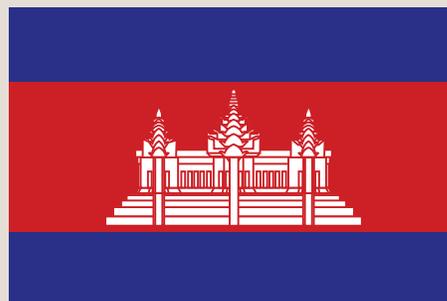
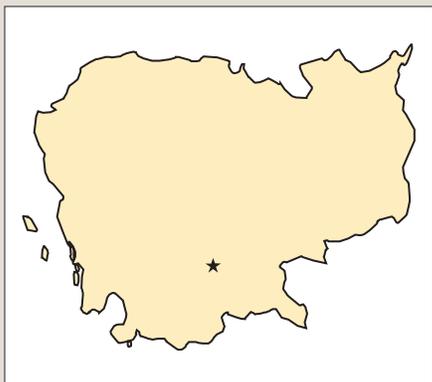


Cambodia



- **Capital:** Phnom Penh
- **Area:** 181,035 sq km
- **Population:** 14,952,665 (July 2012 est.)
- **Age Structure:** 0-14 years: 32.2% (male 2,375,155/female 2,356,305); 15-64 years: 64.1% (male 4,523,030/female 4,893,761); 65 years and over: 3.8% (male 208,473/female 344,993) (2011 est.)
- **Life Expectancy at Birth:** Total population: 63.04 years; male: 60.66 years; female: 65.53 years (2012 est.)
- **Infant Mortality Rate:** Total: 54.08 deaths/1,000 live births; male: 61.02 deaths/1,000 live births; female: 46.82 deaths/1,000 live births (2012 est.)
- **Literacy Rate:** Total population: 73.6%; male: 84.7%; female: 64.1% (2004 est.)
- **GDP:** \$32.95 billion (2011 est.)
- **GDP per Capita:** \$2,300 (2011 est.)

Highlights

- Cambodia's National Institute of Public Health Laboratory (NIPHL) commenced structural enhancements of their BSL-2, BSL-2+, and cell culture rooms.
- The NIPHL achieved perfect scores on panels nine and ten of the WHO External Quality Assessment Project (EQAP) for the detection of influenza A by PCR.
- Cambodia's Ministry of Health (MOH), together with the World Health Organization (WHO) finalized three national pandemic influenza strategic plans for 2011–2015: the Health Sector Pandemic Influenza Response Strategy, the Pandemic Influenza Communication Strategy, and the Pandemic Influenza Rapid Containment Strategy.

U.S. CDC Direct Country Support

Since 2006, the U.S. Centers for Disease Control and Prevention (CDC) has provided support to Cambodia's influenza surveillance through the following cooperative agreements: *Development of Influenza Surveillance Networks Overseas* with the Cambodian Ministry of Health (MOH), and *Surveillance and Response to Avian and Pandemic Influenza* with WHO. In addition, from 2006 to 2010 CDC funded a cooperative agreement titled *Avian Influenza Community Based Risk Reduction Project* with the non-government organization, CARE International. The collective goals of these cooperative agreements have been to build human capacity and infrastructure for influenza surveillance, response, laboratory diagnosis, and pandemic preparedness.

CDC's initial five-year cooperative agreements with Cambodia's MOH and WHO, respectively, ended in September 2010. A second five-year, sustainability cooperative agreement between CDC and Cambodia's MOH started in October 2010 titled *Sustaining Cambodia's Influenza Surveillance Networks and Response to Seasonal and Pandemic Influenza*.

Implementation of these cooperative agreements has resulted in the establishment of a molecular laboratory at NIPHL capable of detecting influenza viruses, seasonal and avian, and other respiratory viruses. CDC's support has also led to the expansion of laboratory-based national surveillance for influenza and other acute respiratory diseases, and strengthening of national and local response to respiratory and other communicable disease outbreaks.

Surveillance

Since 2006, laboratory-based influenza surveillance in Cambodia has been entirely supported by CDC's cooperative agreements with the MOH and WHO. Influenza-like illness (ILI) surveillance, which began in 2006 with four sites in four provinces, has since expanded to 13 sites covering eight provinces for improved geographical representation. Upper respiratory specimens from ILI patients are sent from each site to either the Institute Pasteur Cambodia (IPC) or NIPHL for testing every week.

