From: Peter Daszak <daszak@ecohealthalliance.org>
To: David J Wolking <djwolking@ucdavis.edu>
CC: Kevin Olival, PhD <olival@ecohealthalliance.org>;Prof. Jonna Mazet" <jkmazet@ucdavis.edu>
Sent: 5/26/2017 10:22:24 AM
Subject: RE: Correction Re. URGENT: Modeling & Analytics semi-annual

Great – thanks…

Around all day if you want to call. In the meantime I'm going to see how quickly we can update the website (prob not this weekend, but hopefully by early next week)…

Cheers,

Peter

Peter Daszak
President

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EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that promote conservation and prevent pandemics.

From: David J Wolking [mailto:djwolking@ucdavis.edu]
Sent: Friday, May 26, 2017 1:11 PM
To: Peter Daszak
Cc: David J Wolking; Kevin Olival, PhD; Prof. Jonna Mazet
Subject: Re: Correction Re. URGENT: Modeling & Analytics semi-annual

Thanks Peter sorry I missed your call a few moments ago. All clear now, I'll discuss with Jonna this morning when we go over the report as a whole and will reach out with any additional questions.

Cheers,

David

On Fri, May 26, 2017 at 10:03 AM, Peter Daszak <daszak@ecohealthalliance.org> wrote:
Sorry for the confusion on these – Anna didn't know the background and was just trying to help, given Kevin's out of the office and I'm working from home today.

Give me a call if you need any more info – REDACTED (cell) or REDACTED (home).

And by the way – glad you caught both of these…

Cheers,

Peter

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President

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From: Peter Daszak
Sent: Friday, May 26, 2017 12:55 PM
To: Anna Willoughby; David J Wolking
Cc: Kevin Olival, PhD; Prof. Jonna Mazet
Subject: Correction Re. URGENT: Modeling & Analytics semi-annual
Importance: High

Hi David, Jonna,

Looking at this now, and glad you caught both these things.

Re. the EIDR database, the correct wording in the report should be "Partially-funded by PREDICT", not "PREDICT-derived". That's our fault, but it needs to be corrected. The truth is that DTRA funded the specific building and launching of EIDR as a public database, and we later on supported this with some PREDICT funds, so that we can make sure we get full benefit for PREDICT. If we brand this as USAID PREDICT, it will cause huge problems with DTRA, so I need to make sure we do this correctly and co-brand it. I'll talk with the tech team and look at the branding.

The webpage is: https://eidr.ecohealthalliance.org/ At the very least I'll have our folks insert language about 'funded by', and include DTRA, PREDICT and check if any other funders need to be in there. If you agree, we can insert logos for the funders as well, so there's better visibility when USAID click on it. I'll also get our folks to change the page under our EHA 'programs' list, because this doesn't have information about funders either (and it has our usual 'donate now' button, which wouldn't look great if USAID clicked on it!!!).

Re. the seasonality thing – this refers to some prelim analyses on EHA data that Evan Eskew has been doing and has seen some trends, and we do want to dig in deeper. I know you have a student working on this and we will make sure that 1) we don't scupper her work, and 2) if possible we aim for a bigger collaboration.

Cheers,

Peter

Peter Daszak

President

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From: Anna Willoughby [mailto:willoughby@ecohealthalliance.org]
Sent: Friday, May 26, 2017 12:23 PM
To: David J Wolking
Cc: Kevin Olival, PhD; Peter Daszak; Prof. Jonna Mazet
Subject: Re: URGENT: Modeling & Analytics semi-annual

Hi David,

Kevin is in Thailand, so not sure if he will be able to respond this morning. I will follow up with our Tech team next week to ensure appropriate branding is visible on the EIDR site. The second item does refer to EHA work: an ongoing analysis of viral detection seasonality in bats that has been expanded significantly to include climate/life history data since we started the project in summer of 2016. Perhaps adding in that this is specific to bats will help clarify?

Let me know if you have any further questions.

Best,
Anna

On May 26, 2017, at 11:00 AM, David J Wolking <djwolking@ucdavis.edu> wrote:

Hi Kevin, Peter, and Anna,

We are getting ready to share the semi-annual report later today. Before it goes to USAID I just wanted to follow-up on a few things from your section.

1. You mention that the EIDR is a "PREDICT-derived publicly available database" and linked to it in the report. If this is accurate then we need to get some PREDICT branding on the site so that is clear to those who follow that link.
2. Also, Jonna wanted to double check that the item featured under Analyzing P-1 data refers to work in progress by UCD students and not separate efforts at EHA. For quick reference: "Finally, to assess most productive timing for sample collection, we began analysis of seasonal patterns in viral detection from PREDICT-1 data, including integration of life history data and global climate datasets"

Thanks and we appreciate a quick message back this AM if possible,

David

On Thu, May 11, 2017 at 3:26 PM, Kevin Olival, PhD <olival@ecohealthalliance.org> wrote:
David,

I'm also going to cc you when I send the full M&A M&E tomorrow, just in case you want any more detail when you're editing the SAR bullets we sent. There are figures (47 of them!) and more detailed captions in that document that may help provide some context.

Cheers,
Kevin

Kevin J. Olival, PhD
Associate Vice President for Research

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On May 11, 2017, at 12:58 PM, David J Wolking <djwolking@ucdavis.edu> wrote:

Thanks Peter received

David

On Wed, May 10, 2017 at 6:10 PM, Peter Daszak <daszak@ecohealthalliance.org> wrote:
Hi David,

De-scientificated our M&A semi-annual following Jonna's suggestions, and added a couple of pictures….hope it's ok..

M&E stuff will come to you on Friday…

Cheers,

Peter

Peter Daszak
President

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From: Jonna Mazet <jkmazet@ucdavis.edu>
To: PREDICTMGT <predictmgt@usaid.gov>;Angela Wang <awang@usaid.gov>;Sarah Paige <spaige@usaid.gov>
CC: PREDICT-outbreak <predict-outbreak@ucdavis.edu>
Sent: 5/27/2017 7:36:50 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Update attached.
Have a nice weekend,
Jonna

On Wed, May 24, 2017 at 5:11 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hello,
Today's update attached. I observe in the meeting notes that there will be 4 aliquots of each sample tested and/or stored by the listed labs. Predict is not listed. I inquired with our team, and they responded that we have not yet received a letter officially requesting our testing. It is likely that if/when that is received, we will test the sample going to INRB, where our lab is located, but that is not yet confirmed. I also asked our team to confirm how the samples that we might be asked to test will be transported (media, cold chain, etc.) and stored.
Hopefully, we'll be able to provide clarity on that in the future,
Jonna

On Tue, May 23, 2017 at 9:56 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Current update attached.
Have a nice day,
Jonna

On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.
We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.
Have a nice day,
Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

PREDICT Outbreak or Health Event Rapid Report

Today's Date: *May 25th, 2017*
Working Title of Investigation: *Outbreak of Ebola Virus Disease in the Bas-Uele province, DR Congo*
Cumulative day of the outbreak investigation: 16

Please describe the disease signs and symptoms and species affected (humans, domesticated animals, wildlife:

On 8 May 2017, an alert of 9 suspected cases of Human Viral Hemorrhagic Fever and 2 deaths in the Likati Health Zone, Bas-Uele Province was received from the Provincial Health Officer. Symptoms were fever, bloody vomiting, diarrhea, and bleeding from the nose.

Location	
Country:	*Democratic Republic of Congo*
District:	*Province of Bas-Uele, Health zone of Likati, north-west of Buta*
Village/Town:	*Village in the Nambwa health area, Territory of Aketi*
GPS Coordinates (if known):	
Date that first case(s) of illness occurred (if known or estimate):	*April 22nd, 2017*
Date that PREDICT was first notified of outbreak:	*On May 10th, 2017 the PREDICT CC was informed by the INRB staff working in the virology lab that they were notified of suspected cases of VHF in the Likati Health Zone and that samples were expected to arrive for confirmatory testing anytime.* *On May 11th, 2017 the PREDICT CC was informed that the samples arrived at INRB in early afternoon and are being tested for Ebola. The same day the PREDICT CC was informed by the EPT2 focal point at the mission who talked on the phone with the Bas-Uele provincial health officer about more details on this alert: 9 cases and 2 deaths.*

Key Information	**Description of Findings/Actions/Outcomes**			
How many affected individuals?		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans	37	2	4
	Domestic Animals			
	Wild Animals			
How was outbreak first noticed?	*During 16th week, a 45 year old man (case 1), fisher and farmer, became sick with fever, then bloody vomiting, bloody stools and nosebleed in the fisher camp along the river Likati,*			

	*in the Nambwa health area. He was brought to a traditional healer and then transported by moto with 2 relatives, case 2 (moto driver) and case 3 (his brother) to the Likati general hospital about 45 km away. B*ut he died on the road. Then case 3 decided to return to their village with the corpse. He was buried in the Kapayi village, Nambwa health area. On 25th April, case 2 and 3 developed the disease with same symptoms. Case 2 died the same day, and case 3 recovered. From these 3 persons, 6 other close contacts were infected. Among them, a young boy who attended the burial of case 1 died on 11th May. The provincial health office has sent a team to the site to investigate and information is expected when they return as the area has no cell phone coverage.
Where was the first reported case? What is/was the extent of geographic spread? Include comments on the apparent speed of spread.	*For now the disease is located within four health centers: Nambwa (12 cases, 2 deaths), Muma (3 cases, 1 death), Ngayi (4 cases, 0 death) and Azande (1 case, 0 death), in the Likati Health Zone, Territory of Aketi in the Bas-Uele province, where the first reported case was treated at the health center. No case is reported outside this area.*
Has the country requested support from PREDICT (include date of request)?	*Yes, the INRB General Director asked PREDICT to retest the 5 samples that were received from the field using PREDICT protocols;*
If so, which government agency requested PREDICT support?	The Ministry of Health through the INRB which is the national Public Health Laboratory
When was PREDICT response initiated (date)?	Saturday, 13th May, 2017
Are other EPT partners involved in the response (which ones and how)?	*None for now*
What type of assistance did PREDICT initially provide? Which PREDICT personnel were involved?	Testing of 5 samples from the field using PREDICT protocols and primers for Filoviruses, by the PREDICT lab manager and lab technician
When was the first official acknowledgement of the outbreak (by which government agency or other reputable body and date)? When was a response initiated and by whom? Which agencies were involved? Who was in charge of the national response?	On May 9th, 2017, the Bas-Uele provincial office informed the MoH direction of disease surveillance of the alert. A team from Buta, the provincial health office was sent to the site to investigate. A team from the MoH direction of disease control, INRB, Hygiene and the Ministry of information travelled on Saturday morning to the field. They reached Likati (health zone office) on Sunday night at 10.00 PM. On Monday morning they had a meeting with the health zone staff and sent a first report to the national coordination committee via the Ministry of Health

Was the cause of the outbreak confirmed by a laboratory? If so, give details of the initial confirmation (cause, species, specimen types tested and dates of testing if known). *Note: Daily updates for ongoing laboratory testing should be entered in the Daily Activities/Timeline table below.*	Yes, the INRB virology laboratory tested 5 serum samples collected from patients admitted at the Nambwa health center and who were in contact with the diseased cases. They performed real-time PCR and found 2 positive results for Zaire Ebola virus. The tests were performed on 11th May and re-tested on 12th May, 2017 by the same staff. On Saturday, 13th May, the samples were re-tested by the PREDICT staff using the PREDICT protocol. They found one positive result on the 5 samples, the same that was clearly positive by real-time PCR.
Where was the laboratory testing performed (name of laboratory)?	Samples were tested at the INRB virology laboratory
Number of days between initiation of government response and lab confirmation of laboratory results.	N/A

Summary of the Outbreak or Event:	**To be filled after active outbreak or event activity has ceased**			
Working name of the outbreak:				
Total number of cases:		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans			
	Domestic Animals			
	Wild Animals			
Summary of PREDICT Team response activities during the outbreak.				

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PREDICT Outbreak or Health Event Response Daily Activities/Timeline

Working Title of Investigation: *Suspicion of VHF in the Bas-Uele province, DR Congo*

*Instructions: This is the timeline of all PREDICT team activities related to this event. Please fill out in detail any PREDICT team activity as they occur on a **daily** basis (e.g., sample collection, other field activities, laboratory testing, outbreak related meetings attended, communications with the Mission or Government, etc.) in addition to the key specific items listed below.*

*Add additional rows into the specific activities listed below **in chronological order** as needed. If a specific listed event has not yet occurred, please put "pending" or "not expected" in the date column.*

Key Events:

Date	Day #	Notification or Action Taken
5/10/2017	1	First notification of 9 suspected cases of Viral Hemorrhagic Fever in the Nambwa Health Area, Likati Health Zone, Bas-Uele Province;
5/11/2017	2	PREDICT Country coordinator (CC) notified of reception of samples from the suspected cases at the INRB; PREDICT CC notified PREDICT global team
5/12/2017	3	Two samples out of five tested positive for Ebola Zaire virus, and 3 were negative by real-time PCR at the INRB virology laboratory. PREDICT CC attended the National coordination committee meeting where the Minister and his team presented the situation: 9 cases and 2 deaths, and preparations are made of an investigation team composed of epidemiologists, medical biologists and lab technicians (from the MoH and INRB) to travel tomorrow from Kinshasa to support the local team, begin contact tracing and prepare the logistic for the outbreak response. The area of Nambwa is located 45 km from Likati but it takes about 5 days to reach by car and 2 days by motorcycle. The Minister and WHO have contacted the UN Mission to provide an helicopter to bring equipment to the site. The INRB will deploy the K-Plan mobile laboratory that was purchased through the USAID funds for Yellow Fever Outbreak in Nambwa.
5/13/2017	4	PREDICT CC attended the meeting of the National coordination committee, where the Ministry of Health updated partners of the situation on the ground: a total of 11 cases were reported since the beginning of the outbreak with 3 deaths in the 3 health areas of Nambwa (7 cases and 3 deaths), Mouma (3 cases and 0 death) and Ngayi (1 case and 0 death). The provincial investigation team was back to Likati and could send this update by phone via the provincial health office.

		A team of 9 persons left Kinshasa today for Nambwa, composed of 2 epidemiologist, 1 lab technician, 1 clinician, 1 data manager, 1 information specialist, 1 hygienist, 1 logistician and 1 psychologist. They are expected to reach Nambwa on Monday or Tuesday and will prepare the logistic for the local coordination committee and begin contact tracing and sensitization. Staffs from the WHO country office and the Ministry of health are working to prepare the list of needs for the outbreak response and a budget. A request was made to the MONUSCO to provide an air lift between Kinshasa and Likati for shipping all materials and equipment, including the K-Plan mobile laboratory from the INRB.
5/15/2017	6	On Saturday, 13th May, the General Director of INRB asked PREDICT to retest the 5 samples received from the field for Filovirus using the PREDICT protocol. The reason was to have a second diagnostic method. The INRB staff tested these samples on Friday and Saturday by real time PCR, using 3 different protocols: the first targeting the L gene returned 1 positive result; the second targeting the NP gene returned 2 positive results, and the 3rd targeting the Glycoprotein gene returned 1 positive result. Using the PREDICT protocols, the PREDICT staff tested the five samples which returned only one putative positive result on the gel, from the sample which tested positive from the 3 protocols used by the INRB staff. Amplicon from this sample will be send to GATC for sequencing per our protocol. This result was as expected as the PREDICT Filovirus protocols should be and are correct for detection of this virus but are also necessarily less sensitive as a result of conserved technique, resulting in weak or negative reactions in samples with low viral load. PREDICT CC and virologist attended the National Coordination meeting. Two points were discussed: 1) the plan and budget for the outbreak response: a group from the MoH direction of disease control, the INRB, WHO, UNOCHA and UKAID finalized the plan and budget on Monday morning. Main points are: strengthening of coordination, surveillance, hygiene and biosecurity, medical and psycho-social care, laboratory diagnostic, communication and rehabilitation of health centers and the Likati General Hospital in the Bas-Uele province. No decision of quarantine will be made. The INRB will deploy two mobile laboratories, one at Nambwa (epicenter) and a second in Buta with possibility to be deployed anywhere based on the epidemiologic situation of the outbreak. The total budget for the response is $8,072,636.00 and includes:

		coordination at national, provincial and local levels ($945,377), surveillance and laboratory ($1,685,265.00), communication ($505,000.00), materials and supplies ($1,605,000.00), medical and psychosocial care ($2,313,280.00), prevention ($ 477,839.00), Water, hygiene and sanitation ($540,675). Main Challenges are: transport of goods to the affected area (THE UN may help with a Helicopter), and transport of probable cases to the Ebola Treatment Center due to bad roads. 2) the situation on the field: now the total of cases has increased to 20, reported from 4 health areas: Nambwa with 12 cases and 2 deaths, Muma with 3 cases and 1 death, Ngayi with 4 cases and 0 death, Azande with 1 case and 0 death. Samples collected will all be shipped to the INRB because the committee decided not to wait for the mobile lab to be deployed. Right now all cases are being treated at home because there is no facility for handling Ebola cases. The Ebola Treatment Center is still under rehabilitation. The team has begun to disinfect the laboratory and health centers and the local radio broadcast is used for sensitization.
5/16/2017	7	PREDICT virologist attended the National Coordination Committee. A new case was reported from Nambwa, young girl 16 years old living in a house with a suspect case. Now the total number of reported cases are 21: Nambwa 13 cases, 2 deaths; Muma 3 cases, 1 death; Ngayi 4 cases, 0 death, Azande 1 case, 0 death. 3 teams are now deployed in the field in three different locations with the following objectives : active research of suspected cases, sample collection, contacts tracing and assessment of logistic needs. A fourth team led by the Ministry of Health will leave Kinshasa tomorrow with one mobile laboratory from the INRB, prepared to perform 100 tests. WHO has mobilized PPEs from the city of Kisangani to support the response. Seven committees were set up and will be meeting everyday; PREDICT was invited to be included in the committee in charge for laboratory and research. The first meeting will be on next Thursday to analyze all needs and make request to different partners. These committees will report to the National Coordination Committee daily. PATH, a CDC Implementing Partner in charge to support the country Emergency Operation Center – GHSA is partnering with DigitalGlobe and UCLA to get precise maps of the Likati health zone. They have provided cellphones with GPS to the team who will travel to the site tomorrow.

5/17/2017	8	The PREDICT Lab manager attended the National Coordination Committee meeting at the MoH: no new cases reported from Likati, still a total of 21 cases with 3 deaths, and 4 health areas affected; samples were collected from a total of 13 cases; 5 were shipped to Kinshasa and tested at the INRB, and 8 are kept in Aketi waiting to be tested on site. The investigation team has identified a total of 416 contacts to be followed. A team from the INRB travelled this morning with the 1st mobile laboratory which will be deployed in Nambwa. The 2nd mobile laboratory (K-Plan) will be transported to the field tomorrow and will be deployed in Likati. A fourth investigation team, led by the Minister of Health will travel to the site tomorrow. WHO has confirmed that PPEs (unknown number of kits) were deployed to Aketi from their stockpile in Kisangani PREDICT was requested by the Commission of Laboratory and Research to provide for the mobile laboratory: one glovebox, 1 Qiagen extraction kit and Ethanol.
5/18/2017	9	PREDICT CC and virologist attended the 1st meeting of the commission for laboratory and research, with staffs from the INRB, CDC, UCLA and FAO-ECTAD: - The mobile lab arrived and was deployed to Aketi with 4 INRB staffs; - The K-Plan laboratory travelled today and will be deployed to Buta, the provincial capital city; - INRB transmitted a list of reagents and supplies needed to perform lab tests in the field; the list was transmitted to the MoH and FAO. The team from FAO informed that they will provide the needed supplies according to what is available now at the Central Vet Lab PREDICT virologist attended the National Coordination Committee meeting: The Minister of Health reported on his trip to Aketi: the deployed team is performing active research of suspected cases and contacts; visited health facilities and traditional healers; ongoing data collected regarding burials in villages; sensitization of local communities; different opinion leaders are intensively collaborating with investigation teams; as well as challenges due to bad roads. Epidemiological update:

		Total of 29 suspected cases reported, and 3 deaths: Nambwa Health Area=11 cases and 2 deaths; Muma Health Area=3 cases and 1 death; Ngayi Health Area=14 cases and 0 death; Azande Health Area=1 case and 0 deaths. Registered contacts under follow up = 416. A total of 35 samples collected: 5 were shipped to Kinshasa and the remaining stored at Likati waiting to be tested on site. Four new alerts received, 2 from Azande and 2 from Ngabatal, under investigation Mobile lab expected to be operational tomorrow Discussion on vaccination: Director of the Expanded Program for Immunization presented a plan and proposal for the use of experimental vaccine that was used in West Africa which is made of recombinant ZEBOV-VZV. The vaccine is efficient in protecting chimpanzees from infection. It should be conserved at -60°C, conditioned in 10 doses/vial and after reconstitution could be conserved between +2 and +8°C for a maximum of 6 hours. The vaccine is administered via intramuscular injection. The Protocol of vaccination is ready and will be submitted this evening to the Ethical Committee at KSPH for approval and will be considered a clinical trial. The vaccine is not approved to be used in humans yet. If the DRC Government accept the use of this vaccine, nearly 12,000 doses could be provided to be administered to teams working in the field.
5/19/2017	10	PREDICT virologist attended 2nd meeting of the commission for laboratory and research with staff from the INRB, CDC, UCLA: The commission has transmitted the complete list of members and partners to Ministry of Health. The General Director of INRB presented the strategy for response to the outbreak: - The Mobile Laboratory should be operational for PCR, ELISA tests and rapid tests - As there are only 3 deaths reported till today there is a possibility that this current Ebola outbreak may be mask by another unknown pathogen – INRB will also deploy a team from the Parasitology and Bacteriology Laboratories to perform investigations and diagnosis on samples collected in the field (for example recently in Banalia - Shigella and Salmonella infections were responsible for several deaths) **Reagents for diagnosis:** - Two boxes of Ebola rapid tests are available at INRB Virology

		Laboratory - Another tests will be provided by Japanese Cooperation - The Ebola tests for Mobile Laboratory (Kaplan- Prof. Parisi) were sent to DRC via DHL - The Gene Expert machine with reagents will be received this Sunday and offered by UCLA project to INRB PREDICT virologist also attended the National Coordination Committee meeting: Epidemiological update**:** At the date of May 18, 2017 a total of 32 suspected cases were reported with 4 deaths: Nambwa-11 cases, 2 deaths, Mouma – 3 cases, 1 death, Ngayi – 14 cases, 1 death*, Azande-2 cases and Ngabatala – 2 cases. Concerning the 4th death* – young girl, 22 years old died with hemorrhagic symptoms, vomiting and fever on May 8, 2017 in a small village near Ngayi. She was the family member of the 3rd died case. The burial ceremony was done for her and this was only reported when the surveillance team visited the site. Four direct contacts were identified, they are sick and under the surveillance in the village. Registered contacts: 416 persons Samples collected: 35 The Mobile Laboratory was installed and the testing of samples will start this evening. In the reference Hospital in Likati, separate room for suspected cases and sick persons was prepared for safe medical follow –up of these persons. The General Director of INRB highlighted the importance of intensive research of new cases, the daily follow-up of all contacts (two times per day with measurement of corporal temperature). He also highlighted the importance to determine the "definition of case" by the medical team deployed in the field. The follow-up of contacts is very challenging/difficult to be implemented, there is a need for trained voluntaries (ex. members of Red Cross) to help. **Vaccination Program against Ebola:** The Government has approved the use of the Ebola vaccine in DRC during this Ebola outbreak. The Protocol of vaccination was submitted to Ethical Committee at

		KSPH for approval as a clinical trial. Several scenarios were proposed and will be discussed before starting the vaccination.
5/20/2017	11	PREDICT CC attended the meeting of the commission of Laboratory and Research: Results from the CIRMF laboratory in Gabon: The 2 positive samples for Zaire Ebola Virus out of the 5 that were tested at the INRB were retested and confirmed in CIRMF. The staff at CIRMF is performing whole sequencing of the virus and will send results on Monday or Tuesday with Phylogenetic analysis. The K-Plan mobile laboratory arrived in Kisangani pending transportation to Buta, the provincial capital city. The INRB staff sent to Likati have tested 22 samples collected from suspected cases, all tests (real-time PCR) returned negative results. The director of INRB would like PREDICT to test all negative results with PREDICT protocol for the 5 PREDICT viral families. The DRC PREDICT team is unsure about this as the current sample collection is not in conformity with PREDICT protocol. PREDICT samples should be stored at -80° C soon after collection in either Trizol or VTM which is not the case on the field. PREDICT CC attended the meeting of the National Coordination Committee: The following issues were raised: The data from the field need to be cleaned, waiting for more accurate data tomorrow; the generator of the mobile laboratory is not working, and the lab is using the generator from the Health Zone office; contact tracing is challenging due to bad roads; 2 health facilities were selected to be rehabilitated and transformed to Ebola Treatment Centers (ETC). The K-Plan reagents not arrived yet at the INRB as of this evening at 4.00 PM The CDC will provide rapid tests for this outbreak It was proposed that the team in Likati prepares and sends a list of all cases and contacts, noting timeline of symptoms occurrence, date of sample collection, and clinical outcome in order to better follow the epidemiological curve and be more specific on contacts who can be

		considered to be removed from the list All commissions should prepare an operational action plan; all technical discussion should be prepared in the commissions, and each partner interested to support specific actions and activities should present this to the commission.
21/05/2017	12	-
22/05/2017	13	PREDICT CC and Virologist attended the National Coordination Committee Meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: Situation in the field: - A total of 43 suspected cases with 4 deaths: Nambwa, 24 cases and 2 deaths; Muma, 4 cases and 1 death; Ngayi 10 cases and 1 death; Azande, 3 cases and Ngabatala, 2 cases. - A total of 419 contacts registered: 158 in Nambwa, 162 in Muma, 98 in Ngayi, 1 in Azande and 0 in Ngabatala. - Number of contacts followed=54; - A total of 38 samples collected to date, of which 5 were tested at INRB and 33 being tested in the field with the Mobile laboratory in Nambwa. -- All 33 samples were negative by PCR for the Zaire Ebola virus nucleoprotein. - The K-Plan mobile laboratory that was picked up from the INRB and thought to have left for Kisangani is still in Kinshasa waiting to be transported to Buta. - The INRB team who will work on this mobile lab is already in Buta. - Dr. Pierre Rollin from CDC arrived in Kinshasa with 250 OraSure (OraQuick) rapid tests and 100 Chembio Ebola-Paludism rapid tests. These tests will be used in the field by investigation teams working at places distant from the mobile laboratory. - UCLA in partnership with Dr. Gary Kobinger (a researcher at the University of Laval, Canada, formerly with the Public Health Agency of Canada) will provide the GeneExpert to be used at the Ebola Treatment Center.
23/05/2017	14	PREDICT CC and Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - Sample collection from patients at the Ebola Treatment Center in Likati is ongoing. - It has been decided that 4 aliquots of each sample will be prepared: one to be tested at the mobile lab, the second to be tested using GeneExpert in the field, the third will be shipped to the CIRMF in Gabon for confirmation and the fourth will be stored at the INRB in Kinshasa.

		- The K-Plan mobile lab will be transported in Buta by a UN flight and will be installed at the Buta General Hospital. - The INRB has also received the following reagents for the GeneExpert; Filovirus and Zaire Ebola virus (2x96 tests); reagents for PCR for Ebola virus; Ebola IgM and IgG ELISA as well as reagents for Shigella, Salmonella and Malaria. 2) Current situation in the field: - A total of 48 suspected cases and 4 deaths reported: Nambwa, 28 cases and 2 deaths, Muma 5 cases and 1 death, Ngayi 10 cases and 1 death, Azande 3 cases and Ngabatala 2 cases. - A total of 419 contacts have been registered and from them 49 will be removed from the list of follow up. The remaining 370 contacts are in Nambwa: 109, Ngayi: 98, Muma: 162, Azande: 1 and Ngabatala: 0. - Radio broadcast from a local radio station is currently being used for sensitization but it needs to be improved in order for its signal to be transmitted across multiple villages. - Some staff from the Bacteriology and Parasitology labs at the INRB will travel in the days ahead to Likati to begin testing of samples for other pathogens. - At the moment, two Ebola Treatment Centers are operational; one in Likati and the other in Nambwa. They are managed by Doctors Without Borders (MSF). There is plan to set up 2 others in Muma and Ngayi.
24/05/2017	15	PREDICT Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - The commission received confirmation that the K-Plan mobile laboratory has left for Buta; - Staff from UCLA presented their results of Ebola serological survey in 4 different sites. All Ebola negative samples will be transferred to INRB for further investigation. - The field team reported new symptoms including fever and jaundice as result, it was recommended that samples be tested for Yellow Fever, Hepatitis A, B and C. 2) National coordination meeting at the MoH: - The field team revised the definition of cases, following the new case definition, there are currently 35 suspected cases and 4 deaths: Nambwa, 22 cases and 3 deaths; Muma, 3 cases and 0 death; Ngayi, 3 cases and 1 death; Azande, 3 cases and finally 2 new cases each in Mabangu and Mobenge (new sites) - A total of 294 contacts have been registered: 98 in Nambwa, 78 in

		Ngayi, 87 in Muma, 11 in Azande, 10 in Ngabatala, 4 in Mabangu and 6 in Mobenge.
25/05/2017	16	PREDICT CC and virologist attended the meeting of the commission of Laboratory and research at INRB and the virologist attended the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - All negative field samples for Ebola will be retested in Likati for other pathogens using the GeneExpert platform and in Buta using the K-Plan mobile lab (PREDICT not involved in the testing). - This testing will be for Yellow fever, Hepatitis B and Hepatitis C. An aliquot will be shipped to the INRB by a UN flight. - Two staff from the NIH in the US arrived yesterday evening and will travel to Buta and Likati tomorrow for lab support. - To ease epidemiological data interpretation, all samples shipped to the INRB are accompanied with other relevant information such as the date of disease onset, date of sample collection, signs and symptoms etc. 2) National Coordination Committee meeting: - A total of 37 suspected cases have been reported from 6 health areas, distributed as follow: - Nambwa: 20 suspected, 2 probable, 1 confirmed, 3 deaths; - Muma: 8 suspected, 1 probable and 1 confirmed; - Ngayi: 2 suspected, 1 death; - Azande: 3 suspected; - Mobenge: 2 suspected; - Mabangu: 2 suspected; - Currently, only 177 contacts are being followed: 139 out of 142 in Nambwa, 4 out of 4 in Mabangu, and 34 out of 78 in Muma. - The K-Plan mobile lab has arrived in Kisangani and will be deployed to Buta tomorrow. - Patients care and treatment for Ebola suspected cases/contacts will be free of charge in the whole of Likati health zone.
		First specimens delivered to laboratory
		First laboratory preliminary results
		First laboratory confirmed results
		First report of results to government and taskforce
		First notification to USAID of government cleared laboratory results

In-Country Government Outbreak or Health Event Points of Contact

Public Health ministry or department:	
Name:	Benoit Kebela Ilunga
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Livestock ministry or department:	
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Mobile Phone:	243 (0)81 509 1448 | 243 (0)84 200 0178

Wildlife/Environment ministry or department:	
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EPT ONE HEALTH WORKFORCE Project:	
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EPT PREPAREDNESS and RESPONSE Project:	
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Email:	
Mobile Phone:	

Other Important Contacts:

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Organization:	
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Mobile Phone:	

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Name:	
Email:	
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Organization:	
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Organization:	
Name:	
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Mobile Phone:	

From: Andrew Clements <aclements@usaid.gov>
To: Jonna Mazet <jkmazet@ucdavis.edu>
CC: PREDICTMGT <predictmgt@usaid.gov>;Angela Wang <awang@usaid.gov>;Sarah Paige <spaige@usaid.gov>;PREDICT-outbreak <predict-outbreak@ucdavis.edu>
Sent: 5/30/2017 1:38:58 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Interesting that all 47 suspected cases have tested negative. Hoping, repeat testing at INRB will show the same thing.

