

OIE Collaborating Centres Reports Activities

Activities in 2016

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ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE

Disease control	
Title of activity	Scope
Rabies prevention and control in multiple countries	<p>Haiti - Rabies control and prevention project implemented in Haiti by CDC's Poxvirus and Rabies Branch is at present the most comprehensive program of any rabies endemic developing country. From the initial pilot project in two districts of the capital city started in 2011-2012 program has expanded to 8 out of 10 country' departments currently serving more than 98% of the population. Approximately 1800 animals associated with human exposure are assessed per annum, approximately 15,000 children educated about efficient ways to avoid animal bites and about proper steps to seek medical help once bites occur.</p> <p>Surveillance, risk assessment and integrated bite case management protocols as well tools for assessment of dog density and effective planning and management of mass dog vaccination campaigns developed in Haiti have been successfully shared with WHO, OIE, and other partners for implementation in multiple countries (Ethiopia, Vietnam, Bangladesh, Kenya, Zanzibar, Cambodia, Guinea, Liberia, Namibia, Bhutan and India).</p>
Rabies prevention and control in multiple countries	<p>Other activities have focused on increasing access to cell culture-based human rabies vaccine for pre- and post-exposure prophylaxis through procurement of >50,000 doses of cell culture vaccine by the FMOH, identification of medical facilities in each of Addis Ababa's 10 sub-cities for piloting introduction of cell culture based rabies vaccine using existing FMOH vaccine procurement and distribution systems. The goal is to have at least 1 health center in each sub-city with stockpiles of rabies cell culture vaccine for post-exposure prophylaxis to increase access and accessibility. Assistance is also being provided in the area of local cell culture rabies vaccine production for both humans and animals. In addition, culturally appropriate information, education, and communication materials as well as communication strategies are being developed for increased community awareness on rabies prevention and for use during planned mass canine vaccination campaigns.</p> <p>Thailand - Support to the Institute for Urban Disease Control and Prevention, Ministry of Public Health to implement a One Health Rabies Free Zone in the Bangkok Metropolitan Area.</p>

<p>Rabies prevention and control in multiple countries</p>	<p>Georgia - In 2015, National Food Agency (NFA) noticed a significant increase in the number of reported rabies cases among cattle in the Guria region. NFA with support of CDC conducted case investigations (case-control study) in August 2016. 10 teams visited with 219 respondents along with village and area controls. The investigation identified 23 additional cattle rabies cases (52% out of 44 total) that were not reported but were suspected due to symptoms and date of onset. As expected, documented bites were a major risk factor for rabies as transmission is through infected saliva. The primary route of transmission of rabies in cattle appears to be interaction with wildlife (jackals and wolves) and appropriate rabies vaccination was shown to be protective. Cattle roamed in common pastures,,roamed with other animals,and very few had drivers monitoring the herd. Most cattle roamed in pastures close to the forest and river as compared to the road. A notable cluster of rabid cattle was attributed to a wolf attack and a dead wolf was found during the incubation period.</p> <p>Kenya - Completion of rabies elimination guidelines on rabies surveillance in humans and dog populations, dog vaccination and post vaccination surveys, dog bite management and dog ecology studies. The guidelines are currently in use at three pilot counties where rabies elimination activities have commenced supported by different counties.</p>
<p>Rabies prevention and control in multiple countries</p>	<p>Mass dog vaccination management and evaluation protocol developed by CDC was successfully used and adapted in multiple countries (Haiti, Ethiopia, Guatemala and Bangladesh).</p> <p>CDC teams led collaborations and coordinated efforts to control and prevent dog rabies globally through continued subject matter expertise provided from headquarters and from our international in-country staff through consultations, SARE assessments, development and implementation of surveillance and vaccination management tools, laboratory diagnostic support, training, development and evaluation of surveillance systems, and health education towards a goal of global elimination of dog-mediated human rabies by 2030 (Haiti, Vietnam, Ethiopia, India, Georgia, Bangladesh, Guatemala Cambodia, Kenya, China, Kazakhstan, Thailand, and Egypt). For 2017 plans to work in Kazakhstan (encephalitis surveillance), China, Guatemala, Kenya (regional meeting), and Egypt. Several CDC international sites are currently participating in a networking and data sharing project to enhance current rabies elimination activities.</p>
<p>Nipah Virus in Bangladesh</p>	<p>Provided technical support and operational research on interventions to reduce Nipah virus exposure in community and healthcare facility settings in Bangladesh.</p>
<p>Identification of multiple viral hemorrhagic fever outbreaks in Uganda</p>	<p>In conjunction with the Uganda Virus Research Institute, assisted in the testing and identification Ebola hemorrhagic fever infection (Luwero District of central Uganda), Marburg virus infection (Kabale, Ibanda, Mbarara, and Kampala Districts of Uganda), Crimean-Congo hemorrhagic fever (Agago, Wakiso), and Rift Valley Fever (Kabale)</p>
<p>Malassezia pachydermatis outbreak</p>	<p>CDC's Mycotic Diseases Branch assisted state health departments and a hospital investigating an outbreak of invasive infections caused by Malassezia pachydermatis, a yeast that commonly colonizes skin of dogs and other companion animals, in a neonatal intensive care unit. Whole-genome sequencing showed that outbreak isolates were nearly identical and were not closely related to comparison isolates, suggesting a single source. Continued M. pachydermatis outbreaks among vulnerable preterm infants highlight the role of this zoonotic yeast as a potentially serious pathogen.</p>

