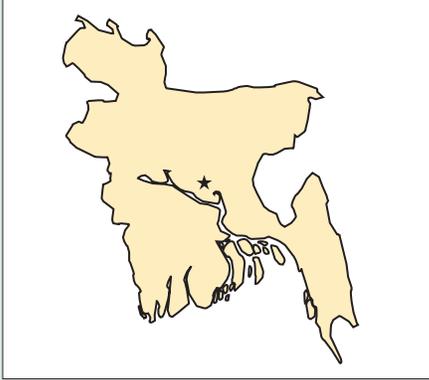


Bangladesh



- **Capital:** Dhaka
- **Area:** 143,998 sq km
- **Population:** 161,083,804 (July 2012 est.)
- **Age Structure:** 0-14 years: 34.3% (male 27,551,594/female 26,776,647); 15-64 years: 61.1% (male 45,956,431/female 50,891,519); 65 years and over: 4.7% (male 3,616,225/female 3,778,119) (2011 est.)
- **Life Expectancy at Birth:** Total population: 70.06 years; male: 68.21 years; female: 71.98 years (2012 est.)
- **Infant Mortality Rate:** Total: 48.99 deaths/1,000 live births; male: 51.48 deaths/1,000 live births; female: 46.39 deaths/1,000 live births (2012 est.)
- **Literacy Rate:** Total population: 47.9%; male: 54%; female: 41.4% (2001 Census)
- **GDP:** \$282.5 billion (2011 est.)
- **GDP per Capita:** \$1,700 (2011 est.)

Highlights

- Bangladesh strengthened its communicable disease surveillance system and reporting to increase the timeliness of outbreak response and compliance with International Health Regulations 2005 (IHR).
- The Institute of Epidemiology Disease Control and Research (IEDCR) and the U.S. Centers for Disease Control and Prevention (CDC) strengthened the laboratory testing capacities at the National Influenza Center (NIC).
- IEDCR and the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) estimated disease and economic burden for respiratory viruses, which is anticipated to facilitate priority setting and funding allocation to programs intended to decrease the respiratory disease burden in Bangladesh.
- During FY 2010, IEDCR implemented a system to collect and investigate daily news reports about suspected outbreaks. This event-based surveillance system can be credited with the early detection of several notable outbreaks throughout the country. For example, it can be credited with the detection of pandemic influenza weeks before the virus was circulating in the general population.

U.S. CDC Direct Country Support

IEDCR, an organization under the Ministry of Health and Family Welfare of the Government of Bangladesh, has been a recipient of CDC cooperative agreements since 2006. They are currently in their first year of a sustainability cooperative agreement. IEDCR is the nation's focal point for conducting disease surveillance and outbreak investigations. Their CDC-funded influenza project concentrates on strengthening disease surveillance, laboratory capacity and pandemic response. IEDCR works closely with icddr,b, which also



receives CDC funding to do the following: perform research and characterize the epidemiology of seasonal influenza, help identify clusters of severe acute respiratory infections (SARI) and pneumonia that may be of international concern, and identify cases of zoonotic transmission of avian influenza. The two institutions collaborate on surveillance, training and research. Bangladesh has made substantial progress in the field of respiratory illness since the start of the cooperative agreement and collaboration with IEDCR, icddr,b and CDC.

Avian influenza outbreaks and the spread of pandemic influenza are of great concern for a country like Bangladesh because of the high population density and frequent interaction between humans and poultry. Bangladesh is a country with over 180 million poultry, 50% of which are raised in backyards. Collaborations on human and animal health also involve the Bangladesh Department of Livestock Services (DLS), the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and the U.S. Agency for International Development (USAID).

Surveillance

CDC funding enabled IEDCR and icddr,b to establish Bangladesh's first influenza sentinel sites. Since 2007, these groups have been conducting hospital-based influenza surveillance in 12 tertiary hospitals across the country. Four of these hospitals expanded surveillance in 2008. These data have allowed Bangladesh to estimate its influenza disease and economic burden. In FY 2010, IEDCR expanded their government surveillance system by establishing 14 new national influenza surveillance sites at district hospitals, raising the total number of national surveillance sites to 26. The current surveillance identifies cases of SARI, influenza-like illness (ILI), and severe pneumonia. In addition, an event-based component of the surveillance system identifies clusters of severe disease, and all patients are screened for exposure to sick or dead poultry and tested for influenza A (H5N1). The system effectively shares staff, resources and data between icddr,b and IEDCR, with increasing ownership over time by public health authorities in Bangladesh. This strategy is anticipated to allow for sustainable influenza surveillance by IEDCR, with expanded investigations into disease transmission, burden, and cost-effectiveness of respiratory disease interventions in collaboration with icddr,b.

Bangladesh continues to experience outbreaks of highly pathogenic avian influenza A (H5N1). The DLS, IEDCR, and icddr,b conduct surveillance for avian influenza in domestic poultry in Bangladesh. The icddr,b currently performs monthly live bird market surveillance at 20 sites. Also, icddr,b performs active surveillance in 32 villages around the country. In addition to surveillance activities, DLS, the IEDCR, and the icddr,b participate in joint avian influenza outbreak investigations.

