

WHO Region for Africa [AFR]





WHO Region for Africa [AFR]

In fiscal year 2014, there were twelve bilateral cooperative agreements to build or enhance sustainable influenza surveillance in the sub-Saharan region of Africa. These agreements are with ministries of health or institutions designated by a country's Ministry of Health (MOH) to work with the U.S. Centers for Disease Control and Prevention (CDC).

Direct country support through non-research cooperative agreements is established in the following 12 countries:

- Democratic Republic of Congo
- Ethiopia
- Madagascar
- Mali
- Mozambique
- Nigeria
- Republic of Côte d'Ivoire
- Rwanda
- South Africa
- Tanzania
- Uganda
- Zambia

In addition, CDC's direct assistance to the countries listed above supports capacity building in six neighboring African countries, Burkina Faso, Mauritania, Niger, Senegal, Sierra Leone, and Togo, to enhance surveillance systems.

CDC also supports the World Health Organization's (WHO) Regional Office for Africa (AFRO) through a cooperative agreement.

Core activities of CDC bilateral agreements and technical assistance include:

- Building sustainable national capacity for surveillance for seasonal influenza, pandemic influenza and other emerging diseases and preparedness for implementation of the International Health Regulations (2005).
- Contributing surveillance data to WHO's Global Influenza Surveillance and Response System (GISRS).
- Increasing the geographic reach of WHO GISRS.

- Providing early access to critical virus isolates from humans and birds for WHO GISRS.
- Increasing the quantity of shipments and influenza isolates provided by African influenza laboratories for analysis by WHO Collaborating Centers (CC).
- Developing sustainable epidemiologic and virologic surveillance systems for severe influenza, in order to gain an understanding of the burden of disease in the WHO African Region.

CDC also partners with:

The U.S. Naval Medical Research Unit No. 3 (NAMRU-3) in Accra, Ghana supporting Burkina Faso, Mali, Mauritania, and Togo to build influenza surveillance systems.

Institut Pasteur in Paris, France to support activities in Cameroon, Central African Republic, and Senegal.

World Health Organization in Geneva, Switzerland and the U.S. Agency for International Development (USAID) to support activities in Burkina Faso, Malawi, Mozambique, and Republic of Congo.

The Indian Ocean Commission (IOC) in Port Louis, Mauritius to enhance surveillance in Mauritius and build surveillance capacity in the Seychelles.

In fiscal year 2013, CDC expanded its cooperative agreement portfolio to include a Vaccine Policy component.

Country support was established in Kenya and Uganda to introduce or expand the use of seasonal influenza vaccines.

Core activities of these agreements include:

- Conducting a needs assessment to identify barriers to vaccine introduction.
- Developing a three-year action plan to introduce vaccines.
- Implementing the plan.
- Introducing or expanding vaccine use to the target population through development of a national policy.

In addition to the capacity building grants identified above, CDC's Influenza Division also supports research collaborations with institutions in Ghana, Kenya, Malawi, Senegal, and South Africa. These collaborations focus on demonstrating the burden of influenza-associated illness in sub-Saharan Africa, identifying risk factors for severe influenza, measuring influenza-associated morbidity and mortality and documenting influenza vaccine effectiveness.

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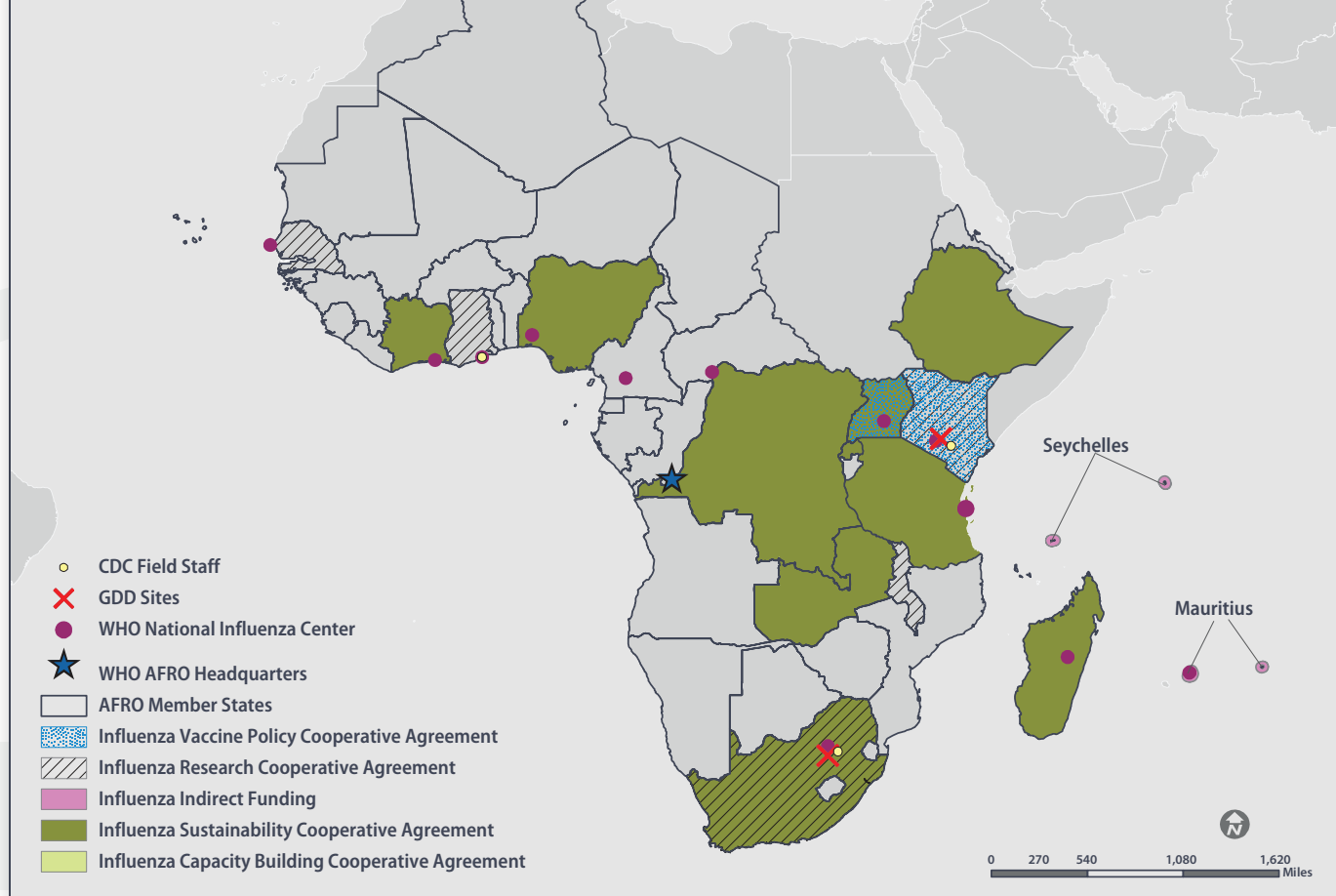
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WHO Regional Office for Africa [AFRO]

International Influenza Activities: CDC-AFRO 2015



HIGHLIGHTS

- Disseminated weekly bulletins on virological surveillance of influenza through the AFR influenza laboratory network.
- Provided strategic guidance, technical and financial support, and coordination to Member States to strengthen the virological and epidemiological surveillance of influenza to better prepare against seasonal, zoonotic, and pandemic influenza threats in the WHO African region.
- Collaborated closely with the Food and Agricultural Organization (FAO) to provide technical guidance and assistance to countries in West Africa that are facing outbreaks of influenza A (H5N1) in poultry.

U.S. CDC DIRECT SUPPORT

The WHO Regional Office for Africa is currently in the fourth year of its five-year cooperative agreement. With the support from U.S. CDC, 30 (64%) of 47 countries in the region have developed and maintained sentinel surveillance and laboratory capacity for the diagnosis of influenza. Support includes technical and financial assistance to Member States to strengthen their national influenza surveillance systems, with a specific focus on influenza-like illness (ILI) and severe acute respiratory infections (SARI). Countries within the network are regularly supplied with laboratory equipment and reagents, thus enhancing and sustaining diagnostic capacity for detection of influenza viruses. This support has also enhanced the laboratory capacity in the region to identify MERS-Coronavirus and Ebola virus.

SURVEILLANCE

During the first quarter of 2015, three countries (Gabon, Mauritania, and Republic of Congo) received support to strengthen their national influenza surveillance systems.

SURVEILLANCE ACTIVITIES

- Reviewed the status of influenza virological surveillance in the African region from 2010 to 2013. Results were published in the November 2014 edition of the Integrated Disease Surveillance and Response quarterly bulletin.
- Worked with the respective governments of Burundi and Mauritania to conduct an assessment of their influenza surveillance systems (July/August 2014). The assessment revealed that both countries do not have functional virological and epidemiological influenza surveillance systems in place.
- Attended the 4th African Network Influenza Surveillance and Epidemiology (ANISE) Meeting held in Cape Town, South Africa (5–6 Dec 2014) and chaired a session on “Setting the Stage for Influenza Vaccine Introduction” during this meeting.

LABORATORY

As of December 2014, the Regional Laboratory Network comprises 30 National Influenza Reference Laboratories. With support from grants, members of the influenza laboratory network are sharing weekly data on influenza virological surveillance.

Between week one and week sixteen (AFRO weekly data updated on 24 April 2015), the networking laboratories tested 9,115 specimens for influenza viruses and found that 1,318 (14%) were positive. The Democratic Republic of Congo was supported to enhance capacity for virological surveillance of influenza.

LABORATORY ACTIVITIES

- Disseminated weekly virological surveillance data through the AFR Influenza Laboratory Network.
- Provided essential reagents and supplies to Algeria, Burkina Faso, Central Africa Republic, Republic of Congo, Senegal, and Togo for enhancing and sustaining laboratory testing of ILI and SARI clinical specimens.
- Provided financial support to the Democratic Republic of Congo in order to strengthen the National Institute of Biomedical Research (INRB) for enhancing virological influenza surveillance.
- Strengthened Zimbabwe’s national influenza reference laboratory with financial support.

PREPAREDNESS

WHO AFRO in collaboration with WHO Headquarters (HQ) is implementing the laboratory and surveillance component of the Pandemic Influenza Preparedness (PIP) framework in two selected countries, Ghana and Tanzania. Both countries are focusing on activities aimed at strengthening their capacities to monitor trends in circulating influenza viruses. In addition, Tanzania is also implementing activities aimed at strengthening its national capacity to detect novel influenza viruses.

Cameroon and Zambia have recently been recruited to join the PIP implementation project. The overall target is to obtain participation from 11 countries in the WHO African region. Efforts are underway to gain participation from seven more countries: Algeria, Burundi, Congo, Madagascar, Mozambique, Sierra Leone, and South Africa. To avoid duplication of efforts, the WHO staff focal point on influenza ensures harmonization of the CDC influenza project and PIP.

PREPAREDNESS ACTIVITIES

- Ghana and Tanzania—Conducted self-assessment surveys of their influenza laboratory using WHO standardized tools.
- Tanzania—Conducted training on influenza specimen collection and shipment for staff

in newly established influenza sentinel sites. Procured IT equipment for the Ministry of Health, laboratories, and sentinel sites to enhance data sharing and ensure monitoring and assessment of influenza events of international concern.

- Ghana National Influenza Center (NIC)—Supported sub-regional influenza capacity by training two staff members from Nigeria and Côte d'Ivoire on influenza virus isolation (18–27 March 2015).
- Ghana—Established 24 sentinel sites for influenza surveillance in all regions, between January and April 2015, as part of influenza preparedness. Sent samples from patients with ILI for assessment by the NIC.

TRAINING

- Participated in and helped facilitate the Influenza Estimating Burden Workshop in Cape Town, South Africa on 4 December 2014.
- Supported three participants from Burkina Faso, Niger, and Togo to attend the Grants Proposal Writing Workshop held in Johannesburg, South Africa from 13–17 April 2015.
- Organized and facilitated a workshop for preparedness and response to influenza and respiratory pandemics in the context of the International Health Regulations (IHR 2005) in Yaoundé, Cameroon. Thirty participants from eleven countries—Angola, Burundi, Cameroon, Gabon, Central African Republic, Democratic Republic of Congo, Sao Tome and Principe, Senegal, Chad and Equatorial Guinea—in the African region attended the workshop (4–8 November 2013).
- Organized a training workshop in Ouagadougou, Burkina Faso on Building the Capacity for Influenza Sentinel Surveillance. Participants were clinicians from sentinel sites, laboratory technicians, and epidemiologists (22–25 April 2014).

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DEMOCRATIC REPUBLIC OF CONGO (DRC)



The rehabilitated National Influenza Laboratory.

