

INDIA



OVERVIEW

The U.S. Centers for Disease Control and Prevention (CDC), in coordination with other U.S. government agencies supports response measures against seasonal, avian and pandemic influenza in India. In 2004, CDC in collaboration with the Indian Council of Medical Research (ICMR) initiated influenza surveillance in India. This CDC cooperative agreement ended in 2014. The CDC-ICMR cooperative agreement supported the development of a network of ten influenza surveillance sites which contributed epidemiological and virological surveillance data for timely characterization (genetic and antigenic) of influenza isolates for inclusion in global vaccine selection. Since 2014, the Indian Ministry of Health and Family Welfare (MoHFW) has contributed some funds for ongoing influenza surveillance and during 2015, ICMR continued to contribute surveillance data to WHO FluNet which demonstrated a large outbreak of influenza A (H1N1)pdm09 virus in 2014–2015.

SURVEILLANCE

The National Institute of Virology (NIV), Pune-led, ICMR network throughout India continued influenza surveillance contributing crucial surveillance data to WHO's FluNet site. Surveillance efforts have demonstrated that influenza seasonality varies across India with peak influenza activity occurring during January–March in the northern most tip of the country (temperate climate) and during the rainy monsoon season (August–October) in the rest of the country. Previously, India was only using Northern Hemisphere influenza vaccine, but these findings have led to importation of Southern Hemisphere vaccine for pre-monsoon vaccination.

SURVEILLANCE ACTIVITIES

- Processed over 5,000 samples in the first six months of 2015.
- Gathered virological data which showed that an outbreak occurred during the winter of 2015 due to influenza A (H1N1)pdm09 virus.

HIGHLIGHTS

- Performed genetic characterization of influenza A (H3N2), A (H1N1) pdm09 and B viruses at the National Institute of Virology (NIV) Pune.
- Based on evidence generated by CDC-supported studies, the Indian Academy of Pediatrics (IAP) recommended a change in vaccination timing to May–June prior to the monsoons and Drugs Controller General of India (DCGI) allowed use of Southern Hemisphere vaccine formulation.
- Conducted extensive analysis of five years of seasonal influenza data which has shown that seasonality varies according to latitudinal location of the site:
 - » Areas lying north of 30°N latitude demonstrate peak activity in winter and limited activity during rainy monsoon season.
 - » Areas between 10°N and 30°N demonstrate highest activity during monsoon and limited activity in winter.

LABORATORY

ICMR network members have trained extensively with CDC-Atlanta scientists on influenza virus typing, sub-typing, RT-PCR, real-time RT-PCR, and reverse genetics techniques. ICMR's network now has ten sites equipped with RT-PCR to detect seasonal influenza A and B viruses. Four of these laboratories are also equipped to detect and handle avian influenza viruses. Genetic characterization of viruses is carried out at NIV, Pune.

LABORATORY ACTIVITIES

- Submitted virological and epidemiological data from the ICMR network to WHO FluNet which includes aggregated data from ten regional sentinel influenza sites in India.
- Completed the genetic characterization of the 2014–2015 circulating strain of influenza A (H1N1)pdm09 virus which revealed minimal changes and matched the recommended vaccine strains for that year.

PREPAREDNESS

HHS/CDC activities have focused on supporting pandemic influenza preparedness programs and helping advance the field of influenza research (seasonal, pandemic and avian) in India. Prior to 2009, preparedness activities to minimize the risk of spread of human infections and disease, including that due to influenza, were carried out by the MoHFW (National Centre for Disease Control and ICMR) and WHO partners and funded partially through CDC support. These efforts contributed to India's ability to respond to the 2009 influenza pandemic. Even after the sustainability period for the cooperative agreement ended in 2014, CDC has continued to provide technical and laboratory support for ongoing surveillance activities. Current activities are focused on continued CDC technical support of the ICMR influenza network in contributing epidemiological and laboratory surveillance data and response trainings.

PREPAREDNESS ACTIVITIES

Current efforts have had policy effects in at least three major areas:

- **Licensure:** Evidence-based surveillance data on influenza seasonality has led to licensure to import Southern Hemisphere vaccine prior to influenza peak.
- **Vaccine:** The Federation of Obstetricians and Gynecologists of India recommended influenza vaccination for pregnant women.
- **HHS/WHO supported Serum Institute of India (SII) in the production of the influenza A (H1N1) pdm09 monovalent live-attenuated influenza vaccine (LAIV).** SII is currently in the process of producing trivalent LAIV.

RESEARCH

CDC collaborates with Indian partner organizations, including the National Institute of Virology, the All India Institute of Medical Science, and multiple academic institutions, on research studies that provide data to inform national strategies for influenza prevention and control. Research studies have focused on estimating influenza burden, identifying groups at risk of severe influenza, evaluating the effectiveness of influenza vaccines, and identifying optimal timing for influenza vaccination in India.

Research Activities

- Estimated the burden of influenza resulting in hospitalizations and outpatient visits in two rural communities in India during 2009–2013.
- Estimated the burden of acute lower respiratory tract infections associated with various viral and bacterial infections among children aged <5 years and adults aged >60 years.
- Estimated the cost of acute lower respiratory tract infection among children aged <5 years and adults aged >60 years in two regions of India.
- Evaluated the use of vital records data from two Indian national death reporting systems in conjunction with influenza surveillance data to estimate influenza-associated mortality in India.