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On May 29, 2017, at 6:35 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Update attached. We will discuss and likely offer to test negatives again on Tuesday.
Hope you had a nice weekend,
Jonna

On Wed, May 24, 2017 at 5:11 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hello,
Today's update attached. I observe in the meeting notes that there will be 4 aliquots of each sample tested and/or stored by the listed labs. Predict is not listed. I inquired with our team, and they responded that we have not yet received a letter officially requesting our testing. It is likely that if/when that is received, we will test the sample going to INRB, where our lab is located, but that is not yet confirmed. I also asked our team to confirm how the samples that we might be asked to test will be transported (media, cold chain, etc.) and stored.
Hopefully, we'll be able to provide clarity on that in the future,
Jonna

On Tue, May 23, 2017 at 9:56 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Current update attached.
Have a nice day,
Jonna

On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.
We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.
Have a nice day,
Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>

Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

From:	Jonna Mazet <jkmazet@ucdavis.edu>
To:	PREDICTMGT <predictmgt@usaid.gov>;Angela Wang <awang@usaid.gov>;Sarah Paige <spaige@usaid.gov>
CC:	PREDICT-outbreak <predict-outbreak@ucdavis.edu>
Sent:	5/30/2017 4:37:37 PM
Subject:	Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

We are reaching out to further explore testing of the negatives, as well as providing technical assistance for the mentioned ecological studies.
Have a good night,
Jonna

On Mon, May 29, 2017 at 5:09 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 29th, 2017
There are currently 19 suspected cases, 2 confirmed and 4 deaths.

Please let me know if you have any questions.

Kind regards,

J. Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
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Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

On Sat, May 27, 2017 at 7:36 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Update attached.
Have a nice weekend,
Jonna

On Wed, May 24, 2017 at 5:11 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hello,
Today's update attached. I observe in the meeting notes that there will be 4 aliquots of each sample tested and/or stored by the listed labs. Predict is not listed. I inquired with our team, and they responded that we have not yet received a letter officially requesting our testing. It is likely that if/when that is received, we will test the sample going to INRB, where our lab is located, but that is not yet confirmed. I also asked our team to confirm how the samples that we might be asked to test will be transported (media, cold chain, etc.) and stored.
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To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD
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Website: www.metabiota.com
Skype: ayukekbong.ayukepi

PREDICT Outbreak or Health Event Rapid Report

Today's Date: *May 29th, 2017*
Working Title of Investigation: *Outbreak of Ebola Virus Disease in the Bas-Uele province, DR Congo*
Cumulative day of the outbreak investigation: 20

Please describe the disease signs and symptoms and species affected (humans, domesticated animals, wildlife:

On 8 May 2017, an alert of 9 suspected cases of Human Viral Hemorrhagic Fever and 2 deaths in the Likati Health Zone, Bas-Uele Province was received from the Provincial Health Officer. Symptoms were fever, bloody vomiting, diarrhea, and bleeding from the nose.

Location	
Country:	*Democratic Republic of Congo*
District:	*Province of Bas-Uele, Health zone of Likati, north-west of Buta*
Village/Town:	*Village in the Nambwa health area, Territory of Aketi*
GPS Coordinates (if known):	
Date that first case(s) of illness occurred (if known or estimate):	*April 22nd, 2017*
Date that PREDICT was first notified of outbreak:	*On May 10th, 2017 the PREDICT CC was informed by the INRB staff working in the virology lab that they were notified of suspected cases of VHF in the Likati Health Zone and that samples were expected to arrive for confirmatory testing anytime.* *On May 11th, 2017 the PREDICT CC was informed that the samples arrived at INRB in early afternoon and are being tested for Ebola. The same day the PREDICT CC was informed by the EPT2 focal point at the mission who talked on the phone with the Bas-Uele provincial health officer about more details on this alert: 9 cases and 2 deaths.*

Key Information	**Description of Findings/Actions/Outcomes**			
How many affected individuals?		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans	14	2	4
	Domestic Animals			
	Wild Animals			
How was outbreak first noticed?	*During 16th week, a 45 year old man (case 1), fisher and farmer, became sick with fever, then bloody vomiting, bloody stools and nosebleed in the fisher camp along the river Likati,*			

	*in the Nambwa health area. He was brought to a traditional healer and then transported by moto with 2 relatives, case 2 (moto driver) and case 3 (his brother) to the Likati general hospital about 45 km away. B*ut he died on the road. Then case 3 decided to return to their village with the corpse. He was buried in the Kapayi village, Nambwa health area. On 25th April, case 2 and 3 developed the disease with same symptoms. Case 2 died the same day, and case 3 recovered. From these 3 persons, 6 other close contacts were infected. Among them, a young boy who attended the burial of case 1 died on 11th May. The provincial health office has sent a team to the site to investigate and information is expected when they return as the area has no cell phone coverage.
Where was the first reported case? What is/was the extent of geographic spread? Include comments on the apparent speed of spread.	*For now the disease is located within four health centers: Nambwa (12 cases, 2 deaths), Muma (3 cases, 1 death), Ngayi (4 cases, 0 death) and Azande (1 case, 0 death), in the Likati Health Zone, Territory of Aketi in the Bas-Uele province, where the first reported case was treated at the health center. No case is reported outside this area.*
Has the country requested support from PREDICT (include date of request)?	*Yes, the INRB General Director asked PREDICT to retest the 5 samples that were received from the field using PREDICT protocols;*
If so, which government agency requested PREDICT support?	The Ministry of Health through the INRB which is the national Public Health Laboratory
When was PREDICT response initiated (date)?	Saturday, 13th May, 2017
Are other EPT partners involved in the response (which ones and how)?	*None for now*
What type of assistance did PREDICT initially provide? Which PREDICT personnel were involved?	Testing of 5 samples from the field using PREDICT protocols and primers for Filoviruses, by the PREDICT lab manager and lab technician
When was the first official acknowledgement of the outbreak (by which government agency or other reputable body and date)? When was a response initiated and by whom? Which agencies were involved? Who was in charge of the national response?	On May 9th, 2017, the Bas-Uele provincial office informed the MoH direction of disease surveillance of the alert. A team from Buta, the provincial health office was sent to the site to investigate. A team from the MoH direction of disease control, INRB, Hygiene and the Ministry of information travelled on Saturday morning to the field. They reached Likati (health zone office) on Sunday night at 10.00 PM. On Monday morning they had a meeting with the health zone staff and sent a first report to the national coordination committee via the Ministry of Health

Was the cause of the outbreak confirmed by a laboratory? If so, give details of the initial confirmation (cause, species, specimen types tested and dates of testing if known). *Note: Daily updates for ongoing laboratory testing should be entered in the Daily Activities/Timeline table below.*	Yes, the INRB virology laboratory tested 5 serum samples collected from patients admitted at the Nambwa health center and who were in contact with the diseased cases. They performed real-time PCR and found 2 positive results for Zaire Ebola virus. The tests were performed on 11th May and re-tested on 12th May, 2017 by the same staff. On Saturday, 13th May, the samples were re-tested by the PREDICT staff using the PREDICT protocol. They found one positive result on the 5 samples, the same that was clearly positive by real-time PCR.
Where was the laboratory testing performed (name of laboratory)?	Samples were tested at the INRB virology laboratory
Number of days between initiation of government response and lab confirmation of laboratory results.	N/A

Summary of the Outbreak or Event:	**To be filled after active outbreak or event activity has ceased**			
Working name of the outbreak:				
Total number of cases:		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans			
	Domestic Animals			
	Wild Animals			
Summary of PREDICT Team response activities during the outbreak.				

PREDICT Outbreak or Health Event Response Daily Activities/Timeline

Working Title of Investigation: *Suspicion of VHF in the Bas-Uele province, DR Congo*

*Instructions: This is the timeline of all PREDICT team activities related to this event. Please fill out in detail any PREDICT team activity as they occur on a **daily** basis (e.g., sample collection, other field activities, laboratory testing, outbreak related meetings attended, communications with the Mission or Government, etc.) in addition to the key specific items listed below.*

*Add additional rows into the specific activities listed below **in chronological order** as needed. If a specific listed event has not yet occurred, please put "pending" or "not expected" in the date column.*

Key Events:

Date	Day #	Notification or Action Taken
5/10/2017	1	First notification of 9 suspected cases of Viral Hemorrhagic Fever in the Nambwa Health Area, Likati Health Zone, Bas-Uele Province;
5/11/2017	2	PREDICT Country coordinator (CC) notified of reception of samples from the suspected cases at the INRB; PREDICT CC notified PREDICT global team
5/12/2017	3	Two samples out of five tested positive for Ebola Zaire virus, and 3 were negative by real-time PCR at the INRB virology laboratory. PREDICT CC attended the National coordination committee meeting where the Minister and his team presented the situation: 9 cases and 2 deaths, and preparations are made of an investigation team composed of epidemiologists, medical biologists and lab technicians (from the MoH and INRB) to travel tomorrow from Kinshasa to support the local team, begin contact tracing and prepare the logistic for the outbreak response. The area of Nambwa is located 45 km from Likati but it takes about 5 days to reach by car and 2 days by motorcycle. The Minister and WHO have contacted the UN Mission to provide an helicopter to bring equipment to the site. The INRB will deploy the K-Plan mobile laboratory that was purchased through the USAID funds for Yellow Fever Outbreak in Nambwa.
5/13/2017	4	PREDICT CC attended the meeting of the National coordination committee, where the Ministry of Health updated partners of the situation on the ground: a total of 11 cases were reported since the beginning of the outbreak with 3 deaths in the 3 health areas of Nambwa (7 cases and 3 deaths), Mouma (3 cases and 0 death) and Ngayi (1 case and 0 death). The provincial investigation team was back to Likati and could send this update by phone via the provincial health office.

		A team of 9 persons left Kinshasa today for Nambwa, composed of 2 epidemiologist, 1 lab technician, 1 clinician, 1 data manager, 1 information specialist, 1 hygienist, 1 logistician and 1 psychologist. They are expected to reach Nambwa on Monday or Tuesday and will prepare the logistic for the local coordination committee and begin contact tracing and sensitization. Staffs from the WHO country office and the Ministry of health are working to prepare the list of needs for the outbreak response and a budget. A request was made to the MONUSCO to provide an air lift between Kinshasa and Likati for shipping all materials and equipment, including the K-Plan mobile laboratory from the INRB.
5/15/2017	6	On Saturday, 13th May, the General Director of INRB asked PREDICT to retest the 5 samples received from the field for Filovirus using the PREDICT protocol. The reason was to have a second diagnostic method. The INRB staff tested these samples on Friday and Saturday by real time PCR, using 3 different protocols: the first targeting the L gene returned 1 positive result; the second targeting the NP gene returned 2 positive results, and the 3rd targeting the Glycoprotein gene returned 1 positive result. Using the PREDICT protocols, the PREDICT staff tested the five samples which returned only one putative positive result on the gel, from the sample which tested positive from the 3 protocols used by the INRB staff. Amplicon from this sample will be send to GATC for sequencing per our protocol. This result was as expected as the PREDICT Filovirus protocols should be and are correct for detection of this virus but are also necessarily less sensitive as a result of conserved technique, resulting in weak or negative reactions in samples with low viral load. PREDICT CC and virologist attended the National Coordination meeting. Two points were discussed: 1) the plan and budget for the outbreak response: a group from the MoH direction of disease control, the INRB, WHO, UNOCHA and UKAID finalized the plan and budget on Monday morning. Main points are: strengthening of coordination, surveillance, hygiene and biosecurity, medical and psycho-social care, laboratory diagnostic, communication and rehabilitation of health centers and the Likati General Hospital in the Bas-Uele province. No decision of quarantine will be made. The INRB will deploy two mobile laboratories, one at Nambwa (epicenter) and a second in Buta with possibility to be deployed anywhere based on the epidemiologic situation of the outbreak. The total budget for the response is $8,072,636.00 and includes:

		coordination at national, provincial and local levels ($945,377), surveillance and laboratory ($1,685,265.00), communication ($505,000.00), materials and supplies ($1,605,000.00), medical and psychosocial care ($2,313,280.00), prevention ($ 477,839.00), Water, hygiene and sanitation ($540,675). Main Challenges are: transport of goods to the affected area (THE UN may help with a Helicopter), and transport of probable cases to the Ebola Treatment Center due to bad roads. 2) the situation on the field: now the total of cases has increased to 20, reported from 4 health areas: Nambwa with 12 cases and 2 deaths, Muma with 3 cases and 1 death, Ngayi with 4 cases and 0 death, Azande with 1 case and 0 death. Samples collected will all be shipped to the INRB because the committee decided not to wait for the mobile lab to be deployed. Right now all cases are being treated at home because there is no facility for handling Ebola cases. The Ebola Treatment Center is still under rehabilitation. The team has begun to disinfect the laboratory and health centers and the local radio broadcast is used for sensitization.
5/16/2017	7	PREDICT virologist attended the National Coordination Committee. A new case was reported from Nambwa, young girl 16 years old living in a house with a suspect case. Now the total number of reported cases are 21: Nambwa 13 cases, 2 deaths; Muma 3 cases, 1 death; Ngayi 4 cases, 0 death, Azande 1 case, 0 death. 3 teams are now deployed in the field in three different locations with the following objectives : active research of suspected cases, sample collection, contacts tracing and assessment of logistic needs. A fourth team led by the Ministry of Health will leave Kinshasa tomorrow with one mobile laboratory from the INRB, prepared to perform 100 tests. WHO has mobilized PPEs from the city of Kisangani to support the response. Seven committees were set up and will be meeting everyday; PREDICT was invited to be included in the committee in charge for laboratory and research. The first meeting will be on next Thursday to analyze all needs and make request to different partners. These committees will report to the National Coordination Committee daily. PATH, a CDC Implementing Partner in charge to support the country Emergency Operation Center – GHSA is partnering with DigitalGlobe and UCLA to get precise maps of the Likati health zone. They have provided cellphones with GPS to the team who will travel to the site tomorrow.

5/17/2017	8	The PREDICT Lab manager attended the National Coordination Committee meeting at the MoH: no new cases reported from Likati, still a total of 21 cases with 3 deaths, and 4 health areas affected; samples were collected from a total of 13 cases; 5 were shipped to Kinshasa and tested at the INRB, and 8 are kept in Aketi waiting to be tested on site. The investigation team has identified a total of 416 contacts to be followed. A team from the INRB travelled this morning with the 1st mobile laboratory which will be deployed in Nambwa. The 2nd mobile laboratory (K-Plan) will be transported to the field tomorrow and will be deployed in Likati. A fourth investigation team, led by the Minister of Health will travel to the site tomorrow. WHO has confirmed that PPEs (unknown number of kits) were deployed to Aketi from their stockpile in Kisangani PREDICT was requested by the Commission of Laboratory and Research to provide for the mobile laboratory: one glovebox, 1 Qiagen extraction kit and Ethanol.
5/18/2017	9	PREDICT CC and virologist attended the 1st meeting of the commission for laboratory and research, with staffs from the INRB, CDC, UCLA and FAO-ECTAD: - The mobile lab arrived and was deployed to Aketi with 4 INRB staffs; - The K-Plan laboratory travelled today and will be deployed to Buta, the provincial capital city; - INRB transmitted a list of reagents and supplies needed to perform lab tests in the field; the list was transmitted to the MoH and FAO. The team from FAO informed that they will provide the needed supplies according to what is available now at the Central Vet Lab PREDICT virologist attended the National Coordination Committee meeting: The Minister of Health reported on his trip to Aketi: the deployed team is performing active research of suspected cases and contacts; visited health facilities and traditional healers; ongoing data collected regarding burials in villages; sensitization of local communities; different opinion leaders are intensively collaborating with investigation teams; as well as challenges due to bad roads. Epidemiological update:

		Total of 29 suspected cases reported, and 3 deaths: Nambwa Health Area=11 cases and 2 deaths; Muma Health Area=3 cases and 1 death; Ngayi Health Area=14 cases and 0 death; Azande Health Area=1 case and 0 deaths. Registered contacts under follow up = 416. A total of 35 samples collected: 5 were shipped to Kinshasa and the remaining stored at Likati waiting to be tested on site. Four new alerts received, 2 from Azande and 2 from Ngabatal, under investigation Mobile lab expected to be operational tomorrow Discussion on vaccination: Director of the Expanded Program for Immunization presented a plan and proposal for the use of experimental vaccine that was used in West Africa which is made of recombinant ZEBOV-VZV. The vaccine is efficient in protecting chimpanzees from infection. It should be conserved at -60°C, conditioned in 10 doses/vial and after reconstitution could be conserved between +2 and +8°C for a maximum of 6 hours. The vaccine is administered via intramuscular injection. The Protocol of vaccination is ready and will be submitted this evening to the Ethical Committee at KSPH for approval and will be considered a clinical trial. The vaccine is not approved to be used in humans yet. If the DRC Government accept the use of this vaccine, nearly 12,000 doses could be provided to be administered to teams working in the field.
5/19/2017	10	PREDICT virologist attended 2nd meeting of the commission for laboratory and research with staff from the INRB, CDC, UCLA: The commission has transmitted the complete list of members and partners to Ministry of Health. The General Director of INRB presented the strategy for response to the outbreak: - The Mobile Laboratory should be operational for PCR, ELISA tests and rapid tests - As there are only 3 deaths reported till today there is a possibility that this current Ebola outbreak may be mask by another unknown pathogen – INRB will also deploy a team from the Parasitology and Bacteriology Laboratories to perform investigations and diagnosis on samples collected in the field (for example recently in Banalia - Shigella and Salmonella infections were responsible for several deaths) **Reagents for diagnosis:** - Two boxes of Ebola rapid tests are available at INRB Virology

		Laboratory - Another tests will be provided by Japanese Cooperation - The Ebola tests for Mobile Laboratory (Kaplan- Prof. Parisi) were sent to DRC via DHL - The Gene Expert machine with reagents will be received this Sunday and offered by UCLA project to INRB PREDICT virologist also attended the National Coordination Committee meeting: Epidemiological update**:** At the date of May 18, 2017 a total of 32 suspected cases were reported with 4 deaths: Nambwa-11 cases, 2 deaths, Mouma – 3 cases, 1 death, Ngayi – 14 cases, 1 death*, Azande-2 cases and Ngabatala – 2 cases. Concerning the 4th death* – young girl, 22 years old died with hemorrhagic symptoms, vomiting and fever on May 8, 2017 in a small village near Ngayi. She was the family member of the 3rd died case. The burial ceremony was done for her and this was only reported when the surveillance team visited the site. Four direct contacts were identified, they are sick and under the surveillance in the village. Registered contacts: 416 persons Samples collected: 35 The Mobile Laboratory was installed and the testing of samples will start this evening. In the reference Hospital in Likati, separate room for suspected cases and sick persons was prepared for safe medical follow –up of these persons. The General Director of INRB highlighted the importance of intensive research of new cases, the daily follow-up of all contacts (two times per day with measurement of corporal temperature). He also highlighted the importance to determine the "definition of case" by the medical team deployed in the field. The follow-up of contacts is very challenging/difficult to be implemented, there is a need for trained voluntaries (ex. members of Red Cross) to help. **Vaccination Program against Ebola:** The Government has approved the use of the Ebola vaccine in DRC during this Ebola outbreak. The Protocol of vaccination was submitted to Ethical Committee at

		KSPH for approval as a clinical trial. Several scenarios were proposed and will be discussed before starting the vaccination.
5/20/2017	11	PREDICT CC attended the meeting of the commission of Laboratory and Research: Results from the CIRMF laboratory in Gabon: The 2 positive samples for Zaire Ebola Virus out of the 5 that were tested at the INRB were retested and confirmed in CIRMF. The staff at CIRMF is performing whole sequencing of the virus and will send results on Monday or Tuesday with Phylogenetic analysis. The K-Plan mobile laboratory arrived in Kisangani pending transportation to Buta, the provincial capital city. The INRB staff sent to Likati have tested 22 samples collected from suspected cases, all tests (real-time PCR) returned negative results. The director of INRB would like PREDICT to test all negative results with PREDICT protocol for the 5 PREDICT viral families. The DRC PREDICT team is unsure about this as the current sample collection is not in conformity with PREDICT protocol. PREDICT samples should be stored at -80° C soon after collection in either Trizol or VTM which is not the case on the field. PREDICT CC attended the meeting of the National Coordination Committee: The following issues were raised: The data from the field need to be cleaned, waiting for more accurate data tomorrow; the generator of the mobile laboratory is not working, and the lab is using the generator from the Health Zone office; contact tracing is challenging due to bad roads; 2 health facilities were selected to be rehabilitated and transformed to Ebola Treatment Centers (ETC). The K-Plan reagents not arrived yet at the INRB as of this evening at 4.00 PM The CDC will provide rapid tests for this outbreak It was proposed that the team in Likati prepares and sends a list of all cases and contacts, noting timeline of symptoms occurrence, date of sample collection, and clinical outcome in order to better follow the epidemiological curve and be more specific on contacts who can be

		considered to be removed from the list All commissions should prepare an operational action plan; all technical discussion should be prepared in the commissions, and each partner interested to support specific actions and activities should present this to the commission.
21/05/2017	12	-
22/05/2017	13	PREDICT CC and Virologist attended the National Coordination Committee Meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: Situation in the field: - A total of 43 suspected cases with 4 deaths: Nambwa, 24 cases and 2 deaths; Muma, 4 cases and 1 death; Ngayi 10 cases and 1 death; Azande, 3 cases and Ngabatala, 2 cases. - A total of 419 contacts registered: 158 in Nambwa, 162 in Muma, 98 in Ngayi, 1 in Azande and 0 in Ngabatala. - Number of contacts followed=54; - A total of 38 samples collected to date, of which 5 were tested at INRB and 33 being tested in the field with the Mobile laboratory in Nambwa. -- All 33 samples were negative by PCR for the Zaire Ebola virus nucleoprotein. - The K-Plan mobile laboratory that was picked up from the INRB and thought to have left for Kisangani is still in Kinshasa waiting to be transported to Buta. - The INRB team who will work on this mobile lab is already in Buta. - Dr. Pierre Rollin from CDC arrived in Kinshasa with 250 OraSure (OraQuick) rapid tests and 100 Chembio Ebola-Paludism rapid tests. These tests will be used in the field by investigation teams working at places distant from the mobile laboratory. - UCLA in partnership with Dr. Gary Kobinger (a researcher at the University of Laval, Canada, formerly with the Public Health Agency of Canada) will provide the GeneExpert to be used at the Ebola Treatment Center.
23/05/2017	14	PREDICT CC and Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - Sample collection from patients at the Ebola Treatment Center in Likati is ongoing. - It has been decided that 4 aliquots of each sample will be prepared: one to be tested at the mobile lab, the second to be tested using GeneExpert in the field, the third will be shipped to the CIRMF in Gabon for confirmation and the fourth will be stored at the INRB in Kinshasa.

		- The K-Plan mobile lab will be transported in Buta by a UN flight and will be installed at the Buta General Hospital. - The INRB has also received the following reagents for the GeneExpert; Filovirus and Zaire Ebola virus (2x96 tests); reagents for PCR for Ebola virus; Ebola IgM and IgG ELISA as well as reagents for Shigella, Salmonella and Malaria. 2) Current situation in the field: - A total of 48 suspected cases and 4 deaths reported: Nambwa, 28 cases and 2 deaths, Muma 5 cases and 1 death, Ngayi 10 cases and 1 death, Azande 3 cases and Ngabatala 2 cases. - A total of 419 contacts have been registered and from them 49 will be removed from the list of follow up. The remaining 370 contacts are in Nambwa: 109, Ngayi: 98, Muma: 162, Azande: 1 and Ngabatala: 0. - Radio broadcast from a local radio station is currently being used for sensitization but it needs to be improved in order for its signal to be transmitted across multiple villages. - Some staff from the Bacteriology and Parasitology labs at the INRB will travel in the days ahead to Likati to begin testing of samples for other pathogens. - At the moment, two Ebola Treatment Centers are operational; one in Likati and the other in Nambwa. They are managed by Doctors Without Borders (MSF). There is plan to set up 2 others in Muma and Ngayi.
24/05/2017	15	PREDICT Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - The commission received confirmation that the K-Plan mobile laboratory has left for Buta; - Staff from UCLA presented their results of Ebola serological survey in 4 different sites. All Ebola negative samples will be transferred to INRB for further investigation. - The field team reported new symptoms including fever and jaundice as result, it was recommended that samples be tested for Yellow Fever, Hepatitis A, B and C. 2) National coordination meeting at the MoH: - The field team revised the definition of cases, following the new case definition, there are currently 35 suspected cases and 4 deaths: Nambwa, 22 cases and 3 deaths; Muma, 3 cases and 0 death; Ngayi, 3 cases and 1 death; Azande, 3 cases and finally 2 new cases each in Mabangu and Mobenge (new sites) - A total of 294 contacts have been registered: 98 in Nambwa, 78 in

		Ngayi, 87 in Muma, 11 in Azande, 10 in Ngabatala, 4 in Mabangu and 6 in Mobenge.
25/05/2017	16	PREDICT CC and virologist attended the meeting of the commission of Laboratory and research at INRB and the virologist attended the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - All negative field samples for Ebola will be retested in Likati for other pathogens using the GeneExpert platform and in Buta using the K-Plan mobile lab (PREDICT not involved in the testing). - This testing will be for Yellow fever, Hepatitis B and Hepatitis C. An aliquot will be shipped to the INRB by a UN flight. - Two staff from the NIH in the US arrived yesterday evening and will travel to Buta and Likati tomorrow for lab support. - To ease epidemiological data interpretation, all samples shipped to the INRB are accompanied with other relevant information such as the date of disease onset, date of sample collection, signs and symptoms etc. 2) National Coordination Committee meeting: - A total of 37 suspected cases have been reported from 6 health areas, distributed as follow: - Nambwa: 20 suspected, 2 probable, 1 confirmed, 3 deaths; - Muma: 8 suspected, 1 probable and 1 confirmed; - Ngayi: 2 suspected, 1 death; - Azande: 3 suspected; - Mobenge: 2 suspected; - Mabangu: 2 suspected; - Currently, only 177 contacts are being followed: 139 out of 142 in Nambwa, 4 out of 4 in Mabangu, and 34 out of 78 in Muma. - The K-Plan mobile lab has arrived in Kisangani and will be deployed to Buta tomorrow. - Patients care and treatment for Ebola suspected cases/contacts will be free of charge in the whole of Likati health zone.
26/5/2017	17	PREDICT virologist attended the meeting of the commission of Laboratory and research at INRB. There was no National Coordination Committee meeting today **(all items are informational and do not reflect PREDICT activities)**: - The K-Plan mobile laboratory arrived in Buta, and will be deployed to the general reference hospital. Laboratory reagents for the K-Plan lab bought by INRB will be sent to Buta, including ELISA tests for HCV, HBsAg, Hepatitis E and Yellow Fever.
27/5/2017	18	**All items are informational and do not reflect PREDICT activities**:

		Situation in the field: - A total of 52 cases and 4 deaths are reported, including 47 suspected, 3 probable and 2 confirmed. - A total of 200 out of 241 registered contacts are currently being followed by the field teams: 139/142 in Nambwa, 4/4 in Mabongo, 40/78 in Muma, 11/11 in Azande and 6/6/ in Mobenge. - All 47 suspected cases tested negative for Ebola by real-time PCR in Likati. Their samples will be tested by Serology (IgM and IgG) to look for Ebola antibodies. - All field negative samples for Ebola (from suspected cases) will be transferred to INRB for further analysis. - Medical diagnostic kits will be shipped to Likati in order to support free medical care at the general hospital.
29/05/2017	20	PREDICT Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the commission of Laboratory and research: - The INRB field team will begin to test samples for bacterial pathogens (e.g Shigella and Salmonella) in Buta using the K-Plan mobile lab - The field epidemiology and laboratory team began cleaning field dataset, deleting duplicates, removing all Ebola negative cases and reclassifying all remaining cases as suspected, probable, and contacts to be followed; - Testing of samples by ELISA has also began in the mobile lab in Likati - The commission thinks that it is now time to conduct ecological studies - It should be noted that a team of researchers from the University of Kisangani Center for Surveillance and Biodiversity conducted an ecological study in Likati some time before the outbreak - Investigators were told that the index case was in contact with a wild pig. Also some persons in the community reported die-offs of domestic pigs - Researchers from the NIH proposed to conduct a longitudinal study of all contacts of confirmed and probable cases to determine markers of the infection. 2) Meeting of the National Coordination Committee: - After cleaning the dataset, the field team has now reported only 19 cases and 4 deaths in total: 14 suspected cases (6 in Nambwa, 4 in Muma, 3 in Ngayi and 1 in Ngabatala); 3 probable cases (2 in Nambwa and 1 in Ngayi) and 2 confirmed cases in Nambwa; - The number of contacts registered is now 101 (20 in Nambwa; 5 in

		Mobenge; 61 in Muma and 15 in Ngayi - Die-offs of domestic pigs were reported from Azande, Ngabatala and Mobenge, and the field veterinarian team collected samples from 30 pigs and 2 goats; - The committee agreed to conduct ecological studies within the area of Aketi.
		First specimens delivered to laboratory
		First laboratory preliminary results
		First laboratory confirmed results
		First report of results to government and taskforce
		First notification to USAID of government cleared laboratory results

In-Country Government Outbreak or Health Event Points of Contact

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Wildlife/Environment ministry or department:	
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EPT PREPAREDNESS and RESPONSE Project:	
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Email:	
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Other Important Contacts:

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Organization:	
Name:	
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Mobile Phone:	

Organization:	
Name:	
Email:	
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Organization:	
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Email:	
Mobile Phone:	

From:	Andrew Clements <aclements@usaid.gov>
To:	Jonna Mazet <jkmazet@ucdavis.edu>
CC:	PREDICTMGT <predictmgt@usaid.gov>;Angela Wang <awang@usaid.gov>;Sarah Paige <spaige@usaid.gov>;PREDICT-outbreak <predict-outbreak@ucdavis.edu>
Sent:	5/31/2017 1:09:29 AM
Subject:	Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks. Have the ecological studies been approved and started? If not, what are the estimated dates?

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On May 31, 2017, at 1:40 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

We are reaching out to further explore testing of the negatives, as well as providing technical assistance for the mentioned ecological studies.
Have a good night,
Jonna

On Mon, May 29, 2017 at 5:09 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 29th, 2017
There are currently 19 suspected cases, 2 confirmed and 4 deaths.

Please let me know if you have any questions.