OVERVIEW

The U.S. Centers for Disease Control and Prevention (CDC) provides financial and technical assistance to the Ministry of Health (MOH) through the Kinshasa School of Public Health. An enhanced routine surveillance system currently collects information used to estimate the national influenza burden. At the beginning of 2014, the surveillance system expanded to two additional provinces in DRC.

SURVEILLANCE

In DRC, the Fourth Directorate of the MOH is the institution in charge of disease control. For influenza sentinel surveillance, this Directorate produces and disseminates standard weekly reports that include virological and epidemiological data, and organizes monthly meetings of the DRC Influenza National Technical Committee.

In 2006, DRC started influenza surveillance and it is currently carried out in 11 health facilities located in five out of 11 provinces in the country. Sentinel site staff report suspected influenza cases and when the criteria are met, take samples. The samples taken are sent to the National Institute of Biomedical Research (INRB) within 48 hours. Sentinel site staff are

HIGHLIGHTS

- Rehabilitated the National Influenza Laboratory which has become one of the best laboratories of the National Institute of Biomedical Research (INRB).
- Extended influenza sentinel surveillance to the northeastern part of the country.
- Began investigation on the estimation of the influenza burden of disease—the pilot survey is underway.
- Developed a database that includes virological and epidemiological data of all suspected cases of influenza as reported by sentinel site staff.

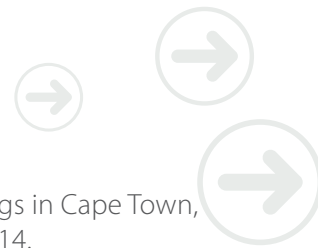
regularly trained and supervised. Supervisory visits are conducted monthly at sentinel sites in Kinshasa and quarterly for those sites located in the provinces.

SURVEILLANCE ACTIVITIES

- Reported 10,495 suspect cases of influenza. Among them, 3,039 (29%) were hospitalized for severe acute respiratory infection (SARI).
- Produced and disseminated 78 weekly reports on influenza surveillance by the Fourth Directorate of the MOH. Reports were also posted to FluNet.
- Conducted 18 supervisory visits at sentinel sites in Kinshasa and six in the provinces.
- Retrained 33 sentinel site staff on completing the notification form, sampling techniques, packaging, conservation and shipping, and reporting.

LABORATORY

The influenza national laboratory is part of the Virology Unit within INRB which is the National Public Health Laboratory. The capacities of this Level II laboratory have been strengthened especially in terms of laboratory equipment and laboratory staff training on RT-PCR technique and virus isolation. INRB analyzes specimens from suspect influenza cases using RT-PCR for typing and subtyping influenza viruses A and B.



Weekly reports on virological findings are produced and disseminated to all stakeholders including sentinel site staff, RDC/MOH, CDC, and WHO. Positive specimens are shared with the WHO Collaborating Center (WHO CC) in Atlanta and thus contribute to the selection of new influenza vaccine strains.

LABORATORY ACTIVITIES

- Identified 340 samples positive for influenza viruses (8.7% positivity rate): 12 (3.5%) were influenza A (H1N1)pdm09 virus, 169 (49.7%) were influenza A (H3N2), 35 (10.3%) were not able to be subtyped and 124 (36.5%) were influenza B.
- Provided 32 influenza A viruses that were not able to be subtyped to the WHO CC in Atlanta.
- Participated in WHO's External Quality Assessment Project (EQAP) for detection of influenza viruses by RT-PCR and in CDC's Influenza Molecular Diagnostic Performance Evaluation.

PREPAREDNESS

Support received through this cooperative agreement helped improve DRC's capacity to rapidly detect and respond to influenza outbreak threats and outbreaks from other causes. Influenza surveillance project staff participated in the management of various epidemics that have occurred throughout the country. Furthermore, they are members of an alliance of health professionals, at all levels of the health pyramid, on disease surveillance and response.

PREPAREDNESS ACTIVITIES

- Participated in the management of the Ebola virus outbreak in Boende (northwestern part of DRC) in December 2014 and in Conakry, Guinea in March 2015.
- Trained staff in the health zones/health districts of Haut-Uélé and Bas-Uélé in disease surveillance and response, November 2013.
- Conducted a train-the-trainer session on Ebola virus disease surveillance in Kinshasa, October 2014.
- Participated in an international meeting to exchange experiences on the fight against Ebola in Côte d'Ivoire, March 2015.

TRAINING

- Attended the ANISE Meetings in Cape Town, South Africa in 2013 and 2014.
- Participated in the Influenza Disease Burden Workshop on 4 December 2014 in Cape Town, South Africa.
- Participated in the CDC/APHL International Advanced Influenza Real-time RT-PCR Workshop 26–30 January 2015 in Antananarivo, Madagascar.

INFLUENZA VACCINE ACTIVITIES

DRC has not yet implemented influenza vaccine activities. However, activities are being planned for the future.

ETHIOPIA

OVERVIEW

With the support of CDC, influenza surveillance in Ethiopia was initiated in 2008. The influenza-like illness (ILI) and severe acute respiratory infection (SARI) sentinel surveillance system is owned by the Ethiopian Public Health Institute (EPHI) and monitored and coordinated by the Public Health Emergency Management Center (PHEMC). In 2009, an emergency operations center under the emergency public health management directorate was established.

SURVEILLANCE

Influenza sentinel surveillance was started in 2008 in two health facilities (Yekatit hospital for SARI and Shiromeda health center for ILI) in Addis Ababa. In 2010, the sentinel sites were expanded to two new health centers (Akaki and Kolfe), and four new SARI sentinel sites (Adama, Adare, Mekele and Felegehiwot Hospitals) were selected from four mega regions (Oromia, SNNP, Tigray and Amhara Regions) respectively.

Currently, eight sentinel sites are conducting surveillance. Of them, five are SARI sites and the other three are ILI sites. Ethiopia has selected twenty priority diseases with mandatory reporting. Among those that are required to be reported immediately are avian-human influenza, pandemic influenza, and SARS.

SURVEILLANCE ACTIVITIES

- Compiled and entered surveillance data into a database using Epi Info.
- Conducted regular descriptive data analysis by time, place and person (trends of the disease over the last four years have been analyzed).
- Monitored completeness and quality of surveillance data and based on the gaps identified, provided feedback to the reporting sentinel sites.
- Collaborated with residents of the Field Epidemiology Training Program (FETP) to conduct supervisory visits to the sentinel sites.
- Conducted on-the-job mentorship activities for staff at the new SARI sites.

HIGHLIGHTS

- Developed and disseminated weekly public health emergency management bulletins to stakeholders.
- Conducted regular meetings of the Influenza Technical Working Group.
- Received surveillance data (case-based and aggregated) from all sentinel sites throughout the year.
- Prepared and implemented the public health emergency management annual plan. Influenza is included in the plan.

LABORATORY

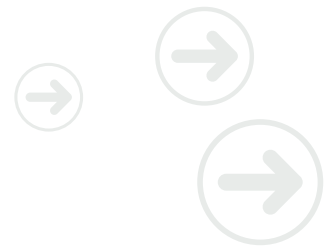
The National Influenza Laboratory (NIL) at EPHI is the only laboratory in the country capable of influenza diagnostic testing. The laboratory became functional in June 2009. The NIL has worked closely with CDC to establish a state of the art laboratory. Routine testing of respiratory samples collected through the SARI/ILI sites commenced in 2009. Collaboration between human and animal health laboratory staff is also being supported.

LABORATORY ACTIVITIES

- Provided onsite technical assistance to all sentinel sites in Addis Ababa twice a week.
- Received weekly throat swab specimens from each sentinel site.
- Collected and tested 1,326 specimens by RT-PCR, of which 169 (12.7%) were positive for an influenza virus: 75 for influenza B, 58 for influenza A (H3N2), 6 for influenza A (H1N1), and 30 for influenza A (H1N1)pdm09 (April 2014 to March 2015).
- Reported laboratory results weekly to WHO AFRO.

PREPAREDNESS

The Public Health Emergency Management Center (PHEM) is responsible for preparedness, early warning and response to any public health emergencies including avian and human influenza and pandemic influenza. The PHEM Center is working closely with the national influenza laboratory and coordinates the implementation of influenza sentinel surveillance.



PREPAREDNESS ACTIVITIES

- Printed and distributed 40,000 leaflets on MERS-CoV.
- Distributed the influenza sentinel surveillance implementation guideline to sentinel sites.
- Printed and distributed reporting formats for pandemic influenza, severe acute respiratory syndrome (SARS), and avian-human influenza to all regions.
- Developed an influenza sentinel surveillance sustainability plan that is aligned with public health emergency management activities.

TRAINING

- Conducted training for 80 participants from sentinel sites, regional health bureaus and other relevant sectors on influenza viruses and MERS-CoV.
- Provided an orientation on MERS-CoV for heads and experts from regional Public Health Emergency Management Centers, Regional Public Laboratories, Disease Prevention and Health Promotion Directorates during the PHEM Annual Review Meeting (August 2014).
- Conducted onsite training and mentoring for all SARI and ILI sites.
- Conducted technical review meetings in May and August 2014.

INFLUENZA VACCINE ACTIVITIES

No influenza vaccine-associated activities were implemented during the reporting period.

KENYA

OVERVIEW

In 2013, Kenya was awarded a new cooperative agreement to help develop a seasonal influenza vaccination policy. Funds are being used to compile relevant data to support the introduction of seasonal influenza vaccination in Kenya. Funding is also being used to conduct a pilot/demonstration project to determine the requirements of introducing and vaccinating target populations with seasonal influenza vaccine.

SURVEILLANCE

Influenza sentinel surveillance activities take place in five public health institutions and two refugee camp hospitals, where cases of influenza-like illness (ILI) from one hospital and severe acute respiratory illness (SARI) from all hospitals are identified. With the support of the Kenya Medical Research Institute (KEMRI) and CDC-Kenya, data and specimens are collected to determine the circulation of influenza viruses. We have also been interacting with the KEMRI-Wellcome Trust project that has been conducting respiratory disease surveillance, including influenza surveillance, in the coastal region of Kenya (Kilifi). KEMRI, in collaboration with the Walter Reed Project (WRP) also runs influenza surveillance in military health institutions.

SURVEILLANCE ACTIVITIES

- Analyzed influenza surveillance data from different partners and determined the temporal trends of influenza activity in the country as well as circulating virus types and sub-types.
- Analyzed influenza surveillance data to determine potential optimal timing of a possible seasonal influenza vaccine campaign.

LABORATORY

Received support from KEMRI and CDC to test specimens collected from the sentinel sites for influenza viruses. In addition, the KEMRI/CDC laboratory assisted in testing for MERS-CoV and avian influenza A (H7N9) during outbreak investigations. Some specimens are sent to CDC Atlanta for serological testing.

HIGHLIGHTS

- Conducted an influenza surveillance stakeholder's sensitization meeting on proposed seasonal influenza vaccine introduction.
- Developed a draft influenza vaccination project "data dossier."
- Attended meetings with CDC Atlanta's subject matter experts on the introduction of seasonal influenza vaccine.
- Tasked the influenza sub-committee of the National Immunization Technical Advisory Group of Kenya (KENITAG) with justifying the introduction of influenza vaccination in Kenya.

The National Influenza Center (NIC) will soon move to the Ministry's National Public Health Laboratories (NPHL). This will ensure that influenza sentinel surveillance activities are wholly owned by the Ministry, making it more sustainable and enhancing influenza virus testing capacity.

LABORATORY ACTIVITIES

- Shared virological data on circulating influenza viruses with WHO and other interested stakeholders.
- Enhanced the capacity of NPHL to test specimens collected at sentinel sites for influenza viruses by training staff and utilizing updated equipment.
- Collaborated with CDC and KEMRI on logistics for specimen collection from surveillance sites and shipping to NPHL.

PREPAREDNESS

- Conducted training on outbreak investigations of MERS-CoV and avian influenza A (H7N9) at our sentinel sites and major hospitals in the Rift Valley, Nairobi, and the Coastal regions. During these trainings, identified points of contact responsible for periodic reports and channels through which specimens from suspected cases are shipped to the KEMRI and CDC laboratories. Brochures and posters were developed to educate the public on these conditions. The posters were strategically placed at Jomo Kenyatta International Airport and other main entry points, the Ministry of Health

(MOH) Headquarters, and the Embassies of Saudi Arabia and China. Investigation of suspected cases reported by the facilities has been coordinated.

PREPAREDNESS ACTIVITIES

- Educated health care workers in public and private health facilities in selected regions on MERS-CoV and avian influenza A (H7N9) virus.
- Printed banners on MERS-CoV and avian influenza A (H7N9) virus and placed them at the main ports of entry as well as the Embassies of China and Saudi Arabia.
- Printed informational brochures on MERS-CoV and avian influenza A (H7N9) virus and distributed them to travelers from the Hajj as well as those from China to educate them on what to look for and how to react.
- Hired a consultant to package the influenza data dossier in the format recommended by the KENITAG and SIVAC.