<p>Zika Virus Surveillance in multiple countries</p>	<p>CDC is currently working globally with ministries of health and agriculture, universities, US government agencies, and other research partners to:</p> <ul style="list-style-type: none"> • Determine incidence of infection and monitor pregnancy and birth outcomes • Determine risk factors for severe outcomes (i.e. Guillain-Barré syndrome or other neurological disorders) • Describe non-human vertebrate and vector ecology at the animal-human interface <ul style="list-style-type: none"> • Describe geographic distribution and transmission dynamics • Evaluate novel diagnostics <p>Zika research activities are ongoing in multiple GDD Regional Centers (Bangladesh, China, Egypt, Georgia, Guatemala, India, Kenya, South Africa, and Thailand) and several countries in the Caribbean, Central, and South American regions.</p> <p>CDC and partners are currently conducting ecology studies in Peru, Colombia, and Brazil.</p> <p>Thailand GDD is working with the Ministry of Public Health (MOPH) to get ethics approval for a zika protocol which will be implemented in Thailand utilizing the CDC Cooperative Agreement to the Thailand MOPH. The implementation is scheduled to start in FY17.</p>
<p>Establishment of real-time syndromic surveillance for animal diseases in Kenya</p>	<p>Establishment of real-time syndromic surveillance for animal diseases using the Enhanced Passive Surveillance (EPS) electronic platform and data management and analysis system developed initially for the US by the Texas Center for Applied Technology (TCAT) and the Institute for Infectious Animal Diseases (IIAD) at Texas A&M University. This data system and tool combines near real time notification of disease or disease syndrome events with visualization and analytics packages that can be programmed to interrogate multiple data points received from the field and other sources. This platform has been adapted for Kenya Ministry of Agriculture and further refinement to integrate analysis of animal and public health data using algorithms defined by epidemiologists from MoA and MoH is planned to enhance the utility of the system to detect zoonotic diseases when they occur before they spill over to human populations.</p>
<p>Surveillance for acute harmful algal bloom-associated illnesses resulting from water, food, or other exposures – U.S.</p>	<p>In June, 2016 CDC launched the One Health Harmful Algal Bloom System (OHHABS; https://www.cdc.gov/habs/ohhabs.html), a voluntary reporting system available to state and territorial public health departments and their designated environmental health or animal health partners. OHHABS collects data on individual human and animal cases of illnesses from HAB-associated exposures, as well as environmental data about HABs. The goal of OHHABS is to collect information to support the understanding and prevention of HABs and HAB-associated illnesses.</p>

Investigation of human Salmonella infections linked to exposure to small turtles exported to multiple countries	On 20 April 2016, the National IHR Focal Point of the United States of America notified PAHO/WHO of an ongoing investigation of four multistate outbreaks of human Salmonella infections linked to exposure to small turtles (with shell length <10 centimeters) or their environments (e.g., water from a turtle habitat) in the United States. 133 cases with the outbreak strains of Salmonella were reported from 26 U.S. states. CDC investigated these outbreaks and identified turtle farms which may have exported turtles with Salmonella internationally. Despite the sale and distribution of small turtles in the United States has been banned since 1975, Salmonella outbreaks linked to pet turtles continue to be documented in the United States. Since the infection is linked to exposure to small turtles that have been exported internationally, there is a risk to pediatric populations in other countries. PAHO/WHO continues to monitor the epidemiological situation and conduct risk assessment based on the latest available information. Countries that import reptile or amphibian pets, including small turtles, should pay attention to potential imports of infected animals, and inform local health authorities to consider exposure to small turtles and other reptile or amphibian pets when investigating cases or potential outbreaks of salmonellosis, especially in the pediatric population.
Largest outbreak to date of human Salmonella infections linked to live poultry- U.S.	The largest number of illnesses linked to backyard poultry have been reported in 2016. Live poultry associated outbreaks in 2016 involve >800 people infected with the outbreak strains of Salmonella reported from 49 states. Epidemiologic, laboratory, and traceback findings linked these four outbreaks of human Salmonella infections to contact with chicks, ducklings, and other live poultry from multiple hatcheries. CDC's Outbreak Response and Prevention Branch is actively working with industry and federal partners to develop new strategies to address this public health issue at the industry level and by providing consumer education.
Prevalence study of antimicrobial resistance in Salmonella enterica isolated from broiler chickens, pigs, and meat products in the Thailand-Cambodia border provinces	In collaboration with Chulalongkorn University, GDD and a Hubert Fellow collaborated in a study to collect specimens during 2014 and 2015 to examine the prevalence and antimicrobial resistance (AMR) in the Salmonella isolates collected in provinces that border Thailand and Cambodia. The study findings were recently accepted by Microbiology and Immunology.
Response to colistin-resistant mcr-1 gene detected in humans and animals	In response to discovery of colistin-resistant mcr-1 gene in E.coli, using bacterial samples from human, retail meat, and food animal sources, the CDC, U.S. Food and Drug Administration (FDA), and U.S. Department of Agriculture (USDA) retrospectively screened nearly 55,000 bacterial isolates through the National Antimicrobial Resistance Monitoring System (NARMS) and collections of healthcare-associated bacteria. https://www.cdc.gov/drugresistance/mcr1.html
Coxiella burnetii (Q fever) in multiple countries	Thailand - Supported studies being carried out by the Thai Ministry of Public Health looking at prevalence of exposure to Coxiella burnetii in ruminants and occupationally exposed people. Supported an additional Thai Ministry of Public Health prospective study evaluating exposure and Q fever illness among Thai farmers. Support included provision of reagents, laboratory training, technical advice, and data analysis. Sponsored the presentation of the findings at the One Health EcoHealth Conference in Melbourne, Australia (December 2016). The findings have been accepted by the American Journal of Tropical Medicine and Hygiene. Jordan - Supported the first prevalence study of Coxiella burnetii in milk derived from ruminants in Jordan by sharing protocols, training staff from the Jordan University of Science and Technology and assisting with data analysis.