Kind regards,

J. Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

On Sat, May 27, 2017 at 7:36 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Update attached.
Have a nice weekend,
Jonna

On Wed, May 24, 2017 at 5:11 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hello,

Today's update attached. I observe in the meeting notes that there will be 4 aliquots of each sample tested and/or stored by the listed labs. Predict is not listed. I inquired with our team, and they responded that we have not yet received a letter officially requesting our testing. It is likely that if/when that is received, we will test the sample going to INRB, where our lab is located, but that is not yet confirmed. I also asked our team to confirm how the samples that we might be asked to test will be transported (media, cold chain, etc.) and stored.
Hopefully, we'll be able to provide clarity on that in the future,
Jonna

On Tue, May 23, 2017 at 9:56 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Current update attached.
Have a nice day,
Jonna

On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.
We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.
Have a nice day,
Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD
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Mobile: +1 250-797-7755
Website: www.metabiota.com
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You received this message because you are subscribed to the Google Groups "PREDICTMGT" group.
To unsubscribe from this group and stop receiving emails from it, send an email to predictmgt+unsubscribe@usaid.gov.
To post to this group, send email to predictmgt@usaid.gov.
To view this discussion on the web visit https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/CAO5tDrEf-oFWtnUnF1OdHDC%3DEJjrHs_%2B4ysdXuvbFVTJw1rfSg%40mail.gmail.com.

From: Leilani Francisco <francisco@ecohealthalliance.org>
Sent: Wed, 31 May 2017 11:30:24 -0400
Subject: RE: 2-page behavioral risk plan
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Christine Kreuder Johnson <ckjohnson@ucdavis.edu>, Tracey Goldstein <tgoldstein@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, "William B. Karesh" <karesh@ecohealthalliance.org>

Hi Jonna,
Wanted to follow up on the below. Might you be able to share your feedback on the plan sometime today so I can send it to USAID before the MT call tomorrow at 3 PM EDT?
Thanks in advance,
Leilani

From: Leilani Francisco [mailto:francisco@ecohealthalliance.org]
Sent: Friday, May 26, 2017 4:38 PM
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Christine Kreuder Johnson <ckjohnson@ucdavis.edu>; Tracey Goldstein <tgoldstein@ucdavis.edu>; Peter Daszak <daszak@ecohealthalliance.org>; William B. Karesh <karesh@ecohealthalliance.org>
Subject: 2-page behavioral risk plan

Hi Jonna,

Please find attached a draft of the 2-page Behavioral Risk plan.
Peter's comments have been incorporated.
I look forward to your feedback.

Thanks and have a nice holiday weekend,
Leilani

--

Leilani Francisco, PhD, MA, PMP
Senior Scientist | PREDICT-2 Senior Behavioral Risk Surveillance Coordinator

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From: Andrew Clements <aclements@usaid.gov>
Sent: Wed, 31 May 2017 18:55:13 +0200
Subject: DR Congo OIE report (H5 HPAI)
To: rgreene@usaid.gov, Dennis Carroll <dcarroll@usaid.gov>, [redacted] Alisa Pereira <apereira@usaid.gov>, Angela Wang <awang@usaid.gov>, alongwagar@usaid.gov, spaige@usaid.gov, lparish@usaid.gov, "Lisa Kramer (Nairobi/EA/RHH)" <lkramer@usaid.gov>, akibria@usaid.gov, "Subhash Morzaria (FAORAP)" [redacted] [redacted] [redacted], Jonna Mazet <jkmazet@ucdavis.edu>, pmulembakani@metabiota.com

http://www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=23872

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
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Mobile phone: 1-571-345-4253
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From: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Anna Willoughby <willoughby@ecohealthalliance.org>, David J Wolking <djwolking@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>
Subject: Re: URGENT: Modeling & Analytics semi-annual
Sent: Wed, 31 May 2017 21:11:09 +0000

Thanks Jonna. I'll work with Evan and reach out to Diego and Nistara to coordinate this.
Cheers,
Kevin

Kevin J. Olival, PhD
Associate Vice President for Research

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On May 31, 2017, at 4:56 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Sure -- thanks,
Just to be clear, Diego is life history/seasonality and Nistara is (micro)climate and foraging habitat.
Diego Montecino <dmontecino@ucdavis.edu>
Nistara Randhawa <nrandhawa@ucdavis.edu>
Have a good one,
J

On Wed, May 31, 2017 at 1:23 PM, Kevin Olival, PhD <olival@ecohealthalliance.org> wrote:

> Hi Jonna,
> Totally cognizant of avoiding overlap here, as with all our projects. The last communication I had with Diego on this was March 7, 2016, over a year ago, as we were starting to formulate ideas for this analysis and started to coordinate. Would it be okay to contact Diego directly via email (and cc you), to keep this moving?

I want to also loop in Evan (who knows Diego from UCD!) who has been leading the programming and development of this project on our side, and make sure we parse out where there may be overlap or not. Would be good for them to share specific progress over the last year and recent months.

Cheers,
Kevin

Kevin J. Olival, PhD

Associate Vice President for Research

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EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that promote conservation and prevent pandemics.

On May 26, 2017, at 1:18 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Ours is to bats, too, but limited to East Africa. I have brought this up to M&A team when I was concerned about the initial Methods, so it looks like Kevin took my advice, but we need to be careful not to scoop our own projects or people or duplicate effort.
I think we can leave the language as it is for now in the report, but we'll need to make sure we don't get cross-wise or double up internally.
More on next M&A call,
J

On Fri, May 26, 2017 at 9:23 AM, Anna Willoughby <willoughby@ecohealthalliance.org> wrote:

Hi David,

Kevin is in Thailand, so not sure if he will be able to respond this morning. I will follow up with our Tech team next week to ensure appropriate branding is visible on the EIDR site. The second item does refer to EHA work: an ongoing analysis of viral detection seasonality in bats that has been expanded significantly to include climate/life history data since we started the project in summer of 2016. Perhaps adding in that this is specific to bats will help clarify?

Let me know if you have any further questions.

Best,
Anna

On May 26, 2017, at 11:00 AM, David J Wolking <djwolking@ucdavis.edu> wrote:

Hi Kevin, Peter, and Anna,
We are getting ready to share the semi-annual report later today. Before it goes to USAID I just wanted to follow-up on a few things from your section.

1. You mention that the EIDR is a "PREDICT-derived publicly available database" and linked to it in the report. If this is accurate then we need to get

some PREDICT branding on the site so that is clear to those who follow that link.
2. Also, Jonna wanted to double check that the item featured under Analyzing P-1 data refers to work in progress by UCD students and not separate efforts at EHA. For quick reference: "Finally, to assess most productive timing for sample collection, we began analysis of seasonal patterns in viral detection from PREDICT-1 data, including integration of life history data and global climate datasets"

Thanks and we appreciate a quick message back this AM if possible,

David

On Thu, May 11, 2017 at 3:26 PM, Kevin Olival, PhD <olival@ecohealthalliance.org> wrote:

David,
I'm also going to cc you when I send the full M&A M&E tomorrow, just in case you want any more detail when you're editing the SAR bullets we sent. There are figures (47 of them!) and more detailed captions in that document that may help provide some context.

Cheers,
Kevin

Kevin J. Olival, PhD
Associate Vice President for Research

EcoHealth Alliance
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New York, NY 10001

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EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that promote conservation and prevent pandemics.

On May 11, 2017, at 12:58 PM, David J Wolking <djwolking@ucdavis.edu> wrote:

Thanks Peter received
David

On Wed, May 10, 2017 at 6:10 PM, Peter Daszak <daszak@ecohealthalliance.org> wrote:

Hi David,

De-scientificated our M&A semi-annual following Jonna's suggestions, and added a couple of pictures….hope it's ok..

M&E stuff will come to you on Friday…

Cheers,

Peter

Peter Daszak

President

EcoHealth Alliance

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www.ecohealthalliance.org

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From: Andrew Clements <aclements@usaid.gov>
To: Jonna Mazet <jkmazet@ucdavis.edu>
CC: PREDICTMGT <predictmgt@usaid.gov>;Angela Wang <awang@usaid.gov>;Sarah Paige <spaige@usaid.gov>;PREDICT-outbreak <predict-outbreak@ucdavis.edu>
Sent: 6/1/2017 11:16:15 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, Jonna.

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On Jun 1, 2017, at 4:42 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Please see the update for today and yesterday attached -- notable is that Predict will now be testing samples received using viral family protocols and is in the process of arranging MTAs for export of cDNA for deep sequencing. Support for ecological studies has been proposed/offered by Predict, FAO, and others -- see notes.
Have a nice night,
Jonna

On Wed, May 31, 2017 at 1:09 AM, Andrew Clements <aclements@usaid.gov> wrote:
Thanks. Have the ecological studies been approved and started? If not, what are the estimated dates?

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On May 31, 2017, at 1:40 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

We are reaching out to further explore testing of the negatives, as well as providing technical assistance for the mentioned ecological studies.
Have a good night,
Jonna

On Mon, May 29, 2017 at 5:09 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 29th, 2017
There are currently 19 suspected cases, 2 confirmed and 4 deaths.

Please let me know if you have any questions.

Kind regards,

J. Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

On Sat, May 27, 2017 at 7:36 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Update attached.
Have a nice weekend,
Jonna

On Wed, May 24, 2017 at 5:11 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hello,
Today's update attached. I observe in the meeting notes that there will be 4 aliquots of each sample tested and/or stored by the listed labs. Predict is not listed. I inquired with our team, and they responded that we have not yet received a letter officially requesting our testing. It is likely that if/when that is received, we will test the sample going to INRB, where our lab is located, but that is not yet confirmed. I also asked our team to confirm how the samples that we might be asked to test will be transported (media, cold chain, etc.) and stored.
Hopefully, we'll be able to provide clarity on that in the future,
Jonna

On Tue, May 23, 2017 at 9:56 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Current update attached.
Have a nice day,
Jonna

On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.
We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.
Have a nice day,
Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

From: Brooke Genovese <bgenovese@ucdavis.edu>
To: Andrew Clements <aclements@usaid.gov>
CC: Jonna Mazet <jkmazet@ucdavis.edu>
Sent: 6/2/2017 1:24:24 PM
Subject: SL Mission Call

Hi Dr. Clements,

My name is Brooke Genovese and I assist Dr. Mazet with administrative tasks. Jonna would like to set up a call with the Sierra Leone Mission and Brian Bird for next week – do any of the dates/times below work for you?

All times are in CEST with corresponding **EAT** times in bold:

Tues. June 6; 8:00PM/**9:00PM**
Wed. June 7; 5:00PM/**6:00PM** or 7:00PM/**8:00PM**
Thurs. June 8; 6:30AM/**7:30AM** or 7:00AM/**8:00AM**

Please let me know what days/times you prefer and I will send a confirmation email out to all involved parties.

Thank you!
Best,
Brooke Genovese
Project Manager
Executive Analyst
One Health Institute
School of Veterinary Medicine
Tel: 530-752-6459
bgenovese@ucdavis.edu

From: Leilani Francisco <francisco@ecohealthalliance.org>
Sent: Thu, 8 Jun 2017 15:15:51 -0400
Subject: 2-page behavioral risk plan
To: predictmgt@usaid.gov
Cc: Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Christine Kreuder Johnson <ckjohnson@ucdavis.edu>, Tracey Goldstein <tgoldstein@ucdavis.edu>, "William B. Karesh" <karesh@ecohealthalliance.org>
P2 Behavioral Risk Surveillance Plan.docx

Dear Andrew, Dennis, Alisa, and Shana,

Please find attached a 2-page summary of the behavioral risk surveillance plan.
Chris will be sending the complementary PREDICT country activities tracker shortly.

We look forward to your thoughts and feedback.
Best regards,
Leilani

--

Leilani Francisco, PhD, MA, PMP
Senior Scientist | PREDICT-2 Senior Behavioral Risk Surveillance Coordinator

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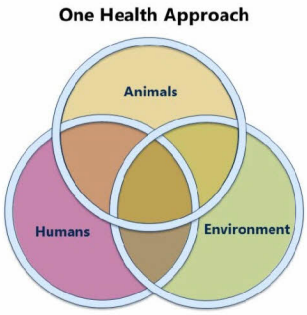
PREDICT-2 In-depth Behavioral Risk Investigations

A primary goal of USAID PREDICT-2 is to strengthen global capacity for the detection and discovery of viruses with pandemic potential, specifically those that can move between animals and people (zoonotic viruses). In addition, PREDICT-2 aims to improve the characterization of associated biological, behavioral, and ecological risks to better understand which geographic locations, 'epidemiological zones', animal-animal and/or animal-human interfaces, and environmental factors are most associated with the evolution, spillover, amplification, and spread of zoonotic viruses with pandemic potential. This summary document is focused on the behavioral risk component of the PREDICT-2 project.

Critical elements of this work, and of USAID's mission, include: building local capacity; evidence-based decision making; and, translating research into practice by leveraging science to inform the development of behavioral risk mitigation interventions that can improve health, save lives, and reduce costs associated with morbidity and mortality. The goal of the behavioral risk work is to use scientific results to inform the development of potential population or policy level intervention strategies that could reduce the spillover, amplification, and spread of novel viruses. The methods, topics, and locations for in-depth behavioral risk investigation are described in the sections that follow.

Methods. PREDICT-2 is geographically focused on 'hot spots' (areas where a confluence of risk factors may contribute to disease emergence) and on high-risk sites within these hot spots. Within these sites, animals and humans are sampled concurrently. When humans are sampled, they complete a questionnaire which covers a number of pertinent topics including behaviors that can impact the risk of zoonotic virus transmission. These quantitative questionnaire data are complemented with qualitative in-depth behavioral risk investigations in the form of ethnographic interviews, focus group discussions, and participant observation.

This 'mixed method approach' (triangulation of quantitative and qualitative data) is being used so that the quantitative questionnaire data can help explain the 'who', 'what', and 'when', and the qualitative data can help explain the 'why' and the 'how'. This combination provides a more holistic understanding of country-specific contexts with increased validity.



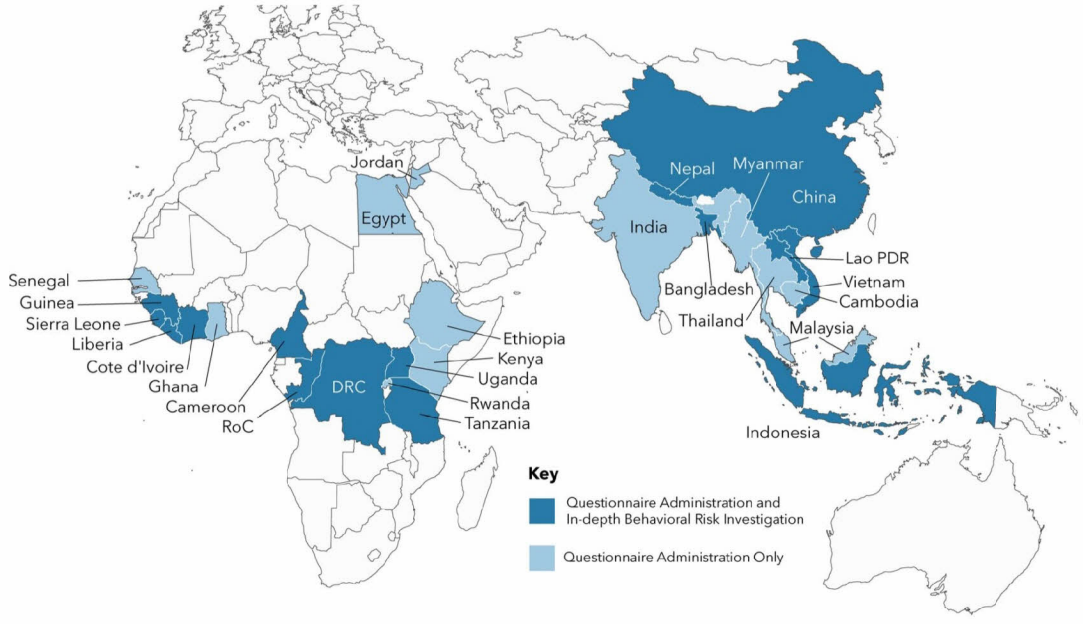
Recommendations for behavioral risk reduction interventions will be developed based on inputs from an inter-disciplinary team of scientists with respective expertise in ecological and biological surveillance, laboratory diagnostics, modeling and analytics, and behavioral risk ethnography. This One Health approach to analysis increases the potential for recommended structural interventions to be holistic and thereby, more appropriate, feasible, effective, and sustainable.

Topics for In-depth Investigation. Over the next 18-24 months, the PREDICT-2 team will conduct in-depth qualitative research on risk reduction intervention strategies relevant to targeted country-specific interfaces. In addition, given emergent trends from preliminary analysis of PREDICT-2 animal surveillance data, the team will hone in on the following topics in particular:

- Value chains with a focus on large markets
- Bat-related interfaces including:
    - Bat guano farming/harvesting
    - Hunted bats in the value chain including bushmeat
    - Shared food resources
    - Bat-community interfaces, including livestock
    - Ecotourism

Locations of In-depth Investigations. The map below depicts planned behavioral risk activities. The shading indicates two categories: 1) countries that will include quantitative questionnaire administration combined with in-depth qualitative investigations, and 2) countries that will include questionnaire administration only.

Figure 1. Planned Behavioral Risk Activities



From: Christine Kreuder Johnson <ckjohnson@ucdavis.edu>
To: "predictmgt@usaid.gov" <predictmgt@usaid.gov>
Cc: Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Tracey Goldstein <tgoldstein@ucdavis.edu>, "William B. Karesh" <karesh@ecohealthalliance.org>, Leilani Francisco <francisco@ecohealthalliance.org>, Megan M Doyle <mmdoyle@ucdavis.edu>, "predict@ucdavis.edu" <predict@ucdavis.edu>
Subject: Quarterly surveillance activities summary June 2017
Sent: Thu, 8 Jun 2017 22:04:00 +0000
PREDICT surveillance activities June 2017.xlsx

Hi everyone,
Attached is our summary of surveillance activities in each country. All wildlife, human, and livestock counts and test counts are based on data in EIDITH to date.
We've added a quick view 'summary' on the 2nd tab as well. Once we have findings approved for release, we will add a column for this too.
Please let Leilani and I know if there are any questions or if there's anything else you need.
Kind regards,
Chris

Christine Kreuder Johnson, VMD, PhD
Professor of Epidemiology and Ecosystem Health
Senior Biological and Ecological Surveillance Coordinator, Emerging Pandemic Threats PREDICT Project
One Health Institute
VM3B 1089 Veterinary Medicine Drive
One Health Institute
School of Veterinary Medicine
University of California
Davis, California 95618
+1.530.752.1238

From: Leilani Francisco <francisco@ecohealthalliance.org>
Date: Thursday, June 8, 2017 at 12:15 PM
To: "predictmgt@usaid.gov" <predictmgt@usaid.gov>
Cc: Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Christine Kreuder Johnson <ckjohnson@UCDAVIS.EDU>, Tracey Goldstein <tgoldstein@ucdavis.edu>, Billy Karesh <karesh@ecohealthalliance.org>
Subject: 2-page behavioral risk plan

Dear Andrew, Dennis, Alisa, and Shana,

Please find attached a 2-page summary of the behavioral risk surveillance plan.
Chris will be sending the complementary PREDICT country activities tracker shortly.

We look forward to your thoughts and feedback.
Best regards,
Leilani

--
Leilani Francisco, PhD, MA, PMP
Senior Scientist | PREDICT-2 Senior Behavioral Risk Surveillance Coordinator

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Produced in Native Format

From: Andrew Clements <aclements@usaid.gov>
Sent: Fri, 9 Jun 2017 16:28:18 +0200
Subject: Saudi Arabia probing several hospital MERS clusters in Riyadh | CIDRAP
To: Dennis Carroll <dcarroll@usaid.gov>, lparish@usaid.gov, akibria@usaid.gov, Christine Kreuder Johnson <ckjohnson@ucdavis.edu>, William Karesh <Karesh@ecohealthalliance.org>, Jonna Mazet <jkmazet@ucdavis.edu>, "Subhash Morzaria (FAORAP)" REDACTED

FYI

http://www.cidrap.umn.edu/news-perspective/2017/06/saudi-arabia-probing-several-hospital-mers-clusters-riyadh

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

From: Shana Gillette <sgillette@usaid.gov>
Sent: Mon, 12 Jun 2017 07:05:39 -0400
Subject: Re: Quarterly surveillance activities summary June 2017
To: Christine Kreuder Johnson <ckjohnson@ucdavis.edu>
Cc: "predictmgt@usaid.gov" <predictmgt@usaid.gov>, Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Tracey Goldstein <tgoldstein@ucdavis.edu>, "William B. Karesh" <karesh@ecohealthalliance.org>, Leilani Francisco <francisco@ecohealthalliance.org>, Megan M Doyle <mmdoyle@ucdavis.edu>, "predict@ucdavis.edu" <predict@ucdavis.edu>

Thank you Chris!
Best
Shana

On Thursday, June 8, 2017, Christine Kreuder Johnson <ckjohnson@ucdavis.edu> wrote:

> Hi everyone,
>
> Attached is our summary of surveillance activities in each country. All wildlife, human, and livestock counts and test counts are based on data in EIDITH to date.
>
> We've added a quick view 'summary' on the 2nd tab as well. Once we have findings approved for release, we will add a column for this too.
>
> Please let Leilani and I know if there are any questions or if there's anything else you need.
>
> Kind regards,
>
> Chris
>
> Christine Kreuder Johnson, VMD, PhD
>
> Professor of Epidemiology and Ecosystem Health
>
> Senior Biological and Ecological Surveillance Coordinator, Emerging Pandemic Threats PREDICT Project
>
> One Health Institute
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> One Health Institute
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> School of Veterinary Medicine
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> University of California
>
> Davis, California 95618
>
> +1.530.752.1238

From: Leilani Francisco <francisco@ecohealthalliance.org>
Date: Thursday, June 8, 2017 at 12:15 PM
To: "predictmgt@usaid.gov" <predictmgt@usaid.gov>
Cc: Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Christine Kreuder Johnson <ckjohnson@UCDAVIS.EDU>, Tracey Goldstein <tgoldstein@ucdavis.edu>, Billy Karesh <karesh@ecohealthalliance.org>
Subject: 2-page behavioral risk plan

Dear Andrew, Dennis, Alisa, and Shana,

Please find attached a 2-page summary of the behavioral risk surveillance plan.

Chris will be sending the complementary PREDICT country activities tracker shortly.

We look forward to your thoughts and feedback.

Best regards,

Leilani

--

Leilani Francisco, PhD, MA, PMP
Senior Scientist | PREDICT-2 Senior Behavioral Risk Surveillance Coordinator

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New York, NY 10001

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--

--
Shana Gillette, PhD
Senior Risk Mitigation Adviser
Emerging Threats Division

Office of Infectious Disease
Bureau for Global Health
U.S. Agency for International Development (USAID)
Office Phone: 202-712-1456
Work Mobile: REDACTED
Email: sgillette@usaid.gov

From: Andrew Clements <aclements@usaid.gov>
Sent: Wed, 14 Jun 2017 08:17:10 +0200
Subject: Re: Change to Approved ITA - Mulembakani
To: Katherine Leasure <kaleasure@ucdavis.edu>
Cc: PREDICTMGT <predictmgt@usaid.gov>, Jonna Mazet <jkmazet@ucdavis.edu>, "predict@ucdavis.edu" <predict@ucdavis.edu>

Thanks. Will let the Mission know.

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On Jun 14, 2017, at 12:01 AM, Katherine Leasure <kaleasure@ucdavis.edu> wrote:

> Hi Andrew. At the request of EcoHealth Alliance, the plan for Dr. Prime Mulembakani's travel to Republic of Congo has been updated in order to coordinate with the EcoHealth Alliance partners that will be traveling to RoC in early July. I have included below the amended ITA request, as well as the previously approved ITA for reference. Please let me know if you have any questions. Thanks!
>
> ***AMENDED ITA REQUEST:***
> Metabiota would like to request travel approval for Dr. Prime Mulembakani, PREDICT Country Coordinator, to travel from Kinshasa, Democratic Republic of Congo to Brazzaville, Republic of Congo between July 8-14, 2017, where he will accompany the EcoHealth Alliance team and to aid with the country transition plan.
>
> **Trip purpose:** Along with Dr. Karen Saylors, Dr. Mulembakani will accompany the EcoHealth Alliance team in RoC, and aid with the country transition plan. Dr. Mulembakani will provide follow-up supervision for the behavioral and administrative team activities, and shift expiring consumables to other PREDICT sites.
>
> ***PREVIOUSLY APPROVED ITA:***
> Metabiota would like to request travel approval for Dr. Prime Mulembakani, PREDICT Country Coordinator, to travel from Kinshasa, Democratic Republic of Congo to Brazzaville, Republic of Congo between June 22-June 30, 2017 to support behavioral surveillance integration, and to meet with the Country Coordinator and the USAID coordinator at the US Mission.
>
> **Trip purpose:** In Brazzaville, Dr. Mulembakani will travel to Brazzaville, RoC from Kinshasa, DRC for two days between June 22-June 30, 2017 to support behavioral surveillance integration, and to meet with the Country Coordinator and the USAID coordinator at the US Mission. Dr. Mulembakini will work with the Mission to set up an appointment with Mr. Mario for this update briefing. Dr. Mulembakani will help the Country Coordinator coordinate recently received lab materials and supplies for Congo Basin PREDICT activities.
>
> Katherine Leasure
> HR/Payroll/Financial Assistant
> One Health Institute
> University of California, Davis
> 530-752-7526
> 530-752-3318 FAX
> kaleasure@ucdavis.edu
>
> --

To post to this group, send email to predictmgt@usaid.gov.
To view this discussion on the web visit
https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/02d801d2e490%247db36ca0%24791a45e0%24%40ucdavis.edu.

Sent: Wed, 14 Jun 2017 07:25:20 -0700
Subject: Fwd: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
From: Jonna Mazet <jkmazet@ucdavis.edu>
To: PREDICTMGT <predictmgt@usaid.gov>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Sarah Paige <spaige@usaid.gov>, Angela Wang <awang@usaid.gov>
PREDICT-DRC_EVD Outbreak Bas-Uele13June2017_bb.doc

Please find attached this week's update and the answers to questions regarding the ecological studies.
Brian is traveling, so you have me back in the reporting loop.
Have a nice day,
Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Tue, Jun 13, 2017 at 12:50 PM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>

Dear all,
Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 13th, 2017.
Hi Brian, coming back to your questions:

1. There are about 11 health areas within the outbreak zone. It is expected that each team (partner) will perform animal sampling in one or two health areas. PREDICT is invited to collect samples from PREDICT prioritized taxa (NHP, rodents and bats) and test these samples for prioritized PREDICT viral families.
2. No Coordination plan has been put in place as most partners have not even submitted their protocols.

Thanks for all the support let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Friday, June 9, 2017 5:04:20 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi James,

Do you have any more specifics on the exact request from the MoH regarding the ecological sampling? Has there been meetings to coordinate the multiple partners invited to submit proposals and plans to participate? Without more information, we don't have much to provide to USAID-Washington for the consideration and possible approval of the ecology activity.

Thanks!

-Brian

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Thursday, June 8, 2017 at 9:23 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you Brian for the edits.

Have a splendid evening,

J

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Thursday, June 8, 2017 6:37:58 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you, James, for this update from DRC. I am very, very happy to see that the outbreak continues to be quiet, and glad to read that there will be continued follow-up with the confirmed survivor and probable cases.

Just some minor edits for clarity.

Have a great evening!

-Brian

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Wednesday, June 7, 2017 at 1:23 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 6th, 2017.

Thanks for all the support let me know if you have any questions.

Kind regards,

J. A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Monday, June 5, 2017 4:23:30 PM
To: Brian Bird; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 5th, 2017.

Hi Brian, the specimens retested by IgG are the 4 specimens that we initially reported from the 31/05/2017 as positive for IgG. It is reported that 2 of these specimens specimens showed increased titers of IgG relative to the previously collected specimen's IgG titers.

Our team attending the national coordination meeting with seek more clarity on what specific support GoDRC is requesting from PREDICT. We however anticipate that wildlife samples collected by PREDICT will be tested in PREDICT lab.

Thanks for all the support and am happy to address other concerns.

Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Monday, June 5, 2017 2:59:06 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you, James and Prime, for the updated form and the clarifications on the field ecology activities.

Very happy that all PUIs have been removed from the contact trace. That's great news!!

In the report, I'm hoping you can help me understand better which specimens were retested by IgG by Gary Kobinger? The entry for 03 June indicates these were "Ebola negative samples", but I think that these were the 4 IgG positive cases that were mentioned and re-bled on 31 May 2017? Can you clarify that? Just want to have it correct for the record. I've modified the text in that section to not specify exactly while we await your clarification, and I tidied up the language about the paired-specimen testing/results/interpretation.

I will forward the additional information on to USAID-Washington for their consideration and approval for the field activities. For the possible ecology activity: It is still a bit confusing what exactly the GoDRC will need in terms of assistance from PREDICT specifically. It appears that there could still be many partners engaged on the same topic, for example sampling bats and rodents? Please keep us informed on the coordination meetings with the national committee this week. Perhaps then we will know more specifically what the government is requesting, and what is specifically expected from PREDICT?

If we are approved for the bat and rodent sampling activity in Bas Uele by USAID-Washington, where will the collected specimens be sent for testing? Has this been already decided by the MoH, or is that part of the discussions this week?

Thanks as always and I look forward to hearing more as you have meetings and get more information.

-b

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Monday, June 5, 2017 at 12:15 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 3rd, 2017.

Prime earlier provided answers to specific questions raised by Brian.

Thanks for all the support.

Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: Prime Mulembakani
Sent: Monday, June 5, 2017 5:43:05 AM
To: Brian Bird; James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi Brian,

And thank you for your edits to the form!

Here are my answers to your questions:

1. Yes, all other partners have received the same letter; the INRB will coordinate all actions on the field. We have submitted our PREDICT modules to the vommission and all partners were requested to do the same thing. We will let you know how this will be operationalized. However we have restricted our intervention to sample collection from rodents and bats (by trapping or opportunistic from hunted/sold animals from markets and non-human primates (hunted or kept as pets) according to PREDICT protocols.

2. The activity is going to be coordinated through the commidsion of laboratory and research. Coordination meetings will be held this week.

3. Once the plan has been approved by the national coordination committee (led by yhe Minister of Health), all staffs involved will be recommanded by the moH to use either UN or ECHO flights as available. Also each partner involved will be asked to participate financially to support flight tickets from kinshasa to kisangani and renting of vehicles and motorcycles.

As for us we are planning to work for a maximum of 10 days and we will bring a dry shipper with liquid nitrogen, as well as a portable minus 80 freezer with a small generator for power supply (as we did in isiro).

We will keep you posted.

Thank you,

Prime

Prime M. Mulembakani, MD, MPH
Country Coordinator, PREDICT | METABIOTA
Democratic Republic of Congo
[REDACTED]

From: Brian Bird
Sent: Saturday, June 3, 04:40
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: James Ayukekbong, Jonna Mazet
Cc: Tracey Goldstein, Eddy Rubin, Karen Saylors, PREDICT-outbreak, Maria Makuwa, Prime Mulembakani, Damien Joly

Hi James,

I am handling the correspondence for this outbreak while Jonna is in transit. I have added a small update to the Outbreak form you sent (just to indicate receipt of the official assistance request).

I have forwarded your outbreak form and the request to USAID-DC for their consideration and approval. Jonna may have other comments/concerns when she lands and gets back on line from Tanzania.

Regarding the field ecology investigations: In the reports on 30 May and again on 31 May it is mentioned that multiple partners may be invited to conduct ecological investigations (PREDICT, FAO, CIRMF, NIH, Robert Koch… etc, etc,) do you know if ***ALL*** of these partners also received the invitation letter to conduct ecological investigations? If so then there should be some kind of coordination amongst the 9 or more institutions mentioned in the outbreak investigation form??