TRAINING

Provided on-the-job training for health care workers from the main health facilities in Rift Valley, Coast, and Nairobi regions on the following:

- Pandemic Influenza Preparedness.
- Influenza A (H7N9) virus and MERS-CoV infections globally and the danger of their spread from their epicenters in Saudi Arabia and China.
- Emerging infectious disease surveillance.
- General disease surveillance.

INFLUENZA VACCINE ACTIVITIES

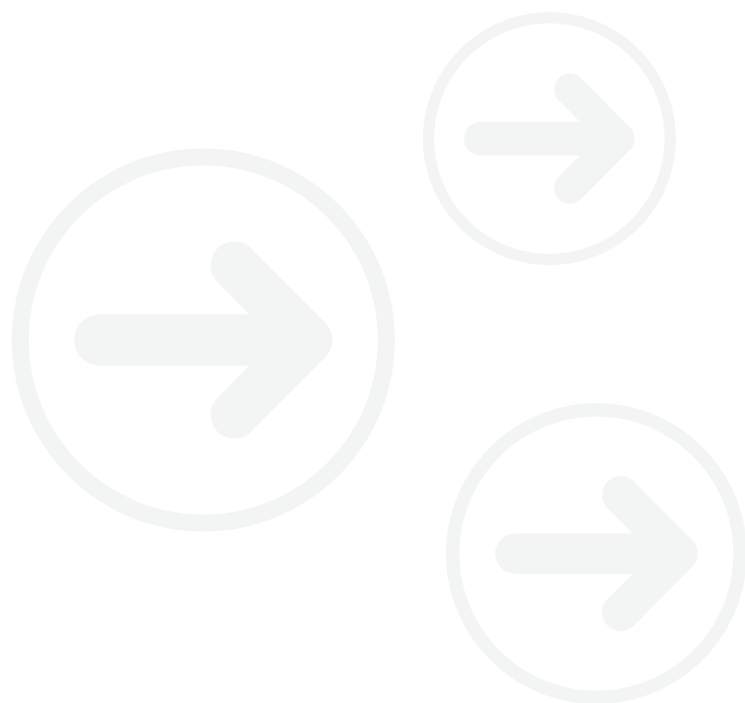
- Designated Kenya MOH staff to attend the Influenza Vaccine Policy Kickoff Meeting in Atlanta to discuss issues related to seasonal influenza vaccine introduction and learn how the U.S. Advisory Committee on Immunization Practices (ACIP) conducts its activities.
- Conducted a one-day meeting to brief influenza surveillance stakeholders in Kenya on the seasonal influenza vaccine introduction project (June 2014).
- Met with influenza stakeholders in August 2014 and collected information on thematic areas to justify seasonal influenza vaccine introduction to the Kenyan public.
- Compiled a data dossier on information justifying vaccine introduction (February 2015).

RESEARCH

CDC's Influenza Division collaborates closely with the Ministry of Health and other partners to explore strategies for sustainable influenza surveillance, the timing of influenza activity in Kenya, optimal times to vaccinate against influenza, the disease and economic burden of influenza illness among SAGE target groups, and the potential impact of influenza vaccination programs. Research activities include studies to:

- Compare the quality, cost and timeliness of data collection between the smartphone data collection system and the paper-based system for routine influenza surveillance in Kenya 2011–2012.
- Compare case definitions for severe acute respiratory illness and clinical pneumonia for the detection of influenza virus infections among hospitalized patients, Western Kenya, 2009–2013.
- Determine whether the length of specimen storage affects influenza testing results by real-time reverse transcription-polymerase chain reaction through the analysis of influenza surveillance specimens, 2008 to 2010.
- Evaluate point-of-care BD Veritor™ Rapid Diagnostic Test for Influenza in Kenya.
- Explore the etiology of pediatric fever in Western Kenya using a case-control study of falciparum malaria, respiratory viruses, and streptococcal pharyngitis.
- Understand the etiology and epidemiology of severe acute respiratory illness in children aged less than 5 years in Kibera, an urban slum in Nairobi during 2007–2011.
- Identify young infants and children at higher risk of dying from respiratory infections within the hospital setting.
- Explore the role of HIV in the household introduction and transmission of influenza in a slum, Nairobi 2008–2011.
- Review existing data on the influenza-associated disease burden in Kenya, 2006–2013.
- Estimate the burden of influenza virus and RSV among inpatients and outpatients in rural Western Kenya, 2009–2012.
- Describe the demographic, socio-economic and geographic determinants of seasonal influenza vaccine uptake in rural western Kenya, 2011.

- Describe the etiology of pediatric respiratory disease mortality at Kenyatta National Hospital.
- Explore what influenza vaccine formulation should be used in Kenya through a comparison of influenza isolates from Kenya to vaccine formulations, 2007–2013.
- Describe the uptake and effectiveness of a trivalent inactivated influenza vaccine in urban and rural Kenya, 2010–2012.
- Describe influenza activity in Kenya, 2007–2013 by analyzing timing, association with climatic factors, and implications for vaccination campaigns.
- Quantify the economic burden of influenza in Kenya.
- Conduct a cohort study of influenza-associated illness among pregnant women in Western Kenya.
- Explore which maternal influenza vaccine strategies have the greatest impact on disease burden among pregnant women and young infants.





MADAGASCAR



Adventures on one of the dirtiest roads of Madagascar to reach one of the sentinel health care centers investigated during this project.

OVERVIEW

Through a sustainability cooperative agreement, CDC provided support to sustain the capacity of the National Influenza Center (NIC) and Health Authorities for surveillance and diagnosis of influenza-like illness (ILI) and severe acute respiratory infection (SARI) [including Highly Pathogenic Avian Influenza (HPAI) in humans] in Madagascar. Efforts to better understand the epidemiology of influenza in Madagascar and estimate incidence and burden of disease are also supported by the cooperative agreement (CoAg).

SURVEILLANCE

To date, the ILI sentinel surveillance system encompasses 34 health care centers that, on a daily basis, send epidemiological information for several diseases including ILI. Twelve send respiratory specimens for influenza diagnosis to the NIC on a weekly basis. The sentinel network for SARI surveillance is functional and encompasses 17 hospitals throughout the country. One hospital in Antananarivo (capital) recruits all hospitalized SARI cases for virological surveillance. The influenza specific project on SARI surveillance ended in October 2013, and was replaced with an enlarged SARI surveillance project in Antananarivo, focusing on four respiratory viruses of importance in Madagascar (influenza A and B viruses, rhinoviruses, and respiratory syncytial virus [RSV]).

HIGHLIGHTS

- Published a paper on influenza seasonality in Madagascar, pointing out that there is a need for deeper studies to decipher factors and mechanisms that can explain influenza circulation and diffusion (in collaboration with the Fogarty International Center).
- Conducted the 4th Annual Sentinel Surveillance Network Meeting involving 61 participants from SARI surveillance sites.
- Conducted training on Risk Communication related to Public Health Emergency in Mauritius (December 2014).

SURVEILLANCE ACTIVITIES

- Assembled a project focused on surveillance at three pig farms to explore the human-animal interface.
- Completed the influenza-specific SARI project in October 2013 and implemented a general SARI surveillance system.
- Managed ILI and SARI surveillance, including sampling and analysis.
- Organized the 4th Annual Meeting for SARI site managers in Antananarivo (July 2014). The discussion focused on coordination and standardization of data collection (clinical illness and mortality) of malaria and SARI throughout sentinel hospitals.

LABORATORY

Madagascar's NIC enhanced its diagnosis and technical capacities by implementing rRT-PCR allelic discrimination analysis for detection of the substitution conferring influenza A(H1N1)pdm09 viruses resistant to oseltamivir. We also implemented the influenza virus microneutralization assay according to CDC's protocol. The NIC also worked closely with CDC Atlanta and South Africa in collaboration with the Association of Public Health Laboratories (APHL) to implement an international training on rRT-PCR for influenza diagnosis, gathering technicians and scientists from 18 African countries, including participants from Madagascar's NIC.

LABORATORY ACTIVITIES

- Tested 2,583 specimens for influenza diagnosis between October 1, 2013 and April 19, 2015. Among all specimens, 311 were SARI cases that were tested at the NIC using an in-house panel system for the detection of respiratory viruses. Submitted 32 positive isolates and 34 positive swabs to the WHO Collaborating Center (CC) in London as part of the WHO Global Influenza Programme.
- Completed the WHO External Quality Assessment Project (EQAP) Panel 13.
- Investigated a bronchiolitis epidemic in Antananarivo in a children's hospital in early March; results highlighted RSV and human metapneumovirus infections in 67% of specimens collected.

PREPAREDNESS

CDC support allowed the NIC to strengthen both ILI and SARI surveillance systems. All fever sentinel hospital sites participated in a meeting in July 2014 to coordinate and standardize data collection (clinical illness and mortality) of SARI data.

High-risk events vary widely in scope and nature but share one common characteristic: how well we manage these critical events relies heavily on how well we communicate before, during, and after these events. Training on Risk Communication, held in Mauritius in December 2014, helped us to understand the process of risk communication and provided tools for informed decision-making and communications.

PREPAREDNESS ACTIVITIES

- Improved the SARI surveillance system by training 61 clinicians from 17 hospitals from July 15–18, 2014.
- Conducted training on Risk Communication in Mauritius with 20 participants from nine countries (December 2014).
- Supported the Ministry of Health of Madagascar in updating the national contingency plan for 2014–2016.
- Trained Ministry of Health staff on case definition and containment of suspected cases with regard to the Ebola outbreak in West Africa.



Students working on a laboratory exercise during the PCR Workshop.

TRAINING

With CDC support, organized or directed participants to attend the following trainings/workshops through the NIC:

- International Grant Management Training Course for CDC Grantees in Antananarivo, Madagascar, 24–28 February 2014.
- Workshop on introduction to empirical population genetics, Institut Pasteur de Madagascar, Antananarivo, Madagascar, 19–23 May 2014.
- Burden of Influenza Disease Workshop, Cape Town, South Africa, 4 December 2014.
- International Workshop on Risk Communication Related to Public Health Emergency, Flic-en-Flac, Mauritius, 15–17 December 2014.
- CDC/APHL International Workshop on Influenza rRT-PCR Diagnosis, Institut Pasteur de Madagascar, Antananarivo, Madagascar, 27–30 January 2015.

INFLUENZA VACCINE ACTIVITIES

Madagascar's NIC is working to provide new data in support of influenza immunization for high-risk groups. A study on pregnant women is currently ongoing in Moramanga to assess influenza incidence. In the coming months, data on influenza disease burden will also be reviewed.

Severity and impact of influenza will be studied through analysis of several indicators, such as mortality data, truancy, and medication use. Data on influenza strains identified in Madagascar will be analyzed regarding timing of isolation and WHO influenza vaccine recommendations for both Northern and Southern Hemispheres in order to guide public health policies.

MALI



A laboratory technician working at CVD-Mali.

OVERVIEW

Influenza surveillance in Mali is carried out through a cooperative agreement between CDC and the Center for Vaccine Development of Mali (CVD-Mali). The agreement began in 2013 and is intended to assess and improve the national influenza surveillance of Mali. Surveillance is conducted using sentinel sites located in two regions and in the capital city of Bamako. The agreement has strengthened influenza surveillance in Mali and supported capacity building that has enhanced the level of preparedness and response of the country.

SURVEILLANCE

Influenza is on the list of reportable diseases in Mali. Prior to the Center for Vaccine Development of Mali's (CVD-Mali) clinical research on influenza in 2009, there was no surveillance system to monitor influenza activity. In May 2009, CVD-Mali was named the National Influenza Center (NIC) of Mali and acquired necessary equipment and reagents. The first laboratory-confirmed cases of influenza revealed that influenza A (H1N1)pdm09 virus had arrived in Mali. When the country was awarded the cooperative agreement, the project was presented to health authorities to endorse the initiative. Currently, influenza surveillance is conducted at three SARI sites and five influenza-like illness (ILI) sites.

HIGHLIGHTS

- Procured laboratory supplies and reagents.
- Assessed the national epidemiological surveillance system.
- Enhanced the national influenza surveillance protocol.
- Selected and activated sentinel sites.

SURVEILLANCE ACTIVITIES

- Trained sentinel site staff on influenza case definition, sample collection, and shipment.
- Developed a centralized database to integrate clinical and laboratory data.
- Performed regular supervisory visits to influenza sentinel sites in Sikasso and Mopti (monthly) and Bamako (weekly).
- Collected samples and case report forms from sentinel sites in Sikasso and Mopti and sent them to the NIC.
- Shared weekly reports with sentinel sites, the Ministry of Health, CDC, and WHO Country Office, and entered information into FluNet.