In 2009, severe acute respiratory infection (SARI) surveillance was established at four referral hospitals in three provinces. Patients admitted for SARI at these sites are tested for influenza and other respiratory viruses, bacterial pathogens and acid-fast bacilli. Laboratory testing for SARI surveillance is performed exclusively at NIPHL.

CDC has also supported operational improvements of Cambodia's national communicable disease surveillance (CamEWAR) and event-based surveillance systems, as well as investigations of H5N1 and other outbreaks.

Surveillance Activities

- Maintained ILI surveillance operations, including weekly collection of specimens for testing and electronic disease reporting via mobile phone SMS, at all sites.
- Conducted multiple supervision visits to the country's 13 ILI surveillance sites.
- Maintained SARI surveillance operations, including collection of samples from each SARI patient and collection of individual and weekly aggregate case data, at all sites.
- Implemented conventional RT-PCR testing for human metapneumovirus and adenovirus among pediatric SARI cases (0–4 years of age) as part of SARI surveillance.
- Conducted supervisory site visits to each of the four SARI surveillance sites.
- Revised case definitions for certain disease indicators in CamEWAR surveillance, while also decreasing the number of reportable indicators from 12 to 10.
- Improved event-based surveillance operations, including the generation of a list of all hot-line telephone calls and monthly reports to better characterize the types of calls received and subsequent actions taken with assistance from WHO.
- Conducted field investigations for eight confirmed H5N1 human cases.
- Maintained production of their monthly respiratory disease and influenza bulletin.
- Presented antibiotic-resistance data from SARI surveillance at an antibiotic resistance meeting held in Phnom Penh.

Laboratory

Funding provided through the CDC-MOH cooperative agreement, together with close technical support and monitoring by the CDC Influenza Program in Cambodia, and technical guidance from laboratory staff at CDC's Influenza Division, has resulted in significant strengthening of laboratory testing capacity at the NIPHL. Since 2009, the NIPHL molecular laboratory has been performing real-time RT-PCR for seasonal, avian (H5N1), and pandemic (nH1N1) viruses. In 2010, the NIPHL initiated conventional PCR testing for

respiratory syncytial virus (RSV) and human parainfluenza viruses (hPIV-1, hPIV-2, and hPIV-3), followed by human metapneumovirus and adenovirus in 2011.

NIPHL's microbiology laboratory has also greatly benefited from cooperative agreement support, with testing activity substantially increased after the implementation of SARI surveillance. In turn, the NIPHL has been able to support the development of microbiology laboratories at national and provincial hospitals.

The CDC-WHO cooperative agreement entirely funds influenza testing of ILI surveillance and suspect H5N1 case specimens at the IPC.

Laboratory Activities

- Implemented testing for human metapneumovirus and adenovirus.
- Tested 778 ILI surveillance specimens for influenza; 23 tested positive (B, H3N2, nH1N1) and these samples were shared with the WHO CC in Melbourne.
- Tested 676 SARI surveillance specimens (nasopharyngeal, bronchoalveolar lavage (BAL), pleural fluid) for influenza and other respiratory viruses.
- Tested 264 outbreak specimens for H5N1 and other influenza viruses:
- Detected influenza B in a suspect H5N1 case.
- Detected novel H1N1 among symptomatic contacts of a confirmed H5N1 case.
- Detected novel H1N1 in specimens from a suspect H5N1 outbreak in Kandal Province.
- Performed culture/antibiotic sensitivity and/or acid-fast bacilli detection on 771 SARI surveillance specimens (sputum, BAL, pleural fluid, blood).
- Commenced structural enhancements of their BSL-2, BSL-2+ and cell culture rooms.
- Achieved perfect scores on panels nine and ten of the WHO EQAP for the detection of influenza A by PCR.
- Achieved a perfect score on CDC's pilot, RT-PCR, influenza performance efficiency panel.
- Detected two *Vibrio cholerae* species (serotype Inaba, non-O1/non-O139) in stool samples from separate diarrheal outbreaks in two different provinces.
- Completed the microbiology laboratory at the Khmer-Soviet Friendship Hospital which is now functional and operating as a SARI site.
- Completed the microbiology laboratory at Takeo Provincial Hospital and is it now functional.

Preparedness

The CDC-WHO cooperative agreement has considerably advanced pandemic influenza preparedness and planning in Cambodia. The National Committee for Disaster Management, together with partnering ministries, has continued to work on a national pandemic plan, while the MOH and WHO have led the development of a health sector response plan. Furthermore, in 2009, a multi-sector pandemic planning pilot project was successfully completed in Siem Reap Province, resulting in a model planning process for use in other provinces.