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Anthrax prevention and control in multiple countries	<p>Enhanced efforts from subject matter experts at CDC headquarters and from our international in-country staff to improve anthrax surveillance through continued in-country consultations, diagnostic support, training, and health education to ministries of agriculture and health representatives (Ethiopia, India, Ghana, Kazakhstan, Georgia, and Bangladesh).</p> <p>Bangladesh - Reviewed reports and data from anthrax outbreak investigations conducted by IEDCR (Institute of Epidemiology, Disease Control and Research) and a global health research institute in Bangladesh (iccdr,b) from the previous three years. In coming year will focus efforts on obtaining high quality outbreak information from 1-2 districts reporting the majority of the anthrax outbreaks in Bangladesh.</p>
Anthrax prevention and control in multiple countries	<p>Ethiopia - provided support for anthrax outbreak investigation in high priority tourist areas and discussed importance of joint One Health approach to anthrax between the Ministry of Health and the Ministry of Livestock and Fisheries. Assessed available reports and data from anthrax surveillance in animals and humans. Started discussions with Ethiopian Public Health Institute (EPHI) and Ministry of Livestock on how to improve laboratory capacity and disease surveillance in the country. A national anthrax workshop in being organized with the participation of key stakeholders to discuss the current anthrax situation in Ethiopia related to capacity for surveillance, outbreak response, laboratory capacity, and where Ethiopia would like technical assistance to improve their anthrax program. In the coming year will conduct anthrax stakeholders meeting with government partners to determine high priority areas needing technical assistance for anthrax surveillance and response and provide training for anthrax laboratory diagnostic techniques.</p> <p>Kazakhstan - supported response to human anthrax outbreak in June 2016.</p>
Anthrax prevention and control in multiple countries	<p>Ghana - Collaborated with Ghana Veterinary Services, Ghana Health Services, Ghana FELTP, and University of Florida to provide intensive training on basic GIS, advanced spatial analysis, and ecological niche modeling. These tools can be applied to epidemiology investigations and outbreak tracking for various diseases including anthrax. Developed a predictive anthrax risk map using ecological niche and random forest modeling that can be used to guide targeted anthrax vaccination campaigns. The map is also guiding renewed efforts to train medical staff in the anthrax high risk zones. Collaborating with Ghana Health Services to collate their human case surveillance data with anthrax disease type to further explain the case fatality rate and its geographic distribution. Discussed improving human and animal anthrax surveillance, and importance of collaborate investigations, at an Anthrax Stakeholders meeting with national and international partners.</p> <p>India - Reviewed historical animal and human anthrax data from India; collaborating with the National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) to enhance surveillance and diagnostic capacity for anthrax detection in several states in India where anthrax is endemic.</p> <p>Georgia - CDC SMEs provided field operations planning and implementation support to National Food Agency of Georgia to conduct anthrax case-control study in Livestock.</p>

<p>Brucellosis prevention and control in multiple countries</p>	<p>Prevalence study in livestock (Ethiopia, Kenya, Bangladesh).</p> <p>Ethiopia – Retrospective data was used to identify and map high risk areas. A linked livestock household sero-surveillance study is being conducted throughout a subset of identified high risk areas within Ethiopia using advanced diagnostic methods in order to assess the disease burden in animals and humans. Laboratory staff have been trained and supplies given to ensure that advanced diagnostics will be used to confirm brucellosis and to determine the circulating Brucella species in humans and animals. Brucella species characterization will aid in the development of future livestock vaccination efforts in high Brucella sero-prevalence areas.</p> <p>Kenya – Brucellosis subtyping: Identification of circulating brucella types in a small proportion of livestock specimens using molecular methods and B. abortus was detected in bovine sera.</p>
<p>Brucellosis prevention and control in multiple countries</p>	<p>Bangladesh – Supported a linked animal and human brucellosis prevalence study by global health research institute in Bangladesh (icddr,b) in a dairy dense area of Bangladesh. Data and specimen collection completed February 2016, analysis and testing is ongoing. Discussed with icddr,b and IEDCR future studies on brucellosis in high risk occupational groups, incidence studies among animals and humans, as well as future cost effectiveness activities such as brucellosis vaccination in selected areas of high prevalence.</p> <p>Jordan – Incidence study in humans and additional follow up at household level.</p> <p>Georgia – Seroprevalence survey in humans living in Rural areas of Georgia (brucellosis survey being done in conjunction with poxvirus surveillance).</p> <p>India – CDC supported outbreak response; livestock One Health serosurvey in Tumkur district; AFI surveillance in humans.</p>
<p>Enhancement and integration of animal bite surveillance system for Rabies in multiple countries</p>	<p>Development, implementation, and enhancement of integrated bite case management system conducted in multiple countries (Vietnam, Ethiopia, Kenya, Zanzibar, Cambodia, Guinea, Liberia and Namibia).</p> <p>Ethiopia – Trainings were successfully held at the Ethiopian Public Health Institute in Addis Ababa to train health care workers and veterinary staff on a mechanism to share data between the sectors by establishing a surveillance system linking human bite (suspected rabies exposure) cases to inciting animals and laboratory test results to increase investigation and response capacity. Veterinary staff were trained in animal handling and vaccination techniques in order to safely perform suspected animal rabies investigations, increase submissions for diagnostic testing, and in preparation for mass canine vaccination campaigns. The initial MVC strategies training was successfully completed in December 2016 resulting in the vaccination of over 500 dogs as part of the training exercise. Mass vaccination campaigns to increase the proportion of stray and owned dogs within the city of Addis Ababa vaccinated against rabies to 70% are being planned for the spring.</p>
<p>Global Dog Rabies Elimination Path 2017-2030 (GDREP13)</p>	<p>Tool developed for the feasibility assessment and planning of dog vaccination campaigns in countries and regions for effective elimination of dog mediated human rabies.</p>
<p>Poxvirus prevention in multiple countries</p>	<p>Enhanced surveillance for monkeypox and support of laboratory diagnostic capacity as well as ecological and epidemiological studies to understand determinants and risk factors of disease (Democratic Republic of Congo, Cameroon, and Colombia).</p> <p>Georgia – As a collaborator of DTRA funded “Enhancing capacity for case detection and diagnosis of febrile zoonotic-related cutaneous lesions in Georgia” program, CDC provided laboratory trainings, laboratory reagents for diagnostics and research, conducted One Health ecology field studies and seroprevalence surveys with participation of professionals from MoH and MoA of Georgia.</p>