Dr. Boubou Tamboura and Dr. Adama Mamby Keita at the Grants Proposal Writing Workshop in Johannesburg, South Africa.



Photo taken during a site visit in 2015.

LABORATORY

Before the cooperative agreement, the NIC in Mali had the capacity to test for influenza viruses. The cooperative agreement supports the laboratory by providing logistical and technical support to sentinel sites. Laboratory supplies received from CDC have helped strengthen surveillance activities.

LABORATORY ACTIVITIES

- Conducted IATA training regarding procedures for shipment of dangerous goods for laboratory staff.
- Provided extensive training to NIC laboratorians on influenza virus typing, subtyping, PCR, RT-PCR, and reverse genetics techniques.
- Participated in WHO's External Quality Assessment Project (EQAP) for the detection of influenza virus type by RT-PCR with successful results (100%).

PREPAREDNESS

Pandemic influenza preparedness and planning has advanced considerably in Mali. The Ministry of Health implemented an integrated disease surveillance and response system which will soon include influenza. Mali developed a national strategic plan for influenza surveillance and response. Sentinel site staff were trained on suspected case detection and NIC laboratory capacity has improved.

TRAINING

- Participated in the Grant Management Training in Madagascar.
- Acquired IATA certification training for seven NIC staff members.
- Trained trainers in collaboration with CDC.
- Trained select sentinel staff members (laboratory technicians, nurses, doctors, and epidemiologists).
- Invited to present at the ANISE Meeting in Cape Town, South Africa (December 2014).
- Participated in a Grants Proposal Writing Workshop in Johannesburg, South Africa (Laboratory Head, NIC and the Project Coordinator).
- Participated in a training workshop on Laboratory Diagnosis of Influenza and other Emerging Respiratory Viruses, November 2013 in Accra, Ghana (Laboratory Technician).

INFLUENZA VACCINE ACTIVITIES

The goal of Mali's NIC is to introduce a seasonal influenza vaccination program within the next five years. In order to achieve this goal, we will identify barriers to achieving the introduction of a seasonal influenza vaccination. By the end of year five of this cooperative agreement, we will gather data on influenza disease burden and seasonality. These data will be used as tools to advocate for vaccine introduction, specifically for high risk groups such as pregnant women and children.

MOZAMBIQUE



A group photo of health facility staff during the Influenza Workshop, September 2014.

OVERVIEW

In 2009, the National Institute of Health (INS) began working toward the establishment of the sentinel surveillance system for influenza and other acute respiratory illnesses (ARI) in order to build up the national capacity for early detection and rapid response to threats posed by these pathogens. The U.S. Centers for Disease Control and Prevention (CDC) cooperative agreement awarded in 2013 supports the INS objectives and has accelerated the implementation and strengthening of influenza surveillance in Mozambique, it has also supported capacity building, enhancing the level of preparedness and response of the country.

SURVEILLANCE

Between 2009 and 2010, the World Health Organization (WHO) and CDC supported the creation of national capacity for influenza surveillance and laboratory diagnosis. In 2013, the system identified an influenza virus in an outbreak in Maputo City. In 2013, influenza surveillance in sentinel sites was initiated. Three sentinel hospitals in Maputo City were selected for influenza-like illness (ILI) and severe acute respiratory infection (SARI) surveillance, with a focus on diagnosing influenza. In 2014, the system was reviewed and the INS was advised to strengthen the system in these sentinel sites before expanding to other sites and to focus on activities related to SARI surveillance. Currently, the recruitment of dedicated

HIGHLIGHTS

- Enhanced the quality of epidemiological and virological data collection and continuous data sharing with both local and global influenza surveillance networks.
- Strengthened the national response to influenza outbreaks.
- Established and strengthened the routine surveillance system based on sentinel sites.
- Generated consistent data related to influenza seasonality and epidemiology.

staff has improved the data and sample collection, laboratory testing, and weekly reporting to WHO from these sites.

SURVEILLANCE ACTIVITIES

- Conducted two assessments and supervisory visits to the INS laboratory and influenza sentinel sites in collaboration with CDC and the Association of Public Health Laboratories (APHL).
- Updated the influenza sentinel surveillance strategies and tools following WHO requirements and CDC recommendations, significantly increasing data quality and sample collection.
- Developed an Access database incorporating currently defined data elements.
- Discussed and shared yearly and monthly data analysis outputs with national doctors and other interested persons.

LABORATORY

The INS Laboratory works closely with CDC, WHO, and the National Institute for Communicable Diseases (NICD) in South Africa to strengthen laboratory analysis activities.

INS laboratorians have trained extensively with WHO and NICD scientists on influenza virus typing, subtyping, single and multiplex real-time RT-PCR, virus isolation, cell culture and specimen shipment. There has been notable progress in laboratory capacity to respond to the current demand. The quality of the data reported to GISRS has also improved.

LABORATORY ACTIVITIES

- Tested 725 specimens; 60 (8.3%) were positive for an influenza virus (about 55 were from sentinel hospitals).
- Standardized cell culture and virus isolation techniques.
- Trained three laboratory staff on laboratory techniques (real time multiplex RT-PCR for respiratory viruses, MDCK cell culture and influenza diagnosis by real-time singleplex RT-PCR) in South Africa and Madagascar.
- Trained a laboratory staff member on IATA Shipping Guidelines for Infectious Substances in Congo-Brazzaville.
- Achieved a high score on WHO's EQAP panel in 2013.

PREPAREDNESS

CDC support through WHO has advanced pandemic influenza preparedness and planning considerably in Mozambique. The National Committee for Disaster Management (INGC), together with partnering ministries, has continued to work on a national pandemic plan while the Ministry of Health (MOH) and WHO have led the development of a health sector response plan. Annually, refresher trainings are organized for public health staff (medical directors, focal points, and surveillance and laboratory technicians from sentinel sites) in the provincial sentinel sites. Every month the INS organizes a surveillance technical meeting to monitor data and trends in sentinel surveillance-based activities.

PREPAREDNESS ACTIVITIES

- Conducted regional pandemic trainings in the Southern, Central, and Northern provinces to adapt and update local and national preparedness plans for influenza and other acute respiratory illness outbreaks.
- Established focal points at all national and provincial levels in accordance with the MOH national plan for disease surveillance.
- Provided epidemiological data tools and sample collection kits in all provinces.



Mr. Almiro Tivane providing lectures during the Influenza Workshop in September 2014.

TRAINING

INS continues to provide technical assistance and re-training to ensure the functioning of the sentinel surveillance system, quality of the surveillance data, prompt data analysis, and integration of the information into preparedness and response activities.

- Identified two INS staff (Project Coordinator and Financial Project Coordinator) to attend the Grants Management Training in Madagascar.
- Identified six INS laboratory staff to attend training on laboratory techniques in cell culture, RT-PCR, virus isolation for influenza and other respiratory viruses and specimen shipment in South Africa, Madagascar, Japan and Congo-Brazzaville.
- Conducted seven trainings and/or workshops for 67 health staff involved in sentinel surveillance work in all sites.
- Conducted two trainings for 60 provincial health staff on influenza outbreak preparedness.
- Participated in WHO influenza surveillance and influenza burden of disease meetings in South Africa.
- Participated in timely outbreak reporting in the U.S.

INFLUENZA VACCINE ACTIVITIES

No vaccine activity occurred. Influenza vaccine is not part of the Immunization Program.

NIGERIA



The H7N9 Surveillance Team in Abuja, Nigeria.

OVERVIEW

The Nigerian Federal Ministry of Health (FMOH) has been collaborating with the U.S. Centers for Disease Control and Prevention (CDC) on influenza control since 2006. This support has enabled Nigeria to establish a system for early detection and effective response to avian and pandemic influenza. To improve integration, coordination and sustainability, the project was placed under the Nigeria Centre for Disease Control. Currently there are four sentinel surveillance sites, located in four tertiary health institutions in four of the six geopolitical zones of the country. Each of these sites has an influenza-like illness (ILI) component in the outpatient clinic and a severe acute respiratory infection (SARI) component in the inpatient unit.

SURVEILLANCE

Surveillance activities continued with improvement in the turn-around time. With a focus on avian influenza A (H7N9) virus, two additional SARI surveillance sites were established and activated, one in each of the two geopolitical zones (South-south and North-east parts of the country) not covered by the National Influenza Surveillance System (NISS). The program improved its data collection to capture additional data from the sentinel sites that are key to the estimation of the disease burden due to influenza.

HIGHLIGHTS

- Confirmed influenza positivity in 262 (60.0%) out of 437 samples from acute respiratory infection (ARI) cases not meeting the criteria for temperature specification for ILI, and received comparable results with that from classical definition of ILI.
- Established two sentinel sites for influenza A (H7N9) surveillance in two geopolitical zones not previously covered by NISS.
- Participated in proficiency testing for MERS-CoV with acceptable results.
- Participated in laboratory confirmation of Ebola virus disease (EVD) from suspected cases during the outbreak in Nigeria.

SURVEILLANCE ACTIVITIES

- Established two additional sites at University of Port Harcourt Teaching Hospital and Abubakar Tafawa Balewa University Teaching Hospital; trained identified teams; activated the sites to carry out SARI surveillance for influenza A (H7N9) virus for one year (November 2013-February 2014).
- Received 1,736 oropharyngeal and nasopharyngeal samples from SARI and ILI cases.
- Received 437 oropharyngeal and nasopharyngeal samples from ILI-like acute respiratory infection cases not meeting the temperature specification for ILI.
- Carried out a one-day stakeholders' meeting to review the one year implementation of NISS sustainability plan (September 2014).
- Convened a one-day stakeholders' meeting to adapt WHO's guidelines (2014) for the new SARI case definition and deliberated on gaps and strategies for estimating influenza disease burden in Nigeria using the WHO Manual for estimating disease burden associated with seasonal influenza (September 2014).
- Reported influenza activities in the Nigeria Weekly Epidemiology Report and submitted weekly epidemiology reports through FluID.



A photo taken during the H7N9 Surveillance Review Meeting.

LABORATORY

The National Influenza Reference Laboratory maintained uninterrupted performance with administrative and laboratory operational tools available in sufficient quantities. The project had two of its laboratory staff leave to pursue higher education and one staff transferred to another position. They were replaced through complementary posting of new laboratory staff. There was demonstrable progress in the establishment of the laboratory's cell culture diagnostic capacity. In its ongoing quest to attract the Government's attention for financing, the laboratory supported the Federal Government of Nigeria in the diagnosis of EVD and other viral hemorrhagic fevers, especially Lassa fever, dengue and yellow fever during the July and August 2014 EVD outbreaks.

These efforts have highlighted the expanded capacity of the laboratory to diagnose other viral diseases in addition to influenza. The laboratory has positioned itself for broader recognition and is currently exploring alternative financing to support sustainability.

LABORATORY ACTIVITIES

- Tested 1,718 samples from ILI and SARI cases and 262 samples from ARI cases received from the sentinel sites during both budget years.
- Submitted 51 influenza-positive samples to a WHO Collaborating Center (CC), some of which contributed to the 2014 WHO seasonal influenza vaccine strain selection.

- Acquired equipment necessary for influenza diagnosis using the cell culture technique in a bid to become a National Influenza Centre (NIC).
- Acquired primers for Ebola, Lassa, dengue and yellow fever viruses, from alternate sources, and utilized them for screening and confirmation of samples from suspected cases of Ebola virus disease.
- Provided weekly virology reports through the WHO AFRO Laboratory Network and FluNet.
- Performed well on WHO's External Quality Assessment Project (EQAP).

PREPAREDNESS

NISS redoubled its efforts in pandemic preparedness by forging collaboration with key Ministries, Departments and Agencies and highlighting plans to detect and prevent any influenza epidemic or pandemic in the country. In addition, discussions were held on sharing influenza data with the Federal Ministry of Agriculture and National Primary Health Care Development Agency's (NPHCDA) Immunization Department for enhanced surveillance and utilization of influenza surveillance data to inform introduction of an influenza vaccination and programming.

PREPAREDNESS ACTIVITIES

- Convened stakeholders meeting to strengthen collaboration among NISS, the surveillance and pandemic preparedness components of NCDC, the animal component of influenza surveillance, and immunization component of NPHCDA in the spirit of "One World, One Health, One Medicine".
- Facilitated the coordination of national efforts to strengthen the detection and diagnostic capacity for dangerous zoonotic pathogens in Nigeria.
- Collaborated with some State Ministries of Health, State Ministries of Agriculture and Nigeria Field Epidemiology and Laboratory Training Programme (NFELTP) to investigate handlers and human contacts of influenza A (H5N1) virus-infected birds during the zoonotic outbreak that affected 20 of the 36 states (plus Federal Capital Territory) of the Federation.



An H7N9 Training Session in October 2014.