Can you please clarify if this activity is being coordinated through the EOC or MoH etc?

Another concern from a practical standpoint will be, if approved, how will the field teams reach the outbreak site and conduct activities safely while maintaining supplies, specimens, cold chain etc? I was at Isiro in 2012, and that region of the country has its own special challenges for sure. I'm confident the team can handle those, but just want to jump start the discussions related to the preparation process.

All the best to you, Prime, and the DRC team!

-Brian

Brian H. Bird DVM, MSPH, PhD

One Health Institute

1089 Veterinary Medicine Dr.

School of Veterinary Medicine

University of California, Davis

bhbird@ucdavis.edu

From: <predict-outbreak-request@ucdavis.edu> on behalf of James Ayukekbong <jayukekbong@metabiota.com>
Date: Friday, June 2, 2017 at 3:32 PM
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>, Damien Joly <djoly@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of June 1st, 2017.

Of note is that the current number of suspected cases has dropped to 8, suggesting that the end of the outbreak is near.

Also, attached is a formal request from the INRB (on behalf of the gov't) to perform ecological studies in Likati, Bas Uele Province.

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: [redacted] > on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 31, 2017 7:34:47 PM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

No problem at all -- every other day os fine unless we have substantive updates.

Appreciate the effort,

Jonna

On Wed, May 31, 2017 at 5:00 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 31st, 2017.

Sorry for merging the update of both 30th and 31st May together as I have been on flights from DRC within the last 24 hours.

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Tuesday, May 30, 2017 11:46:01 PM
To: Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear Jonna,

Yes, I do agree with you that considering the high rate of negative results from persons with Ebola-like symptoms, testing these samples on PREDICT panel will surely reveal some interesting findings on the etiology.

We will inform the commission on our desire to assist on this as well as technical support on ecological studies.

Thank you.

Kind regards,

J

From: [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Tuesday, May 30, 2017 4:35:40 PM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, James,

We should probably reach out at this point and offer assistance testing the negatives, as well as technical assistance for the ecological studies.

Please advise if you agree or disagree. If you agree, please pass on the desire to offer support to our team members attending meetings.

Appreciate all of the good information,

Jonna

On Mon, May 29, 2017 at 5:09 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 29th, 2017
>
> There are currently 19 suspected cases, 2 confirmed and 4 deaths.
>
> Please let me know if you have any questions.
>
> Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

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Skype: ayukekbong.ayukepi

From [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Monday, May 29, 2017 9:28:28 AM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, James,

Jonna

On Monday, May 29, 2017, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 27th, 2017
>
> Please let me know if you have any questions.
>
> Kind regards,
>
> **J.A Ayukekbong, PhD**
>
> **Regional Coordinator /Central Africa**
>
> **USAID PREDICT | Metabiota**
>
> **Email: jayukekbong@metabiota.com**
>
> **Mobile: +1 250-797-7755**
>
> **Website: www.metabiota.com**

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Friday, May 26, 2017 4:46:47 AM
To: Tracey Goldstein; Jonna Mazet; Eddy Rubin; Karen Saylors; PREDICT-outbreak
Cc: Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 25th, 2017

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Friday, May 26, 2017 1:31:37 AM
To: Tracey Goldstein
Cc: Jonna Mazet; Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Hi Tracey,

This is correct, thanks.

We wait for the request and or approval to do further PREDICT viral family testing.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: [redacted] on behalf of Tracey Goldstein <tgoldstein@ucdavis.edu>
Sent: Thursday, May 25, 2017 10:57:36 AM
To: James Ayukekbong
Cc: Jonna Mazet; Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Hello James,

Thank you for the protocol!

It looks like the RNA is inactivated and then extracted with the Qiagen kit, and they end up with ~50ul RNA after extraction. They are only using 5ul RNA for the Ebola testing, so there should be plenty of sample left to do PREDICT testing.

If asked to do the testing, we would need 8ul RNA to make cDNA the normal way we do with Superscript, and the the samples can be used for the PREDICT viral family testing.

Hope this helps,

Best Tracey

On Thu, May 25, 2017 at 1:55 AM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Hi Tracey,

Attached is the protocol for suspected Ebola sample inactivation and handling use by the INRB.

PREDICT would have access to sample aliquot at INRB if we are requested and approve to do the testing.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

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Skype: ayukekbong.ayukepi

From: [redacted]> on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 24, 2017 5:06:07 PM

To: James Ayukekbong
Cc: Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Thanks, James -- probably worth having our team ask the question, so we can plan and also suggest which aliquot and transport medium would likely be used or possible for our testing in an upcoming meeting or through a mechanism you all suggest.

Jonna

On Wed, May 24, 2017 at 4:48 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear Jonna,
>
> We were earlier told verbally in a meeting that a request may be made for PREDICT to test all outbreak samples (including negatives) using PREDICT panel. We have not received any official request yet.
>
> The only samples tested by PREDICT so far are the initial set of 5 samples that 2 were positive by the INRB real-time PCR protocol and one was confirmed positive by PREDICT Filovirus assay.
>
> With the new direction of the coordination committee, we are not currently testing any samples in the PREDICT lab. Testing is being done in the field and aliquots to INRB for storage.
>
> However, the mobile lab bought with PREDICT USAID funds is being used in the field for testing by INRB staff who have received training from PREDICT.
>
> Please let me know if you have others concerns, thanks.
>
> Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: REDACTED REDACTED > on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 24, 2017 4:25:18 PM
To: James Ayukekbong
Cc: Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear James,

Thanks for the update & for adding the clarifying formatting note -- just one question:

We have reported that we have been requested to test the samples. Your report today indicates that 4 aliquots will be made. Which one will we test (if any). If we will no longer be testing, we need to report that.

Once I have that info -- I will send your report forward.

Hope you have a good night,

Jonna

On Tue, May 23, 2017 at 11:59 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease Outbreak in the Bas-Uele province, DRC as of May 23, 2017.
>
> Please let me know if you have any questions.
>
> Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Website: www.metabiota.com

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permitted in this email transmission. If you have received this email in error, please delete it without copying or forwarding it, and notify the sender of the error by email reply.

From: [redacted] [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Tuesday, May 23, 2017 3:19:14 PM
To: James Ayukekbong; Maria Makuwa; Prime Mulembakani; Karen Saylors
Cc: Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Fwd: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi Team, not sure if this request below from Andrew is reasonable or possible -- if so, maybe you could get the clarity in your meetings and report accordingly. If not, we should likely just stop reporting on testing that we aren't doing. In other words -- only include Predict testing in the daily reports.

Remember, do not include results in the reports until you have cleared those data through your lab lead, the lab team, and your country reviewers/release process. The lab team stands ready on a short timeline, just as I am doing with these daily reports.

In the short-term that would mean that you report meeting informational items (without testing) in one section with a paragraph separation space and then report on Predict activities, including # samples received and, when ready, # samples tested, but no results until cleared through our process.

Thanks,

Jonna

---------- Forwarded message ----------
From: **Andrew Clements** <aclements@usaid.gov>
Date: Tue, May 23, 2017 at 12:04 PM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: PREDICTMGT <predictmgt@usaid.gov>, Angela Wang <awang@usaid.gov>, Sarah Paige <spaige@usaid.gov>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>

Thanks, Jonna.

Is it possible for more precise terminology to be used in these reports regarding the samples tested? (Possibly not if the government is providing the information in a specific way.) I find it confusing for the reporting to mention number of samples collected and tested without any reference to how many cases these samples have come from. Is it as simple as "1 sample tested" = "1 case"? Or is that not necessarily the case?

Andrew P. Clements, Ph.D.

Senior Scientific Adviser

Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health

U.S. Agency for International Development

Mobile phone: 1-571-345-4253

Email: aclements@usaid.gov

On May 23, 2017, at 6:59 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

> Current update attached.
>
> Have a nice day,
>
> Jonna
>
> On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
>
> > Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being

collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.

We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.

Have a nice day,

Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official

request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

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predictmgt+unsubscribe@usaid.gov.
To post to this group, send email to predictmgt@usaid.gov.
To view this discussion on the web visit
https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/CAO5tDrG__JOzkWdNh%2Bk6eFkbshtA%2BWBVF4dejX5U7Xeyki9GfQ%40mail.gmail.com.

<PREDICT-DRC_EVD Outbreak Bas-Uele 22May2017.doc>

--

Tracey Goldstein, PhD
One Health Institute
School of Veterinary Medicine
University of California
Davis, CA 95616
Phone: (530) 752-0412
Fax: (530) 752-3318
E-mail: tgoldstein@ucdavis.edu

PREDICT Outbreak or Health Event Rapid Report

Today's Date: *June 13th, 2017*
Working Title of Investigation: *Outbreak of Ebola Virus Disease in the Bas-Uele province, DR Congo*
Cumulative day of the outbreak investigation: 35

Please describe the disease signs and symptoms and species affected (humans, domesticated animals, wildlife:

On 8 May 2017, an alert of 9 suspected cases of Human Viral Hemorrhagic Fever and 2 deaths in the Likati Health Zone, Bas-Uele Province was received from the Provincial Health Officer. Symptoms were fever, bloody vomiting, diarrhea, and bleeding from the nose.

Location	
Country:	*Democratic Republic of Congo*
District:	*Province of Bas-Uele, Health zone of Likati, north-west of Buta*
Village/Town:	*Village in the Nambwa health area, Territory of Aketi*
GPS Coordinates (if known):	
Date that first case(s) of illness occurred (if known or estimate):	*April 22nd, 2017*
Date that PREDICT was first notified of outbreak:	*On May 10th, 2017 the PREDICT CC was informed by the INRB staff working in the virology lab that they were notified of suspected cases of VHF in the Likati Health Zone and that samples were expected to arrive for confirmatory testing anytime.* *On May 11th, 2017 the PREDICT CC was informed that the samples arrived at INRB in early afternoon and are being tested for Ebola. The same day the PREDICT CC was informed by the EPT2 focal point at the mission who talked on the phone with the Bas-Uele provincial health officer about more details on this alert: 9 cases and 2 deaths.*

Key Information	**Description of Findings/Actions/Outcomes**			
How many affected individuals?		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans	0	5	4
	Domestic Animals			
	Wild Animals			
How was outbreak first noticed?	*During 16th week, a 45 year old man (case 1), fisher and farmer, became sick with fever, then bloody vomiting, bloody stools and nosebleed in the fisher camp along the river Likati,*			

	*in the Nambwa health area. He was brought to a traditional healer and then transported by moto with 2 relatives, case 2 (moto driver) and case 3 (his brother) to the Likati general hospital about 45 km away. B*ut he died on the road. Then case 3 decided to return to their village with the corpse. He was buried in the Kapayi village, Nambwa health area. On 25th April, case 2 and 3 developed the disease with same symptoms. Case 2 died the same day, and case 3 recovered. From these 3 persons, 6 other close contacts were infected. Among them, a young boy who attended the burial of case 1 died on 11th May. The provincial health office has sent a team to the site to investigate and information is expected when they return as the area has no cell phone coverage.
Where was the first reported case? What is/was the extent of geographic spread? Include comments on the apparent speed of spread.	*For now the disease is located within four health centers: Nambwa (12 cases, 2 deaths), Muma (3 cases, 1 death), Ngayi (4 cases, 0 death) and Azande (1 case, 0 death), in the Likati Health Zone, Territory of Aketi in the Bas-Uele province, where the first reported case was treated at the health center. No case is reported outside this area.*
Has the country requested support from PREDICT (include date of request)?	*Yes, the INRB General Director asked PREDICT to retest the 5 samples that were received from the field using PREDICT protocols;*
If so, which government agency requested PREDICT support?	The Ministry of Health through the INRB which is the national Public Health Laboratory
When was PREDICT response initiated (date)?	Saturday, 13th May, 2017
Are other EPT partners involved in the response (which ones and how)?	*None for now*
What type of assistance did PREDICT initially provide? Which PREDICT personnel were involved?	Testing of 5 samples from the field using PREDICT protocols and primers for Filoviruses, by the PREDICT lab manager and lab technician
When was the first official acknowledgement of the outbreak (by which government agency or other reputable body and date)? When was a response initiated and by whom? Which agencies were involved? Who was in charge of the national response?	On May 9th, 2017, the Bas-Uele provincial office informed the MoH direction of disease surveillance of the alert. A team from Buta, the provincial health office was sent to the site to investigate. A team from the MoH direction of disease control, INRB, Hygiene and the Ministry of information travelled on Saturday morning to the field. They reached Likati (health zone office) on Sunday night at 10.00 PM. On Monday morning they had a meeting with the health zone staff and sent a first report to the national coordination committee via the Ministry of Health

Was the cause of the outbreak confirmed by a laboratory? If so, give details of the initial confirmation (cause, species, specimen types tested and dates of testing if known). *Note: Daily updates for ongoing laboratory testing should be entered in the Daily Activities/Timeline table below.*	Yes, the INRB virology laboratory tested 5 serum samples collected from patients admitted at the Nambwa health center and who were in contact with the diseased cases. They performed real-time PCR and found 2 positive results for Zaire Ebola virus. The tests were performed on 11th May and re-tested on 12th May, 2017 by the same staff. On Saturday, 13th May, the samples were re-tested by the PREDICT staff using the PREDICT protocol. They found one positive result on the 5 samples, the same that was clearly positive by real-time PCR.
Where was the laboratory testing performed (name of laboratory)?	Samples were tested at the INRB virology laboratory
Number of days between initiation of government response and lab confirmation of laboratory results.	N/A

Summary of the Outbreak or Event:	**To be filled after active outbreak or event activity has ceased**			
Working name of the outbreak:				
Total number of cases:		**Suspected:**	**Confirmed:**	**Deaths:**
	Humans			
	Domestic Animals			
	Wild Animals			
Summary of PREDICT Team response activities during the outbreak.				

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PREDICT Outbreak or Health Event Response Daily Activities/Timeline

Working Title of Investigation: *Suspicion of VHF in the Bas-Uele province, DR Congo*

*Instructions: This is the timeline of all PREDICT team activities related to this event. Please fill out in detail any PREDICT team activity as they occur on a **daily** basis (e.g., sample collection, other field activities, laboratory testing, outbreak related meetings attended, communications with the Mission or Government, etc.) in addition to the key specific items listed below.*

*Add additional rows into the specific activities listed below **in chronological order** as needed. If a specific listed event has not yet occurred, please put "pending" or "not expected" in the date column.*

Key Events:

Date	Day #	Notification or Action Taken
5/10/2017	1	First notification of 9 suspected cases of Viral Hemorrhagic Fever in the Nambwa Health Area, Likati Health Zone, Bas-Uele Province;
5/11/2017	2	PREDICT Country coordinator (CC) notified of reception of samples from the suspected cases at the INRB; PREDICT CC notified PREDICT global team
5/12/2017	3	Two samples out of five tested positive for Ebola Zaire virus, and 3 were negative by real-time PCR at the INRB virology laboratory. PREDICT CC attended the National coordination committee meeting where the Minister and his team presented the situation: 9 cases and 2 deaths, and preparations are made of an investigation team composed of epidemiologists, medical biologists and lab technicians (from the MoH and INRB) to travel tomorrow from Kinshasa to support the local team, begin contact tracing and prepare the logistic for the outbreak response. The area of Nambwa is located 45 km from Likati but it takes about 5 days to reach by car and 2 days by motorcycle. The Minister and WHO have contacted the UN Mission to provide an helicopter to bring equipment to the site. The INRB will deploy the K-Plan mobile laboratory that was purchased through the USAID funds for Yellow Fever Outbreak in Nambwa.
5/13/2017	4	PREDICT CC attended the meeting of the National coordination committee, where the Ministry of Health updated partners of the situation on the ground: a total of 11 cases were reported since the beginning of the outbreak with 3 deaths in the 3 health areas of Nambwa (7 cases and 3 deaths), Mouma (3 cases and 0 death) and Ngayi (1 case and 0 death). The provincial investigation team was back to Likati and could send this update by phone via the provincial health office.

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		A team of 9 persons left Kinshasa today for Nambwa, composed of 2 epidemiologist, 1 lab technician, 1 clinician, 1 data manager, 1 information specialist, 1 hygienist, 1 logistician and 1 psychologist. They are expected to reach Nambwa on Monday or Tuesday and will prepare the logistic for the local coordination committee and begin contact tracing and sensitization. Staffs from the WHO country office and the Ministry of health are working to prepare the list of needs for the outbreak response and a budget. A request was made to the MONUSCO to provide an air lift between Kinshasa and Likati for shipping all materials and equipment, including the K-Plan mobile laboratory from the INRB.
5/15/2017	6	On Saturday, 13th May, the General Director of INRB asked PREDICT to retest the 5 samples received from the field for Filovirus using the PREDICT protocol. The reason was to have a second diagnostic method. The INRB staff tested these samples on Friday and Saturday by real time PCR, using 3 different protocols: the first targeting the L gene returned 1 positive result; the second targeting the NP gene returned 2 positive results, and the 3rd targeting the Glycoprotein gene returned 1 positive result. Using the PREDICT protocols, the PREDICT staff tested the five samples which returned only one putative positive result on the gel, from the sample which tested positive from the 3 protocols used by the INRB staff. Amplicon from this sample will be send to GATC for sequencing per our protocol. This result was as expected as the PREDICT Filovirus protocols should be and are correct for detection of this virus but are also necessarily less sensitive as a result of conserved technique, resulting in weak or negative reactions in samples with low viral load. PREDICT CC and virologist attended the National Coordination meeting. Two points were discussed: 1) the plan and budget for the outbreak response: a group from the MoH direction of disease control, the INRB, WHO, UNOCHA and UKAID finalized the plan and budget on Monday morning. Main points are: strengthening of coordination, surveillance, hygiene and biosecurity, medical and psycho-social care, laboratory diagnostic, communication and rehabilitation of health centers and the Likati General Hospital in the Bas-Uele province. No decision of quarantine will be made. The INRB will deploy two mobile laboratories, one at Nambwa (epicenter) and a second in Buta with possibility to be deployed anywhere based on the epidemiologic situation of the outbreak. The total budget for the response is $8,072,636.00 and includes:

		coordination at national, provincial and local levels ($945,377), surveillance and laboratory ($1,685,265.00), communication ($505,000.00), materials and supplies ($1,605,000.00), medical and psychosocial care ($2,313,280.00), prevention ($ 477,839.00), Water, hygiene and sanitation ($540,675). Main Challenges are: transport of goods to the affected area (THE UN may help with a Helicopter), and transport of probable cases to the Ebola Treatment Center due to bad roads. 2) the situation on the field: now the total of cases has increased to 20, reported from 4 health areas: Nambwa with 12 cases and 2 deaths, Muma with 3 cases and 1 death, Ngayi with 4 cases and 0 death, Azande with 1 case and 0 death. Samples collected will all be shipped to the INRB because the committee decided not to wait for the mobile lab to be deployed. Right now all cases are being treated at home because there is no facility for handling Ebola cases. The Ebola Treatment Center is still under rehabilitation. The team has begun to disinfect the laboratory and health centers and the local radio broadcast is used for sensitization.
5/16/2017	7	PREDICT virologist attended the National Coordination Committee. A new case was reported from Nambwa, young girl 16 years old living in a house with a suspect case. Now the total number of reported cases are 21: Nambwa 13 cases, 2 deaths; Muma 3 cases, 1 death; Ngayi 4 cases, 0 death, Azande 1 case, 0 death. 3 teams are now deployed in the field in three different locations with the following objectives : active research of suspected cases, sample collection, contacts tracing and assessment of logistic needs. A fourth team led by the Ministry of Health will leave Kinshasa tomorrow with one mobile laboratory from the INRB, prepared to perform 100 tests. WHO has mobilized PPEs from the city of Kisangani to support the response. Seven committees were set up and will be meeting everyday; PREDICT was invited to be included in the committee in charge for laboratory and research. The first meeting will be on next Thursday to analyze all needs and make request to different partners. These committees will report to the National Coordination Committee daily. PATH, a CDC Implementing Partner in charge to support the country Emergency Operation Center – GHSA is partnering with DigitalGlobe and UCLA to get precise maps of the Likati health zone. They have provided cellphones with GPS to the team who will travel to the site tomorrow.

5/17/2017	8	The PREDICT Lab manager attended the National Coordination Committee meeting at the MoH: no new cases reported from Likati, still a total of 21 cases with 3 deaths, and 4 health areas affected; samples were collected from a total of 13 cases; 5 were shipped to Kinshasa and tested at the INRB, and 8 are kept in Aketi waiting to be tested on site. The investigation team has identified a total of 416 contacts to be followed. A team from the INRB travelled this morning with the 1st mobile laboratory which will be deployed in Nambwa. The 2nd mobile laboratory (K-Plan) will be transported to the field tomorrow and will be deployed in Likati. A fourth investigation team, led by the Minister of Health will travel to the site tomorrow. WHO has confirmed that PPEs (unknown number of kits) were deployed to Aketi from their stockpile in Kisangani PREDICT was requested by the Commission of Laboratory and Research to provide for the mobile laboratory: one glovebox, 1 Qiagen extraction kit and Ethanol.
5/18/2017	9	PREDICT CC and virologist attended the 1st meeting of the commission for laboratory and research, with staffs from the INRB, CDC, UCLA and FAO-ECTAD: - The mobile lab arrived and was deployed to Aketi with 4 INRB staffs; - The K-Plan laboratory travelled today and will be deployed to Buta, the provincial capital city; - INRB transmitted a list of reagents and supplies needed to perform lab tests in the field; the list was transmitted to the MoH and FAO. The team from FAO informed that they will provide the needed supplies according to what is available now at the Central Vet Lab PREDICT virologist attended the National Coordination Committee meeting: The Minister of Health reported on his trip to Aketi: the deployed team is performing active research of suspected cases and contacts; visited health facilities and traditional healers; ongoing data collected regarding burials in villages; sensitization of local communities; different opinion leaders are intensively collaborating with investigation teams; as well as challenges due to bad roads. Epidemiological update:

		Total of 29 suspected cases reported, and 3 deaths: Nambwa Health Area=11 cases and 2 deaths; Muma Health Area=3 cases and 1 death; Ngayi Health Area=14 cases and 0 death; Azande Health Area=1 case and 0 deaths. Registered contacts under follow up = 416. A total of 35 samples collected: 5 were shipped to Kinshasa and the remaining stored at Likati waiting to be tested on site. Four new alerts received, 2 from Azande and 2 from Ngabatal, under investigation Mobile lab expected to be operational tomorrow Discussion on vaccination: Director of the Expanded Program for Immunization presented a plan and proposal for the use of experimental vaccine that was used in West Africa which is made of recombinant ZEBOV-VZV. The vaccine is efficient in protecting chimpanzees from infection. It should be conserved at -60°C, conditioned in 10 doses/vial and after reconstitution could be conserved between +2 and +8°C for a maximum of 6 hours. The vaccine is administered via intramuscular injection. The Protocol of vaccination is ready and will be submitted this evening to the Ethical Committee at KSPH for approval and will be considered a clinical trial. The vaccine is not approved to be used in humans yet. If the DRC Government accept the use of this vaccine, nearly 12,000 doses could be provided to be administered to teams working in the field.
5/19/2017	10	PREDICT virologist attended 2nd meeting of the commission for laboratory and research with staff from the INRB, CDC, UCLA: The commission has transmitted the complete list of members and partners to Ministry of Health. The General Director of INRB presented the strategy for response to the outbreak: - The Mobile Laboratory should be operational for PCR, ELISA tests and rapid tests - As there are only 3 deaths reported till today there is a possibility that this current Ebola outbreak may be mask by another unknown pathogen – INRB will also deploy a team from the Parasitology and Bacteriology Laboratories to perform investigations and diagnosis on samples collected in the field (for example recently in Banalia - Shigella and Salmonella infections were responsible for several deaths) **Reagents for diagnosis:** - Two boxes of Ebola rapid tests are available at INRB Virology

		Laboratory - Another tests will be provided by Japanese Cooperation - The Ebola tests for Mobile Laboratory (Kaplan- Prof. Parisi) were sent to DRC via DHL - The Gene Expert machine with reagents will be received this Sunday and offered by UCLA project to INRB PREDICT virologist also attended the National Coordination Committee meeting: Epidemiological update**:** At the date of May 18, 2017 a total of 32 suspected cases were reported with 4 deaths: Nambwa-11 cases, 2 deaths, Mouma – 3 cases, 1 death, Ngayi – 14 cases, 1 death*, Azande-2 cases and Ngabatala – 2 cases. Concerning the 4th death* – young girl, 22 years old died with hemorrhagic symptoms, vomiting and fever on May 8, 2017 in a small village near Ngayi. She was the family member of the 3rd died case. The burial ceremony was done for her and this was only reported when the surveillance team visited the site. Four direct contacts were identified, they are sick and under the surveillance in the village. Registered contacts: 416 persons Samples collected: 35 The Mobile Laboratory was installed and the testing of samples will start this evening. In the reference Hospital in Likati, separate room for suspected cases and sick persons was prepared for safe medical follow –up of these persons. The General Director of INRB highlighted the importance of intensive research of new cases, the daily follow-up of all contacts (two times per day with measurement of corporal temperature). He also highlighted the importance to determine the "definition of case" by the medical team deployed in the field. The follow-up of contacts is very challenging/difficult to be implemented, there is a need for trained voluntaries (ex. members of Red Cross) to help. **Vaccination Program against Ebola:** The Government has approved the use of the Ebola vaccine in DRC during this Ebola outbreak. The Protocol of vaccination was submitted to Ethical Committee at

		KSPH for approval as a clinical trial. Several scenarios were proposed and will be discussed before starting the vaccination.
5/20/2017	11	PREDICT CC attended the meeting of the commission of Laboratory and Research: Results from the CIRMF laboratory in Gabon: The 2 positive samples for Zaire Ebola Virus out of the 5 that were tested at the INRB were retested and confirmed in CIRMF. The staff at CIRMF is performing whole sequencing of the virus and will send results on Monday or Tuesday with Phylogenetic analysis. The K-Plan mobile laboratory arrived in Kisangani pending transportation to Buta, the provincial capital city. The INRB staff sent to Likati have tested 22 samples collected from suspected cases, all tests (real-time PCR) returned negative results. The director of INRB would like PREDICT to test all negative results with PREDICT protocol for the 5 PREDICT viral families. The DRC PREDICT team is unsure about this as the current sample collection is not in conformity with PREDICT protocol. PREDICT samples should be stored at -80° C soon after collection in either Trizol or VTM which is not the case on the field. PREDICT CC attended the meeting of the National Coordination Committee: The following issues were raised: The data from the field need to be cleaned, waiting for more accurate data tomorrow; the generator of the mobile laboratory is not working, and the lab is using the generator from the Health Zone office; contact tracing is challenging due to bad roads; 2 health facilities were selected to be rehabilitated and transformed to Ebola Treatment Centers (ETC). The K-Plan reagents not arrived yet at the INRB as of this evening at 4.00 PM The CDC will provide rapid tests for this outbreak It was proposed that the team in Likati prepares and sends a list of all cases and contacts, noting timeline of symptoms occurrence, date of sample collection, and clinical outcome in order to better follow the epidemiological curve and be more specific on contacts who can be

		considered to be removed from the list All commissions should prepare an operational action plan; all technical discussion should be prepared in the commissions, and each partner interested to support specific actions and activities should present this to the commission.
21/05/2017	12	-
22/05/2017	13	PREDICT CC and Virologist attended the National Coordination Committee Meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: Situation in the field: - A total of 43 suspected cases with 4 deaths: Nambwa, 24 cases and 2 deaths; Muma, 4 cases and 1 death; Ngayi 10 cases and 1 death; Azande, 3 cases and Ngabatala, 2 cases. - A total of 419 contacts registered: 158 in Nambwa, 162 in Muma, 98 in Ngayi, 1 in Azande and 0 in Ngabatala. - Number of contacts followed=54; - A total of 38 samples collected to date, of which 5 were tested at INRB and 33 being tested in the field with the Mobile laboratory in Nambwa. -- All 33 samples were negative by PCR for the Zaire Ebola virus nucleoprotein. - The K-Plan mobile laboratory that was picked up from the INRB and thought to have left for Kisangani is still in Kinshasa waiting to be transported to Buta. - The INRB team who will work on this mobile lab is already in Buta. - Dr. Pierre Rollin from CDC arrived in Kinshasa with 250 OraSure (OraQuick) rapid tests and 100 Chembio Ebola-Paludism rapid tests. These tests will be used in the field by investigation teams working at places distant from the mobile laboratory. - UCLA in partnership with Dr. Gary Kobinger (a researcher at the University of Laval, Canada, formerly with the Public Health Agency of Canada) will provide the GeneExpert to be used at the Ebola Treatment Center.
23/05/2017	14	PREDICT CC and Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - Sample collection from patients at the Ebola Treatment Center in Likati is ongoing. - It has been decided that 4 aliquots of each sample will be prepared: one to be tested at the mobile lab, the second to be tested using GeneExpert in the field, the third will be shipped to the CIRMF in Gabon for confirmation and the fourth will be stored at the INRB in Kinshasa.