Rift Valley Fever (RVF) in multiple countries	<p>Kenya – Outbreaks of Rift Valley Fever disease in Eastern Africa and Kenya specifically are characterized by huge public health and socio-economic impact in the country. While preparedness and response protocols have been prepared since the 2006/07 outbreak, application of interventions including enhanced surveillance to detect early cases in animals before spill over to human populations is a key component of mitigating impact of outbreaks when they occur. Since July 2015, climatic models predicted El Niño conditions forecasted for Kenya with up to approximately 95% chance of “strong” El Niño during late 2015 into early 2016 were issued through FAO Emergency Prevention System for Animal Health. In response to this alert, WHO/OIE/FAO advised countries at risk to (among other risk mitigation strategies) enhance active surveillance and immediate notification of RVF cases to limit human morbidity and mortality. Kenya Ministry of Agriculture, Livestock and Fisheries (MALF) did not have an existing active surveillance system for livestock diseases. RVF syndromic surveillance system was established in 22 counties (out of 47 counties in Kenya) and involving over 1000 farmers to enhance detection of RVF in animals.</p>
Rift Valley Fever (RVF) in multiple countries	<p>(Kenya - continued) Between November 16, 2015 and February 29, 2016, climatic conditions such as localized flooding, increase in mosquito populations and animal syndromes associated with RVF in animals including abortions, deaths in livestock and bleeding were reported weekly by 55 veterinarians through a toll free number provided by CDC partner. In addition, illness in humans in households where animal disease were reported. Through GHSA, syndromic reporting system is being optimized for real-time livestock disease reporting system that will capture outbreaks of emerging zoonotic pathogens for investigation before spillover into human populations.</p> <p>Niger - Provided risk communication and health education materials (in French) for supporting local capacities in the RVF outbreak response.</p>
Ebola Outbreak in West Africa	<p>Between 2014-2016, West Africa experienced the largest outbreak of Ebola in history, with multiple countries affected. In response to the outbreak, CDC activated its Emergency Operations Center to coordinate technical assistance and control activities with other U.S. government agencies, the World Health Organization, and other domestic and international partners. CDC also deployed teams of public health experts to West Africa. Widespread transmission of Ebola in West Africa has been controlled, although additional cases may continue to occur sporadically. However, because of ongoing surveillance and strengthened response capacities, the affected countries now have the experience and tools to rapidly identify any additional cases and to limit transmission. More information on CDC’s response to Ebola is available: http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html</p>
Ebola Outbreak in West Africa	<p>Persistence of Ebola virus in semen in Liberia</p> <ul style="list-style-type: none"> • Coordinated management and oversight with Liberia’s Ministry of Health and the World Health Organization in the Liberia’s Men’s Health Screening Program. This national program was created to provide testing of semen to male survivors of Ebola virus disease. Results and counselling are provided to participants. <p>Ebola Virus Persistence study in Sierra Leone</p> <ul style="list-style-type: none"> • Technical support for research on the persistence of Ebola virus in multiple body fluids of survivors of Ebola virus disease. <p>Bat trapping and testing in Sierra Leone</p> <ul style="list-style-type: none"> • Capture wild bat species in Eastern Sierra Leone to test for evidence of going or previous infection with Ebola virus. Trainings with local partners in proper field and laboratory diagnostic techniques are ongoing.
Viral hemorrhagic fever surveillance in multiple countries	<p>Uganda – Enabled the rapid diagnosis of Ebola hemorrhagic fever in Uganda by expanding surveillance in-country for viral hemorrhagic fever (VHF)— a group of diseases that include Ebola and Marburg hemorrhagic fevers among others. The expanded program included assigning a staff member to the Uganda Virus Research Institute (UVRI), providing training for case recognition and management for health professionals, providing reagents and training for diagnostic testing, and completing renovation of the VHF diagnostic laboratory at UVRI.</p> <p>Provided VHF outbreak response when requested to countries (Uganda, Niger).</p>

Hantavirus surveillance in United States	Maintain surveillance of all cases of hantavirus infections in the US. Provide consultation to State Health Departments, physicians, and the general public. Coordinate sample shipments, diagnostics, and result dissemination.
Kyasansur Forest Disease in India	CDC supported acute febrile illness surveillance allowed for expansion of the geographic distribution of Kyasansur Forest Disease.
Leptospirosis prevention and control in multiple countries	Bangladesh and India - supported leptospirosis surveillance in 10 health centers in Bangladesh and 15 sites in India to better understand the burden of leptospirosis in Bangladesh. Results suggest a higher burden than previously identified. Indonesia - Assisted the ministry of health to develop protocol for leptospirosis surveillance in 5 clinics in Jakarta province. Also working with the Eijkman Institute to test banked samples from 4 provinces for leptospirosis.
Crimean-Congo hemorrhagic fever (CCHF) in multiple countries	Georgia - Knowledge, Attitudes, and Practices (KAPs) and risk assessment. Kazakhstan - Surveillance enhancement through detection, clinical management, diagnosis, and surveillance trainings.
Zoonotic Influenza Activity in multiple countries	CDC collects, compiles and analyzes information on influenza activity year round in the United States. The U.S. influenza surveillance system is a collaborative effort between CDC and its many partners in state, local, and territorial health departments, public health and clinical laboratories, vital statistics offices, health care providers, clinics, and emergency departments. CDC receives and characterizes thousands of influenza viruses from the U.S. and around the world to understand influenza disease, inform influenza vaccine strain selection in collaborating with partners, and guides public health and clinical recommendations. Studies and conducts risk assessments on animal influenza A viruses to understand their zoonotic/pandemic potential. U.S. - Provided information for public and offered technical support to states for H7N2 outbreak in cats in a New York City shelter in December 2016.
Zoonotic Influenza Activity in multiple countries	Bangladesh - avian influenza surveillance, Surveillance for human infections with avian influenza A viruses among live bird market workers in Dhaka city area, Bangladesh Kenya - live bird market surveillance. Guatemala - avian and swine surveillance. Thailand - Support for a cross sectional study to conduct live bird market surveillance in 9 major districts of Bangkok Metropolitan area during 2017. Previous avian influenza virus surveillance conducted in 2013 in live-bird markets in Bangkok was published in the January 2017 edition of the Southeast Asian Journal of Tropical Medicine and Public Health. India - H5N8 outbreak support China - Supported case-control study for avian influenza A(H7N9) outbreak in China. Also supported analysis and interpretation of data from 2013-2014 avian influenza A(H7N9) serologic study. Collaborative manuscripts describing both studies were published in the peer-reviewed literature in 2016. Collaborated on MMWR summarizing first 4 epidemics of avian influenza A(H7N9). Participated in FAO-hosted workshop to promote collaborations among animal, human and wildlife health sectors to strengthen influenza networks in China.

