

# South Africa



**Capital:** Pretoria

**Infant Mortality Rate:** 42.15/1,000 live births

**Population:** 48,601,098 (July 2013 est.)



## Overview

CDC collaborates with the National Institute for Communicable Diseases (NICD)/National Health Laboratory Service (NHLS) to strengthen laboratory and epidemiologic capacity of national health authorities for the detection, surveillance, and response to seasonal, pandemic, and zoonotic influenza in South Africa and countries of the Southern Africa Development Community. CDC sponsored a data management training course for influenza surveillance data managers and epidemiologists. Surveillance for influenza has provided a platform to explore the role of other viral respiratory pathogens in causing pneumonia in South Africa. Robust estimates of influenza burden in specific populations (e.g. HIV-infected) have provided evidence for policy improvements on the use of the influenza vaccine in targeted groups. Strengthening pandemic preparedness and response capacity at the local level provides a platform for improved preparedness and response for other communicable diseases.

## Highlights

- Developed a draft of the national influenza policy with National Department of Health and the Biovac Institute.
- Developed a sustainability plan for the influenza programme including plans to integrate into an established national infectious disease surveillance programme (GERMS).
- Established laboratory assays for MERS-CoV and avian influenza H7N9 following emergence of these pathogens.

## Surveillance

The severe acute respiratory illness (SARI) and the influenza-like illness (ILI) programmes continue at hospitals and outpatient clinics across the country. The SARI programme routinely tests for RSV, influenza A and B, adenovirus, human metapneumovirus, parainfluenza 1, 2, 3, rhinovirus and enterovirus. An additional ILI routine surveillance site was established last year. The ILI surveillance programme enrolls patients by a standard case definition of ILI. It provides a platform for the influenza shedding study and allows for a better description of the risk factors for ILI and SARI in a high HIV prevalence setting. Additional protocols are included to allow for identification of *Pneumocystis jirovecii*, *M. tuberculosis*, *Streptococcus pneumoniae*, *Bordetella pertussis*, *Haemophilus influenzae* type B, atypical bacterial causes of pneumonia (*Legionella species*, *Chlamydomydia pneumoniae* and *Mycoplasma pneumoniae*), coronaviruses and bocavirus. Describing these pathogens will allow for a full description of the causes of pneumonia in our setting. Taqman array card testing for additional respiratory pathogens has been established.

## Surveillance Activities

- The National Influenza Center (NIC) was the first reference laboratory in Africa to initiate testing for MERS-CoV; the NIC is now accredited by both the South African National Accreditation System (SANAS) and the Department of Agriculture Forest and Fisheries (DAFF) for human and zoonotic influenza strain identification.
- Established surveillance to investigate human-animal interface in areas where avian influenza outbreaks have been recorded.

## Laboratory

Since A(H1N1) pdm09 predominated in 2013, most virus isolates were made from clinical specimens positive for this strain including 41/46 cell culture and 18/36 egg isolates. Hemagglutination inhibition assays characterized 98% (40/41) of A(H1N1)pdm09 isolates with normal reactivity to the A/California/7/2009 reference. Three A(H3N2) isolates reacted with  $\geq 2$  fold lower titer to the reference antiserum, A/Perth/16/2009. Influenza B virus isolates showed normal reactivity to B/Wisconsin/1/2010 (Yamagata lineage) antisera. H3N2 hemagglutinin (HA) genes from 2013 are in genetic group 3 and specifically 3C. For 70 A(H1N1) pdm09 positive samples sequenced 99% (69/70) are in lineage 3C. Seven influenza B strains belong to clade 2 of the B/Yamagata lineage. Influenza A(H1N1)pdm09 positive samples (n=203) tested for the H275Y oseltamivir resistance mutation were wild type. For influenza virus isolates [A(H1N1)pdm09: n=16, A(H3N2): n=1, influenza B: n=7] tested for phenotypic resistance to oseltamivir and zanamivir 1 A(H1N1)pdm09 were resistant and one showed reduced sensitivity.