		- The K-Plan mobile lab will be transported in Buta by a UN flight and will be installed at the Buta General Hospital. - The INRB has also received the following reagents for the GeneExpert; Filovirus and Zaire Ebola virus (2x96 tests); reagents for PCR for Ebola virus; Ebola IgM and IgG ELISA as well as reagents for Shigella, Salmonella and Malaria. 2) Current situation in the field: - A total of 48 suspected cases and 4 deaths reported: Nambwa, 28 cases and 2 deaths, Muma 5 cases and 1 death, Ngayi 10 cases and 1 death, Azande 3 cases and Ngabatala 2 cases. - A total of 419 contacts have been registered and from them 49 will be removed from the list of follow up. The remaining 370 contacts are in Nambwa: 109, Ngayi: 98, Muma: 162, Azande: 1 and Ngabatala: 0. - Radio broadcast from a local radio station is currently being used for sensitization but it needs to be improved in order for its signal to be transmitted across multiple villages. - Some staff from the Bacteriology and Parasitology labs at the INRB will travel in the days ahead to Likati to begin testing of samples for other pathogens. - At the moment, two Ebola Treatment Centers are operational; one in Likati and the other in Nambwa. They are managed by Doctors Without Borders (MSF). There is plan to set up 2 others in Muma and Ngayi.
24/05/2017	15	PREDICT Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - The commission received confirmation that the K-Plan mobile laboratory has left for Buta; - Staff from UCLA presented their results of Ebola serological survey in 4 different sites. All Ebola negative samples will be transferred to INRB for further investigation. - The field team reported new symptoms including fever and jaundice as result, it was recommended that samples be tested for Yellow Fever, Hepatitis A, B and C. 2) National coordination meeting at the MoH: - The field team revised the definition of cases, following the new case definition, there are currently 35 suspected cases and 4 deaths: Nambwa, 22 cases and 3 deaths; Muma, 3 cases and 0 death; Ngayi, 3 cases and 1 death; Azande, 3 cases and finally 2 new cases each in Mabangu and Mobenge (new sites) - A total of 294 contacts have been registered: 98 in Nambwa, 78 in

		Ngayi, 87 in Muma, 11 in Azande, 10 in Ngabatala, 4 in Mabangu and 6 in Mobenge.
25/05/2017	16	PREDICT CC and virologist attended the meeting of the commission of Laboratory and research at INRB and the virologist attended the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of laboratory and research: - All negative field samples for Ebola will be retested in Likati for other pathogens using the GeneExpert platform and in Buta using the K-Plan mobile lab (PREDICT not involved in the testing). - This testing will be for Yellow fever, Hepatitis B and Hepatitis C. An aliquot will be shipped to the INRB by a UN flight. - Two staff from the NIH in the US arrived yesterday evening and will travel to Buta and Likati tomorrow for lab support. - To ease epidemiological data interpretation, all samples shipped to the INRB are accompanied with other relevant information such as the date of disease onset, date of sample collection, signs and symptoms etc. 2) National Coordination Committee meeting: - A total of 37 suspected cases have been reported from 6 health areas, distributed as follow: - Nambwa: 20 suspected, 2 probable, 1 confirmed, 3 deaths; - Muma: 8 suspected, 1 probable and 1 confirmed; - Ngayi: 2 suspected, 1 death; - Azande: 3 suspected; - Mobenge: 2 suspected; - Mabangu: 2 suspected; - Currently, only 177 contacts are being followed: 139 out of 142 in Nambwa, 4 out of 4 in Mabangu, and 34 out of 78 in Muma. - The K-Plan mobile lab has arrived in Kisangani and will be deployed to Buta tomorrow. - Patients care and treatment for Ebola suspected cases/contacts will be free of charge in the whole of Likati health zone.
26/5/2017	17	PREDICT virologist attended the meeting of the commission of Laboratory and research at INRB. There was no National Coordination Committee meeting today **(all items are informational and do not reflect PREDICT activities)**: - The K-Plan mobile laboratory arrived in Buta, and will be deployed to the general reference hospital. Laboratory reagents for the K-Plan lab bought by INRB will be sent to Buta, including ELISA tests for HCV, HBsAg, Hepatitis E and Yellow Fever.
27/5/2017	18	**All items are informational and do not reflect PREDICT activities**:

		Situation in the field: - A total of 52 cases and 4 deaths are reported, including 47 suspected, 3 probable and 2 confirmed. - A total of 200 out of 241 registered contacts are currently being followed by the field teams: 139/142 in Nambwa, 4/4 in Mabongo, 40/78 in Muma, 11/11 in Azande and 6/6/ in Mobenge. - All 47 suspected cases tested negative for Ebola by real-time PCR in Likati. Their samples will be tested by Serology (IgM and IgG) to look for Ebola antibodies. - All field negative samples for Ebola (from suspected cases) will be transferred to INRB for further analysis. - Medical diagnostic kits will be shipped to Likati in order to support free medical care at the general hospital.
29/05/2017	20	PREDICT Virologist attended 2 meetings; the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the commission of Laboratory and research: - The INRB field team will begin to test samples for bacterial pathogens (e.g Shigella and Salmonella) in Buta using the K-Plan mobile lab - The field epidemiology and laboratory team began cleaning field dataset, deleting duplicates, removing all Ebola negative cases and reclassifying all remaining cases as suspected, probable, and contacts to be followed; - Testing of samples by ELISA has also began in the mobile lab in Likati - The commission thinks that it is now time to conduct ecological studies - It should be noted that a team of researchers from the University of Kisangani Center for Surveillance and Biodiversity conducted an ecological study in Likati some time before the outbreak - Investigators were told that the index case was in contact with a wild pig. Also some persons in the community reported die-offs of domestic pigs - Researchers from the NIH proposed to conduct a longitudinal study of all contacts of confirmed and probable cases to determine markers of the infection. 2) Meeting of the National Coordination Committee: - After cleaning the dataset, the field team has now reported only 19 cases and 4 deaths in total: 14 suspected cases (6 in Nambwa, 4 in Muma, 3 in Ngayi and 1 in Ngabatala); 3 probable cases (2 in Nambwa and 1 in Ngayi) and 2 confirmed cases in Nambwa; - The number of contacts registered is now 101 (20 in Nambwa; 5 in

		Mobenge; 61 in Muma and 15 in Ngayi - Die-offs of domestic pigs were reported from Azande, Ngabatala and Mobenge, and the field veterinarian team collected samples from 30 pigs and 2 goats; - The committee agreed to conduct ecological studies within the area of Aketi.
30/05/2017	21	PREDICT CC and Virologist attended the meeting of the commission of Laboratory and research at INRB. The PREDICT virologist attended the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the commission of Laboratory and research - The K-Plan mobile laboratory was successfully installed in Buta and ready to be used. The equipment will also be used for testing of bacteria pathogens in blood and stool samples. An aliquot of all negative samples will be shipped from Likati to Buta. - Two staff from the NIH arrived in Likati to support testing on the mobile laboratory platform. - Dr. Kobinger from Canada has begun testing samples in Likati by ELISA. Currently, there are 2 Ebola IgG positive samples which were negative by real-time PCR. - Aliquots of all samples negative for Ebola by real-time PCR in Likati were received at the INRB. Through support from METABIOTA, these samples will be inactivated and extracted RNA shipped to the USA for deep sequencing. The DRC PREDICT lab was also requested to test these samples using the PREDICT protocol for all priority viral families. - The local Veterinarian in Likati has collected samples from domestic pigs and goats. These samples will be shipped to the Central Veterinary Laboratory in Kinshasa for testing. FAO will also provide ELISA reagents to test for the African Swine Fever. - Ecological studies are being proposed by different institutions: PREDICT, FAO, Institut de Medecine Tropicale (Antwerp, Belgium), Robert Koch Institute (Germany), the University of Kisangani, NICD (South Africa), NIH and the University of OKAIDO (Japan). Request letters from the MoH will be released soon; all institutions are requested to send their protocols to Prof. Muyembe, director of the INRB by tomorrow. 2) National Coordination Committee meeting - Situation in the field: There are a total of 17 cases: 12 are suspected cases (6 in Nambwa, 1 in Muma, 3 in Ngayi and 2 in Azande), 3 probable cases (2 in Nambwa and 1 in Ngayi), and 2 confirmed cases (from Nambwa).

		- A total of 4 deaths: 3 from probable EVD cases (2 in Nambwa and 1 in Ngayi) and 1 from a confirmed case in Nambwa. - On the 101 contacts registered, 20 are in Nambwa, 5 in Mobenge, 61 in Muma and 15 in Ngayi. Only contacts from Nambwa and Mobenge were followed by the investigation teams. - Active surveillance activities will continue in the Likati health zone even after the declaration of the end of the outbreak.
31/05/2017	22	PREDICT CC and Virologist attended the meeting of the commission of Laboratory and research at INRB. The PREDICT virologist attended the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the commission of Laboratory and research - A team from the African CDC attended this meeting following the request from the government of the DRC to help set up a transboundary surveillance system with neighbor countries and to contact key actors in Ebola response management to become part of the regional collaboration center. A follow-up meeting will be held in Gabon on the 25-26 July, 2017 and the INRB is invited. The African CDC suggested that the CIRMF in Gabon be added to the list of institutions which will conduct ecological studies in the field. - In Likati a total of 4 samples tested positive for Ebola IgG by ELISA (the Elisa IgM tests are not sensitive enough). In order to interpret these results, a second sample will be collected from these 4 cases (at least 10 days after the first test) to detect any increase in antibody titer. This will enable the discrimination between recent and past infection. The field team is advised to send all clinical and epidemiological data from these 4 cases in order to support lab interpretation. - The K-Plan mobile laboratory is already in Buta. Blood and stool samples will be tested for bacteria pathogens (hemoculture and coproculture). - The first batch of Ebola negative samples from suspected cases arrived at the INRB and will be tested using the PREDICT protocol. - Metabiota DRC director will prepare an MTA for the samples that will be shipped to the USA for deep sequencing. 2) National Coordination Committee meeting - Situation in the field is unchanged, still 17 cases: 12 suspected, 3 probable and 2 confirmed, with 4 deaths and 101 contacts. - The local Vet team will travel tomorrow to Nambwa, Ngayi and Muma to investigate die-offs among domestic animals and collect samples.
1/06/2017	23	PREDICT Virologist attended the National Coordination Committee

		meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: - There was no meeting of the commission of laboratory and research due to difficulties to establish contact with the field team - Current epidemiologic data from the field suggest there are a total of 13 cases (8 suspected, 3 probable and 2 confirmed) and still 4 deaths - A second blood sample was collected today from the 4 cases with Ebola positive IgG on ELISA. IgG titration which will be performed in Likati to determine if there is an increase in titer - Today marks 21 days since the outbreak was officially declared and the curve suggests that the outbreak is coming to an end. A scientific commission will be put in place to discuss next steps and preparedness strategies for any other Ebola outbreak as well as opportunity for a vaccination campaign - All samples collected from domestic animals (pigs and goats) tested negative for Ebola. These samples will be shipped to the Central Vet Lab in Kinshasa for further analysis - A total of 357 contacts were removed from the list and 72 are currently being followed. That is 38/38 in Nambwa, 9/9 in Mabango, 11/11 in Azande and 14/14 in Ngayi
01/06/2017	23	Official Request from the Ministry of Public Health (National Institute of Biomedical Research) to assist with an ecological investigation in the Bas-Uéle Province. The request specifically mentions "as was provided during the Isiro epidemic". *Nota bene* - The Isiro outbreak referred to was in 2012 and was of Bundibugyo ebolavirus.
03/06/2017	25	PREDICT Virologist attended the meeting of the commission of Laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of Laboratory and Research - In the field, Dr. Gary Kobinger from Canada retested Ebola specimen by ELISA for anti-Ebola IgG: 2 specimens showed increased titers of IgG relative to a previously collected specimen's IgG titers. Using rise in titer of these paired serum results as a sign of recent infection, there are now 4 confirmed positive cases; 2 by real-time PCR and 2 by IgG serology. Repeat testing of the 2 other specimens that were initially positive for IgG, one was negative and the other showed an indeterminate result and will be retested. - The commission has prepared a plan of activities for the next 21 days and for a period of 2 months after the end of the outbreak that will be proposed to the national coordination committee The plan has 4 objectives:

		1) Conduct ecological studies in Likati 2) Evaluation of some rapid tests (OraQuick, Chembio and Quicknavyebola) in human and animal population 3) Train local health workers on the use of the rapid tests as well as on Biosafety & Biosecurity 4) Strengthen the capacity of the laboratory at the Buta General Hospital in the analysis of samples from the Bas-Uéle province 2) The National Coordination Committee meeting - Situation in the field: ***Currently, there are no suspected cases***, 3 probable cases (2 in Nambwa and 1 in Ngayi) and 4 confirmed cases (all from Nambwa, 2 confirmed by real-time PCR and 2 by ELISA serology) - A total of 4 deaths have been registered: 3 from Nambwa (1 confirmed and 2 probable), and 1 probable from Ngayi - 72 contacts were removed from the contact trace list because laboratory results from suspected cases they were connected to turned out to be negative. - Free Medical care is currently being implemented in some of the health facilities in the Likati health zone as basic medical kits were distributed by WHO and UNICEF. It is reported that WHO will send 20 more basic medical kits to the area
5/06/2017	27	PREDICT Virologist attended the meeting of the commission of laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of Laboratory and Research - An additional sample from a suspected case that initially tested negative for Ebola virus genomic material by real-time PCR, on further testing was found to be positive by ELISA for IgG with a rising titer indicative of recent infection (1st sample tested negative, second sample tested IgG ++ and the third was IgG ++++). This case is now considered as the 5th confirmed case - The commission is developing a budget for post-epidemic surveillance - A meeting is planned to develop a coordination plan for the ecological study that will be conducted in the near future. - FAO has ordered lab reagents to be used in testing samples collected from pigs and goats at the Central Veterinary Lab. 2) National Coordination Committee Meeting - Currently, there are 5 confirmed cases and 3 probable. The 5th confirmed case initially tested negative by real-time PCR and is now test positive by ELISA with increasing anti-Ebola IgG antibody titers.

		- Of note is that the 5th case was the care-giver of the driver of the motorcycle who died after transporting the index case - The Commission for Laboratory and Research will organize a coordination meeting with all partners for the ecologic study in a few days. - It was mentioned that all partners ending their activities and leaving the outbreak zone should present a report of their support and an inventory of items they would like to leave in Likati
6/06/2017	28	PREDICT Virologist attended the meeting of the commission of laboratory and research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of Laboratory and Research - Two additional samples were received in Likati and will be tested for Ebola virus - The team in Buta also received 6 samples for hemoculture and testing is ongoing. The K-Plan lab in Buta will also be used to retest all samples that tested negative for Ebola virus in Likati - One sample was received at the INRB from Makota village in the Lomami province from a suspected case of Viral Hemorrhagic Fever and testing for Ebola virus is pending. - Professor Steve Ahuka from the INRB has been appointed as the coordinator for the ecological study. He will coordinate meetings with all partners proposed to engage in field ecology studies. - Dr. Gary Kobinger will return to Canada tomorrow. He has offered to train in his laboratory one staff member from INRB to perform whole genome sequencing of the Ebola virus from this outbreak. 2) National Coordination Committee Meeting - Situation in the field: 5 confirmed cases, 3 probable and 4 deaths - The confirmed survivor was removed from follow up for this outbreak. However, it was decided that he and the 3 probable cases will be checked regularly during the post-outbreak period. Blood and semen specimens (if possible) will be collected and tested by PCR. - A post-outbreak surveillance commission will be created with the objective of coordinating all activities after the end of the current outbreak - Moving forward, the National Coordination Committee will meet only once a week (on Fridays), but the commissions will be meeting daily maintaining contact with the field and report to the National Coordination Committee on Friday.
13/06/2017	35	PREDICT Virologist attended the meeting of the Commission of

		Laboratory and Research at INRB and the National Coordination Committee meeting at the MoH **(all items are informational and do not reflect PREDICT activities)**: 1) Meeting of the Commission of Laboratory and Research -The sample received at the INRB from Makota village in the Lomami province from a suspected case of Viral Hemorrhagic Fever tested negative for Ebola virus by OraSure rapid test and PCR. *Post-outbreak surveillance plan:* -Surveillance is planned to be conducted at least 3 months post-outbreak. -The Ebola virus rapid test kit will be used for testing of specimens from all persons with fever of unknown origin or deaths of unknown cause. Training materials and SOPs for the testing will be prepared and approved by the Commission before the 20th of June, 2017. -Blood and semen samples from confirmed cases will be tested by PCR (the protocol of study is being prepared). *Ecologic study:* -Only FAO and PREDICT have submitted their protocols to the Commission, the protocols from other partners is still pending. -The planning and coordination of field activities with different partners has not been finalized. Discussion on this is planed with members of different participating teams. -Each partner is expected to have a budget for field activities -The use of Ebola rapid tests for the testing of animal samples is under discussion The Commission of Laboratory and Research will meet only once a week (Thursdays) and will report the epidemiologic situation to National Coordination Committee on Friday 2) National Coordination Committee Meeting -The epidemiologic situation in the field remains unchanged: 5 confirmed cases, 3 probable and 4 deaths - Active search of suspected cases and door-to-door sensitization of the population is ongoing -Free health-care for suspected Ebola cases was implemented in the hospital in Likati -The K-plan mobile lab in Buta continues to be useful in the testing of specimens for bacteria and parasites

In-Country Government Outbreak or Health Event Points of Contact

Public Health ministry or department:	
Name:	Benoit Kebela Ilunga
Email:	kebelailunga@gmail.com
Mobile Phone:	243 (0)81 997 2691 | 243 (0)90 282 1986

Livestock ministry or department:	
Name:	Leopold Mulumba
Email:	Leopold_mulumba@yahoo.com
Mobile Phone:	243 (0)81 509 1448 | 243 (0)84 200 0178

Wildlife/Environment ministry or department:	
Name:	Jeff Mapilanga
Email:	jeffmapilanga@gmail.com
Mobile Phone:	243 (0)99 810 1924

OIE focal point:	
Name:	Honore N'Lemba Mabela
Email:	Dr_nlemba@yahoo.fr
Mobile Phone:	243 (0)81 512 6564 | 243 (0)99 990 2967

IHR focal point:	
Name:	Theophile Bokenge
Email:	drbokenge@yahoo.fr
Mobile Phone:	

FAO:	
Name:	Philippe Kone
Email:	Philippe.kone@fao.org
Mobile Phone:	243 (0)82 961 6580

WHO:	
Name:	Ernest Dabire
Email:	dabireer@who.int
Mobile Phone:	

EPT ONE HEALTH WORKFORCE Project:	
Name:	Diafuka Saila Ngita
Email:	Diafuka.saila_ngita@tufts.edu

v.16May2017

Mobile Phone:	243 (0)81 230 4310

EPT PREPAREDNESS and RESPONSE Project:	
Name:	
Email:	
Mobile Phone:	

Other Important Contacts:

Organization:	
Name:	
Email:	
Mobile Phone:	

Organization:	
Name:	
Email:	
Mobile Phone:	

Organization:	
Name:	
Email:	
Mobile Phone:	

Organization:	
Name:	
Email:	
Mobile Phone:	

Organization:	
Name:	
Email:	
Mobile Phone:	

From: Andrew Clements <aclements@usaid.gov>
Sent: Wed, 14 Jun 2017 17:58:05 +0200
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: PREDICTMGT <predictmgt@usaid.gov>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Sarah Paige <spaige@usaid.gov>, Angela Wang <awang@usaid.gov>

Thanks!

Andrew P. Clements, Ph.D.
Senior Scientific Adviser
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On Jun 14, 2017, at 4:28 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

> Please find attached this week's update and the answers to questions regarding the ecological studies.
> Brian is traveling, so you have me back in the reporting loop.
> Have a nice day,
> Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Tue, Jun 13, 2017 at 12:50 PM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>

Dear all,
Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 13th, 2017.
Hi Brian, coming back to your questions:

1. There are about 11 health areas within the outbreak zone. It is expected that each team (partner) will perform animal sampling in one or two health areas. PREDICT is invited to collect samples from PREDICT prioritized taxa (NHP, rodents and bats) and test these samples for prioritized PREDICT viral families.
2. No Coordination plan has been put in place as most partners have not even submitted their protocols.

Thanks for all the support let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD
Regional Coordinator /Central Africa
USAID PREDICT | Metabiota
Email: jayukekbong@metabiota.com
Mobile: +1 250-797-7755
Website: www.metabiota.com
Skype: ayukekbong.ayukepi

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Friday, June 9, 2017 5:04:20 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi James,

Do you have any more specifics on the exact request from the MoH regarding the ecological sampling? Has there been meetings to coordinate the multiple partners invited to submit proposals and plans to participate? Without more information, we don't have much to provide to USAID-Washington for the consideration and possible approval of the ecology activity.

Thanks!

-Brian

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Thursday, June 8, 2017 at 9:23 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you Brian for the edits.

Have a splendid evening,

J

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Thursday, June 8, 2017 6:37:58 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you, James, for this update from DRC. I am very, very happy to see that the outbreak continues to be quiet, and glad to read that there will be continued follow-up with the confirmed survivor and probable cases.

Just some minor edits for clarity.

Have a great evening!

-Brian

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Wednesday, June 7, 2017 at 1:23 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 6th, 2017.

Thanks for all the support let me know if you have any questions.

Kind regards,

J. A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Monday, June 5, 2017 4:23:30 PM
To: Brian Bird; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 5th, 2017.

Hi Brian, the specimens retested by IgG are the 4 specimens that we initially reported from the 31/05/2017 as positive for IgG. It is reported that 2 of these specimens specimens showed increased titers of IgG relative to the previously collected specimen's IgG titers.

Our team attending the national coordination meeting with seek more clarity on what specific support GoDRC is requesting from PREDICT. We however anticipate that wildlife samples collected by PREDICT will be tested in PREDICT lab.

Thanks for all the support and am happy to address other concerns.

Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Skype: ayukekbong.ayukepi

From: Brian Bird <bhbird@ucdavis.edu>
Sent: Monday, June 5, 2017 2:59:06 PM
To: James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly; Prime Mulembakani
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thank you, James and Prime, for the updated form and the clarifications on the field ecology activities.

Very happy that all PUIs have been removed from the contact trace. That's great news!!

In the report, I'm hoping you can help me understand better which specimens were retested by IgG by Gary Kobinger? The entry for 03 June indicates these were "Ebola negative samples", but I think that these were the 4 IgG positive cases that were mentioned and re-bled on 31 May 2017? Can you clarify that? Just want to have it correct for the record. I've modified the text in that section to not specify exactly while we await your clarification, and I tidied up the language about the paired-specimen testing/results/interpretation.

I will forward the additional information on to USAID-Washington for their consideration and approval for the field activities. For the possible ecology activity: It is still a bit confusing what exactly the GoDRC will need in terms of assistance from PREDICT specifically. It appears that there could still be many partners engaged on the same topic, for example sampling bats and rodents? Please keep us informed on the coordination meetings with the national committee this week. Perhaps then we will know more specifically what the government is requesting, and what is specifically expected from PREDICT?

If we are approved for the bat and rodent sampling activity in Bas Uele by USAID-Washington, where will the collected specimens be sent for testing? Has this been already decided by the MoH, or is that part of the discussions this week?

Thanks as always and I look forward to hearing more as you have meetings and get more information.

-b

From: James Ayukekbong <jayukekbong@metabiota.com>
Date: Monday, June 5, 2017 at 12:15 PM
To: Brian Bird <bhbird@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Damien Joly <djoly@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uéle Province in DRC as of June 3rd, 2017.

Prime earlier provided answers to specific questions raised by Brian.

Thanks for all the support.

Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

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From: Prime Mulembakani

Sent: Monday, June 5, 2017 5:43:05 AM
To: Brian Bird; James Ayukekbong; Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi Brian,

And thank you for your edits to the form!

Here are my answers to your questions:

1. Yes, all other partners have received the same letter; the INRB will coordinate all actions on the field. We have submitted our PREDICT modules to the vommission and all partners were requested to do the same thing. We will let you know how this will be operationalized. However we have restricted our intervention to sample collection from rodents and bats (by trapping or opportunistic from hunted/sold animals from markets and non-human primates (hunted or kept as pets) according to PREDICT protocols.

2. The activity is going to be coordinated through the commidsion of laboratory and research. Coordination meetings will be held this week.

3. Once the plan has been approved by the national coordination committee (led by yhe Minister of Health), all staffs involved will be recommanded by the moH to use either UN or ECHO flights as available. Also each partner involved will be asked to participate financially to support flight tickets from kinshasa to kisangani and renting of vehicles and motorcycles.

As for us we are planning to work for a maximum of 10 days and we will bring a dry shipper with liquid nitrogen, as well as a portable minus 80 freezer with a small generator for power supply (as we did in isiro).

We will keep you posted.

Thank you,

Prime

Prime M. Mulembakani, MD, MPH
Country Coordinator, PREDICT | METABIOTA
Democratic Republic of Congo
Ph/243 81 013 8305-243 99 340 4083

From: Brian Bird
Sent: Saturday, June 3, 04:40
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: James Ayukekbong, Jonna Mazet
Cc: Tracey Goldstein, Eddy Rubin, Karen Saylors, PREDICT-outbreak, Maria Makuwa, Prime Mulembakani, Damien Joly

Hi James,

I am handling the correspondence for this outbreak while Jonna is in transit. I have added a small update to the Outbreak form you sent (just to indicate receipt of the official assistance request).

I have forwarded your outbreak form and the request to USAID-DC for their consideration and approval. Jonna may have other comments/concerns when she lands and gets back on line from Tanzania.

Regarding the field ecology investigations: In the reports on 30 May and again on 31 May it is mentioned that multiple partners may be invited to conduct ecological investigations (PREDICT, FAO, CIRMF, NIH, Robert Koch… etc, etc,) do you know if ***ALL*** of these partners also received the invitation letter to conduct ecological investigations? If so then there should be some kind of coordination amongst the 9 or more institutions mentioned in the outbreak investigation form??

Can you please clarify if this activity is being coordinated through the EOC or MoH etc?

Another concern from a practical standpoint will be, if approved, how will the field teams reach the outbreak site and conduct activities safely while maintaining supplies, specimens, cold chain etc? I was at Isiro in 2012, and that region of the country has its own special challenges for sure. I'm confident the team can handle those, but just want to jump start the discussions related to the preparation process.

All the best to you, Prime, and the DRC team!

-Brian

Brian H. Bird DVM, MSPH, PhD

One Health Institute

1089 Veterinary Medicine Dr.

School of Veterinary Medicine

University of California, Davis

bhbird@ucdavis.edu

From: <predict-outbreak-request@ucdavis.edu> on behalf of James Ayukekbong <jayukekbong@metabiota.com>
Date: Friday, June 2, 2017 at 3:32 PM
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Tracey Goldstein <tgoldstein@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen Saylors <ksaylors@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>, Prime Mulembakani <pmulembakani@metabiota.com>, Damien Joly <djoly@metabiota.com>
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of June 1st, 2017.

Of note is that the current number of suspected cases has dropped to 8, suggesting that the end of the outbreak is near.

Also, attached is a formal request from the INRB (on behalf of the gov't) to perform ecological studies in Likati, Bas Uele Province.

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Skype: ayukekbong.ayukepi

From: [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 31, 2017 7:34:47 PM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

No problem at all -- every other day os fine unless we have substantive updates.

Appreciate the effort,

Jonna

On Wed, May 31, 2017 at 5:00 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 31st, 2017.
>
> Sorry for merging the update of both 30th and 31st May together as I have been on flights from DRC within the last 24 hours.
>
> Please let me know if you have any questions.
>
> Kind regards,
>
> **J.A Ayukekbong, PhD**
>
> **Regional Coordinator /Central Africa**

USAID PREDICT | Metabiota

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From: James Ayukekbong
Sent: Tuesday, May 30, 2017 11:46:01 PM
To: Jonna Mazet
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear Jonna,

Yes, I do agree with you that considering the high rate of negative results from persons with Ebola-like symptoms, testing these samples on PREDICT panel will surely reveal some interesting findings on the etiology.

We will inform the commission on our desire to assist on this as well as technical support on ecological studies.

Thank you.

Kind regards,

J

From: [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Tuesday, May 30, 2017 4:35:40 PM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, James,

We should probably reach out at this point and offer assistance testing the negatives, as well as technical assistance for the ecological studies.

Please advise if you agree or disagree. If you agree, please pass on the desire to offer support to our team members attending meetings.

Appreciate all of the good information,

Jonna

On Mon, May 29, 2017 at 5:09 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 29th, 2017
>
> There are currently 19 suspected cases, 2 confirmed and 4 deaths.
>
> Please let me know if you have any questions.

Kind regards,

J. Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Skype: ayukekbong.ayukepi

From: [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Monday, May 29, 2017 9:28:28 AM
To: James Ayukekbong
Cc: Tracey Goldstein; Eddy Rubin; Karen Saylors; PREDICT-outbreak; Maria Makuwa; Prime Mulembakani; Damien Joly

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, James,

Jonna

On Monday, May 29, 2017, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 27th, 2017

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Friday, May 26, 2017 4:46:47 AM
To: Tracey Goldstein; Jonna Mazet; Eddy Rubin; Karen Saylors; PREDICT-outbreak
Cc: Maria Makuwa; Prime Mulembakani; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Dear all,

Find attached the update of Ebola Virus Disease outbreak in the Bas-Uele Province in DRC as of May 25th, 2017

Please let me know if you have any questions.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: James Ayukekbong
Sent: Friday, May 26, 2017 1:31:37 AM
To: Tracey Goldstein

Cc: Jonna Mazet; Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Hi Tracey,

This is correct, thanks.

We wait for the request and or approval to do further PREDICT viral family testing.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: [redacted] on behalf of Tracey Goldstein <tgoldstein@ucdavis.edu>
Sent: Thursday, May 25, 2017 10:57:36 AM
To: James Ayukekbong

Cc: Jonna Mazet; Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update

Hello James,

Thank you for the protocol!

It looks like the RNA is inactivated and then extracted with the Qiagen kit, and they end up with ~50ul RNA after extraction. They are only using 5ul RNA for the Ebola testing, so there should be plenty of sample left to do PREDICT testing.

If asked to do the testing, we would need 8ul RNA to make cDNA the normal way we do with Superscript, and the the samples can be used for the PREDICT viral family testing.

Hope this helps,

Best Tracey

On Thu, May 25, 2017 at 1:55 AM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Hi Tracey,
>
> Attached is the protocol for suspected Ebola sample inactivation and handling use by the INRB.
>
> PREDICT would have access to sample aliquot at INRB if we are requested and approve to do the testing.
>
> Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: REDACTED REDACTED on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 24, 2017 5:06:07 PM

To: James Ayukekbong
Cc: Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Thanks, James -- probably worth having our team ask the question, so we can plan and also suggest which aliquot and transport medium would likely be used or possible for our testing in an upcoming meeting or through a mechanism you all suggest.

Jonna

On Wed, May 24, 2017 at 4:48 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

Dear Jonna,

We were earlier told verbally in a meeting that a request may be made for PREDICT to test all outbreak samples (including negatives) using PREDICT panel. We have not received any official request yet.

The only samples tested by PREDICT so far are the initial set of 5 samples that 2 were positive by the INRB real-time PCR protocol and one was confirmed positive by PREDICT Filovirus assay.

With the new direction of the coordination committee, we are not currently testing any samples in the PREDICT lab. Testing is being done in the field and aliquots to INRB for storage.

However, the mobile lab bought with PREDICT USAID funds is being used in the field for testing by INRB staff who have received training from PREDICT.

Please let me know if you have others concerns, thanks.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

Email: jayukekbong@metabiota.com

Mobile: +1 250-797-7755

Website: www.metabiota.com

Skype: ayukekbong.ayukepi

From: [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Wednesday, May 24, 2017 4:25:18 PM
To: James Ayukekbong
Cc: Maria Makuwa; Prime Mulembakani; Karen Saylors; Eddy Rubin; PREDICT-outbreak; Damien Joly

Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Dear James,

Thanks for the update & for adding the clarifying formatting note -- just one question:

We have reported that we have been requested to test the samples. Your report today indicates that 4 aliquots will be made. Which one will we test (if any). If we will no longer be testing, we need to report that.

Once I have that info -- I will send your report forward.

Hope you have a good night,

Jonna

On Tue, May 23, 2017 at 11:59 PM, James Ayukekbong <jayukekbong@metabiota.com> wrote:

> Dear all,
>
> Find attached the update of Ebola Virus Disease Outbreak in the Bas-Uele province, DRC as of May 23, 2017.
>
> Please let me know if you have any questions.
>
> Kind regards,
>
> **J. Ayukekbong, PhD**
>
> **Regional Coordinator /Central Africa**
>
> **USAID PREDICT | Metabiota**
>
> **Email: jayukekbong@metabiota.com**
>
> **Mobile: +1 250-797-7755**
>
> **Website: www.metabiota.com**
>
> **Skype: ayukekbong.ayukepi**
>
>

From: [redacted] [redacted] on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Sent: Tuesday, May 23, 2017 3:19:14 PM
To: James Ayukekbong; Maria Makuwa; Prime Mulembakani; Karen Saylors
Cc: Eddy Rubin; PREDICT-outbreak; Damien Joly
Subject: Fwd: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update

Hi Team, not sure if this request below from Andrew is reasonable or possible -- if so, maybe you could get the clarity in your meetings and report accordingly. If not, we should likely just stop reporting on testing that we aren't doing. In other words -- only include Predict testing in the daily reports.

Remember, do not include results in the reports until you have cleared those data through your lab lead, the lab team, and your country reviewers/release process. The lab team stands ready on a short timeline, just as I am doing with these daily reports.

In the short-term that would mean that you report meeting informational items (without testing) in one section with a paragraph separation space and then report on Predict activities, including # samples received and, when ready, # samples tested, but no results until cleared through our process.