MERS-CoV in Kenya	High seroprevalence of MERS-CoV among camels has been reported in Kenya and other countries in Africa. To date, the only report of MERS-CoV sero-positivity among humans in Kenya is of two livestock handlers with no known contact with camels or history of travel. We assessed whether persons exposed to seropositive camels (90% sero-prevalence) at household level had serological evidence of infection. None of the 760 persons tested with well characterized exposure to camels and camel products (milk) showed evidence of previous exposure MERS. While most human MERS-CoV infections are not linked to camel exposure, our findings were unexpected in part because of the high seropositivity reported in camels in same households as the participants.
Training, capacity building	
Title of activity	Scope
Zoonotic Disease Outbreak Rapid Response Teams in multiple countries	Technical and coordination support and training provided for multidisciplinary zoonotic disease outbreak rapid response teams (Ethiopia, India, Kenya, Thailand, Bangladesh). Kenya - Developed a preparedness and response plan for public health events of initial unknown etiology (PHEUE). This plan was adapted from the WHO-AFRO generic plan that is aimed at helping countries mount rapid and early detection of etiologies of initially unknown origin that are common in this region. The plan is available for customizing for use by other countries in the region.
Anthrax diagnostic training in multiple countries	Conducted training, June 17-19th at Manipal University on molecular diagnostics for the identification of Anthrax in people and animals. This training included public health scientists from India and Bangladesh. Training included sample processing and RT-PCR techniques for proper identification of B. anthracis. Ghana - Validation of rapid diagnostic assay in Ghana - Trained regional vet staff using a train-the-trainer model to collect samples from suspect animal anthrax cases, and test a rapid diagnostic assay on these samples. Additionally, we will conduct laboratory training in FY17 to enable confirmatory testing for anthrax to be done in Ghana. The samples tested on the RDT will be compared to the results of the confirmatory tests for validation.
Leptospirosis diagnostic training in multiple countries	Bangladesh - Conducted training, May 9th-10th, at IEDCR (Institute of Epidemiology and Disease Control and Research), on rapid diagnostics (RT-PCR) for the detection of leptospirosis among people and animals. India - Conducted training, Sept. 19th-21st, at Manipal University on rapid diagnostics (RT-PCR) for the detection of leptospirosis among people and animals.
Rabies diagnostic training in multiple countries	Trainings in various laboratory diagnostic methods (DRIT, DFA, PCR) for rabies conducted in Ghana and Georgia.
Training in effective management of mass dog vaccination campaigns for rabies in multiple countries	Training in effective management of mass dog vaccination campaigns conducted in Haiti, Ethiopia and Guatemala.
Poxvirus diagnostic training in multiple countries	Enhancement of laboratory diagnostic capacity and training of personnel in field collection of small mammals and in conducting molecular diagnostics and serology assays for poxviruses (Georgia, DRC, Colombia). Azerbaijan - Training for PCR detection, sequencing and data interpretation for orthopox and parapoxvirus was provided to Azerbaijani laboratory specialists.
Hantavirus diagnostic training in Colombia	Technical training on diagnostic tests provided to support surveillance for hantavirus cases in Colombia.
Rift Valley Fever diagnostic testing in Burkina Faso	Assessment of facilities and technical recommendations provided to support future efforts in diagnosis and surveillance of Rift Valley Fever in Burkina Faso.
Influenza global systems development in multiple countries	CDC supports the development of sustainable global systems for influenza virus detection, characterization, and response. CDC's staff train and offer technical assistance on the use of cutting edge laboratory techniques to its partners in public health laboratories around the globe.
Assessment of Epidemiology Capacity in a One Health Team at the provincial level in Thailand	GDD is providing support to the Thailand Ministry of Public Health's Bureau of Epidemiology to measure the provincial One Health Teams' capacity in three essential services: 1.) surveillance, 2.) data reporting and 3.) outbreak investigation. The findings show the impact of implementing a One Health approach increases capacity development at the community level. CDC supported the investigator who presented these findings at the One Health EcoHealth Conference in Melbourne, Australia (December 2016).