CDC funding has extended to other areas of preparedness, such as hospital infection control (IC) and implementation of the International Health Regulations 2005 (IHR). In 2010, WHO assisted the MOH's Hospital Services Department in the development of Cambodia's first national IC strategic plan, IC guidelines for health care facilities, and an IC training program together with appropriate training materials.

Preparedness Activities

- MOH and WHO finalized Cambodia's:
 - *National Health Sector Pandemic Influenza Response Strategy, 2011–2015.*
 - *National Pandemic Influenza Rapid Containment Strategy, 2011–2015.*
 - *National Pandemic Communication Strategy, 2011–2015.*
- WHO provided select hospitals with training on how to prepare alcohol hand gel as part of improving IC practices.
- WHO developed a three-module, IC training tool based on national IC guidelines, consisting of hand hygiene, proper use of personal protective equipment, and waste management (segregation, handling, storage). This training was piloted at two national hospitals, the National Pediatric Hospital and the Maternal and Child Hospital and one provincial hospital, Kampong Cham Provincial Hospital.
- WHO developed a hand hygiene compliance tool for use in hospitals which was piloted at Kampong Cham Provincial Hospital.
- WHO visited Kampong Cham Provincial Hospital and Battambang Provincial Hospital on multiple occasions to assist in the development of these hospitals as regional centers of excellence for IC.
- WHO hired a consultant to assist in developing a work plan for future IC activities.
- WHO supported the attendance of a MOH IC focal person at the Asia Pacific International Conference for Infection Control, Melbourne.
- WHO assisted the MOH in the IHR (2005) certification process of Cambodia's international points of entry.

Training

- Two ILI and three SARI surveillance refresher training workshops were held for staff from all sites.
- A refresher course on CamEWAR was conducted for 153 rapid response team members from the MOH, provincial and district health offices, and hospitals from all 24 provinces.
- On-the-job microbiology training was provided by NIPHL and CDC-Cambodia to technicians from one SARI surveillance site.
- Microbiology training was provided by NIPHL staff for technicians from one provincial hospital and students from Phnom Penh's Technical School for Medical Care.
- Two NIPHL staff attended a training workshop in Vietnam for strengthening of GISRS International Air Transport Association (IATA) licensing for National Influenza Centers; both participants earned IATA certification.
- Five training courses on the case management of severe respiratory infections and avian influenza were held for 238 clinicians from provincial and district hospitals in five provinces previously affected by H5N1.
- Funding and technical support was provided to the MOH's applied epidemiology training program.

Contacts

Paul Kitsutani, MD, MPH
Director, CDC Influenza Program
U.S. Centers for Disease Control and Prevention
Phnom Penh, Cambodia
Email: kitsutanip@kh.cdc.gov

Kunthy Chan
Budget Analyst
CDC Influenza Program
CDC-Cambodia
Phnom Penh, Cambodia
Email: kunthyc@kh.cdc.gov

Borann Sar, MD, MPH
Medical Research Scientist
CDC Influenza Program
CDC-Cambodia
Phnom Penh, Cambodia
Email: sarb@kh.cdc.gov

Ung Sam An, MD, MPH
Director
National Institute of Public Health
Phnom Penh, Cambodia
Email: usa@camnet.com.kh

Sok Touch, MD, MPH
Director
Communicable Disease Control Department
Ministry of Health
Phnom Penh, Cambodia
Email: touch358@moh.gov.kh

Chuop Sokheng, Ph (Pharmacy)
Director, National Public Health Laboratory
National Institute of Public Health
Phnom Penh, Cambodia
Email: chuopsokheng@niph.org.kh

Sovann Ly, MD, DTMH, MCTM
Deputy Director
Communicable Disease Control Department, Ministry of Health
Phnom Penh, Cambodia
Email: sovann_ly@online.com.kh



CDC-Cambodia Influenza Program staff members.



Nima Asgari-Jirhandeh, MBChB, MPH, FFPH
Team Leader, Communicable Disease Surveillance and Response
WHO Cambodia
Phnom Penh, Cambodia
Email: asgarin@wpro.who.int

Nora Chea, MD
Medical Officer, Communicable Disease Surveillance and Response
WHO Cambodia
Phnom Penh, Cambodia
Email: cheano@wpro.who.int

Maria Conception Roces, MD
Technical Officer, Communicable Disease Surveillance and Response
WHO Cambodia
Phnom Penh, Cambodia
Email: rocesm@wpro.who.int