Thanks,

Jonna

---------- Forwarded message ----------
From: **Andrew Clements** <aclements@usaid.gov>
Date: Tue, May 23, 2017 at 12:04 PM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province -update
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: PREDICTMGT <predictmgt@usaid.gov>, Angela Wang <awang@usaid.gov>, Sarah Paige <spaige@usaid.gov>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>

Thanks, Jonna.

Is it possible for more precise terminology to be used in these reports regarding the samples tested? (Possibly not if the government is providing the information in a specific way.) I find it confusing for the reporting to mention number of samples collected and tested without any reference to how many cases these samples have come from. Is it as simple as "1 sample tested" = "1 case"? Or is that not necessarily the case?

Andrew P. Clements, Ph.D.

Senior Scientific Adviser

Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health

U.S. Agency for International Development

Mobile phone: 1-571-345-4253

Email: aclements@usaid.gov

On May 23, 2017, at 6:59 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Current update attached.

Have a nice day,

Jonna

On Sun, May 21, 2017 at 1:38 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

> Please see below and attached regarding what has been requested of Predict and what we believe we can offer. Note that we are concerned about both cold chain and the media into which samples are being collected in the field. We can test the samples, but there will likely be a reduction in sample quality that may impact analysis.

We will keep you posted, but please let us know if you have questions that we should pass to the in-country team.

Have a nice day,

Jonna

---------- Forwarded message ----------
From: **James Ayukekbong** <jayukekbong@metabiota.com>
Date: Sun, May 21, 2017 at 7:37 AM
Subject: Re: [predict] [predict-outbreak] Ebola Virus Disease Outbreak in the Bas-Uele province - update
To: Jonna Mazet <jkmazet@ucdavis.edu>, Maria Makuwa <mmakuwa@metabiota.com>
Cc: Prime Mulembakani <pmulembakani@metabiota.com>, PREDICT-outbreak <predict-outbreak@ucdavis.edu>, Brian Bird <bhbird@ucdavis.edu>, Eddy Rubin <erubin@metabiota.com>, Karen

Saylors <ksaylors@metabiota.com>, Damien Joly <djoly@metabiota.com>

Dear all,

Find attached the updated PREDICT Outbreak Rapid Report form regarding the current Ebola outbreak in DRC.

We are told the Minister of health would sign an official request for PREDICT to perform the following;

- To conduct a joined ecological research with FAO to look for Ebola virus among wild and domestic

animals in Likati.

- To test all samples (including negatives) from these outbreak with the PREDICT panel.

Kind regards,

J.A Ayukekbong, PhD

Regional Coordinator /Central Africa

USAID PREDICT | Metabiota

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Mobile: +1 250-797-7755

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Skype: ayukekbong.ayukepi

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You received this message because you are subscribed to the Google Groups "PREDICTMGT" group.
To unsubscribe from this group and stop receiving emails from it, send an email to predictmgt+unsubscribe@usaid.gov.
To post to this group, send email to predictmgt@usaid.gov.
To view this discussion on the web visit https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/CAO5tDrG__JOzkWdNh%2Bk6eFkbshtA%2BWBVF4dejX5U7Xeyki9GfQ%40mail.gmail.com.

<PREDICT-DRC_EVD Outbreak Bas-Uele 22May2017.doc>

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Tracey Goldstein, PhD
One Health Institute
School of Veterinary Medicine
University of California
Davis, CA 95616
Phone: (530) 752-0412
Fax: (530) 752-3318
E-mail: tgoldstein@ucdavis.edu

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<PREDICT-DRC_EVD Outbreak Bas-Uele13June2017_bb.doc>

From: Cara Chrisman <cchrisman@usaid.gov>
Sent: Thu, 22 Jun 2017 13:12:08 -0400
Subject: Re: Reminder: GVP Call (in 15 min)
To: Eddy Rubin <erubin@metabiota.com>, Nathan Wolfe <nwolfe@metabiota.com>, Jonna Mazet <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Brooke Watson <watson@ecohealthalliance.org>, REDACTED
REDACTED
Cc: Dennis Carroll <dcarroll@usaid.gov>

GVP Pitch Deck.mini.6.22.17.SUMMER.pptx

let's see if this is any better

If not, also put it here: https://drive.google.com/drive/folders/0B8zuHKkwwXSAUWoxRXY2TVNIOWM

Cara J. Chrisman, PhD
Senior Infectious Diseases Technical Advisor
Emerging Threats Division
Office of Infectious Disease
Bureau for Global Health
U.S. Agency for International Development (USAID)

Desk: (202) 712-1161
Cell: REDACTED
E-mail: cchrisman@usaid.gov

On Thu, Jun 22, 2017 at 12:47 PM, Cara Chrisman <cchrisman@usaid.gov> wrote:

Hi All,
We'll plan to spend the bulk of the meeting discussing:

- Pitch Deck (including Brooke's updates. We'll save the presentation for another day)
- Outreach (including London updates, Eri's suggestions, Thailand)
- AOB

Please find attached an updated version of the pitch deck.

Best,
Cara

Cara J. Chrisman, PhD
Senior Infectious Diseases Technical Advisor
Emerging Threats Division
Office of Infectious Disease
Bureau for Global Health
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Desk: (202) 712-1161
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E-mail: cchrisman@usaid.gov

GVP Pitch Deck.mini.6.22.17.SUMMER.pptx

From:	David J Wolking <djwolking@ucdavis.edu>
To:	Prof. Jonna Mazet <jkmazet@ucdavis.edu>;Peter Daszak <daszak@ecohealthalliance.org>;Kevin Olival <Olival@ecohealthalliance.org>;William Karesh <karesh@ecohealthalliance.org>;Catherine Machalaba <Machalaba@ecohealthalliance.org>;Leilani Francisco <francisco@ecohealthalliance.org>;Karen Saylors <ksaylors@metabiota.com>;Prof. Woutrina Smith <wasmith@ucdavis.edu>;Brian Bird <bhbird@ucdavis.edu>;Damien Joly <djoly@metabiota.com>;Tammie O'Rourke <torourke@metabiota.com>;Tracey Goldstein <tgoldstein@ucdavis.edu>;Christine Kreuder Johnson <ckjohnson@ucdavis.edu>;Simon Anthony <sja2127@columbia.edu>;Eddy Rubin <erubin@metabiota.com>
CC:	Alison Andre <andre@ecohealthalliance.org>;Evelyn Luciano <luciano@ecohealthalliance.org>;Elizabeth Leasure <ealeasure@ucdavis.edu>;Beth Edison <bedison@metabiota.com>;Megan Doyle <mmdoyle@ucdavis.edu>;Amanda Andre <amanda.andre@ecohealthalliance.org>;Taylor Elnicki <telnicki@metabiota.com>;predict@ucdavis.edu <predict@ucdavis.edu>;Brooke Genovese <bgenovese@ucdavis.edu>;Molly Turner <turner@ecohealthalliance.org>;Ava Sullivan <sullivan@ecohealthalliance.org>;Murray, Suzan <MurrayS@si.edu>;Amanda Fine <afine@wcs.org>
Sent:	7/26/2017 12:04:11 PM
Subject:	Action required: PREDICT Y4 Global Workplan - Due to UCD Friday August 4th

Hi there,

It's that time of year again, workplan time!

The last two year's workplan development process seemed to work pretty well (at leas for the global team) so there are no major changes going forward. Hopefully that means this process is not time intensive either as we are already down to the wire for development and submission timeline (see instructions below).

I'm attaching the Year 4 Global Template and instructions here (action required). I'm also attaching the preliminary draft of the All-country workplan for reference (no action required).

Operational leads are responsible for returning their sections of the global workplan to UC Davis on Friday August 4th. As in previous years, I will use the updated and consolidated content from this Global workplan to finalize the All-country workplan.

A separate email will be shared very soon with country leads and will include the preliminary draft of the All-country workplan and an updated template for the Country Briefs. There is also a new USAID-generated template this year for Phase 1 GHSA countries, but I'm still working on that with the USAID/W team and will share separate instructions and that template when approved and available.

Happy to answer questions at any time and thanks in advance for your excellent work and contributions!

Best,

David

YEAR 4 GLOBAL WORKPLAN INSTRUCTIONS

This Year 4 Global workplan template is designed to capture activities and expected outcomes at the global level.

What about the All-country plan and Country Briefs?

A draft of the Year 4 *All-country plan* (see attached) will be shared with country teams separately to allow sufficient time for review and comment and to inform the development of country-specific plans (*Country Briefs*). Upon receipt of global-level content from operational leads, UC Davis will review and refine the draft *All-country workplan* and communicate any changes to country teams to facilitate county-level updates or revisions of the Briefs (if necessary).

Global workplan instructions:

As with last year's process, this template is based the Year 3 workplan describing Objectives and Activities. Also as in previous years, objectives and activities have been assigned to operational leads ***(highlighted in green)*** for content compilation.

Operational leads are responsible for coordination with consortium partners for completion. Workplan development is intended as a collaborative process, so please communicate with operational team members across consortium partners for content development.

Please update content with planned activities for Year 4 only. For quick reference, activities from the Year 3 workplan are included in blue font.

Do not mention your organization's name or acronym in the document unless absolutely essential for understanding a specific point. USAID considers all of us "PREDICT". Similarly, activities need not be attributed to individuals by name or title.

BE BRIEF AND CONCISE. Only list significant plans or items of specific interest for each objective and activity/sub-activity.

Timeline (reminders will be shared for all deadlines as they draw near):

- **Global workplan content from operational leads will be due to UC Davis HQ on Friday August 4th**
- Country Briefs (based on the draft All-country workplan) will also be due to HQ on August 4th
- GHSA Phase 1 workplan instructions will be shared separately along with the new and improved template; GHSA workplans will be due to HQ Friday August 11th with the week of August 14th reserved for HQ review and finalization.

YEAR 4 GLOBAL WORKPLAN INSTRUCTIONS

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Global workplan instructions:
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BE BRIEF AND CONCISE. Only list significant plans or items of specific interest for each objective and activity/sub-activity.

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PREDICT-2 GLOBAL Workplan (October 2017-September 2018)

USAID/PREDICT is supporting the Global Health Security Agenda (GHSA) by training and facilitating One Health teams to conduct zoonotic disease sampling and laboratory detection for known and novel viral threats and by working with in-country government partners to strengthen multi-sectoral partnerships and platforms that enable rapid detection and response to zoonotic pathogens spilling over from animals to people.

PREDICT's Global Workplan is a comprehensive list of activities and outcomes expected from collaborative efforts from PREDICT's extensive and unified (country-level and global) team. Specific country-level activities and additional details are provided in the companion GHSA country workplans (separate Excel template), the PREDICT All-country workplan, and the Country Briefs that follow. The Global and All-Country workplans are key requirements of PREDICT's Cooperative Agreement with USAID. These portions of the package also serve as guidance documents for all global and country activities to ensure the standardization of methods and resulting data for the cross-country and global analyses necessary to use the information most effectively to promote and protect global health.

GHSA Phase 1 countries are supported to complete most activities using Ebola funds. However, some important activities are supported through USAID core funds, as they may otherwise expand the overall scope of activities beyond current-year GHSA milestones. These are noted where appropriate.

Some global-level objectives and activities may not be fully achievable in 2017-2018, as activities will begin but take more than one year to complete. These activities are noted at the objective, activity, or sub-activity level as appropriate.

Objective 1: Characterizing Biological and Ecological Risk of Zoonotic Disease Threats

Identify the biological and ecological drivers and host-pathogen dynamics at high-risk interfaces in Asia and Africa.

Activity 1.1. Targeted sampling for zoonotic viruses with pandemic potential at specific high-risk interfaces

Conduct sampling for zoonotic viruses in collaboration with in-country and EPT partners (CDC, WHO, and FAO, etc.) at field sites most reflective of the processes underlying pathways for viral evolution, spillover, amplification, and spread.

Sub-activity 1.1.1. Identifying and characterizing pathways, epizones, and surveillance priorities for viruses with pandemic potential. . (Chris, Peter, Simon, Tracey)

- Further refine prioritization of wildlife and livestock host taxa for sampling and surveillance using species-level data on viral spillover risk, local information on human-animal interaction, and species occurrence at high-risk interfaces and disease emergence pathways.
- Optimize methods to investigate disease transmission among wildlife, livestock, and at-risk human populations and improve standardized protocols to collect data to assist in characterization of disease transmission interfaces and epizones.
- Together with EPT and country partners, continue to prioritize sampling activities, partnerships, and locations in areas of new engagement.
- Continue to explore animal movements, migrations, and value chains, in coordination with EPT and in-country partners, to refine targeted opportunities for surveillance and improve understanding of epizones for pathogens of significance.
- Refine spatial models to map geographic epizones for viruses of concern using data from host-virus associations to guide sampling and surveillance priorities and analytical approach.
- Use existing data to refine sampling strategies and prioritize potential zoonotic viral reservoirs, including potential ebolavirus hosts (see activity 1.6 below).

Expected Outcomes: Optimized sampling and surveillance priorities for identification and characterization of pathways for disease emergence and epizones; coordinated sampling activities with collaborative EPT partners, platforms, and networks.

Sub-Activity 1.1.2. Standardized, concurrent, and selectively longitudinal sampling of wildlife, livestock, and at-risk human populations with high levels of contact with animals. (Chris)

- Coordinate field activities across EPT countries through frequent meetings with regional and operational leads (behavior, laboratory, capacity building, information management, and modeling and analytics) for integration of expertise into sampling and surveillance design and implementation.
- Continue to develop, optimize, and amend protocols for the ethical conduct of research involving humans (IRB) and animals (IACUC).
- Ensure compliance with all permits and protocols, including locally approved protocols and permissions needed for sampling activities, site access, data collection, and diagnostic testing.
- Ensure adherence to national requirements for data and sample sharing and international standards and regulations for disease notification.

- Implement concurrent synchronized sampling of animals and humans using standardized field protocols, data collection tools, and diagnostic testing protocols across wildlife and at-risk human populations in high-risk communities to document sharing of viruses within and between species; identify high-risk interfaces and pathways for disease emergence; and enable standardized biological, behavioral, and ecological risk characterization.
- Implement syndromic surveillance among patients with undifferentiated or undiagnosed acute fevers of likely viral origin meeting standardized clinical case definitions in collaboration with clinics and hospitals in the catchment of high-risk communities targeted for concurrent surveillance.
- Continue to coordinate with FAO at global, regional, and country level to collaborate on concurrent synchronized sampling of livestock species at prioritized sites with respect to sample collection, sample and data handling, and viral detection and characterization protocols.

Expected Outcomes: Coordinated concurrent and effective sampling activities, including standardized data collection for wildlife, livestock, and at-risk human populations (where feasible) for monitoring of viral threats and investigation of viruses with pandemic potential at high-risk interfaces; known and novel pathogens associated with diseases of unknown origin, including severe acute respiratory infections, acute encephalitis, and influenza-like illnesses detected and identified.

Activity 1.2. Characterizing Risk
Collect standardized data at regular intervals on epidemiological and ecological factors identified as important drivers of pandemic risk, identify and characterize epizones for pandemic risk, and develop actionable surveillance improvements and risk mitigation strategies.

This activity is included for completeness, but some sub-activities may not be achievable in Year 4.

***Not a GHSA funded activity.*

Sub-Activity 1.2.1. Ranking of high-risk interfaces and identification of key processes influencing evolution, spillover, amplification, and spread of viral threats. (Chris)

- Continue to optimize sampling and data collection protocols and tools for standardized characterization of animal-human contact and high-risk interfaces that articulate human-animal contact and produce data on human activities and epidemiologic conditions associated with transmission of viruses between animals and humans at surveillance sites.
- Where feasible, use standardized questionnaires to collect quantitative data on human activities and behaviors underlying high-risk interfaces.

- **Develop methods to summarize PREDICT data as available and integrate with published data on known zoonotic viruses to identify high-risk interfaces, ecological conditions, and key epidemiological processes influencing evolution, spillover, amplification, and spread of viral threats to guide surveillance.
- **Characterize risk of viral spillover and spread for all PREDICT-detected viruses using associated virological, epidemiological, and ecological data.
- **As data on viruses in animal and human hosts become available (through the project and from other sources), develop methods to characterize virus host plasticity and cross-species disease transmission; rank high-risk interfaces; and model specific emergence, amplification, and spread for potential zoonotic and pandemic viral threats.

  Expected Outcomes: Establishment of standardized epidemiologic approaches and protocols for characterizing and ranking high-risk viruses and interfaces to understand processes influencing viral evolution, spillover, amplification, and spread.

Sub-activity 1.2.2. Characterizing ecological risk and predicting spillover: advancing the knowledge of how ecological factors, demographic and other socioeconomic changes, agricultural and wildlife-use trends, host life history, viral diversity, and human behavior influence the likelihood of heightened viral evolution, spillover, amplification, and spread. (*Chris, Peter, Leilani*)

- **Integrate biological and behavioral surveillance data from PREDICT to-date into models on an ongoing basis and as appropriate.
- **As human questionnaire data become available, summarize behavior data with particular relevance to spillover (e.g., human-animal contact) and spread mechanisms (e.g., human movement patterns).
- **Continue to collaboratively develop, collate, and refine the methods, data sources/sets, and models (e.g., on land-use change; ecological, socioeconomic, and other demographic changes; agricultural trends; livestock production systems; value chains; climate variability; etc.) needed to characterize risk and predict spillover for each disease emergence pathway.
- **Continue to develop spatial analytical methods for mapping fine-scale spillover risk from wildlife to livestock for specific zoonotic viruses and hosts.
- **Continue to update all known mammalian virus-host associations using data available from published literature to date.
- **Develop framework and analyze projected changes to future EID hotspots with respect to recent trends and modeled forecasts of known EID drivers.
- **Analyze models of disease risk attributed to high-risk pathogens considering different livestock production scenarios under the African Sustainable Livestock 2050 project in collaboration with EPT partners, as well as under anticipated scenarios for changing land use, travel, and trade.

- **Continue analyses of global and local travel and risk of pandemic spread and validate models with data from past disease emergence events.
- **Develop a spatial model to examine the role of conflict and political instability as drivers of EIDs.
- **Identify epizones for high-risk priority viruses, based on modeled wildlife reservoir distributions and relevant EID drivers, building on previous PREDICT models for Ebola and MERS-CoV.
- **Develop and refine dynamic models (e.g. SIR models) for high-risk pathogens in animal reservoir populations and parameterize with field data.
- **Model the zoonotic potential of viruses in high-priority viral families using a combination of viral traits and host and environmental associations.
- **Characterize and quantify risk pathways for Ebola virus disease emergence and spread.
- **Examine the spatial relationship between global antibiotic use and antimicrobial resistance (AMR) using past global AMR emergence events.
- **Using antimicrobial resistance as a model for pathogen emergence, develop techniques that will assist in detecting emergence and spread and targeting potential policy interventions.

Expected Outcomes: Exploration and analysis of datasets needed to characterize ecological, demographic, and socio-economic factors to inform and prioritize surveillance activities; development of novel modeling and analytical approaches to forecast future changes in EID drivers, examine new socio-economic factors, and map the risk of pathogen emergence, including AMR; integration of human behavioral data into models; development and testing of models for characterizing ecological risk and predicting spillover of viruses from animals to humans; identification of epizones for key zoonotic viral groups; maps of national and international EID risk for spillover, amplification, and spread.

Sub-activity 1.2.3. Mapping viral diversity and evolution: analyzing global viral diversity and viral phylogeography to better understand the rules governing pandemic viral risk, how viruses evolve within emergence pathways, and which viral clades are more likely to spillover in which host species assemblages. (Peter, Chris, Tracey, and Simon)

- **Analyze PREDICT data to examine proportion of viruses likely present that were detected in each country (or epizone) and to predict underlying viral diversity in each country, with controls for sampling effort.
- **Continue co-evolutionary analyses of hosts and high-priority viruses to examine potential for cross-species transmission and human spillover.
- **Continue to map viral sharing among host assemblages and evaluate viral diversity using network analysis to examine linkages among host taxa, emergence pathways, and epizones.

Expected Outcomes: Novel approaches to map viral diversity and evolution and forecast disease emergence.

Sub-activity 1.2.4. Developing actionable surveillance improvements and risk mitigation strategies: using modeling and other analytics to evaluate optimal surveillance strategies for biological and behavioral data collection. (Chris, Peter, Leilani)

- **Evaluate data on shared viruses, including host traits, phylogeny, and recognized spillover and ecological risk characteristics, to prioritize animal taxa and identify important 'outlier taxa' for surveillance while maintaining consistency in standardized data collection.
- **Continue and refine cost-benefit analyses and scenario testing, as data become available, to evaluate different intervention strategies.
- **Analyze completed qualitative data from six countries to identify policy and intervention implications.
- **As surveillance, behavioral, and ecological data become available, identify specific risk mitigation and intervention strategies in target countries to prevent viral pathogen spillover at identified high-risk interfaces.
- **Collect baseline data on barriers to implementation of intervention strategies and evaluate risk mitigation models.

Expected Outcomes: Iteratively optimized strategies and prioritization for surveillance and identification of potential targets for mitigation of spillover of viruses from animals to humans.

Activity 1.3. Potential pathogen detection and discovery and longitudinal monitoring of potential pathogens to track changes in geographic and host distribution, genetic sequences, transmissibility, infectivity, and evolution

This activity is included for completeness, but some sub-activities may not be achievable in Year 3.

***Not a GHSA funded activity.*

Sub-activity 1.3.1. Pathogen detection and discovery. (Tracey and Simon)

- Continue to implement strategy to test prioritized sample types to facilitate detection of viral sharing and/or spillover among humans and animals based on: i) evidence of direct or indirect contact between people, livestock, and wildlife; and ii) likely route of transmission, using data available to date and analyzed by viral family, transmission interface, and specimen type.
- Implement standardized testing of samples collected across interface, specimen type, host taxa, and region with laboratories ready to start testing priority viral families (influenza, paramyxovirus, coronavirus, filovirus, and flavivirus when feasible) and adding additional families (retrovirus,

arenavirus, bunyavirus, reovirus, rhabdovirus, picornavirus, alphavirus) to reflect regional priorities and viral diversity based on data available to date.
- As data become available, coordinate with government partners and national and international reporting authorities to inform on the detection of viruses in animals and humans.

Expected Outcomes: Implemented plan for standardized testing of samples collected across interfaces, specimen types, host taxa, and regions; detection of virus from prioritized specimens originating within specified pathways for emergence; and potential discovery of novel viruses from different hosts and sample types.

Sub-activity 1.3.2. Deploying serology to characterize exposure in human and animal populations and detect spillover. (Tracey and Simon)

- Identify appropriate viral targets for serologic assay development (e.g. ebolavirus serology).
- Continue working with partner laboratories to select appropriate platforms (e.g., serum neutralization, ELISA, Luminex) and to develop plans to perform assay development.
- Following their development, optimize and evaluate serologic assay(s) for the testing of field samples, including the generation or acquisition of appropriate positive/negative controls.
- Develop and implement ebolavirus serology to assist in identification of ebolavirus reservoirs and spillover hosts in Sierra Leone, Liberia and Guinea (see Activity 1.6).
- Develop a training and distribution plan to implement serologic assay(s) in participating in-country collaborating laboratories.

Expected Outcomes: Appropriate viral targets identified for serologic assay development and appropriate platforms and laboratories selected for assay development, optimization, and testing.

Sub-Activity 1.3.3. Expanding characterization of viruses to better understand pandemic potential, geographic and host distribution, and genetic diversity. (Tracey, Simon, Chris, Jonna, Peter)

- Identify viruses for further characterization (e.g., full genome sequencing, virus isolation, identification of human receptor binding) and follow-up investigations into pathogenicity and host range.
- Continue to identify laboratories and identify and acquire samples for further characterization according to a reasonable timeline.
- **Complete coronavirus pilot project to develop a set of primers for full-genome characterization of any new coronavirus in-country by PCR as a first step towards developing the capacity to fully characterize viruses discovered with PREDICT protocols.

- Complete the genome sequencing of prioritized coronaviruses and compare the spike protein sequences and structure of receptor binding sites to better understand mechanisms facilitating host sharing of viruses.
- Complete full genome sequencing of the influenza viruses identified by PREDICT to date for comparison to other subtypes.
- Complete full genome sequencing of targeted paramyxoviruses identified in a subset of countries.
- **Develop reverse genetics system to further characterize detected paramyxoviruses.

Expected Outcomes: Refined plan to prioritize samples for follow-up virus characterization; full genome characterization of prioritized viruses.

Activity 1.4 Advancing pathogen characterization

Sub-activity 1.4.1. Tiered approach to detecting, characterizing, and identifying disease associations with bacterial pathogens. (Tracey and Simon)

- **Select appropriate, available assays for detection of bacterial genes.
- Pilot appropriate assays for limited antimicrobial resistance detection.
- Develop training plan to implement testing for bacterial pathogens in in-country collaborating laboratories.
- **Identify appropriate methods (e.g., pathology, in-situ hybridization, immunohistochemistry, serology) to link bacterial infections with illness to begin to evaluate causation.

Expected Outcomes: Appropriate optimized assays for bacterial gene detection and antimicrobial resistance; plan for training and implementation with in-country partners.

Sub-Activity 1.4.2. Mainstreaming testing protocols and comparing speed and cost-effectiveness of viral family screening approaches with standard methods. (Tracey, Simon, Billy)

- Continue to work with FAO to partner with national veterinary laboratories to test livestock samples with viral screening protocols.
- **Assess the utility and cost-effectiveness of PREDICT protocols to detect known and new viruses in livestock samples in FAO collaborating laboratories.
- Assess capacity to conduct PREDICT viral family testing in other national laboratories (e.g., public health laboratories) in collaboration with appropriate ministries, WHO, and CDC.

Expected Outcomes: Strategy for collaborative implementation and assessment of PREDICT viral family protocols for livestock and human

samples to guide decision making and planning for wider implementation; comparable test result data across host taxa for targeted viral families.

Activity 1.5. Assisting host country partners in outbreaks

Sub-activity 1.5.1. Strengthening existing relationships with host country governments and building partnerships to increase synergies between national task force and response planners and project teams. (Billy, Brian)

- Continue to coordinate with ministries and EPT partners on technical recommendations that could be provided to national task forces, One Health platforms, and GHSA partners for optimizing outbreak response.
- Continue to evaluate broad categories of partners involved to date and to identify major areas where global and in-country partnerships might be strengthened in both the short-term and long-term.

Expected Outcomes: Expanded network of professionals available that can be utilized to support outbreak response capacity and collaborations across episodes.

Sub-activity 1.5.2. Training, equipping, and supplying project teams to ensure a constant state of preparedness for contributing technically and substantively to focused outbreak response. (Woutrina, Brian)

- Coordinate with technical partners (e.g., P&R, OHW, CDC, WHO, FAO) in preparation of scenario-based in-service training for outbreak response assistance.
- Pilot test and update training materials on an annual basis or as needed based on new outbreak developments.
- Utilize updated outbreak preparedness and response protocols (Outbreak Response Guidance, Human-Animal Survey Instruments, and Outbreak Report short forms) during in-service, scenario-based training and outbreak response activities.
- Participate in preparedness exercises and training events as relevant to create a locally-responsive and globally-networked health community.
- Coordinate with EPT and implementing partners in the equipping and supplying of teams involved with outbreak response events.

Expected Outcomes: Refined training materials; improved knowledge and preparedness to participate in transdisciplinary teams during focused scenario training and actual outbreak response efforts; improved communication and coordination across partners and agencies involved with disease detection and outbreak response.

Sub-activity 1.5.3. Outbreak response, targeted surveillance during and between disease outbreaks, and sharing of data to inform on new or modified policies and practices for outbreak preparedness and response. (Chris, Brian)

- Support in-country implementing partners by providing technical assistance and conducting investigations during outbreaks of undiagnosed illnesses in humans and animals at the request of host country governments through field investigations, human and animal contact surveys, biological surveillance of suspected animal hosts, and testing of animal and human specimens using targeted viral detection techniques to identify potential cause(s) of disease.
- Support in-country implementing partners in analyzing outbreak investigation data to understand epidemiological factors facilitating spillover and spread of disease during outbreaks and to identify targets for disease control and prevention.
- Support in-country implementing partners in targeting surveillance activities between outbreaks to monitor key epidemiological factors facilitating spillover, including biological and ecological characteristics of host species and human activities facilitating contact with host species.
- Support in-country implementing partners in reviewing data gained from targeted surveillance during and between disease outbreaks to inform on new or modified policies and practices for outbreak preparedness and response and share information across EPT partners.

Expected Outcomes: Improved outbreak investigations that inform and target surveillance activities; engagement of partners in outbreak response and sharing of results.

Activity 1.6. Identifying potential animal reservoir(s) and transmission hosts for Ebola virus in Guinea, Liberia, and Sierra Leone
Identify animals that may act as reservoir or transmission hosts for Ebola virus to develop and target prevention measures that reduce the risk of spillover from animals to people.

Sub-activity 1.6.1. Surveillance for Ebola and other filo viruses. (Brian, Chris)

- Optimize field-study data collection instruments and survey tools for ebola-specific data collection.
- Identify sampling sites with high levels of Ebola virus disease and high human-animal contact in varying ecological zones (forest, rural, semi-urban, urban).
- Establish sampling strategy to cover potential reservoir host taxa (wildlife) and potential spill-back hosts (livestock and domestic animals) that may have been exposed to human EVD cases.

- Establish repeated longitudinal sampling to capture seasonal variations at study sites to span relevant key environmental time-periods among key target animal taxa (i.e. dry-season, wet-season, breeding season).
- Identify and characterize high-risk interfaces, epizones, and surveillance priorities for Ebola virus transmission.
- Continue to explore animal value chains, in coordination with EPT and in-country partners, to refine targeted opportunities for surveillance and improve understanding of animal movements for Ebola virus emergence and spillover.

Expected Outcomes: Strengthened in-country capacities in West Africa for surveillance to detect Ebola and filo viruses; optimized surveillance priorities for identification and characterization of pathways for Ebola virus disease emergence and epizones.

Sub-activity 1.6.2. Develop and utilize testing technologies to detect EBOV and filovirus infection (molecular techniques) or evidence of previous infection (serology) in wildlife and livestock. (Brian, Tracey, Simon)

- Compare viral family PCR for filovirus with previously published EBOV-specific assays for use in wildlife and livestock samples.
- Identify appropriate assay(s) for technology transfer to in-country laboratories.
- Sequence genomes of all positive samples using high-throughput sequencing.
- Develop in collaboration or coordination with in-country and EPT partners (CDC, WHO, and FAO) reagents for serologic assays (antigens, positive control sera, secondary antibodies).
- Develop and optimize ELISA or other technology-based serologic assays for use in wildlife and livestock species.
- Determine feasibility of technology transfer of serologic assays to in-country laboratories where available.

Expected Outcomes: Optimized molecular and serologic assays for Ebola and other filo viruses in targeted animal taxa; sharing of protocols and reagents across EPT partners (CDC, WHO, FAO and others) as feasible.

Sub-activity 1.6.3. Site characterization and pilot human surveys at select high-risk animal-human interfaces to examine risk of Ebola virus transmission. (Brian, Chris, Leilani)

- Implement the human behavioral questionnaire with Ebola-specific questions alongside concurrent animal surveillance activities.
- Characterize human Ebola exposure and history of animal use to investigate animal-human interface transmission risk (data from questionnaire on treatment, time spent in an Ebola treatment center).

