sec. 2, Zhongxiao E. Rd., Zhongzheng Dist., Taipei City 100, Taiwan (R.O.C.)
Teelphone No.	886-2-23215942
Date of Publication	July-30
Date of begin publication	Dec-03
Price	NT$520

Available at the following bookstores

Government Publish Store

Add:1F., No.209, Songjiang Rd., Zhongshan District, Taipei City 104, Taiwan (R.O.C.)

Tel:+886-2-2518-0207

Website:http://www.govbooks.com.tw

Wu Nan Bookstore

Add:6 Jhongshan Rd., Taichung City, Taiwan

Tel:+886-4-2226-0330

Eslitebooks.com

Website:http://www.eslitebooks.com/xinyi/

Books.com.Co.

Website:http://www.books.com.tw

GPN:2010201596

ISSN:1813-3428

2013 CDC

Annual Report

2013 Annual Report

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

ISSN 18133428
9 771813 342007

GPN : 2010201596
Price : NT$ 520

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