Evaluation of One Health practice in Kenya	Conducted baseline evaluation of One Health status in the country. The aim was to assess the status of the markers/indicators of One Health (OH) in practice in Kenya focusing on the current status, evaluate Kenya's ability to respond to outbreaks of zoonotic diseases and determine the current status of zoonotic disease (ZD) surveillance in animals as indicators of progress made in the last five years.
Global Health Security Agenda (GHSA), multiple countries	The U.S. government, other nations, international organizations and public and private stakeholders have partnered to accelerate progress toward a world safe and secure from infectious disease threats, to promote global health security as an international security priority, and to spur progress toward full implementation of the WHO International Health Regulations 2005 (IHR), the OIE Performance of Veterinary Services (PVS) pathway, and other relevant global health security frameworks. GHSA work includes a 5 year target of adopting measured behaviors, policies and/or practices that minimize the spillover of zoonotic diseases from animals into human populations. More information is available at http://www.cdc.gov/globalhealth/security/index.htm .
Scientific manuscript writing training for animal and human health professionals in Georgia	CDC South Caucasus Office sponsored and conducted scientific writing training for human and animal health professionals within One Health concept.
Scientific Writing Workshop for Field Epidemiology Training Program-Veterinarians in Thailand	GDD supports the Field Epidemiology Training Program for Veterinarians (FETP-V) to obtain skills for scientific writing to encourage the FETP-V to develop, implement, and report findings related to One Health.
Coordinating Unit of One Health in Thailand	GDD supports the Coordinating Unit of One Health in Thailand, the body responsible for coordinating all One Health activities within Thailand. They convene the unit which has representation from the Thai government as well as NGO's and other collaborating partners involved in One Health. This unit, utilizing CDC financial and technical support, coordinated the first Global One Health Day in Thailand (November 2016) which included a presentation by the CDC Director.
One Health Workshop sponsored by the CDC South Caucasus office held in Baku, Azerbaijan	Provided updates and feedback on rabies and orthopoxvirus studies that were conducted in the South Caucasus region as well as updates on surveillance and laboratory techniques for rabies elimination. Rabies, Anthrax, Brucellosis and other prioritized diseases and topics were discussed. Also, discussed priorities for 2017 and Poxvirus program plans and perspectives in Azerbaijan.
One Health Zoonotic Disease Prioritization Workshops in multiple countries	The CDC One Health Office coordinates activities for the One Health Zoonotic Disease Prioritization (OHZDP) Workshop. Conducting a OHZDP workshop allows a country to do the following: bring together multisectoral, One Health representatives to connect human, animal (both livestock and wildlife), and environmental health sectors; prioritize endemic and emerging zoonoses of greatest national concern using equal input from all represented sectors; support the creation of One Health coordination mechanisms to improve health outcomes for humans and animals; and focus the use of limited resources to build capacity and reduce the impact of prioritized zoonoses. Prioritizing zoonoses using a One Health approach allows a country to focus limited financial and personnel resources to build laboratory capacity, conduct efficient and effective surveillance for zoonoses in human and animals, develop joint outbreak response plans, and create prevention and control strategies for both human and animal health. More information is available at https://www.cdc.gov/onehealth/pdfs/zoonotic-disease-prioritization-workshop.pdf . In 2016, OHZDP workshops were conducted in Cameroon, Democratic Republic of Congo, and South Africa.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Anthrax outbreak preparedness and response in multiple countries	Support training, specimen collection, and diagnostic support for outbreak rapid response teams to rapidly diagnose suspected anthrax disease in animal and human populations (India, Bangladesh), and in animal populations (Ghana). Currently working to expand efforts in other African countries.
Brucellosis diagnostic testing capacity in multiple countries	Support training human and animal health care providers to recognize human signs of brucellosis and improve laboratory diagnostic capacity for brucellosis in Ethiopia. Iraq and Jordan- support laboratory diagnostic capacity and sample collection among public health labs.
Leptospirosis diagnostic capacity in multiple countries	Support SOP development, diagnostic support for outbreak response and specimen collection for leptospirosis among public health and veterinary labs in India and Bangladesh.

Development, validation, and standardization of rapid laboratory diagnostic tools and reagents for rabies in multiple countries	<p>Development, validation and standardization of real-time PCR assay for rabid detection of lyssaviruses in brain, skin, saliva and cornea (Rep. of Georgia) as well as development and evaluation of CDC monoclonal antibodies for direct rapid immunohistochemistry (DRIT) test.</p> <p>In collaboration with the Animal and Plant Health Agency (APHA, UK), CDC is working closely with the Rabies Diagnosis Laboratory, Veterinary College, Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU), Bangalore, India, to enhance their laboratory diagnostic capacity for rabies, develop standard operating procedures, quality management systems as well as biosafety and biosecurity protocols to achieve accreditation to international quality standard and eventual designation as a recognized OIE Reference Laboratory for rabies by 2020.</p> <p>Contributed to dossiers submitted to OIE Biological Standard Commission for consideration of the inclusion of direct rapid immunohistochemistry test (DRIT) and PCR as OIE approved methods for laboratory diagnostic of rabies. Both are expected to be reviewed and possibly approved by OIE Assembly and all member states in May 2017.</p>
Rabies laboratory assessment in Ethiopia	A comprehensive laboratory assessment was completed which has guided improvement of laboratory testing capacity at the national and regional levels in both the animal and human health sectors. Improving protocols and providing fluorescent microscope capabilities, along with supplying regional and national public health laboratories with all the necessary equipment and supplies necessary for rabies diagnostic testing, will allow for more accurate and safe rabies surveillance and response.
Buffer zone cattle rabies vaccination in Georgia	National Food Agency (NFA), and the CDC South Caucasus Office are committed to reduce the devastating burden of rabies among cattle in Guria. CDC will provide confirmation of primary route of transmission and provide insight into control interventions (i.e. domestic versus wildlife). In the meantime, rabies can be controlled through thorough and effective vaccination. In this regard, CDC South Caucasus Office procured 20,000 universal rabies vaccines, syringes, and disposable equipment for cattle, dogs, and small ruminants for Guria in order to conduct a mass vaccination among animals to create a "buffer zone" between wildlife and livestock. NFA and CDC are currently working on implementing this phased vaccine campaign.
Development, validation and standardization of rapid laboratory diagnostic tools for poxviruses	Field validation of a multiplex orthopoxvirus-monkeypox GeneXpert PCR assay.
Development and validation of species specific antibodies against orthopoxviruses	To develop new diagnostic tests to determine species specific antibodies against orthopoxviruses by various platforms, like for example, peptide-based, lateral flow and protein microarray based assays.
Capacity building in laboratory detection of poxviruses in animals and humans in Georgia	Collaborating on technology transfer of poxvirus diagnostics to agencies of the Ministries of Health and Agriculture of Georgia.
Multi-pathogen zoonotic disease diagnostic platform in multiple countries	CDC Global Disease Detection South Africa and Thailand regional centers supported diagnostic platform undergoing further field surveillance evaluation.
Vaccines	
Title of activity	Scope