Expected Outcomes: Standardized data collection protocols with Ebola-specific questions added; pilot human behavioral surveys with concurrent animal surveillance activities.

Objective 2: Characterizing Behavioral Risk

Characterize contact among people, livestock, and potential wildlife reservoirs; investigate the correlations between human behavior and zoonotic disease risk to understand the behavioral mechanisms of high-risk pathways for disease emergence and spread; identify potential control points and behavior change options; and field pilot strategies to evaluate behavior change interventions that can be taken to scale.

Activity 2.1. Standardizing approaches to study human behavioral risk
Identify and monitor behaviors, attitudes, practices, and socio-cultural norms and conditions that facilitate animal-human and animal-animal contact and influence the spillover, amplification, and spread of zoonotic pathogens.

**Not a GHSA funded activity.

Sub-activity 2.1.1. Developing frameworks and standardizing approaches for behavioral risk data collection to understand human-animal interactions and their associated meaning and rationale. (Leilani, Karen)

- Continue developing and strengthening partnerships to coordinate activities for human behavioral risk data collection.
- Continue integrating human behavioral risk data collection with concurrent biological sampling along targeted pathways and epizones.
- Continue to support the submission and monitoring of IRB protocols for the ethical conduct of human subjects research for additional qualitative and quantitative behavioral studies.
- **Complete the analysis of Deep Forest Human Contact survey data to inform and refine the human behavioral questionnaire.

Expected Outcomes: Integrated partnerships for the coordination of concurrent behavioral risk data collection; refined and standardized data collection protocols and training materials for the human behavioral questionnaire and biological sample collection; finalized sampling and recruitment strategies; IRB approvals solicited and/or acquired; human behavioral questionnaire implemented with concurrent surveillance activities.

Sub-activity 2.1.2. Conducting semi-structured, targeted ethnographic assessments in natural settings at prioritized biological and ecological surveillance sites to characterize behavioral risk along high-risk pathways for disease emergence and spread. (Leilani, Karen)

- Analyze qualitative data from focus groups, ethnographic interview transcripts, and field notes to better understand relationships among human-animal contact, the context of contact, and unusual disease experiences as perceived by individuals at high-risk of disease spillover.
- Expand ethnographic interview and focus group discussion data collection to include up to 10 additional countries.
- **Analyze qualitative data for actionable insights from six countries where data collection is complete: China, Indonesia, Cameroon, DRC, Bangladesh and Uganda.
- Evaluate qualitative data to identify any evident intervention strategies, as well as any barriers or opportunities to risk mitigation interventions.

Expected Outcomes: Qualitative data from prioritized sites collected and analyzed; novel findings and actionable insights from qualitative data analysis reported; qualitative data used to identify or develop policy recommendations and risk mitigation strategies.

Activity 2.2. Identifying potential intervention points
Develop and measure indicators and integrate data from biological surveillance, behavioral risk characterization, and economic and anthropologic studies to identify potential targets for intervention to reduce the risk of viral amplification and spread.

Sub-activity 2.2.1. Combine data collected from human behavioral questionnaire with biological and ecological surveillance data; develop and measure key indicators of high-risk contact among demographic groups to identify high-risk subpopulations and determine relationships between high-risk contact indicators and biological, ecological, and socio-behavioral data. (Leilani, Karen, Chris, Peter)

- Analyze qualitative data in conjunction with human behavioral questionnaire data to refine key indicators of high-risk contact.
- Analyze human behavioral questionnaire data with results from biological sampling to identify high-risk subpopulations and to potentially specify disease spillover mechanisms (e.g., eating raw wildlife, cuts and scratches acquired through slaughtering practices).
- Analyze human behavioral questionnaire data with biological sampling data, for evidence of viral sharing between animal reservoirs and humans.
- Analyze human behavioral questionnaire data with ecological data to determine if human high-risk indicator activity or prevalence is associated with ecological context data.

Expected Outcomes: Key indicators of high-risk contact and high-risk context developed and refined; indicator data shared within project for incorporation into analytic modeling frameworks; integration of human and

animal data for exploration of viral sharing and indicators of drivers for spillover.

Sub-activity 2.2.2. Target specific high-risk contact behaviors commonly reported and associated with increased risk for further in-depth study and to advise on suitable intervention approaches. (Leilani, Karen, Chris)

This activity is included for completeness, but some sub-activities may not be achievable in Year 4.

- Begin to prioritize high-risk contact behaviors conditional on context for further in-depth study.
- Develop and prioritize data-informed policy and intervention targets as data become available.
- Based on the development of suitable intervention and policy approaches, create additional qualitative data collection tools to assess opportunities and barriers to success of specific intervention approaches, as well as to solicit community input on possible alternative engagement strategies.

Expected Outcomes: Identify targets for policy recommendations and intervention strategies; anticipate and solicit community-based alternatives to challenges posed by specific policies and strategies.

Objective 3: Improving Global Surveillance Networks

Strengthen internal data storage and sharing platforms to improve the ease of collection, synthesis, storage, access, and dissemination of relevant animal and human, spatially explicit epidemiological, and ecological data.

Activity 3.1. Standardizing data collection

**Not a GHSA funded activity.

Sub-activity 3.1.1. Standardizing human and animal data management: developing and optimizing tools for the collection of standardized data on human and animal hosts and pathogens; behaviors and risks of disease emergence; and drivers, ecological conditions, and transmission interfaces during standard surveillance and outbreak situations. (Damien, Chris, Leilani, Tracey, Simon)

- Develop and refine surveillance, behavior, and ecological data collection tools already developed, based on feedback from field testing.
- Develop a system for entering and linking ethnographic interview, focus group, and field note data to surveillance and ecological data.
- Develop and refine a data quality tool to enable review of submitted data for assurance of consistency and standardization (QA/QC).

Expected Outcomes: Improved tools for standardized surveillance and behavioral data collection with improved validation and data QA/QC workflow over previous tools.

Sub-activity 3.1.2. Enhancing digital surveillance and outbreak intelligence: *collecting, filtering, geo-referencing, and integrating publicly available information on emerging diseases with human and animal field surveillance data.* (Damien)

- **Continue to develop the system with HealthMap to provide near real-time digital disease detection intelligence (e.g., HealthMap alerts) to government and host country partners, including country-specific feeds and training materials on the use of HealthMap and ProMED.
- Field test outbreak response assistance tools, including streamlined communication and outbreak response methods and standardized data collection procedures.

Expected Outcomes: Improved tools for global and in-country intelligence on disease outbreaks.

Activity 3.2. Synthesizing global data

Build on and extend the Emerging Infectious Disease Information Technology Hub (EIDITH) to create a secure and internal globally accessible database to house aggregated human behavioral risk, biological surveillance, and outbreak information with novel analytic and visualization tools.

Sub-activity 3.2.1. Expanding EIDITH to provide the access and integration capabilities necessary for biological, ecological, and behavioral risk characterization and progress tracking for deliverables and annual data reviews. *(Damien, Chris, Leilani, Tracey, Simon)*

- Continuously adapt and refine the EIDITH database structure for efficient storage of surveillance, ecological, and behavioral data, including diagnostic test results for human and animals (expanding beyond current focus on animal data).
- Refine and maintain the EIDITH surveillance databases that include human surveillance and behavior data linked to animal surveillance data by geographic space and time.
- Continuously improve the EIDITH data query, extraction, and reporting tools for efficient and effective reporting of surveillance, ecological, and behavioral data for deliverable tracking and annual data reviews.
- Continue developing and refining database structure, import and export tools, and data access and management policies and procedures.

- Develop visual maps and charts within the data collection app to aid in the tracking the locations, interfaces, and taxa groups where sampling has occurred.

  Expected Outcomes: Improved EIDITH performance and capacity to handle the expanded scope of activities; relational databases for human data developed and linkages tested; tools in use by global and in-country teams for tracking and reporting; a globally accessible database of known and potential pathogens.

Activity 3.3. Disseminating global data
Provide data on results for policy use, response, and meeting IHR and OIE reporting obligations; distribute data for public release using a globally accessible public portal; and incorporate processed risk-characterization data coupled with clearly documented, cross-cutting forecasting of risk resulting from the characterization process. (Damien, Chris, Billy, Tracey)

- Continue to determine key areas of overlap between data collection strategies and IHR and OIE reporting requirements to develop a strategy to best utilize data collected to facilitate in-country achievement of reporting obligations.
- Continue to refine and enhance the PREDICT public data access portal (http://data.predict.global), specifically providing enhancements to incorporate risk characterization data and risk forecasting, as well as other enhancements to facilitate multilateral reporting requirements.

  Expected Outcomes: Improved sharing and release of data with host country governments, EPT partners, and the public.

Objective 4: Validating One Health Approaches

Conduct a systematic and dedicated effort to validate and evaluate the utility of One Health approaches using all available evidence.

**Not a GHSA funded activity.

****Activity 4.1. Promoting policies and practices that reduce the risk of viral evolution, spillover, amplification, and spread**
In collaboration with government, EPT/P&R project, and inter-agency partners, develop the evidence base to support the strategic application and institutionalization of policy approaches promoting transdisciplinary cooperation; compile and create case studies for situations in which a One Health approach has been used; and support efforts to more effectively utilize One Health platforms. (Billy)

- Disseminate the One Health case study booklet ('One Health in Action', co-

developed with P&R) to country and global partners.

- Develop a case study template to capture/promote quantitative data and begin compiling case studies for version two of the case study booklet, with emphasis on quantitative measures.
- As part of the One Health data collection tool, begin compiling information on results reporting to communities and any mitigation measures employed.
- Continue to track and interpret findings from literature searches (peer-reviewed, reports, pubs, etc.) to identify examples of One Health in practice and compile qualitative and quantitative information for One Health case studies.
- Continue to engage in-country government partners, as well as partners from other EPT-2 projects, FAO, WHO, CDC, World Bank, and other local, regional, and intergovernmental entities, in the prospective and retrospective assembly of information to validate the use of One Health approaches.
- Based collected data, coordinate with P&R to conduct an analysis on gender equality and integration to elucidate how comprehensive representation contributes to a more successful One Health approach, especially around risk mitigation and prevention strategies.
- Work with P&R to help determine and encourage best practices for overcoming gender bias in One Health efforts, as well as provide information to P&R, OHW, and other EPT partners on populations that could be further integrated into One Health approaches (e.g., economically, culturally, and occupationally).
- Continue to evaluate potential inter-agency partnerships to assess the viability and palatability of potential policies informed by One Health activities.
- Contribute to outreach tools (e.g. short topic videos, blogs, presentations/events) to support awareness and cross-sectoral relevance of policies and practices that reduce risk of emerging viral threats (involving P&R partners).

Expected Outcomes: Quantitative One Health case studies generated/compiled; One Health best practices library expanded, including community reporting as a component; identification of broad factors contributing to gender or other biases in disease risk or risk mitigation; guidance on populations that could be further integrated into One Health efforts, as well as measures identified that might be taken to integrate underrepresented populations; potential examples of policy changes that could or have resulted from demonstrated One Health successes.

****Activity 4.2. Improving cross-sectoral collaboration, capacity development, and coordination with EPT-2 partners**

Sub-activity 4.2.1. Improving cross-sectoral collaboration by promoting strong communication and data sharing opportunities that support One Health

approaches and demonstrating the value of adopting One Health approaches for biological surveillance, capacity building, and outbreak response. (Billy)

- Continue to maintain communications with EPT-2 global partners, including through maintenance and sharing of the EPT-wide partner contact list.
- Building on Year 2 progress, conduct policy engagement with priority policy processes and policy-making institutions, including OFFLU, GHSA, international animal trade regulators, such as OIE, CITES, the WHO Expert Roster on Zoonoses, the European Food Safety Agenda, Toward a Safer World initiative, the WHO-CBD Joint Work Programme on Biodiversity and Human Health, and the UN Office for Disaster Risk Reduction.
- Work jointly with P&R to complete the final version of their Supplemental Guidance (Planning Tool) and the Audit Tool, promote their dissemination and uptake by the private sector and development project financers, and examine the mitigation measures proposed and review the existing literature to determine current cost-effective mitigation measures that should be recommended in different hot spot areas.
- In collaboration with P&R, develop suggested updates for the International Finance Corporation's Environmental, Health and Safety guidelines and supporting evidence summary.
- Support P&R at both the international and national levels to engage the private sector as stakeholders in the One Health approach to prevention, preparedness, and response by working jointly to help build the business case and develop materials on the value of private sector participation in One Health (via cost-effectiveness scenarios).
- Provide One Health input on the proposed indicators for the Sendai Framework for Disaster Risk Reduction.
- Through ongoing communication with EPT partners, continue to identify EPT One Health activities for which PREDICT could offer technical support.

Expected Outcomes: Efficient communication pathways with EPT-2 partners; policy engagement; development of data sharing plan.

Sub-activity 4.2.2. Support collaborative platforms and partnerships for longitudinal monitoring of viral threats and monitoring of the use of One Health approaches in surveillance and outbreak response situations for comparison with other contemporary (single-silo) outbreak responses. (Billy)

- Through ongoing coordination with partners, continue to identify opportunities to compare One Health approaches to contemporary surveillance and outbreak response approaches (potentially informed by P&R's After-Action Reviews) to conduct and refine analyses, including on potential savings from prevention, early warning/detection, or other outcomes that will be calculated and shared with EPT-2 partners.
- Toward furthering implementation of prevention and preparedness measures, collaborate with the UN Office of Disaster Risk Reduction on

their pilot project on integration of health emergencies (including outbreaks) into disaster risk loss data collection in Guinea, Liberia, and Sierra Leone.

Expected Outcomes: Components of wildlife disease surveillance needed for longitudinal monitoring of viral threats refined**;** comparative analysis of approaches and cost or cost savings analyses continued and methods/outreach optimized; recommendations developed with partners on targeted intervention options; policy-relevant global indictors for outbreak prevention, preparedness, and response effectiveness refined.

Sub-activity 4.2.3. Advancing socio-economic arguments by conducting global scale analyses of the economics of pandemic mitigation vs. adaptation policies directly applied to the World Bank/FAO One World, One Health capacity building plan. (Billy)

- Continue process planning and stakeholder engagement through calls and meetings with partners from the World Bank to promote integration/complementarity with the One Health capacity building plan.
- In partnership with the World Bank and in coordination with P&R, hold an expert workshop and high-level forum on One Health economic evaluation as a follow up to the 2012 'People, Pathogens and Our Planet' report to identify key policy-oriented information gaps and develop and disseminate a global strategy.
- Continue to assemble available data for the global-scale analysis of the economics of pandemic mitigation versus adaptation policies; based on the global strategy developed from the One Health economic evaluation workshop; implement a plan for conducting and refining analyses (potentially at a country level in collaboration with P&R).
- Continue to conduct economic analyses of specific intervention strategies enacted or proposed for recent outbreaks (e.g., Ebola, SARS), which can be used support EPT-2 partners in policy development and developing messages for outreach to the private sector.
- Continue to analyze the costs of emerging disease outbreaks of relevance to EPT.
- Share methodologies, best practices, and case examples and co-developed materials on One Health systematic evaluation and policy outreach with partners in the EU COST Network for the Evaluation of One Health, as well as in the development of the Checklist for the One Health Epidemiological Reporting of Evidence.

Expected Outcomes: Stakeholder engagement and data collection tools and evaluation framework developed; pilot analyses refined; baseline data generated and built upon; global One Health evaluation strategy developed and endorsed by high-level institutions (with targeted commitments to fill key data/policy gaps).

Sub-activity 4.2.4. Sharing lessons learned among EPT partners and projects for utilization in national preparedness plans for public health events, for proposed incorporation into curricula for the One Health Workforce (OHW) and for validating evidence-based strategies to share with the P&R program to inform best practices and implementation guidelines at national levels. (Billy)

- Continue to hold coordination calls and email communication with OHW and P&R project personnel, FAO, and CDC.
- Collaborate with P&R and external partners (e.g. CBD) to disseminate evidence-based strategies to support effective One Health platforms and One Health evaluation on priority areas (e.g. data for decision making, research coordination to inform policy, disease prioritization, and others)
- In collaboration with P&R (and its Learning Agenda) and in coordination with country stakeholders, identify priority regional, country, or community-level policy questions for application of One Health effectiveness evaluation and begin targeted data compilation and analysis with a strategy for stakeholder engagement.

Expected Outcomes: Frequent information sharing and collaboration with EPT partners; ongoing sharing of best practices with EPT partners; targeted One Health questions identified for addressing; engaged stakeholders.

Sub-activity 4.2.5. Support the training of the next generation of One Health professionals through coordinated activities with EPT and inter-agency partners. (Billy)

- Continue to conduct strategic planning and coordination with other EPT projects and partners to promote capacity development at the epizone scale.
- Identify promising candidates to participate in diverse training opportunities.
- Participate in meetings, conferences, and trainings/workshops to share best practices across EPT projects and inter-agency partners.
- Compile One Health capacity building tools with EPT partners (e.g. an optional training module)
- Strengthen relationships with key institutional partners to build sustainability.

Expected Outcomes: Dialogue and coordination across EPT projects and inter-agency partners; development of training opportunities that contribute to capacity strengthening; placement of key individuals to receive training; enhanced project sustainability through institutional partnerships.

Objective 5: Strengthening Capacity

Add depth and scope to transdisciplinary One Health platforms using a systems approach to classify and track biological surveillance and behavioral risk characterization advances, thereby strengthening surveillance system capacities.

**Not a GHSA funded activity.

Activity 5.1. Systems approach to capacity building for wildlife, livestock, and human surveillance
Develop materials, conduct trainings, and track progress to address all areas of project design and implementation that will improve infrastructure and capacity to perform surveillance-related activities; coordinate with OHW and P&R projects on training and capacity strengthening plans along with complementary activities.

Sub-activity 5.1.1. Strengthening biological sampling and behavioral risk characterization capacity. (Woutrina, Chris, Leilani)

- Continue to conduct capacity scoping and assessments along with evaluation of ongoing capacity strengthening activities in areas of new engagement.
- Plan strategic activities to build capacity for biological sampling and behavioral risk assessment and characterization along high-risk pathways for disease emergence.
- Develop and continue revising protocols and training tools that build and test technical knowledge and skills related to biosafety, biological sampling, laboratory protocols, surveillance, behavioral risk investigations, assistance during outbreaks, and information management.
- Distribute protocols and training materials to participating countries and partners to strengthen in-country capabilities.
- Conduct and participate in training events related to biological sampling and behavioral risk assessment and characterization to build capacity at the local, national, and international levels.
- Provide Collaborative Institutional Training Initiative (CITI) training for all partners implementing human surveillance and behavioral risk activities.
- Continue training local public health professionals and other partners in human behavioral data collection techniques and preliminary analyses.
- Continue to identify and facilitate training opportunities for project staff and to develop and pilot new technologies for training and knowledge transfer in One Health, surveillance, pathogen detection, and information management.
- Develop and launch a system for assuring trainings are conducted with and knowledge and skills attained by all relevant personnel prior to taking part in project activities.
- Track and monitor capacity strengthening progress on an annual basis using a standardized protocol across countries and epizones.

Expected Outcomes: Systematic capacity building plans to optimize project implementation strategies; updated protocols and training materials; increased awareness of the importance of biological surveillance and human risk behavior data in successfully addressing emerging infectious disease issues; trainings conducted for human behavioral questionnaire and

specimen collection; improved communication among human and animal health partners in-country.

Sub-activity 5.1.2. Technical support for viral surveillance and strengthening of laboratory capacity. (Tracey and Simon)

- Continue to identify training needs for collaborating laboratories to improve sample handling, nucleic acid extraction, biosafety, and performance of cPCR.
- Revise protocols as needed and provide refresher and annual basic training to staff in collaborating laboratories.
- Continue to identify priority laboratories and training for in-person training to improve performance and capacity.
- Distribute reference panels to perform quality control and assessments of laboratory procedures for deployment to all in-country collaborating laboratories.
- Continue to strengthen communication networks of key PREDICT partner labs to provide peer support for technical troubleshooting and data analysis.
- Begin development of training modules for introductory training on basic sequence analysis and bioinformatics.
- Track training and progress on an annual basis using a standardized protocol across countries and epizones.

Expected Outcomes: Completed plan for basic and follow-up training to improve the quality of cPCR results and sequences for analysis; active communication among lab personnel to enhance quality assurance and capacity.

Sub-activity 5.1.3. Strengthening information management capacity. (Woutrina, Damien)

- Plan strategic activities to continue to improve information management capacity locally and globally.
- Continue to compile, revise, and distribute available protocols and training materials related to information management.
- Conduct training exercises relating to information management skills and technologies that build capacity at the local, national, and international levels.
- Track training and progress on an annual basis using a standardized protocol across countries and epizones.

Expected Outcomes: Development of information management training materials; disseminated knowledge and training materials to in-country personnel.

***Sub-activity 5.1.4. Strengthening risk management capacity though training on basic data analysis tools, spatial mapping, and disease modeling. .* (Woutrina, Peter)

- Identify key gaps and opportunities for capacity building related to risk management at the local and national levels.
- Conduct and participate in training exercises relating to risk management skills and technologies, such as data analysis, spatial mapping, and disease modeling.
- Support in-country scientists through in-depth training and collaborative analyses to develop local capacity in risk modeling of EIDs.
- Track capacity strengthening progress on an annual basis using a standardized protocol across countries.

Expected Outcomes: Increased numbers of trained individuals able to utilize data analysis and modeling tools to inform risk management; development and refinement of new training materials; submission of annual capacity tracking progress report.

Objective 6: Assisting Organization of USAID EPT-2 Annual Data Review Meetings

**Not a GHSA funded activity.

****Activity 6. In close coordination with USAID and other EPT-2 projects and partners (including FAO, CDC, WHO, etc.), organize annual data reviews to optimize and refine ongoing and future activities. (Billy)**

- Review Year 2 data meeting structure, partner representation, and outcomes with USAID to identify refinements needed for Year 3 meeting
- Refine the draft data sharing plan with EPT-2 partners as needed.
- Plan the Year 3 global data meeting, including requesting, assembling, and collating agenda priorities from partners into a meeting agenda and identifying participants.
- Assess progress on and utility of proposed cross-project or comparable data sharing platforms.
- Use selected country-level discussions to strengthen One Health platforms and produce recommendations to be utilized by P&R around sustained cross-sectoral collaboration, including through data sharing.
- Continue to explore/refine the compilation of and potential improvements to global data sets of influenza and other respiratory pathogens, potentially with input from external partners, e.g. OFFLU, Influenza Research Database, etc. (exploring optimized ways to link bio-surveillance data to response through “IT portals”).
- In follow up to the global data review meeting, generate a list of action items

to support the advancement of effective data sharing and compose recommendations for programmatic adjustments as needed.

Expected Outcomes: Identification of existing and pending available data sets; broad ideas and plans for longitudinal data sets; strengthened and efficient communication across partners; more direct and targeted lines of communication with global partners for data reporting; identification of needs/opportunities for more streamlined data outputs for more efficient integration into global reporting systems; identification of recommendations for programmatic adjustments, including more targeted data discussions for Year 4.

Objective 7. Managing and Coordinating Operations

Maintain collaborative and adaptive management of program operations and ensure compliance with agency policies and procedures. Activities in this objective are required for successful implementation of PREDICT's contributions to the GHSA. **(David)**

**Not a GHSA funded activity.

- Collaboratively develop work plans and project strategy.
- Execute and monitor award, sub-award agreements, sub-contracts, and service agreements and ensure compliance.
- Hold biweekly coordination meetings with Management Team and biweekly coordination meetings with Executive Board, with frequent communication and meetings for project planning between these meetings of leadership.
- Develop and compile semiannual technical reports, quarterly financial reports, GHSA technical and financial reports (monthly, quarterly, and annual), capacity strengthening tracking reports, and environmental management and mitigation reports; respond to other requests for information as needed.
- Continue to develop, refine, track, and report on monitoring and evaluation indicators and integrated plans with ministries and EPT partners to optimize program performance.
- Ensure frequent and regular communication with operational leads on activity plans, deliverables, and progress.
- **Provide management, administrative, and logistical support to the Global Virome Project.
- Coordinate and track travel among participants and facilitate travel approvals.
- Track and catalog all program communications and publications, including partner communications and reports for GHSA and government partners and USAID Missions.

- Continue to work with global and regional vendors to improve supply procurement and distribution of both field and laboratory supplies.

  Expected Outcomes: Completion and implementation of workplans; ongoing refinement of systematic and collaborative implementation strategy; ensured compliance with USG policies and regulations and with host country policy and regulations; timely submission of all reports and response to data call requests; successful communications with EPT, GHSA, and interagency partners; cataloging and monitoring of all submitted updates and progress reports to host country partners; continued communications with vendors for improving supply chains; refined M&E indicators with EPT partners with data tracked and integrated into project reporting streams.

PREDICT-2 All-country Workplan
Year 4 (October 2017-September 2018)

As a companion to the PREDICT Global Workplan, the All-country workplan is a comprehensive list of activities and outcomes expected from all PREDICT countries conducting the full suite of activities in the upcoming year and is intended to support the intensive standardization and coordination required at the country-level. The All-country workplan includes objectives and activities for implementation in the following countries where PREDICT anticipates full engagement (***GHSA countries in bold italics***):

Africa: ***Cameroon***, ***Cote d'Ivoire***, ***Democratic Republic of Congo, Ghana, Guinea*, Liberia*, Republic of Congo, Rwanda, Senegal, Sierra Leone*, Tanzania***, and ***Uganda***
*Ebola Host Project (EHP) countries – Additional detail provided under Activity 1.6

Asia: ***Bangladesh***, ***Cambodia***, China, ***India (West Bengal/Assam)***, ***Indonesia***, ***Lao PDR***, ***Malaysia***, Myanmar, Nepal, ***Thailand,*** and ***Viet Nam***

PREDICT plans to conduct a more limited suite of activities in the following countries, which may include continued capacity assessment/strengthening, targeted surveillance, and behavioral assessment and risk characterization (see attached country briefs for a description of alterations from the All-country plan specific to each of these countries; ***GHSA countries in bold italics***):

East/North Africa and the Middle East: Egypt, ***Ethiopia***, Jordan, and ***Kenya***
Asia: Mongolia

Workplans for Phase 1 Global Health Security Agenda (GHSA) countries describing planned activities aligned with GHSA Action Packages and indicators have been provided in the separate template. Country-level activities supported through non-GHSA funds are noted in the following pages where appropriate.

Country Briefs are provided to detail each country's active partnerships, geographic areas of focus for surveillance activities, and laboratory system strengthening plans.

For more information on partnerships and the scope of activities planned for implementation in each country, see the specific Country Briefs beginning on page X below.

Objective 1: Characterizing Biological and Ecological Risk of Zoonotic Disease Threats

Identify the biological and ecological drivers and host-pathogen dynamics at high-risk interfaces in Asia and Africa.

Activity 1.1. Targeted sampling for zoonotic viruses with pandemic potential at specific high-risk interfaces

Conduct sampling for zoonotic viruses in collaboration with in-country and EPT partners (CDC, WHO, and FAO, etc.) at field sites most reflective of the processes underlying pathways for viral evolution, spillover, amplification, and spread.

Sub-activity 1.1.1. Identifying and characterizing pathways, epizones, and surveillance priorities for viruses with pandemic potential.

- Further refine sampling and surveillance priorities, partnerships, and locations.
- Together with EPT and in-country partners, continue to prioritize sampling and surveillance activities for concurrent sampling of humans and animals along suspected pathways for disease emergence and spread.
- Continue to foster collaborative partnerships for human and livestock sampling and strengthen ongoing relationships with existing partners for sampling and diagnostic testing with relevant ministries, FAO, additional EPT partners, and other relevant organizations.
- Continue to develop, introduce, and help optimize methods to investigate disease transmission among wildlife, livestock, and at-risk human populations and improve standardized protocols to collect data to assist in characterization of disease transmission interfaces and epizones
- Continue to explore animal movements, migrations, and value chains and improve understanding of epizones for pathogens of significance.

Expected Outcomes: Optimized sampling and surveillance priorities for identification and characterization of pathways for disease emergence and epizones; coordinated sampling activities with collaborative partners, platforms, and networks.

Sub-Activity 1.1.2. Standardized, concurrent, and selectively longitudinal sampling of wildlife, livestock, and at-risk human populations with high levels of contact with animals.

- On request, participate in surveillance team calls to gather expertise and strengthen technical capabilities and sampling and surveillance coordination.
- Obtain or renew permits and any additional institutional approvals and ethical clearances needed to conduct high priority sampling activities (e.g. IRB, IACUC, MOUs for animal sampling).

- Ensure adherence to national requirements for data and sample sharing and international standards and regulations for disease notification.
- Coordinate with FAO on livestock sampling at sites prioritized for concurrent surveillance, with respect to sample collection, sample and data handling, and viral detection and characterization protocols.
- Implement concurrent synchronized sampling of animals and humans using standardized sampling protocols, data collection tools, and diagnostic testing protocols across wildlife and at-risk human populations in high-risk communities to document sharing of viruses within and between species; identify high-risk interfaces and pathways for disease emergence; and enable standardized biological, behavioral, and ecological risk characterization.
- Implement syndromic surveillance among patients with undifferentiated or undiagnosed acute fevers of likely viral origin meeting standardized clinical case definitions in collaboration with clinics and hospitals in the catchment of high-risk communities targeted for concurrent surveillance.
- Contribute data to combined phylogeographic, ecological, and epidemiological analyses, as information becomes available, to support characterization of pathways for disease emergence and spread in epizones.

Expected Outcomes: Coordinated concurrent and effective sampling activities, including standardized data collection for wildlife, livestock, and at-risk human populations (where feasible) for identification of viral threats and investigation of viruses with pandemic potential at high-risk interfaces; known and novel pathogens associated with diseases of unknown origin, including severe acute respiratory infections, acute encephalitis, and influenza-like illnesses, detected and identified; permissions and ethical clearances to collect all necessary data.

Activity 1.2. Characterizing Risk

Collect standardized data at regular intervals on epidemiological and ecological factors identified as important drivers of pandemic risk, identify and characterize epizones for pandemic risk, and develop actionable surveillance improvements and risk mitigation strategies.

This activity is included for completeness, but some sub-activities may not be achievable this year.

***Not a GHSA funded activity.*

Sub-Activity 1.2.1. Ranking of high-risk interfaces and identification of key processes influencing evolution, spillover, amplification, and spread of viral threats.

- Continue to contribute to the optimization and implementation of standardized data collection protocols to characterize animal-human contact and high-risk interfaces for all sampling activities.
- Gather quantitative and qualitative data on human activities and behaviors underlying high-risk interfaces through standardized questionnaires, as well as observational studies where appropriate.
- **With support from global team, continue to conduct epidemiological analyses as data are available to guide surveillance priorities, rank interfaces, and identify key processes influencing viral evolution, spillover, amplification, and spread.

  Expected Outcomes: In-country characterization of high-risk viruses and interfaces to understand processes influencing viral evolution, spillover, amplification, and spread.

Sub-activity 1.2.2. Characterizing ecological risk and predicting spillover: advancing the knowledge of how ecological factors, demographic and other socioeconomic changes, agricultural and wildlife-use trends, host life history, viral diversity, and human behavior influence the likelihood of heightened viral evolution, spillover, amplification, and spread.