TRAINING

- Attended training on laboratory diagnosis of influenza and other emerging respiratory viruses organized by Noguchi Memorial Institute for Medical Research in Accra, Ghana (November 2013).
- Trained two staff on Molecular Diagnosis and Serology of Infectious Diseases at the Nigerian Institute of Medical Research in Lagos, Nigeria (February 2014).
- Attended the 4th African Network for Influenza Surveillance and Epidemiology (ANISE) Meeting in Cape Town, South Africa (December 2014).
- Attended the CDC/APHL International Advanced Influenza Real-Time RT-PCR workshop in Antananarivo, Madagascar (January 2015).
- Attended training on cell culture and isolation of influenza viruses at Noguchi Memorial Institute for Medical Research, in Accra, Ghana (March 2015).

INFLUENZA VACCINE ACTIVITIES

There was no influenza vaccination activity but there was an awareness meeting with the agency responsible for immunization to discuss the relevance of influenza data in influencing decisions on vaccination policy and program.

REPUBLIC OF CÔTE D'IVOIRE

OVERVIEW

This cooperative agreement provides supplementary support to the Ivorian Government in order to ensure the sustainability of the influenza surveillance system over time. Among other objectives, this funding will enable an estimation of the burden of disease from influenza in Côte d'Ivoire. Moreover, it will facilitate the development of an influenza vaccine policy based on surveillance data, as well as improve detection and control of influenza and other severe respiratory illnesses.

SURVEILLANCE

The influenza surveillance network in Côte d'Ivoire is included in the Disease Early Warning System that was established in 2000. The influenza surveillance system was able to detect and investigate two outbreaks. In February 2014, an outbreak of influenza A (H3N2) virus was detected in a village north of Abidjan. One hundred twenty-four influenza cases were identified, including 12 deaths among children aged 1–11 years. The deaths were in persons with acute respiratory infection (ARI) associated with malnutrition. In April 2015, a second outbreak was detected in a city south of Abidjan. Ten cases of influenza A (H1N1) pdm09 virus infection, three in persons who were hospitalized, were recorded.

In March 2014, the annual project review meeting held in Korhogo allowed focal points to learn about attack rate, base reproductive rate, generation intervals, and vaccine efficacy. Also, the project team developed a sustainability plan in November 2013, and submitted it to CDC.

SURVEILLANCE ACTIVITIES

- Conducted two annual review meetings to assess the activities being implemented within the influenza surveillance network—the 6th in Korhogo (March 2015) and the 7th in San Pedro (June 2015).
- Developed a sustainability plan for the influenza surveillance network in November 2013.
- Conducted five supervisory visits to influenza sentinel sites by epidemiologists and a virologist from both Institut National d'Hygiène Publique (INHP) and Institut Pasteur de Côte d'Ivoire (IPCI).

HIGHLIGHTS

- Developed and disseminated weekly public health emergency management bulletins to stakeholders.
- Conducted regular meetings of the Influenza Technical Working Group.
- Received surveillance data (case-based and aggregated) from all sentinel sites throughout the year.
- Prepared and implemented the public health emergency management annual plan. Influenza is included in the plan.

- Collected data for estimating influenza burden.
- Detected and investigated two outbreaks outside of Abidjan in February 2014 and April 2015.

LABORATORY

The National Influenza Center (NIC) of Côte d'Ivoire is located at IPCI. The influenza project provided consumables and reagents each year for the diagnosis of influenza. Since 2013, in light of the increase in the number of samples that the NIC must analyze, additional supplies and reagents were purchased for the project. These materials enabled the isolation of influenza viruses during this period. In the same timeframe, 4,224 specimens from suspected cases were analyzed by the laboratory (positivity rate of 11.1%); 176 were influenza B virus, 67 influenza A (H1N1)pdm09, 175 influenza A (H3N2), and 48 influenza A not able to be subtyped. There were three cases of co-infection with influenza A (H3N2) and (H1N1)pdm09 viruses and one case of influenza A (H1N1)pdm099 and influenza B viruses.

LABORATORY ACTIVITIES

- Collected 52 samples of viruses from October–December 2014, and shipped them to the WHO CC in Atlanta for sequencing.
- Assigned the head of the NIC to participate in quality management training in France at Agence Française de la Normalisation (AFNOR) and helped conduct and evaluate a management policy based on quality (January 2014).

- Trained a virologist on influenza sequencing and phylogenetic analysis at CDC Atlanta in November 2014.

PREPAREDNESS

In the framework of preparedness against pandemic and avian influenza threats, INHP purchased personal protective equipment (PPE) for health workers, and improved the capacities of the quick-response investigation team for local epidemics and clusters. The project organized sensitization and communication visits targeting health care workers, poultry farmers and dealers, community leaders, administrative and political authorities throughout the country.

PREPAREDNESS ACTIVITIES

- Acquired PPE which will be used to fight against epidemic or pandemic influenza, other acute respiratory infections, and emerging and/or re-emerging infectious diseases.
- Developed a functional, quick-response investigation team at the central level and in 82 health districts and sentinel sites.
- Organized a training for health care workers and key stakeholders involved in border surveillance.

TRAINING

- Conducted district-level training for 12 health professionals on sample collection, packaging, and shipping of biological specimens (July 2014).
- Designated the Head of Epidemiological Surveillance of INHP and the Head of the NIC to attend the ANISE Meeting in Cape Town, South Africa (December 2014).
- Identified an epidemiologist to attend the Conference of the International Society for Diseases Surveillance in Philadelphia, PA (December 2014).
- Identified two participants from INHP and IPCI to attend the Grants Proposal Writing Workshop in Johannesburg, South Africa (April 2015).
- Conducted training for 18 health professional workers on influenza outbreak investigation, sample collection, packaging, and shipping of biological specimens (July 2015).

INFLUENZA VACCINE ACTIVITIES

Côte d'Ivoire, within the framework of the Partnership for Influenza Vaccine Introduction (PIVI), plans to organize a mass influenza vaccination campaign in 2015; the campaign will focus on pregnant women to protect this high risk group from severe influenza infections.

This vaccination program aims to reduce the morbidity and mortality from influenza in pregnant women and protect their newborns and infants up to six months. The mass vaccination will take place in the eight health districts of Abidjan.

To this end, Côte d'Ivoire submitted an Operational Work Plan (PAO) to the Task Force for Global Health. The plan was developed in collaboration with WHO and the United Nations Children's Fund (UNICEF). For Côte d'Ivoire, this important campaign will target 200,000 pregnant women. The total amount of vaccine required is 210,000 doses. The campaign will be organized in two phases in 2015.

RWANDA

OVERVIEW

CDC supports the Rwanda Biomedical Center (RBC) in preparedness and communication, surveillance and disease detection, and response and containment to improve Rwanda's capacity to identify and manage outbreaks of avian and pandemic influenza. The influenza surveillance network in Rwanda is currently composed of six sentinel surveillance sites (two referral hospitals and four district hospitals), and the Rwanda Biomedical Center/National Reference Laboratory Division (RBC/NRL) serves as the National Influenza Testing Centre and the Rwanda Biomedical Center/Epidemic Infectious Diseases Division (RBC/EID) as the support coordination institution.

SURVEILLANCE

Sentinel surveillance for severe acute respiratory illness (SARI) and influenza-like illness (ILI) is implemented in pediatric, adult, and maternity inpatient and ambulatory wards. Epidemiological data along with respiratory samples are collected and analyzed to characterize patients. From October 1, 2013 to September 30, 2015, 2,956 cases including 2,594 (88%) SARI and 362 (12%) ILI cases were identified. Of these, 239 (8%) tested positive for an influenza virus: 181 (76%) and 58 (24%) were influenza A and B virus, respectively. Among influenza A viruses, 131 (78%) were A (H3N2) and 50 (28%) were A (H1N1)pdm09. The network reports weekly to WHO FluNet and has strains posted to GISAID. The program is working to establish virus isolation capacity to achieve National Influenza Center (NIC) status and determine estimates of burden of disease for medically-attended influenza for use in policy decision making.

SURVEILLANCE ACTIVITIES

- Collected data and developed a protocol and data collection tools for estimates of burden of disease for medically-attended influenza.
- Conducted eight quarterly supervisory visits to the sentinel sites.
- Investigated and confirmed two suspected outbreaks of ILI and SARI due to influenza A (H1N1)pdm09 virus.

HIGHLIGHTS

- Shipped samples to a WHO Collaborating Center (CC) for the first time.
- Performed characterization of other respiratory pathogens for the first time using RT-PCR Multiplex.
- Completed manuscript summarizing six years of influenza surveillance in Rwanda.
- Performed antigenic characterization of influenza viruses circulating in Rwanda for the first time and identified their relation to the annual influenza vaccine compositions.

- Reviewed the Integrated Disease Surveillance and Response (IDSR) framework to include both ILI and SARI case definitions according to WHO's new case definitions.

LABORATORY

Since 2008, the National Reference Laboratory, situated in Kigali, has been the National Influenza Testing Centre. The laboratory is a Biosafety Level II (BSL-2) with some enhanced BSL-3 procedures. It has supported the influenza surveillance system network with RT-PCR assays for detection of influenza A and B viruses and avian influenza A (H5N1) virus using CDC-provided primer/probes and protocols.

The NRL has also performed detection of other respiratory pathogens using multiplex RT-PCR reactions that detect the following pathogens: influenza A and B viruses, coronaviruses (HCoV) NL63, 229E, and OC43, parainfluenza viruses 1-4, human metapneumovirus (hMPV) A and B, adenoviruses, enteroviruses, respiratory syncytial virus (RSV) A and B, rhinoviruses, parechovirus, bocavirus, *Mycoplasma pneumoniae*, *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Staphylococcus aureus*.

LABORATORY ACTIVITIES

- Tested 2,956 respiratory specimens (362 ILI/2,594 SARI cases) for influenza with a detection rate of 8% (239/2,956).
- Submitted a total of 53 positive samples to the WHO CC Atlanta as part of WHO's Global Influenza Surveillance and Response System (GISRS).

- Reported weekly testing results to WHO FluNet.
- Participated in six supervisory visits and provided logistical support to sentinel hospitals in the influenza surveillance network.

PREPAREDNESS

The occurrence of Ebola virus disease (EVD) outbreaks in West Africa triggered a high level response. CDC in collaboration with the Ministry of Health and other partners such as USAID (EPT, PREDICT), WHO, and partnering ministries and institutions such as the Rwanda Biomedical Center/Epidemic Surveillance and Response Division (RBC/ESR) and RBC/NRL actively participated in preparedness and response activities.

PREPAREDNESS ACTIVITIES

- Developed and tested the National Emergency Preparedness and Response Plan.
- Updated standard operating procedures (SOP) for detection, confirmation, and management of potential specimens from persons suspected of having EVD or other viral hemorrhagic fevers.
- Participated in Ebola virus (EBV) preparedness and response meetings.
- Participated in EBV simulation exercises.

TRAINING

CDC continued to provide technical assistance and training to build organizational capacity at the sentinel sites and national levels to ensure optimal functioning of the sentinel surveillance system, quality of data, prompt data analysis and information sharing, and

integration of the ISS into the national integrated disease surveillance and response system for effective transition from a donor-funded to a country-led program.

During the reporting period, the following trainings were organized and/or attended:

- Multiplex PCR Testing at the National Institute for Communicable Diseases (NICD), South Africa for two laboratory technicians from the National Reference Laboratory.
- Influenza Surveillance Refresher Training at the University Teaching Hospital of Butare for 20 health care workers.
- Medical Burden of Disease Estimates Training for 12 health care providers.
- Data Analysis Training using STATA software facilitated by CDC Rwanda for four senior influenza surveillance staff at Rwanda Biomedical Center.
- Advanced RT-PCR Training in Antananarivo, Madagascar was attended by one laboratorian.

INFLUENZA VACCINE ACTIVITIES

No influenza vaccine-associated activities have been implemented during the reporting period.

SOUTH AFRICA

OVERVIEW

CDC collaborates with the National Institute for Communicable Diseases (NICD)/National Health Laboratory Service (NHLS) to strengthen laboratory and epidemiologic capacity in South Africa.

SURVEILLANCE

The severe acute respiratory illness (SARI) and the influenza-like illness (ILI) programs continue at hospitals and outpatient clinics across the country. The SARI surveillance programme has been renamed pneumonia surveillance as the programme moves towards a national multi-pathogen programme that will include both acute and more chronic respiratory illness case definitions. The SARI programme tests for RSV, influenza A and B viruses, adenoviruses, human metapneumovirus, parainfluenza viruses 1, 2, 3, rhinoviruses and enteroviruses. The pneumonia surveillance programme will include testing for the following pathogens: *Pneumocystis jiroveci*, *Mycobacterium tuberculosis*, *Streptococcus pneumoniae*, *Bordetella pertussis*, *Haemophilus influenzae* type B, atypical bacterial causes of pneumonia (*Legionella species*, *Chlamydia pneumoniae* and *Mycoplasma pneumoniae*), coronaviruses (OC43, 229E and HKU1) and bocavirus.