Sierra Leone Trial to Introduce a Vaccine against Ebola (STRIVE)	<p>The College of Medicine and Allied Health Sciences (COMAHS), University of Sierra Leone, the Sierra Leone Ministry of Health and Sanitation (MoHS), and the U.S. Centers for Disease Control and Prevention (CDC) are working together on a study called "Sierra Leone Trial to Introduce a Vaccine against Ebola (STRIVE)". It is a combined Phase 2 and Phase 3 clinical trial designed to assess the safety and efficacy of the rVSV-ZEBOV candidate Ebola vaccine. The study is strengthening existing research capacity of institutions in Sierra Leone by providing training and research experience to hundreds of Sierra Leonean staff. The skills and expertise of these trained personnel can be used in future studies. Infrastructure has been expanded, including renovating existing structures and building new ones to be able to enroll and vaccinate participants, handle data management, and store the vaccine. New technology is also available to maintain the cold chain, which keeps vaccines at required temperatures. More information available at https://www.cdc.gov/vhf/ebola/strive/qa.html.</p>
Development and evaluation of rabies vaccines for humans and dogs in Ethiopia	<p>Development and evaluation of novel rabies vaccines (immunocontraceptive vaccine for dogs, thermostable dual rabies vectored Ebola vaccine), monoclonal antibodies and antivirals.</p> <p>As a part of GHS activities in Ethiopia, CDC is working closely with Ethiopian Public Health Institute (EPHI) on development of human rabies vaccine (to replace currently used nerve tissue vaccine) and with the National Veterinary Institute (NVI) on development and evaluation of rabies vaccines for dogs. Development and facilitation of sustainable local rabies vaccine production capacity in developing countries for both humans and animals is critical for successful path towards WHO/OIE/FAO goal of elimination of dog mediated human rabies by 2030.</p>
Development and evaluation of therapeutics for monkeypox	Development of animal models and the evaluation of the efficacy of multiple therapeutics against monkeypox.
Evaluation of livestock anthrax vaccine in Bangladesh	In preparation to assist the Division of Livestock Services (DLS) with an evaluation the anthrax vaccine produced in country for use in livestock. Safety and efficacy testing will be done in accordance to OIE guidelines. Planning meetings with members from CDC and DLS was held on February 15, 2016 and May 5th, 2016 in Bangladesh.

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
Collaborating for the Implementation of the Revised International Health Regulations National Surveillance and Response Capacity	NCEZID works with CDC's Division of Global Health Protection, the Global Disease Detection program, and GDD Regional centers to assure that the IHR process will be accommodated during all investigations, surveillance activities, and research when appropriate. Whenever possible, animal and human components are sharing biologic isolates and epidemiologic data to facilitate the control and containment of disease.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines

ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations

3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Multiple OIE CCs/RLs/other organizations	Multiple	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	CDC is in communication with multiple collaborating centers, reference laboratories and other organizations from multiple countries to maintain a network and share information on One Health activities related to emerging and re-emerging zoonoses.

4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Centers for Disease Control and Prevention; United States Department of Agriculture; National Institutes of Health; Food and Drug Administration; Environment Protection Agency; U.S. Department of the Interior: National Park Service, U.S. Fish and Wildlife Service, U.S. Geological Survey; U.S. Department of Homeland Security; U.S. Department of Defense; U.S. Department of Labor and others	United States	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	To communicate, coordinate, and collaborate on projects related to One Health; To identify and pursue opportunities to improve efficiency outcomes for human, animal, and environmental health across the U.S. government.

ToR: To place expert consultants at the disposal of the OIE.

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

Yes

Name of expert	Kind of consultancy	Subject
Julie Sinclair, MA, DVM, MPH, DACVPM	CDC Liaison to the World Organization for Animal Health (OIE)	Global health security, emerging and re-emerging zoonoses, and antimicrobial resistance
Sean Shadomy, DVM, MPH, DACVPM	CDC Liaison to the Food and Agriculture Organization of the United Nations (FAO)	Global health security, emerging and re-emerging zoonoses, and antimicrobial resistance

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

Yes

- a) Technical visits: 10
- b) Seminars: 10
- c) Hands-on training courses: 10
- d) Internships (>1 month): 15