Surveillance Activities

- The IEDCR expanded their web-based disease surveillance reporting, which collects information from 64 districts and more than 450 Upazila (sub-districts). With this expansion, facilities all over the country will build capacity to submit reports of ILI and SARI electronically.
- Specimens are now collected and routinely tested for influenza from 14 new surveillance sites.
- Over 5,000 specimens obtained through surveillance activities were tested for influenza A virus. Influenza A virus subtypes (H3N2) and influenza A(H1N1)pdm09, as well as influenza B viruses were circulating throughout Bangladesh during that period. There was one peak of influenza activity in July 2011, during the regular influenza season that occurs annually from May through October.
- Data generated by the surveillance system and its associated burden of disease and economic burden studies have allowed the Bangladesh government to develop national treatment guidelines for groups at high risk of complications from influenza. These data have also guided pandemic preparedness efforts and informed seasonal influenza prevention strategies.

- Influenza surveillance results are publically reported with monthly updates on IEDCR's website.
- IEDCR and icddr,b continue to send detailed surveillance reports to CDC and WHO on a weekly basis during the influenza season.
- IEDCR and icddr,b routinely submit influenza isolates to CDC for further characterization as part of the global influenza network of WHO (100–200 seasonal influenza isolates per year). These samples are used for annual global vaccine preparation.
- During the FY 2011 period, approximately 2,000 poultry samples from routine surveillance activities were tested for influenza A virus, of which one fourth were positive for influenza A virus and over 100 samples were positive for influenza A (H5N1) by real-time RT-PCR in the Biosafety Level 2 (BSL-2) animal virology laboratory at icddr,b. Additionally, approximately 200 samples collected during investigations of poultry outbreaks were tested and about half of these were positive for influenza A (H5N1) by real-time RT-PCR. The poultry-related work of DLS and the health sectors in IEDCR has improved communication between the groups and has resulted in routine surveillance among persons who are involved in culling poultry infected with influenza A (H5N1).
- In March 2011, IEDCR and icddr,b jointly investigated cases of mild respiratory illness caused by avian influenza infection among young children in Dhaka. Two new cases of influenza A (H5N1) and a case of influenza A (H9N2) infection were identified. In all cases, IEDCR reported these findings to WHO within 24 hours as per the IHR (2005).
- During June–July 2011, DLS, FAO and icddr,b jointly investigated a cluster of high mortality in ducks and geese with suspected influenza A (H5N1) etiology in a north-eastern district of Bangladesh. Infections were caused by clade 2.3.2.1 influenza A (H5N1) viruses that were recently introduced into Bangladesh.

Laboratory

In 2007, IEDCR was nominated as a National Influenza Center (NIC) by WHO and has contributed specimens to the Global Influenza Surveillance and Response System (GISRS). An upgrade of IEDCR's BSL-2 laboratory was completed in 2010. State-of-the-art equipment was purchased and the new BSL-2 laboratory is performing real-time and conventional PCR to identify seasonal, influenza A(H1N1)pdm09, influenza A (H9N2) and influenza A (H5N1) viruses. Plans are currently underway to increase the serologic testing capacity of the NIC.

Laboratory Activities

- With funding from World Bank, IEDCR has installed a prefabricated Biosafety Level 3 (BSL-3) laboratory, which is now operational. The BSL-3 facility will enable IEDCR to isolate and culture highly pathogenic viruses.
- The BSL-3+ laboratory at icddr,b was accredited in July 2010. A new BSL-2 animal laboratory initiated poultry sample testing in November 2009, allowing them to identify outbreaks of avian influenza.
- In 2011, the upgraded IEDCR laboratory tested over 1,500 clinical samples for influenza.
- IEDCR and icddr,b send about 200–300 influenza isolates per year, including unsubtypables, to a WHO Collaborating Center for further characterization.

Preparedness

IEDCR, with key partners, has periodically updated their pandemic response and avian influenza plan with lessons learned from the pandemic. Training of public health officials and health professionals is an integral part of pandemic preparedness and IEDCR has led several training activities during FY 2011.

Preparedness Activities

- Standard operating procedures to roll out non-pharmaceutical interventions, triage, and alternate care facilities during a pandemic were updated to reflect lessons learned during the 2009 H1N1 pandemic.
- An emergency operations center was built and equipped to help centralize government response during major outbreaks and pandemics.



Posters in Bangladesh promote the safe handling of poultry to minimize exposure to avian influenza using images and Bengali text.

Training

- During the pandemic period, IEDCR routinely trained public health officials and clinical providers from the district and sub-district levels on management of patients with suspected pandemic influenza using evidence-based recommendations generated from collaborative IEDCR, icddr,b, and CDC research.
- A consultative workshop for improving data collection, reporting, and use by developing and implementing web-based surveillance was held at IEDCR in June 2011.
- Training of health help desk officers at points of entry for IHR (2005) implementation was held at IEDCR in October 2010.
- Training on the establishment of institutional disease surveillance at the district and Upazilla level for civil surgeons, a statistical assistant and key leadership took place at IEDCR in December 2010.
- Refresher training for physicians regarding standard operating procedures for avian influenza in humans was held at IEDCR in May 2011.

Special Influenza Projects

- IEDCR, icddr,b, and CDC estimated the disease and economic burden of influenza in Bangladesh, generated influenza mortality rates, and piloted scalable non-pharmaceutical interventions to control influenza.
- IEDCR continues to demonstrate its leadership within the Bangladesh government to guide the country through any influenza-related response, and through policy development related to pandemic preparedness in light of the endemic circulation of influenza A (H5N1) in the country.

Contacts

Mahmudur Rahman, MD
Director
Institute of Epidemiology Disease Control and Research
Dhaka, Bangladesh
Email: mrahman@citechco.net

A.S.M. Alamgir, MD, PhD
Virologist, NIC
Institute of Epidemiology Disease Control and Research
Dhaka, Bangladesh
Email: aalamgir@gmail.com