Testing for these pathogens will allow for a full description of the causes of pneumonia in our setting. The ILI surveillance programme enrolls patients using a standard case definition of ILI and provides a platform for the influenza shedding study and an asymptomatic control cohort to enable better description of the risk factors for ILI and SARI in our high HIV prevalent setting.

SURVEILLANCE ACTIVITIES

- Reported to WHO on our annual influenza season to inform vaccine strain selection.
- Drafted the national influenza policy following two stakeholder meetings with the National Department of Health (NDoH).
- Supported NDoH on vaccine and clinical treatment guidelines for the 2013 and 2014 influenza season.

HIGHLIGHTS

- Implemented national pneumonia surveillance protocol.
 - Received core sustainable funding for surveillance through the National Department of Health.
 - Published annual health care workers handbook on influenza.
 - Published annual vaccine recommendations in South African Medical Journal.
 - Established laboratory assays for influenza virus complete genome PCR and next-generation genome sequencing.
- Integrated the SARI surveillance system into a more comprehensive pneumonia surveillance and will move into the GERMS-SA programme to allow more national representation.
 - Posted updates on novel coronavirus and other influenza-related international outbreaks weekly on NICD's webpage.

LABORATORY

The NIC processed a total of 6,537 samples in 2014. Influenza virus isolation was attempted on clinical samples and about 67% (50/75) were successful. The majority of influenza A virus isolates (n=35) were influenza A/H3N2 which dominated the season. Of the 50 influenza virus isolations obtained, 43 were from influenza A viruses and seven were from influenza B viruses. A total of 46 virus isolates could be characterized antigenically by hemagglutination inhibition assay (HAI) of which 70 % (32/46) were influenza A(H3N2). Of the influenza A(H3N2) viruses serotyped 69% (22/32) showed normal reactivity to the A/Texas/50/2012 vaccine strain reference antiserum. Almost 100 complete or near complete influenza A/B genomes were sequenced.



LABORATORY ACTIVITIES

- Performed inter-laboratory quality assurance testing with Seychelles and Zambia.
- Attended the 9th Annual Sequencing, Finishing, and Analysis in the Future meeting in Santa Fe, New Mexico (May 2014).
- Provided a report on the final results for sero and molecular surveillance for influenza A viruses in South African pigs surveyed nationally during 2013 to the Department of Agriculture, Forestry, and Fisheries (DAFF) and other stakeholders.

PREPAREDNESS

As part of our strategy to build partnerships for surveillance activities at the animal-human interface, we conducted HAI assays on pig serum samples as part of a collaboration with DAFF to ensure the ability to detect exposures to swine-origin influenza viruses and that necessary reagents are available in the laboratory. Several discussions with stakeholders in the ostrich industry took place regarding monitoring of staff with influenza-like symptoms.

PREPAREDNESS ACTIVITIES

- Designated staff to participate in the Good Emergency Management Practice Workshop: “Strengthening capacity to respond to animal diseases emergencies” presented by the Crisis Management Centre, Animal Health (CMC-AH) FAO; the Animal and Plant Health Inspection Services (APHIS), United States Department of Agriculture (USDA) and DAFF (25–29 August 2014).
- Attended meetings at WHO on “Influenza Severity Assessment” in April 2014 and November 2014.

TRAINING

The Centre for Respiratory Diseases and Meningitis (CRDM) continues to provide training support to southern African countries and to the staff working at the surveillance sites.

The following activities/trainings occurred:

- Trained visiting scientists from Rwanda and Mozambique on the multiplex real time RT-PCR assay (September 2013).
- Trained the virology laboratory at the University Teaching Hospital in Lusaka on influenza virus isolation techniques (November 2013).
- Helped screen pilgrims returning from Hajj in Saudi Arabia for the MERS-CoV virus and influenza A and B viruses.
- Assisted CDC South Africa with a site visit and influenza surveillance training in Maputo, Mozambique (September 2014).
- Appointed Dr. Cheryl Cohen as a member of the WHO Working Group on the Burden of Influenza Disease, 2014–2016.

INFLUENZA VACCINE ACTIVITIES

During this period, CRDM advised NDoH on the risk groups for influenza to assist with the national guidelines on influenza vaccination.

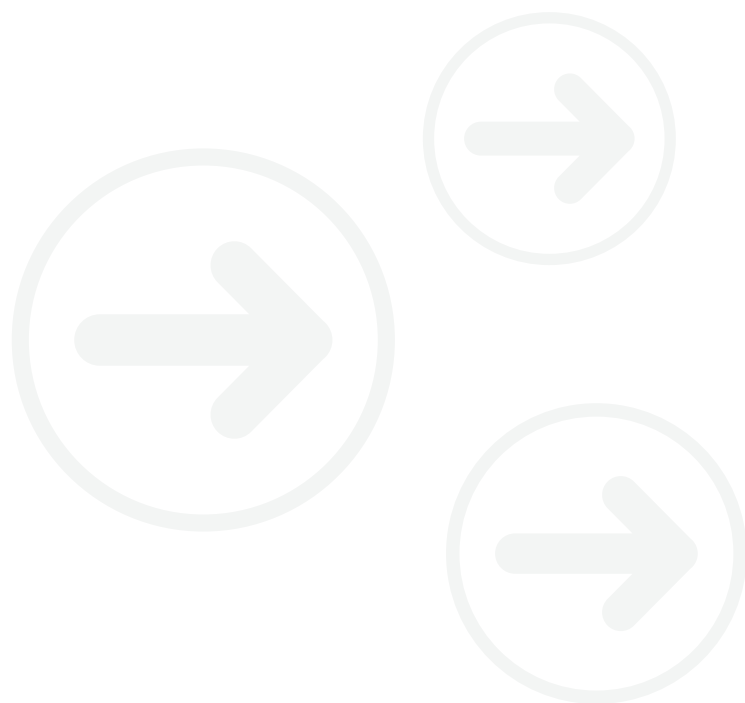
CRDM publishes the annual vaccine guidelines in the South African Medical Journal. In addition, NICD publishes a health care workers handbook on influenza which is circulated to stakeholders and published on NICD’s web page.

CRDM published a peer-review paper on the effectiveness of influenza vaccine for 2010 to 2013. A survey on knowledge, attitudes and practices related to influenza vaccine was also published in this period.

RESEARCH

CDC's Influenza Division has collaborated with the National Institute for Communicable Diseases in South Africa to conduct severe acute respiratory illness surveillance at five hospitals and influenza-like illness at two sites. From this platform we have identified risk factors for influenza-associated hospitalization and death including HIV-infection, pulmonary tuberculosis infection, age <2 years and age ≥65 years. With data from health utilization surveys we have also estimated the burden of disease among children, adults and pregnant women. In addition, newer studies have assessed the duration of viral shedding in HIV-infected and HIV-uninfected adults and children. Likewise, household transmission of influenza viruses has been studied to assess the role of HIV and TB infection in disease transmission. Research projects include studies to explore:

- Disease and economic burden of respiratory illness associated with influenza.
- Transmission of influenza viruses among HIV-infected and HIV-uninfected household members.
- Prospective cohort study of influenza viral shedding in HIV-infected and -uninfected adults.
- Attributable fraction and risk factors for influenza-associated severe acute respiratory illness hospitalization in a high HIV prevalence setting.
- Effectiveness of trivalent inactivated influenza maternal vaccination among pregnant women and their newborns.





TANZANIA

OVERVIEW

The Ministry of Health and Social Welfare (MoHSW), Preventive Services Department through its Epidemiology and Diseases Control section collaborates with the U.S. Centers for Disease Control and Prevention (CDC) to sustain influenza surveillance networks and respond to seasonal and pandemic influenza in Tanzania. Influenza epidemiologic surveillance is done in six sentinel surveillance sites [five sites for severe acute respiratory infection (SARI) and influenza-like illness (ILI) and one for ILI-only].

SURVEILLANCE

The influenza sentinel surveillance system is based on the laboratory confirmation of samples collected from patients meeting the influenza-like illness (ILI) standard case definition and all SARI cases from the sentinel sites at the National Influenza Center (NIC). In this reporting period, four sentinel sites were financially supported to conduct influenza surveillance. Weekly SARI reports are sent to the MOHSW through the Integrated Disease and Surveillance Response (IDSR) system from the sentinel sites, and reports on aggregated data are shared with all stakeholders, including top management of MoHSW, the World Health Organization (WHO) Country Office, CDC Tanzania, sentinel sites and other partners. Through this surveillance, MoHSW has been able to identify the circulating influenza viruses in the country, share samples with the WHO Collaborating Center (CC) in Atlanta, and build capacity on preparedness, early detection and rapid response to influenza and other emerging and re-emerging viral diseases.

SURVEILLANCE ACTIVITIES

- Collected influenza epidemiological data from four sentinel sites where 5,056 patients were enrolled into surveillance.
- Supported sentinel surveillance sites with mentorship and training of new/additional staff.
- Shared SARI weekly data through IDSR with the national level, WHO, and CDC Atlanta.
- Conducted supervisory visits to the existing four sentinel sites to provide mentorship, on-the-job training, inventory of project equipment/

HIGHLIGHTS

- Identified the epidemiology of circulating influenza viruses.
- Strengthened laboratory capacity to attain NIC status.
- Established country capacity to control outbreaks and pandemics as evidenced during the influenza A (H1N1)pdm09 virus outbreak in 2009 where only one death occurred in the country.
- Shared viruses with the international community for quality control and development of vaccine.

assets, feedback to site authorities, and discuss sustainability issues.

- Shared influenza surveillance information at national and international meetings.

LABORATORY

The National Influenza Laboratory (NIL) has built significant capacity in terms of human resource and equipment and attained NIC status in November 2014. In addition, the National Health Laboratory Quality Assurance and Training Center, of which the NIC is part, was accredited by the Southern African Development Community Accreditation Services with ISO15189 standard in April 2014 and awarded a certificate of honor for the accredited laboratories during the ASLM 2014 Meeting in Cape Town, South Africa.

The epidemiological picture of influenza viruses circulating in the country is now well known. From October 2013 to May 11, 2015 a total of 2,000 specimens were tested for influenza viruses using real-time RT-PCR; out of those, 270 (13.5%) were positive, of which 191 (71%) were influenza A viruses and the rest 79 (29%) were influenza B. Among the influenza A viruses, 185 were influenza A (H3N2) and six were A (H1N1)pdm09. Out of the positive samples, 111 were subjected to cell culture. Laboratory capacity has been strengthened not only for influenza viruses, but also for other emerging and reemerging infections. The experiences and resources gained through influenza surveillance were used to respond to other emerging and reemerging diseases (e.g., Rift Valley fever, dengue, and chikungunya) and for Ebola.

LABORATORY ACTIVITIES

- Performed RT-PCR testing on 2,000 samples; out of those, 111 samples were subjected to virus cell culture.
- Shared 73 virus isolates with the WHO CC in Atlanta.
- Participated in WHO's External Quality Assessment Project (EQAP) with excellent scores.
- Procured reagents and supplies for laboratory specimens collection and testing.
- Provided feedback on influenza laboratory results sent weekly from sentinel sites.

PREPAREDNESS

The MOHSW continues to work with CDC, the United Nations, and other stakeholders on the implementation of the preparedness and response plan for avian and pandemic influenza and other emerging and reemerging infectious diseases. The plan is multi-sectoral, involving the key ministries and other stakeholders. However, preparedness activities were carried out at a very minimal pace due to a lack of funding available to implement the plan. The MOHSW-CDC cooperative agreement is concentrated on surveillance activities. The National Task Force to deal with emerging and reemerging diseases is in place to deal with preparedness activities and will respond to any outbreak that may occur. The committee is divided into five subcommittees including coordination, surveillance, case management, logistics, and social mobilization and public awareness.

PREPAREDNESS ACTIVITIES

- Strengthened surveillance at points of entry in collaboration with other stakeholders including immigration officers.
- Distributed personal protective equipment (PPE) to all districts in an effort to prepare for the threat of Ebola and other emerging infectious diseases.
- Developed a national team and divided into five subcommittees; coordination, surveillance, case management, logistics and public awareness.
- Developed public communication materials in collaboration with UNICEF.

TRAINING

- Designated a team member to attend a short course on Computer Aided Qualitative Data Analysis in New Delhi, India.
- Trained 24 Regional and Council Health Management team members on disease surveillance and outbreak response.
- Conducted refresher training on influenza surveillance and other emerging infectious diseases, including Ebola, for newly employed health care workers at sentinel surveillance sites.
- Conducted training on improving laboratory capacity and surveillance for pandemic influenza preparedness for health care providers from 13 provinces in the country.
- Attended training on molecular diagnosis of respiratory diseases at the National Institute for Communicable Diseases (NICD) in Johannesburg, South Africa.