### Laboratory Activities

- Expanded surveillance for ILI in ostrich farming areas to detect transmission of influenza A at the animal-human interface allowed testing of respiratory samples from farm owners and workers, animal handlers, abattoir workers and veterinary personnel.
- Collaborated with DAFF to do surveillance for influenza A in pigs.
- Supported South African Development Community countries by testing specimens for suspected avian influenza and performing inter-laboratory quality assurance testing.

## Preparedness

Assays to test for the MERS coronavirus by real time reverse transcription PCR of the E and orf-1b genes are established. The assay for the E protein gene target (UpE) is considered highly sensitive, and has been implemented at the Centre for Respiratory Diseases and Meningitis (CRDM). A second confirmatory PCR on the open reading frame 1b (ORF1b) and a pan-coronavirus PCR can run on UpE positive specimens. For A(H7N9) preparedness we established the real time RT-PCR assays to test for the H7 and N9 genes as well as other avian H5, H6; H7 and H9 influenza strains.

Serum hemagglutination inhibition assays have been established for serological surveillance for human exposure to the following avian influenza virus strains: inactivated A(H5N2), A(H6N2), A(H6N8); A(H7N1), A(H7N7). The virology laboratory was accredited by SANAS in May 2011 as well as DAFF to support diagnostic testing of avian influenza A/H5 in ostriches during the H5N2 avian influenza outbreak using the CDC real-time RT-PCR assay. In-house RT-PCR assays for avian influenza A/H5, A/H7 and A/H9 have been established which enhance our capacity to provide reference laboratory support for avian influenza virus diagnosis. We have also established the H7N9 typing RT-PCR for detecting cases of the emerging strain from China.

## Preparedness Activities

- Contributed to WHO working groups on novel coronavirus.
- Conducted meetings to discuss pandemic preparedness and the National Influenza Centre's role in detecting imported cases.
- Supported the National Department of Health (NDOH) on vaccine and clinical treatment guidelines for 2013 influenza season.
- Established surveillance in humans on farms where newly positive Avian Influenza cases were detected in ostriches.
- Established surveillance for influenza in pigs for the first time in South Africa.
- Established real-time PCRs for MERS-CoV, as well as a pancoronavirus PCR.

## Training

- Presented three papers on respiratory syncytial virus (RSV) at the 8th Annual International RSV Symposium, Sante Fe, New Mexico (US).
- Hosted the 9th Influenza Symposium in March 2013 in Johannesburg, South Africa.
- Hosted the African Influenza and Emerging Respiratory Virus Preparedness Meeting in Cape Town, South Africa (September 2013).
- Attended the Influenza in Africa Workshop: Afriflu 2012.
- Attended the Data for Action: Research Methods and Data Analysis Course (Epi Info) facilitated through the Centre for Statistical Analysis and Research at Cedar Park Hotel, Johannesburg (May 2013).

## Publications

Pretorius MA, Madhi SA, Cohen C, Naidoo D, Groome M, Moyes J, Buys A, Walaza S, Dawood H, Chhagan M, Haffjee S, Kahn K, Puren A, Venter M. Respiratory viral coinfections identified by a 10-plex real-time reverse-transcription polymerase chain reaction assay in patients hospitalized with severe acute respiratory illness—South Africa, 2009–2010. *J Infect Dis* 2012;206 Suppl 1:S159–65. doi: 10.1093/infdis/jis538.:S159–S165.

Venter M, Naidoo D, Pretorius M, Buys A, McAnerney J, Blumberg L, Madhi SA, Cohen C, Schoub B. Evolutionary dynamics of 2009 pandemic influenza A virus subtype H1N1 in South Africa during 2009–2010 *J Infect Dis*. 2012 Dec 15;206 Suppl 1:S166–72. doi: 10.1093/infdis/jis539.

Wolter N, Cohen C, Tempia S, Madhi SA, Venter M, Moyes J, Walaza S, Kgothong BM, Groome M, du Plessis M, Pretorius M, Dawood H, Kahn K, Variava E, Klugman KP, von Gottberg A. HIV and Influenza Infection Are Associated with Increased Blood Pneumococcal Load, South Africa, 2009–2011. *J Infect Dis*. 2013 Aug 6.