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
b	CDC's One Health Office hosts the Zoonoses and One Health Updates or ZOHU Call, a monthly webinar to provide the latest news and resources on zoonoses and other One Health issues for a USA audience including >1,000 public health and animal health professionals working in government, non-governmental organizations, industry, and academia	United States	1000
c	Rabies diagnostic capacity 2 trainings on diagnostic assays for antigenic detection (DFA) at national laboratory and evaluation of regional laboratories.	Vietnam	20
c	Provided serological training for ELISA diagnostics for brucellosis for regional public health and veterinary laboratories.	Ethiopia	30

a	Participated in a stakeholder workshop for brucellosis with local government and university partners in Ethiopia to discuss the burden of brucellosis in Ethiopia and assist them with planning a linked household serosurvey to better understand the burden and determine appropriate prevention and control techniques. Trained six regional vet staff to collect samples for rapid diagnostic assay validation study, which includes confirmatory testing for anthrax. The trained vet staff will perform training in three regions at high risk of anthrax outbreaks in 2017, aiming to train 56 district and local vet staff.	Ethiopia	40
c	Leptospirosis: Conducted training, May 9th-10th, at IEDCR (Institute of Epidemiology and Disease Control and Research), on rapid diagnostics (RT-PCR) for the detection of leptospirosis among people and animals.	Bangladesh	23
c	Leptospirosis: Conducted training, Sept. 19th-21st, at Manipal University on rapid diagnostics (RT-PCR) for the detection of leptospirosis among people and animals.	India	15
c	Anthrax: Conducted training, June 17-19th at Manipal University on molecular diagnostics for the identification of Anthrax in people and animals. This training included public health scientists from India and Bangladesh. Training included sample processing and RT-PCR techniques for proper identification of B. anthracis.	India and Bangladesh	20
a, c	Surveillance and diagnostic capacity for Rabies identification Evaluation of rabies surveillance system; CDC and EPHI hosted a workshop to plan implementation of rabies prevention and control in the pilot regions - February 2016 2 members of CDC Rabies Program, 3 from OSU, and 1 from GARC traveled to Ethiopia to conduct Animal Rabies and Handling training for 29 veterinary health professionals August 1-12. (November 2016). Trained 42 PHEM officers and veterinary staff on animal rabies and bite surveillance and response (November 2016) Trained 36 PHEM officers and veterinary staff on the Rabies Educator Certificate Course; a course developed and administered by GARC (November 2016)	Ethiopia	107
d	CDC's National Center for Emerging and Zoonotic Infectious Diseases hosted Epidemiology Elective Students and Emory University student interns to provide public health training.	United States	15
c	Rabies virus molecular diagnostic capacity Improved in-country capacity to use molecular techniques to characterize rabies positive samples; provided assistance and guidance in prioritizing activities to produce data for informing future strategy for controlling rabies in domestic dogs and wildlife.	Georgia	10

a, c	Development of a national rabies elimination plan and a national rabies control task force. Trained in dog enumeration and conducted a 500-dog vaccination clinic. 15 national rabies focal points completed the SARE workshop. 5 local veterinarians trained in dog enumeration (they have since trained an additional 10 veterinary students to conduct dog enumeration in new locations).	Guatemala	5
c	Training of personnel in conducting molecular diagnostics for poxviruses, and Training of personnel in field collection of small mammals. Personnel now have experience to investigate zoonotic diseases through sampling of small sylvan and peridomestic mammals; this activity is conducted three times a year as part of the ongoing DTRA funded study to investigate orthopoxviruses in Georgia.	Georgia	10
c	Orthopoxvirus diagnostic capacity. Real-time PCR diagnostic assays for detection of Orthopoxviruses was transferred to diagnostic laboratories in country.	Cameroon	15
c	Rabies diagnostic capacity Conducted training on antigen detection diagnostic (DRIT) to 10 participants	Ghana	10
c	Rabies diagnostic capacity 2 trainings on diagnostic assays for antigenic detection (DFA), 1 training on real-time RT - PCR. 20 people trained in RTRTPCR & DFA (Ag).	Haiti	85

ToR: To organise and participate in scientific meetings and other activities on behalf of the OIE

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

Yes

National/International	Title of event	Co-organiser	Date (mm/yy)	Location	No. Participants
International	2nd International Symposium on Alternatives to Antibiotics	USDA	12/16	Paris, France	1000

ToR: To collect, process, analyse, publish and disseminate data and information

relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 10000

Over 10,000 full text articles can be accessed at CDC Stacks: <http://stacks.cdc.gov/welcome>

CDC Stacks is a free, digital archive of scientific research and literature produced by CDC. This online archive is composed of curated collections tailored for public health research needs. This repository is retained indefinitely and is available for public health professionals, researchers, as well as the general public. CDC Stacks provides access to current CDC research and literature such as the Open Access Collection. In addition, CDC Stacks offers a historical perspective that was previously not available, such as the first 30 volumes of the Morbidity and Mortality Weekly Report. As a fully-featured repository, CDC stacks provides the ability to search the full text of all documents, browse journal articles by public health subjects, and explore the curated collections of documents on relevant topics.

b) International conferences: 100

Each year, CDC NCEZID technical and program staff attend and present at numerous international conferences.

c) National conferences: 100

Each year, NCEZID technical and program staff attend and present at numerous national conferences.

d) Other

(Provide website address or link to appropriate information): 4

Emerging Infectious Diseases (EID) Journal – Published monthly by CDC, EID was established to promote the recognition of new and re-emerging infectious diseases around the world and improve the understanding of factors involved in disease emergence, prevention, and elimination. EID Journal Website:

<http://www.cdc.gov/ncidod/EID>

The National Center for Emerging and Zoonotic Infectious Diseases (NCEZID) website maintains updated information on current outbreaks, recent work, and publications. <http://www.cdc.gov/ncezid/>

CDC One Health Office maintains a website that provides updated information on One Health activities, including CDC's One Health Office led the CDC efforts for the first One Health Day, which occurred on November 3, 2016. CDC led a domestic and global social media hashtag campaign, which had about 20 million impressions with 1,700 participants. CDC also published two blog articles via two different outlets: CDC's Our Global Voices and Huffington Post. CDC worked across the entire agency with colleagues to collectively send seven GovDelivery messages to more than 333,200 recipients. Additionally, action-oriented emails were sent to more than 1,700 partners via targeted outreach. Additional communication products included a revamped One Health website, a new global health infographic, an educational webinar, newsletter content regarding global efforts to prioritize zoonoses, and more. www.cdc.gov/onehealth

CDC One Health Office provided scientific input to CDC's Zika and Animals page.

<https://www.cdc.gov/zika/transmission/qa-animals.html>