INFLUENZA VACCINE ACTIVITIES

Although currently there is no influenza vaccine program in Tanzania, the country recognizes that vaccination is the most effective way to prevent influenza and therefore is important particularly among high-risk groups such as young children, pregnant women, the elderly and persons with underlying medical conditions. With the currently available data, we are able to estimate only the relative burden of influenza for influenza-like illness (ILI) and severe acute respiratory illness (SARI); however, incomplete data, mainly on patient outcome, make accurate estimates a challenge.

- We have started collection of additional data including denominator data from a well-defined catchment area in order for us to be able to estimate the incidence of influenza-associated morbidity (hospitalizations and outpatient visits) as well as influenza-associated mortality. Accurate data and calculation of burden of disease can inform the government and assist them in developing a national action plan for influenza vaccine introduction in the country.

UGANDA



OVERVIEW

Since 2008, the Centers for Disease Control and Prevention (CDC) has provided funding to the Uganda National Influenza Center (NIC). The aim of the cooperative agreement is to consolidate achievements in influenza surveillance from the first round of funding and develop a sustainability plan. In 2014, new funding was provided by CDC to assist Uganda in defining a road map for introduction of seasonal influenza vaccines and their increased use through a process of informed analysis of available scientific evidence and assessment of the needs and barriers.

SURVEILLANCE

We have maintained an efficient routine influenza surveillance system in Uganda that collects, analyzes and reports quality data on severe acute respiratory infections (SARI) and/or influenza-like illness (ILI), and it includes virologic and epidemiologic data on both children and adults. The system collects, analyses and reports epidemiologic and virologic data on both mild and severe influenza-associated disease from sentinel sites using case definitions and epidemiologic and laboratory protocols consistent with global standards. Priority is given to collecting SARI data from five of our surveillance sites: Arua Regional Referral Hospital, Mbarara Regional Referral Hospital, Tororo District Referral Hospital, Fort Portal Regional Referral Hospital and Entebbe General Hospital. Kawaala Health Centre IV, Kitebi and Lobule Health Center III only do surveillance for ILI. Entebbe General Hospital and Koboko District hospital do surveillance for both ILI and SARI. We initiated surveillance for MERS-CoV and avian influenza A (H7N9) virus at three other sentinel sites in Kampala.

SURVEILLANCE ACTIVITIES

- Improved database for epidemiology and virology data.
- Reviewed and updated our sustainability plan.
- Collected samples regularly and shared data through the Ministry of Health (MOH) Weekly Epidemiology Newsletter, FluNet, and WHO AFRO's system weekly.
- Organized new staff training at the sentinel site in Fort Portal so surveillance could be restarted.

HIGHLIGHTS

- Hosted two Symposia where we disseminated data on influenza in Uganda.
- Inaugurated the Uganda National Immunization Technical Advisory Group (UNITAG).
- Presented the National Immunization Policy to Uganda Parliament.
- Organized a meeting for the Influenza Technical Committees of the UNITAG and KENITAG (Kenya National Immunization Advisory Group) to explore possibilities for collaboration.

LABORATORY

The laboratory received 2,093 SARI samples and 1,781 ILI samples from the sentinel sites. All samples were tested. We did not discard any samples, an indication that the sample collection, storage, and transportation are doing well. There were 178 (8.5%) SARI and 275 (15.4%) ILI samples positive for an influenza virus. All positive samples were subtyped. Of the SARI influenza-positive samples the majority (72%) were influenza A (H1N1)pdm09 virus while for the ILI influenza-positive samples 52% were influenza A (H3N2) virus. Virus isolation was carried out on the positive samples, and 112 isolates were obtained. The laboratory sent two shipments of over 200 isolates to the WHO CC in Atlanta. The laboratory participated in WHO's EQAP, Panel 14 and improved the laboratory database. During this period, reagents were received to test for avian influenza A (H7N9) virus and MERS-CoV. Three sentinel sites were initiated in Kampala for this surveillance, but as of now no samples have tested positive for influenza A (H7N9) virus or MERS-CoV.

LABORATORY ACTIVITIES

- Tested all samples from the sentinel sites for influenza viruses.
- Maintained and cleaned the data in the virological laboratory database.
- Shipped isolates to the WHO CC in Atlanta as part of WHO's GISRS.
- Participated in WHO's EQAP with 100% score for the 13th time.

- Conducted training reviews of sentinel staff at all sentinel sites and at regional review sessions.
- Responded to a questionnaire from WHO AFRO on virological and epidemiological surveillance in the region.

PREPAREDNESS

The NIC is part of the National Task Force for pandemic preparedness in the country. Data are reported to the Surveillance and Response committee of the National Task Force. The committee meets quarterly and the National Task Force meets twice a year. However during outbreaks the committee meets more regularly, sometimes three to four times a week. While there were no influenza outbreaks, as members of the Task Force, we participated in the Marburg and the Crimean-Congo hemorrhagic fever (CCHF) outbreaks in the country. We were involved in training personnel for surge capacity in blood collection and shipment in preparedness for Ebola.

PREPAREDNESS ACTIVITIES

- Trained neighboring countries on preparedness for disease outbreaks.
- Presented influenza surveillance data to the National Task Force on Pandemic Preparedness, including our surveillance for MERS-CoV and influenza A (H7N9) virus.
- Prepared a document on risk for introduction of avian influenza A (H5N1) virus into Uganda in light of the poultry outbreaks in West Africa.
- Participated in the quarterly and semi-annual meetings of the National Task Force.
- Trained staff on surge capacity for laboratory activities, field sample collection and transportation in preparation for an Ebola outbreak.

TRAINING

- Designated one laboratorian to attend a training on PCR and sequencing techniques at the National Institute for Communicable Diseases (NICD), South Africa.
- Designated two laboratorians to attend a training on virus sequencing at Los Alamos Laboratories, USA.
- Designated all staff to attend various trainings on Biosecurity and Biosafety provided by Sandia Laboratories.

- Participated in the Burden of Disease Webinar.
- Participated in the Burden of Disease Workshop at the ANISE Meeting in South Africa.
- Designated staff members to attend training by Supporting Independent Immunization and Vaccine Committees (SIVAC) on conducting data/publication reviews for support of influenza vaccination activities.
- One of our staff attended the grants writing training in South Africa conducted by CDC.

INFLUENZA VACCINE ACTIVITIES

A survey was conducted to identify gaps and/or barriers to the introduction of influenza vaccination. We also participated in the establishment of the Uganda NITAG and are members of the Influenza Technical Committee of the UNITAG.

We attended several workshops supported by SIVAC: a training workshop for NITAGs in East and South Africa in Naivasha, Kenya from August 4–7, 2014; and February 23–25 2015, a UNITAG workshop for inauguration and orientation of NITAG members to committee roles, responsibilities, and methods of work.

We also attended a Joint Influenza Workshop of the KENITAG and UNITAG Flu Vaccine Working Groups held on March 9–10, 2015 in Entebbe.

We developed a plan for seasonal influenza vaccination introduction activities into Uganda, and continued to collect, compile and analyze SARI data for burden of influenza disease evidence in Uganda.





ZAMBIA



OVERVIEW

The overall goal of Zambia's influenza program is to strengthen influenza surveillance and the surveillance of other communicable diseases by bolstering the public sector laboratory and surveillance capacity for influenza-like illness (ILI) and severe acute respiratory infection (SARI).

SURVEILLANCE

A prospective, sentinel surveillance system for ILI and SARI was established in 2008 and is currently operating in Zambia. This system originally consisted of two SARI and two ILI sites in Lusaka and two SARI and two ILI sites in Ndola, Lusaka and Ndola being the two most populous cities in the country. During 2013, in order to strengthen operations by focusing efforts, the sites were scaled down to two SARI sites and one ILI site in Lusaka, plus one SARI site and one ILI site in Ndola.

Data from ILI surveillance provide information on the burden of influenza and contribute to an understanding of circulating viruses, while the SARI cases contribute to an understanding of circulating viruses and are relevant for estimating the burden of severe morbidity. Virus isolates are shipped to a World Health Organization (WHO) Collaborating Center (CC) for further analysis. Weekly summary data are uploaded to FluNet and emailed to key stakeholders in Zambia as well as to other cooperating partners.

SURVEILLANCE ACTIVITIES

- Investigated over 1,600 cases of respiratory disease from the sentinel sites for influenza virus infection through improved management and closer supervision of the program.
- Conducted regular supervisory and training visits to sentinel sites to support surveillance activities and orient new staff as necessary.
- Initiated collection of denominator data.
- Maintained weekly reporting of SARI/ILI results to stakeholders and to FluNet.
- Organized a standard operating procedures (SOP) writing workshop

HIGHLIGHTS

- Reviewed the performance of the influenza sentinel surveillance program since inception.
- Organized a stakeholder meeting to discuss sustainability.
- Investigated over 1,600 cases of respiratory disease for influenza virus infection as well as for other respiratory viruses.
- Strengthened virus isolation capacity; and regularly shipped isolates to a WHO CC.

LABORATORY

The UTH Virology Laboratory (UTHVL) which has been functioning as Zambia's National Influenza Center (NIC) worked closely with CDC, the National Institute for Communicable Diseases (NICD) in Johannesburg, South Africa and the WHO CC in London to strengthen influenza laboratories. Zambian scientists have now been trained in various procedures including influenza virus typing, subtyping, RT-PCR, real-time RT-PCR, sequencing techniques as well as virus isolation and identification. The establishment of this capacity has led to significant enhancements benefiting both Zambia and the Global Influenza Surveillance and Response System (GISRS).

LABORATORY ACTIVITIES

- Tested 1,615 influenza specimens collected at sentinel sites as part of routine surveillance and from outbreak investigations.
- Increased virus isolation and sent several shipments to a WHO CC following training by NICD scientists.
- Continued to perform very well on both WHO's External Quality Assurance Project (EQAP) and CDC performance panels.

PREPAREDNESS

CDC support has contributed to advanced pandemic influenza preparedness and planning in Zambia. The Ministry of Health (MOH) Directorate of Disease Surveillance, Research and Control, led the development of a health sector response plan under the umbrella of the National Disaster Management Committee. The MOH has established multi-sectoral Epidemic Preparedness Committees down to the district level. In the period under review, the MOH continued training and supporting these committees and, through them, responded to various epidemic threats.

PREPAREDNESS ACTIVITIES

- Held discussions with the main veterinary school in the country, which is conducting animal influenza surveillance nationwide, regarding cooperation in surveillance for zoonotic diseases (including early detection of novel influenza viruses).
- Supported the MOH in various ways in the implementation of the national Ebola virus disease (EVD) Preparedness and Response Plan developed in reaction to the ‘public health emergency’ posed by the West African EVD outbreak.
- Experienced gain in the establishment of the ISS program is being used by the MOH in the process of creating a National Public Health Institute (NPHI) with an integrated National Public Health Laboratory (NPHL).

TRAINING

The influenza sentinel surveillance program, through CDC and other partners, continues to provide technical assistance and training to ensure the functioning of the sentinel surveillance system, quality of the surveillance data, prompt data analysis, and integration of the information into preparedness and response activities.

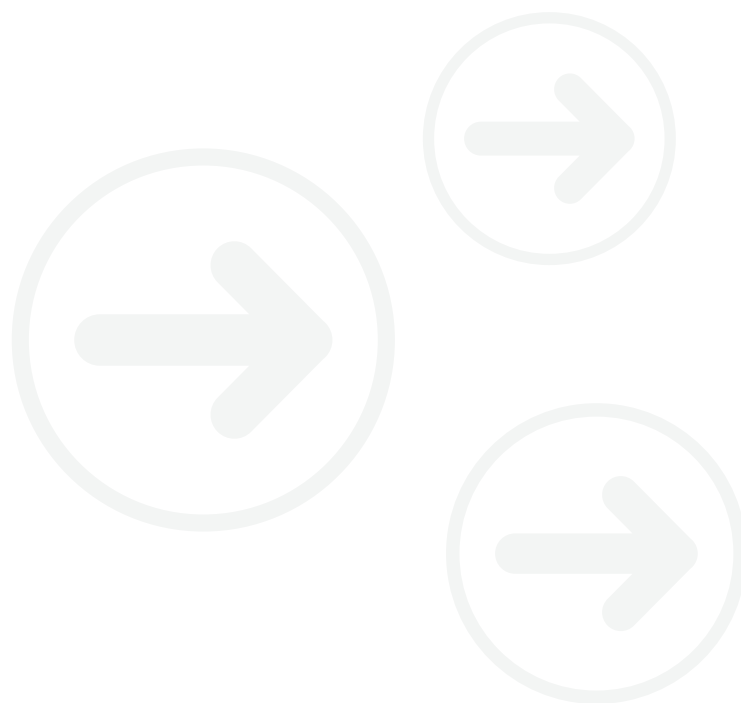
During this period, the following training activities took place:

- Annual orientation and training workshops for all health staff involved in ISS activities at all sentinel sites.
- Refresher training for laboratory scientists at the sub-national influenza laboratory at the Tropical Diseases Research Center (TDRC), Ndola.

- Training of one PhD-level virologist in sequencing techniques and influenza virus genotyping at the WHO CC in London.
- Training of one scientist in advanced molecular methods at the Pasteur Institute in Madagascar.
- Participation in several international conferences and workshops provided valuable learning opportunities for staff.

INFLUENZA VACCINE ACTIVITIES

There is a need to strengthen the national policy on influenza vaccination. Influenza vaccines are used on an ad-hoc basis. Seasonal vaccines are used mainly in the private sector, and in the public sector, vaccines have been given to high-risk groups in outbreak settings. Data being collected by the ISS program on influenza disease burden will greatly assist policy formulation.





Partner Countries

BURKINA FASO

With the support of CDC, influenza surveillance in Burkina Faso was initiated in 2009. After the 2009 influenza pandemic, the Ministry of Health designated the Institute of Research in Health Sciences (IRSS) as the National Influenza Reference Laboratory of Burkina Faso (NIRL-BFA). NIRL-BFA continues to build laboratory and epidemiologic surveillance capacity to determine seasonality and burden of influenza disease in the country. Through training for laboratorians and surveillance officers, NIRL-BFA has also improved the capacity of laboratories to detect influenza viruses.

A national protocol for influenza surveillance was drafted by the Ministry of Health (MoH) and NIRL-BFA in 2009-2010. Since 2012, surveillance for ILI has increased to six sites. The preliminary results show an influenza virus prevalence of 6.7% in 2010-2012.

Notable progress in laboratory surveillance capacity has been achieved over the past three years, and the success of this partnership has led to significant enhancements beneficial for Burkina Faso.

- Tested 1,799 specimens by RT-PCR from 2013 to 2015, and 230 (12.8%) were positive for an influenza virus.
- Conducted six supervisory visits to Ouagadougou sites and a monthly visit to Bobo-Dioulasso sites.

No vaccine activities occurred in Burkina Faso for the period 2013–2015. The goal of the MoH and NIRL-BFA is to introduce a seasonal influenza vaccination program within the next five years.

MAURITANIA

Mauritania is a country on the Atlantic (West) coast of Africa. Much of Mauritania is made up of the Sahara desert, and because of the drought conditions that affected most of that region of Africa in the 1970s, a large proportion of the population is nomadic.

The collaboration between the Ministry of Health/DLM (Direction de la Lutte contre la Maladie), CDC, and the Institut National de Recherches en Santé Publique (INRSP)/National Public Health Research Institute of Nouakchott started in 2010. In 2011, with

support from CDC and NAMRU-3, Mauritania began influenza surveillance.

INRSP advocates to Ministry of Health for strengthening epidemiological surveillance capabilities for influenza in order to determine seasonality and burden of disease through sentinel site surveillance across Nouakchott.

CDC and NAMRU-3 helped strengthen the capacity of the influenza laboratory through the acquisition of a RT-PCR machine, a biosafety cabinet, and influenza reagents, in addition to coordinating multiple national and regional trainings. The U.S. Embassy supported the influenza laboratory by donating refrigerators and an air conditioner.

Significant progress in laboratory surveillance capacity was achieved over the past four years, and the success of this partnership has led to substantial improvements benefiting Mauritania. The influenza surveillance network in Mauritania now includes an influenza laboratory and two sentinel sites.

MAURITIUS

In collaboration with the Institut Pasteur of Madagascar, the first cooperative agreement with Mauritius began in 2013. The cooperative agreement period is for five years. Additional funds were made available by CDC through a cooperative agreement for the purchase of a real-time PCR machine through WHO AFRO and the local WHO Country Office.

A comprehensive ILI and SARI surveillance system was established in January 2013. SARI and ILI surveillance occurs year round, but illness peaks between the months of May through August. Surveillance is also carried out yearly amongst pilgrims returning from the Hajj. They are screened for respiratory viruses including influenza, RSV, HMPV, and MERS-CoV. With the help of CDC, the laboratory acquired NIC status. In an average week, the laboratory receives and processes 30 respiratory samples. The NIC provides support to all surveillance sites by providing viral transport media and sample collection kits through the laboratory transport system.

A pandemic preparedness plan has been drafted and circulated to all stakeholders at appropriate levels within the Ministry of Health and Quality of Life (MOHQL). Every year, the Ministry of Social Security, in collaboration with the MOHQL, provides 80,000 doses of influenza vaccine for the elderly. The MOHQL purchases another 20,000 doses for healthcare workers, vulnerable groups including immunocompromised patients (diabetics, HIV, and patients on immune suppressants), pregnant women, and children under the age of two. Vaccination activities start the last week of April and end the last week of June or continue until the stock is depleted.

NIGER

In May 2009, influenza surveillance was initiated in Niger by the Centre de Recherche Médicale et Sanitaire (CERMES) in collaboration with the Institute Pasteur of Paris (IPP), World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC).

Niger's influenza surveillance system has five sentinel sites. Surveillance data is shared weekly with WHO AFRO and the MoH. In April 2015, a case of avian influenza A (H5N1) virus in poultry was confirmed, motivating the surveillance system to work in collaboration with the veterinarian laboratory.

Laboratory technicians participated in various regional trainings organized mainly by CDC and WHO. Reagents and positive controls are obtained through CDC's Influenza Reagent Resource (IRR). The laboratory has a capacity to detect influenza A and B viruses, to subtype A viruses (H3N2, H1N1pdm09, H7N9, H5N1) and to detect MERS-CoV. The laboratory coordinates all influenza surveillance activities such as sentinel site training and sample shipments.

- Tested 3,091 specimens for influenza viruses.
- Participated in WHO's EQAP.

The recent reappearance of avian influenza A (H5N1) virus in poultry prompted formation of an integrated plan to reactivate all necessary measures to fight influenza outbreaks. Influenza vaccination is not part of the immunization program in Niger although certain groups (health workers, children <5 years, and pregnant women) have been vaccinated.

SENEGAL

Since 2012, with the financial and technical support of DHHS and CDC, the Senegalese influenza surveillance system has been enhanced to detect additional clinical syndromes and the laboratory identification of other respiratory viruses. This improved system, now called the 4S Network, is based on reporting nonspecific indicators as epidemiological data to the healthcare authorities, and on random sampling for laboratory-based testing.

The network has been expanded from three ILI sentinel sites, all in Dakar (2011), to 14 sentinel sites (2015) with two SARI sites. Weekly reports are prepared and transmitted by the Ministry of Health (MoH) to regional and district public health staff, as well as national and international partners.

Notable progress in laboratory diagnostic capacity has been achieved over the past four years, and the success of this partnership has led to significant enhancements benefiting both Senegal and GISRS. The 4S Network supports other laboratories on a regional level. Laboratorians from Guinea, Togo, and Mauritania have been trained on influenza detection and identification techniques.

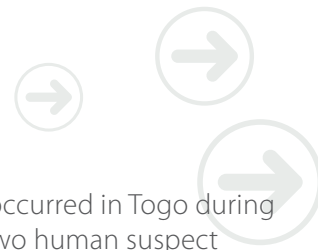
- Tested 3,437 specimens for influenza viruses.
- Submitted 98 influenza-positive samples to WHO CC's in Atlanta and London.

Pasteur Institute of Dakar, in collaboration with the Ministry of Health, continues to build laboratory and epidemiologic surveillance capacity to determine the burden of influenza disease.

SEYCHELLES

ILI and SARI surveillance in Seychelles both began in October 2013. ILI sentinel surveillance is conducted in six health care centers, four of those on the island of Mahe, one on the island of Praslin, and one on the island of La Digue. They send daily epidemiological information for several diseases including ILI.

SARI sentinel surveillance is conducted in four hospitals throughout the country, two of those are on the islands of Praslin and La Digue. The sentinel sites are monitored periodically by the Disease Surveillance and Response Unit to verify registers and entry of data. They use checklists and questionnaires as evaluation tools.



The Molecular Diagnostic Unit (MDU) of the Seychelles Public Health Laboratory began analyzing samples from sentinel sites in October 2013, for the detection of influenza A (H1N1, H3N2, H1N1pdm09) and influenza B viruses. The MDU successfully participated in WHO's External Quality Assessment Project (EQAP) Panel 13.

- Tested 269 specimens for influenza viruses.
- Supported the Ministry of Health of Madagascar in updating the National Contingency Plan for 2014–2016.

In July 2014, all sentinel hospital site staff members participated in data collection training in order to coordinate and standardize data collection (clinical illness and mortality) on SARI cases. Staff have also attended trainings on Risk Communication, Grants Management, and Influenza rRT-PCR Diagnosis.

SIERRA LEONE

In 2011, the World Health Organization (WHO) selected eight countries in sub-Saharan Africa, including Sierra Leone, to strengthen sentinel surveillance efforts through the project, Strengthening Influenza Sentinel Surveillance in Africa (SISA). Prior to this effort, Sierra Leone had no influenza surveillance activities.

Sierra Leone conducts sentinel surveillance for influenza. The Central Public Health Reference Laboratory (CPHRL) provides logistical support to sentinel sites in the influenza surveillance system in Sierra Leone. From October 2013 to May 2015, the laboratory analyzed 160 samples from four sentinel sites.

Laboratory staff participated in WHO training on shipment of biological substances. Laboratory staff also received training at Noguchi Memorial Institute for Medical Research on laboratory diagnosis of influenza and other emerging diseases.

Currently, there are no influenza vaccination activities in the country. However, this an area to explore in the near future.

TOGO

Avian influenza A (H5N1) virus occurred in Togo during 2007 and 2008. Samples from two human suspect cases were sent to Institut Pasteur of Dakar but the results were negative. The 2009 influenza pandemic increased the necessity to build a national influenza laboratory.

With the support of partners such as NAMRU-3, CDC and WHO, the influenza laboratory was established and has been functional since May 2010.

Today, Togo is conducting routine surveillance for influenza A (H5N1), sentinel surveillance for ILI in two sites (one civilian and one military) in the capital city Lomé, and SARI sentinel surveillance in three sites throughout the country.

- Participated in the Pandemic Preparedness Roundtable Simulation Exercise with USCOM AFRICA.
- Contributed to influenza vaccine strain selection by submitting isolates to WHO.

Research Activities in Partner Countries

GHANA

CDC's Influenza Division developed a research cooperative agreement with the Noguchi Memorial Institute for Medical Research in 2013. Together we established a respiratory disease surveillance platform in Shai-Osudoku and Ningo-Prampam Districts in the Greater Accra Region of Ghana. Patients with influenza-like illness and hospitalized patients with severe acute respiratory illnesses are enrolled in surveillance at nine health facilities. Other health facilities within the district provide weekly aggregate data on the number of respiratory diseases and number of patients meeting the ILI and SARI case definitions. Additional studies include measuring the incidence of influenza in HIV-infected and HIV-uninfected adults and the impact of influenza infection on pregnancy outcomes.

MALAWI

CDC's Influenza Division has partnered with the Malawi-Liverpool Wellcome Trust Clinical Research Programme located at Queen Elizabeth's Central Hospital (QECH) in Blantyre, Malawi since 2011. Influenza surveillance is conducted among children and adults seeking care at QECH. In addition, we have collaborated to assess nosocomial transmission of influenza viruses and RSV in the pediatric high dependency unit, the impact of HIV and malaria on transplacental transfer of antibodies to influenza viruses, the incidence and severity of influenza among HIV-infected and HIV-uninfected adults, and determine changes in influenza genomics that may impact the severity or transmissibility of influenza viruses.

SENEGAL

Research activities are being conducted through a partnership with PATH, the Institut de Recherche pour le Développement (IRD), and Institute Pasteur de Dakar.

These activities include three separate but related vaccine trials. Vaccination and follow-up activities are completed for all three trials, and analyses are underway with manuscripts anticipated in 2015–2016.

- A large-scale randomized controlled trial to evaluate the impact of inactivated influenza vaccine (IIV) among vaccinated children and their communities, through indirect effects or "herd immunity."
- A randomized controlled trial of the safety and immunogenicity of an influenza vaccine containing an immune response-boosting adjuvant (MF59-adjuvanted IIV).
- A randomized controlled trial of the efficacy of live, attenuated influenza vaccine (LAIV) in reducing influenza among LAIV-vaccinated children compared to those receiving a placebo.





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