- **Contribute country-level data as needed to inform and prioritize surveillance activities and to support the development of frameworks for risk characterization and spillover models, including AMR.
- **In coordination with global team, contribute data for the identification of epizones for priority viruses based on modeled reservoir distributions and relevant emerging infectious disease (EID) drivers.
- **Work with the global team to identify sites of future epizones where reservoir hosts will potentially co-exist and flag areas of concern for virus emergence.

  Expected Outcomes: Ongoing identification, exploration and analysis of datasets; surveillance sites refined and others identified for further consideration; maps of national and international post-spillover amplification and spread risk.

Sub-activity 1.2.3. Mapping viral diversity and evolution.

- **Contribute country-level detail on viruses that have been detected or that have emerged in each country along the pathways and epizones as identified in sub-activity 2.1.1.

  Expected Outcome: Available data provided.

Sub-activity 1.2.4. Developing actionable surveillance improvements and risk mitigation strategies.

- **Coordinate with the global team to apply and evaluate methods and tools for biological and behavioral data collection, while maintaining consistency in standardized data collection with other EPT countries.
- **As appropriate, optimize qualitative behavioral data collection strategies and complete behavioral risk assessment and characterization investigations.
- **Work with global team to use ecological and qualitative data to identify specific risk mitigation and intervention targets to prevent viral pathogen spillover at identified high-risk interfaces.
- **As data become available, work with global teams to identify possible barriers to implementation of potential intervention strategies.

Expected Outcomes: Iteratively optimized strategies and prioritization for surveillance and identification of potential targets for mitigation of spillover of viruses from animals to humans.

Activity 1.3. Potential pathogen detection and discovery and longitudinal monitoring of potential pathogens to track changes in geographic and host distribution, genetic sequences, transmissibility, infectivity, and evolution

This activity is included for completeness, but some sub-activities may not be achievable this year.

Sub-activity 1.3.1. Pathogen detection and discovery.

- Continue to train and facilitate in-country laboratories for implementation of viral family testing using consensus PCR (cPCR).
- Continue to refine plans to meet needs for complete testing for all prioritized viral families and implement cPCR protocols for pathogen detection, discovery, and characterization.
- Continue to implement standardized testing of samples collected across interfaces, specimen types, host taxa, seasons, and regions, with laboratories ready to start testing four viral families (influenza, paramyxovirus, coronavirus, filovirus, and flavivirus when feasible), and adding additional families (flavi-, retro-, arena-, bunya-, reo-, rhabdo-, picorna-, alpha-) aligned with regional priorities and viral diversity based on data available to date.
- Identify samples for further characterization, including but not limited to, full genome sequencing and evaluation of host receptor binding.
- As data become available, coordinate with government partners and national and international reporting authorities to inform on detection of viruses in animals and humans.

Expected Outcomes: Implemented standardized testing of samples collected across interfaces, specimen types, host taxa, seasons, and regions; detection of virus from prioritized specimens; and potential discovery of novel viruses from different hosts and locations.

Sub-activity 1.3.2. Deploying serology to characterize exposure in human and animal populations and detect spillover.

- Continue to identify equipment and current capacities to implement serologic assay utility in collaborating laboratories.
- Continue working with global team to select appropriate platforms (e.g., serum neutralization, ELISA, Luminex) and develop plans to perform assay development and to develop training plans to implement serological assay(s) in participating collaborating laboratories.

Expected Outcomes: Continued compilation of capacities, equipment, and training needs to implement serologic testing at appropriate collaborating laboratories.

Sub-Activity 1.3.3. Expanding characterization of viruses to better understand pandemic potential, geographic and host distribution, and genetic diversity.

- Continue to work with laboratory leads to obtain permissions and ship samples to appropriate partner laboratories for follow-up virus characterization.

Expected Outcomes: Comprehensive plans in action with identified and prioritized samples located and shipped to partner laboratories for follow-up virus characterization.

Activity 1.4. Advancing pathogen characterization
This is a global activity.

Activity 1.5. Assisting host country partners in outbreaks

Sub-activity 1.5.1. Strengthening existing relationships with host country governments and building partnerships to increase synergies among national task force and response planners and project teams.

- Continue to identify opportunities to strengthen relationships with governments and build synergistic partnerships through provision of outbreak response training, equipment, and supplies for PREDICT and other EPT teams.

- Coordinate with ministries and EPT partners to develop or strengthen existing communication chains among human and animal (livestock and wildlife) sectors for optimizing outbreak reporting and response.
- Ensure participation in, and if needed, organize meetings with government partners to identify areas where PREDICT could provide outbreak response technical support for unidentified disease outbreaks of likely zoonotic origin.
- Continue and expand existing activities that promote ministerial and inter-ministerial collaborations for outbreak response and participate in training exercises to improve preparedness to participate technically and substantively in focused outbreak response efforts.
- Provide technical advice during outbreaks for planning, logistics, investigations, sampling, and diagnostics.

Expected Outcomes: Expanded network of available in-country professionals that can be utilized to support outbreak response capacity and collaborations; assistance to host country partners in planning for and responding to disease outbreaks; communication and coordination across partners and ministries involved with disease detection and outbreak response.

Sub-activity 1.5.2. Training, equipping, and supplying project teams to ensure a constant state of preparedness for contributing technically and substantively to focused outbreak response.

- Continue to build partnerships to increase workforce available for national response to disease outbreaks in animals and people.
- Coordinate with implementing partners to support national and subnational teams involved with outbreak response events.
- Continue efforts to ensure partner labs engaged in outbreak response have capacity and protocols in place to test human and animal samples using PREDICT viral detection techniques.
- Participate in training exercises and provide feedback to improve preparedness for technical and substantive participation in outbreak response efforts.
- Customize updated outbreak response protocols (Outbreak Response Guidance, Human-Animal Survey Instruments, and Outbreak Report short forms) to meet local needs for outbreak preparedness and response activities.

Expected Outcomes: Identification of training, equipment, and supply needs; provision of information and support to operational teams in refining outbreak response recommendations, and in revision of training materials as needed; improved knowledge and preparedness to participate in transdisciplinary teams during focused outbreak response efforts; enhanced laboratory engagement and overall preparedness for outbreak response;

developed capacity for rapid implementation of investigation and control measures with clearly defined roles for partners.

Sub-activity 1.5.3. Targeted surveillance during and between disease outbreaks, and sharing of data to inform on new or modified policies and practices for outbreak preparedness and response.

- At the request of host country governments, provide technical assistance and conduct investigations during outbreaks of undiagnosed illnesses in humans and animals through field investigations, human and animal contact surveys, biological surveillance of suspected animal hosts, and testing of animal and human specimens using targeted viral detection techniques to identify potential cause(s) of disease.
- Contribute to analysis of outbreak investigation data to understand epidemiological factors facilitating spillover and spread of disease during outbreaks and identify targets for disease control and prevention.
- Target surveillance activities between outbreaks to monitor key epidemiological factors facilitating spillover, including biological and ecological characteristics of host species and human activities facilitating contact with host species.
- Review data gained from targeted surveillance during and between disease outbreaks to inform on new or modified policies and practices for outbreak preparedness and response.

Expected Outcomes: Improved outbreak investigations that inform and target surveillance activities; engagement of partners in outbreak response and sharing of results.

Activity 1.6. Identifying potential animal reservoir(s) and transmission hosts for Ebola virus in Guinea, Liberia, and Sierra Leone (note that this section applies only to these three countries)
Identify animals that may act as reservoir or transmission hosts for Ebola virus to develop and target prevention measures that reduce the risk of spillover from animals to people.

Sub-activity 1.6.1. Surveillance for Ebola and other filoviruses.

- Implement and optimize field data collection instruments and survey tools for Ebola-specific data collection.
- Identify sampling sites with high levels of Ebola virus disease and high human-animal contact in varying ecological zones where feasible (forest, rural, semi-urban, urban).
- Implement sampling strategy to cover potential reservoir host taxa (wildlife) and potential spill-back hosts (livestock and domestic animals) that may have been exposed to human EVD cases.

- Implement repeated longitudinal sampling to capture seasonal variations at study sites and to span relevant key environmental time-periods among key target animal taxa (i.e., dry-season, wet-season, breeding season).
- Work with global team to identify and characterize high-risk interfaces, epizones, and surveillance priorities for Ebola virus transmission.
- Continue to explore animal value chains, in coordination with EPT and in-country partners, to refine targeted opportunities for surveillance and improve understanding of animal movements for Ebola virus emergence and spillover.

Expected Outcomes: Strengthened in-country capacities in West Africa for surveillance to detect Ebola and filoviruses; optimized surveillance priorities for identification and characterization of pathways for Ebola virus disease emergence and epizones.

Sub-activity 1.6.2. Develop and utilize testing technologies to detect EBOV and filovirus infection (molecular techniques) or evidence of previous infection (serology) in wildlife and livestock.

- Provide inactivated specimen materials for diagnostic testing in centralized laboratories.
- Work with global team to determine feasibility of technology transfer of molecular assays to in-country laboratories.
- Work with global team to determine feasibility of technology transfer of serologic assays to in-country laboratories when available.

Expected Outcomes: Optimized molecular and serologic assays for Ebola and other filoviruses in targeted animal taxa; sharing of protocols and reagents across partners.

Sub-activity 1.6.3. Site characterization and pilot human surveys at select high-risk animal-human interfaces to examine risk of Ebola virus transmission.

- Implement the human behavioral questionnaire with Ebola-specific questions alongside concurrent animal surveillance activities.
- Work with the global team to characterize human Ebola exposure and history of animal use to investigate animal-human interface transmission risk.

Expected Outcomes: Standardized data collection protocols with Ebola-specific questions added; pilot human behavioral surveys with concurrent animal surveillance activities.

Objective 2: Characterizing Behavioral Risk

Characterize contact among people, livestock, and potential wildlife reservoirs; investigate the correlations between human behavior and zoonotic disease risk to understand the behavioral mechanisms of high-risk pathways for disease emergence and spread; identify potential control points and behavior change options; and field pilot strategies to evaluate behavior change interventions that can be taken to scale.

Activity 2.1. Standardizing approaches to study human behavioral risk
Identify and monitor behaviors, attitudes, practices, and socio-cultural norms and conditions that facilitate animal-human contact and influence the spillover, amplification, and spread of zoonotic pathogens.

Sub-activity 2.1.1. Developing frameworks and standardizing approaches for behavioral risk data collection to understand human-animal interactions and their associated meaning and rationale.

- Continue developing and strengthening partnerships to coordinate activities for human behavioral risk data collection.
- Continue integrating human behavioral risk data collection with concurrent biological sampling along targeted pathways and epizones.

Expected Outcomes: Integrated partnerships for the coordination of concurrent behavioral risk data collection; refined and standardized data collection protocols and training materials for the human behavioral questionnaire and biological sample collection; finalized sampling and recruitment strategies; human behavioral questionnaire implemented with concurrent surveillance activities.

Sub-activity 2.1.2. Conducting human subjects research through semi-structured, targeted ethnographic assessments in natural settings at prioritized biological and ecological surveillance sites to characterize behavioral risk along high-risk pathways for disease emergence and spread.

- Collect qualitative data from at-risk populations to develop high-risk contact indicators and contexts, as appropriate.
- Work with the global team to analyze qualitative data from focus group, ethnographic interview transcripts, and field notes to better understand relationships among human-animal contact, the context of contact, and disease exposures as perceived by individuals at high-risk of disease spillover.
- Work with global team to evaluate qualitative data to identify any evident intervention targets, as well as any barriers or opportunities to risk mitigation interventions.

Expected Outcomes: Qualitative data from prioritized sites collected and analyzed; novel findings and actionable insights from qualitative data

reported; qualitative data used to identify or develop intervention targets and potential risk mitigation strategies.

Activity 2.2. Identifying potential intervention points
Develop and measure indicators and integrate data from biological surveillance, behavioral risk characterization, and economic and anthropologic studies to identify potential targets for intervention to reduce the risk of viral amplification and spread.

Sub-activity 2.2.1. Combine data collected from human behavioral questionnaire with biological and ecological surveillance data; develop and measure key indicators of high-risk contact among demographic groups to identify high-risk subpopulations and determine relationships between high-risk contact indicators and biological, ecological, and socio-behavioral data.

- Provide data and work with global team to analyze integrated data from surveillance and behavioral risk characterization activities to support identification of high-risk subpopulations and to postulate disease spillover mechanisms and intervention targets.

  Expected Outcomes: Data and insight provided to global teams.

Sub-activity 2.2.2. Target specific high-risk contact behaviors commonly reported and associated with increased risk for further in-depth study and to advise on suitable intervention approaches.

This activity is included for completeness, but some sub-activities may not be achievable in this year.

- Work with global teams to analyze data to identify high-risk contact behaviors and context associated with viral sharing and subsequent transmission risk.
- Work with global teams to prioritize high-risk contact behaviors conditional on context for further in-depth study and to support development of data-informed policy and intervention targets.
- Introduce and implement additional qualitative data collection tools, as available, to assess opportunities and barriers to success of specific intervention approaches and to solicit community input on possible alternative engagement strategies.

  Expected Outcomes: Where appropriate, identify targets for policy recommendations and intervention strategies; anticipate and solicit community-based alternatives to challenges posed by specific policies and strategies.

Objective 3: Improving Global Surveillance Networks

Strengthen internal data storage and sharing platforms to improve the ease of collection, synthesis, storage, access, and dissemination of relevant animal and human, spatially explicit epidemiological, and ecological data.

Activity 3.1. Standardizing data collection

Sub-activity 3.1.1. Standardizing human and animal data management.

- Continue to provide feedback on surveillance data collection tools, including behavioral data, to support refinement and optimization.
- Incorporate standardized data collection tools during both standard surveillance and outbreak situations at the request of, and in coordination with, operational teams.

Expected Outcomes: Feedback on all data collection tools; consistent use of data collection tools in all operations.

Sub-activity 3.1.2. Enhancing digital surveillance and outbreak intelligence.

- **Continue utilization of near real-time digital disease detection intelligence (e.g., HealthMap alerts) and integrate new country-specific feeds and training materials for use with in-country partners at the request of, and in coordination with, global team.
- Field test outbreak response assistance tools, including streamlined communication and outbreak response methods and standardized data collection procedures as they become available at the request of, and in coordination with, the global team.

Expected Outcomes: Use of and feedback on improved tools for in-country intelligence on disease outbreaks.

Activity 3.2. Synthesizing global data

Build on and extend the Emerging Infectious Disease Information Technology Hub (EIDITH) to create a secure and internal globally-accessible database to house aggregated human behavioral risk, biological surveillance, and outbreak information with novel analytic and visualization tools.

Sub-activity 3.2.1. Expanding EIDITH to provide the access and integration capabilities necessary for biological, ecological, and behavioral risk characterization and progress-tracking for deliverables and annual data reviews.

- Continue to implement the improved EIDITH access and integration tools for management of surveillance, ecological, and behavioral data.
- Continue to incorporate the use of data entry tools for surveillance, behavior, and test result data in all operations.
- Continue to incorporate the use of EIDITH data query, extraction, and reporting tools for efficient and effective reporting of surveillance, ecological, and behavioral data for deliverable tracking and annual data reviews.

Expected Outcomes: Local level EIDITH data entry platform in use; feedback provided on data access and integration tools and overall user-experience and functionality.

Activity 3.3. Disseminating data
Provide data on results for policy use, response, and meeting IHR and OIE reporting obligations; distribute data for public release using a globally accessible public portal; and incorporate processed risk-characterization data coupled with clearly documented, cross-cutting forecasting of risk resulting from the characterization process.

- Continue working with the global team on introduction and use of data distribution tools through the globally accessible public portal (http://data.predict.global).
- Provide data and respond to requests for information as needed.
- Manage process for clearing data for public release with appropriate ministries.

Expected Outcomes: Improved sharing and release of data with host country governments, EPT partners, and the public.

Objective 4: Validating One Health Approaches

Conduct a systematic and dedicated effort to validate and evaluate the utility of One Health approaches using all available evidence.

**Not a GHSA funded activity.

****Activity 4.1. Promoting policies and practices that reduce the risk of viral evolution, spillover, amplification, and spread**
In collaboration with government, EPT/P&R project, and inter-agency partners, develop the evidence base to support the strategic application and institutionalization of policy approaches promoting transdisciplinary cooperation; compile and create case studies for situations in which a One Health approach has been used; and support efforts to more effectively utilize One Health platforms.

- Work with global team to disseminate the One Health case study booklet ('One Health in Action', co-developed with P&R) to country partners as appropriate.
- Where appropriate, work with global team to engage EPT-2 and in-country government partners in the prospective and retrospective assembly of information to validate the use of One Health approaches.
- Provide data and respond to requests as needed to support development of a One Health case study template and refinement of the One Health data collection tool.
- Provide feedback to global team on success story development and outreach tools (e.g. short topic videos, blogs, presentations/events) that support awareness and cross-sectoral relevance of policies and practices that reduce risk of emerging viral threats.
- Where relevant, assemble information on results-reporting and any associated actions (including mitigation measures) taken by communities.
- Engage existing One Health platforms and identify opportunities for expansion, integration of additional communities, or additional approaches needed.

Expected Outcomes: One Health platform(s) in-country engaged in communications; actionable steps identified for engaging additional stakeholders/populations as appropriate; country-level One Health data generated/compiled; One Health information disseminated to in-country partners.

****Activity 4.2. Improving cross-sectoral collaboration, capacity development, and coordination with EPT-2 partners**

Sub-activity 4.2.1. Improving cross-sectoral collaboration by promoting strong communication and data sharing opportunities that support One Health approaches and demonstrating the value of adopting a One Health approach for surveillance, capacity building, and outbreak response.

- Continue to conduct activities to identify relevant policy processes and policy-making institutions (including private sector) for engagement at local and national scales and determine plans for engagement.
- Communicate any policy outreach needs or opportunities where global team may provide additional support.
- Continue to participate in meetings, workshops, and coordinated field activities to foster dialogue and provide data to inform on policy across disciplines and sectors at local and national levels to support strengthening of One Health Platforms.
- As part of One Health data collection, collaborate with global team to identify and compile information on One Health-relevant national or local policies.

- Through ongoing communication with partners, continue to identify One Health activities for which PREDICT could offer technical support, including P&R's national One Health platforms.

  Expected Outcomes: Efficient communication pathways with EPT-2 partners; policy engagement; events held to enable cross-ministry dialogue and data sharing; additional One Health stakeholders engaged in communications; sharing of One Health findings and discussion of best practice recommendations.

Sub-activity 4.2.2. Support collaborative platforms and partnerships for surveillance and outbreak response and monitoring of the use of One Health approaches in surveillance and outbreak response situations for comparison with other contemporary (single-silo) outbreak responses.

- Continue to participate in meetings with existing and potential country partners to identify collaborative platforms and partnerships opportunities for longitudinal monitoring of viral threats and identification of opportunities for One Health data collection and evaluation.
- Continue to assess opportunities for PREDICT protocols to be integrated into existing and potential country partner surveillance infrastructure.
- Work with global team to facilitate partner information exchange with priority in-country institutions and international organizations, including FAO, WHO, and GHSA.

  Expected Outcomes: Meetings held with partners; opportunities for PREDICT protocol integration identified; data and information shared with global team in support of the development of recommendations for targeted intervention options and refinement of policy relevant global indicators for outbreak prevention, preparedness, and response effectiveness.

Sub-activity 4.2.3. Advancing socio-economic arguments by conducting global scale analyses of the economics of pandemic mitigation vs. adaptation policies directly applied to the World Bank/FAO One World, One Health capacity building plan.

- In follow up to the global One Health evaluation workshop (planned with World Bank partners for 2017), begin country-level dissemination of workshop outcomes to stimulate further discussion on nationally-relevant One Health information.
- Continue working with the global team to assess data needs and explore country-level opportunities (potentially in collaboration with P&R, where relevant) to contribute to a global-scale analysis of the economics of pandemic mitigation versus adaptation polices.
- Continue efforts to expand EPT-2 collaboration with partners where possible through local World Bank, WHO, and FAO national/regional representatives

to identify examples of existing or potential cost-effective One Health programs to be explored for expansion or implementation.

Expected Outcomes: Stakeholder engagement and data collection tools and evaluation framework developed and implemented; mechanism for One Health analysis report-back and/or information dissemination enabled or maintained.

Sub-activity 4.2.4. Sharing lessons learned among EPT partners and projects for utilization in national preparedness plans for public health events, for proposed incorporation into curricula for the One Health Workforce (OHW) and for validating evidence-based strategies for P&R to inform best practices and implementation guidelines at national levels.

- Where relevant and with support of the global team, P&R (and its Learning Agenda), and in collaboration with country stakeholders, help identify priority regional, country, or community-level policy questions for application of One Health effectiveness evaluation; where feasible, begin targeted data compilation and analysis that includes a strategy for stakeholder engagement.
- Contribute to identifying national priorities for One Health core competencies to provide targeted lesson sharing, training, and other support to in-country partners.
- Work with global team to disseminate evidence-based strategies to support effective One Health platforms and One Health evaluation on priority areas (e.g. data for decision making, research coordination to inform policy, disease prioritization, and others)

Expected Outcomes: Frequent information sharing and collaboration with EPT partners; ongoing sharing of best practices with EPT partners; targeted One Health questions identified for addressing; engaged stakeholders.

Sub-activity 4.2.5. Support the training of the next generation of One Health professionals through coordinated activities with EPT and inter-agency partners.

- Continue to coordinate across EPT projects and implementing partners to support the promotion of capacity development at the epizone scale.
- Continue to identify promising candidates to participate in training opportunities that will build technical, team building, and critical thinking skills; support those candidates in their pursuit of said training where feasible.
- Strengthen relationships with key EPT and institutional partners to enhance project infrastructure and sustainability.

Expected Outcomes: Dialogue and coordination across EPT projects and inter-agency partners; development of training opportunities that contribute

to capacity strengthening; placement of key individuals in available trainings; enhanced project sustainability through institutional partnerships.

Objective 5: Strengthening Capacity

Add depth and scope to transdisciplinary One Health platforms using a systems approach to classify and track biological surveillance and behavioral risk characterization advances, thereby strengthening surveillance system capacities.

**Not a GHSA funded activity.

Activity 5.1. Systems approach to capacity building for wildlife, livestock, and human surveillance

Develop materials, conduct trainings, and track progress to address all areas of project design and implementation that will improve infrastructure and capacity to perform surveillance-related activities.

Sub-activity 5.1.1. Strengthening biological sampling and behavioral risk characterization capacity.

- Continue to conduct capacity scoping and assessment along with evaluation of ongoing capacity strengthening activities in areas of new engagement.
- Continue contributing to revisions of protocols and training tools that build and test technical knowledge and skills related to biological sampling, laboratory test interpretation, and behavioral risk assessment and characterization.
- Translate protocols and guides into local languages (as needed) in coordination with the operational team.
- Distribute protocols and training modules to strengthen in-country capabilities.
- Conduct and participate in training events related to biological sampling and behavioral risk assessment and characterization to build capacity at the local and national levels.
- Provide Collaborative Institutional Training Initiative (CITI) training for all partners implementing human surveillance and behavioral risk activities.
- Continue training local public health professionals and other partners in human behavioral data collection techniques and preliminary analyses.
- Continue providing targeted training for implementing partners and project staff for all appropriate activities, including environmental management and mitigation plans.
- Implement procedures for field sampling and specimen transport that prevent exposure to especially dangerous pathogens and ensure appropriate handling, management, storage, and disposal of hazardous and infectious materials.
- Work with global team to pilot new technologies for training and knowledge transfer in surveillance, pathogen detection, and information management.

- Continue to track capacity strengthening progress on an annual basis using a standardized protocol.

  Expected Outcomes: Systematic capacity building plans to optimize project implementation strategies; adoption and use of updated protocols and training materials; increased awareness of the importance of biological surveillance and human risk behavior data in successfully addressing emerging infectious disease issues; trainings conducted for human behavioral questionnaire and biological sample collection; improved communication among human and animal health partners in-country.

Sub-activity 5.1.2. Technical support for viral surveillance and strengthening of laboratory capacity.

- Receive training and modules for refresher and annual basic training for staff in collaborating laboratories and disseminate training modules for laboratory scientists.
- Continue to conduct basic and follow-up training to improve the quality of cPCR results and sequences for analysis.
- Introduce or continue to implement procedures for specimen transport and laboratory testing that prevent exposure to especially dangerous pathogens and ensure appropriate handling, management, storage, and disposal of hazardous and infectious materials.
- Continue to use reference panels to perform quality control and assessments of laboratory procedures in collaborating laboratories.
- Track training and progress on an annual basis using a standardized protocol.
- Continue to implement training (as needed) in the partner national veterinary laboratories to test livestock samples and in public health laboratories to test human samples using PREDICT viral screening protocols.
- Continue transferring protocols and providing technical support to pilot PREDICT viral screening protocols to test livestock and human samples in interested national laboratories.

  Expected Outcomes: Completed plan for basic and follow-up training to improve the quality of field work and lab results and sequences for analysis; active communication among personnel to enhance quality assurance and capacity; enhanced local surveillance and laboratory capacity in the use of PREDICT surveillance and pathogen detection and discovery framework; piloting/implementation of targeted viral family level protocols in national laboratories identified as willing to engage.

Sub-activity 5.1.3. Strengthening information management capacity.

- Ensure bidirectional flow between the country and global levels on protocols and training materials related to information management.
- Continue to provide and participate in trainings on management of field data, tracking of laboratory sample and results data, interpretation of data, and analysis of results.
- Participate in training exercises related to information management skills and technologies and provide feedback.
- Track training and progress using a standardized protocol.

Expected Outcomes: Continued refinement of information management training materials.

***Sub-activity 5.1.4. Strengthening risk management capacity.*

- Provide and participate in training exercises relating to risk management skills and technologies (e.g., basic data analysis tools, spatial mapping, and disease modeling).
- Work with global team as needed to conduct collaborative analyses and in-depth trainings to develop local capacity in risk modeling of EIDs.
- Track training and progress on an annual basis using a standardized protocol.

Expected Outcomes: Increased numbers of trained individuals able to utilize data analysis and modeling tools to inform risk management; development and refinement of new training materials.

Objective 6: Assisting Organization of In-country Meetings

In close coordination with USAID and other EPT-2 projects and partners (including FAO, CDC, WHO, etc.), organize relevant meetings to optimize and refine ongoing and future activities.

Activity 6. Work with the global team to support partner meetings and annual data reviews to optimize and refine ongoing and future activities.

- In close consultation with USAID and other EPT-2 partners, coordinate and develop appropriate agenda(s) and identify participants for relevant meetings, ensuring appropriate gender balance.
- Work with global team to compile a list of data sets in preparation for global Annual Data Review Meeting, including gender, age and culture-disaggregated data sets, where available.
- With support of global team, identify type and format of data that might be more readily used to meet present or anticipated data sharing and reporting needs (e.g., for OIE or WHO IHR).

Expected Outcomes: Identification of existing and pending available data sets; enhanced country partner data review; identification of areas where future data collection might be targeted to complement data sharing and reporting needs and opportunities.

Objective 7. Managing and Coordinating Operations

Maintain collaborative and adaptive management of program operations and ensure compliance with agency policies and procedures.

- Participate in regularly scheduled coordination meetings with lead consortium partners and other appropriate implementing partners, as well as specific-operational team calls, as needed.
- Proactively prepare partner (implementing organizations, ministries, USAID mission, GHSA stakeholders, etc.) and operational team updates on all in-country activities, as appropriate, including technical and financial reports.
- Respond in a timely fashion to all requests for information on progress, outbreak/disease alerts, and requests for data, including performance monitoring, capacity tracking, M&E indicator tracking, and environmental mitigation and monitoring reporting.
- Ensure coordination with collaborative in-country surveillance and diagnostic platforms and networks, including GHSA partners and initiatives (where relevant).

Expected Outcomes: Completion of workplan and reports; refinement of systematic implementation strategy (as appropriate); effective and efficient operation of the project; timely response to all data calls and information requests; successful communications with EPT, GHSA, and interagency partners; submission of updates and progress reports to host country partners.

From: Megan M Doyle <mmdoyle@ucdavis.edu>
To: "predict-surveillance@ucdavis.edu" <predict-surveillance@ucdavis.edu>
Cc: Catherine Machalaba <machalaba@ecohealthalliance.org>, "William B. Karesh" <karesh@ecohealthalliance.org>, Jonna Mazet <jkmazet@ucdavis.edu>
Subject: Surveillance team call tomorrow, Thurs, Aug 3rd @ 10am PT/1pm ET
Sent: Wed, 2 Aug 2017 17:32:51 +0000

Hi PREDICT Surveillance Team,

Our next surveillance call is tomorrow, **Thurs, Aug 3rd @ 10am PT/1pm ET.** Call information and agenda are below. Please let us know if you have additional items to discuss. Thanks, and talk soon! -M

Join from **PC, Mac, Linux, iOS or Android**: REDACTED

Or **iPhone one-tap** (US Toll): +[redacted]

Or **Telephone**:

Dial: +1 646 558 8656 (US Toll) or +1 408 638 0968 (US Toll)
Meeting ID: REDACTED
International numbers available: [redacted]

Draft Agenda
-EIDITH GPS data visualization
-Human sample and specimen ID alignment (Tammie)
-Other livelihoods data
-How to engage USAID POCs in the workplan process (David)
-Africa updates
-Other items?

Megan Doyle
Research Associate
Emerging Pandemic Threats PREDICT Project
EpiCenter for Disease Dynamics
One Health Institute
UC Davis School of Veterinary Medicine
530-564-2133
mmdoyle@ucdavis.edu
skype: megan.m.doyle

From: David J Wolking <djwolking@ucdavis.edu>
Sent: Thu, 17 Aug 2017 10:35:51 -0700
To: Molly Turner <turner@ecohealthalliance.org>
Cc: Emily Hagan <hagan@ecohealthalliance.org>, Jon Epstein <epstein@ecohealthalliance.org>, Ariful Islam <arif@ecohealthalliance.org>, Melinda Rostal <rostal@ecohealthalliance.org>, "predict@ucdavis.edu" <predict@ucdavis.edu>
Subject: [predict] Re: PREDICT-2 Y4 Bangladesh work plan brief

Thanks Molly,

I'm not at all surprised by this feedback, thanks for sharing. It's very helpful to see what expectations mission staff have on our coordinators and plans. As you're all aware, PREDICT's M&E is tracked at the program level and through HQ. Our EPT-2 M&E framework (developed with USAID and EPT-2 partners) captures some of the outcome indicators Kelly is asking about but falls short of the GHSA requirements. We are in a constant struggle satisfying demands for both from global to country levels.
Once you have worked through the new GHSA template we can revisit how best to address Kelly's concerns. As you'll notice, the TZ model for the GHSA template does not go into the level of detail she is asking for (e.g., #s of samples, workshop dates and plans, #s of trainees, etc.) so I'm not sure she will be happy with that approach either. I leave it in your hands as the Bangladesh team to balance the program vs. mission needs but will standby to provide whatever back up and support you need to manage expectations and potentially unreasonable requests. Maybe you could try to build in some of these details as "planning targets" in that GHSA template in the last column where details and context can be dropped in to better describe and contextualize the activities (# of animals targeted by taxa extrapolated by site from your brief or something - nothing overly detailed but enough to address it using our minimum surveillance targets - the 100/species/season/site). You could also consider including a few details or notes on typical timelines for sequence-confirmed results from labs, public release, etc. (usually 6 months to a year from sample collection in my countries). Training detail maybe sufficient in the current template but I'm sure Kelly would love to see some projections.

Hang in there, I realize this new Mission engagement requirement is really challenging and will likely continue to be through implementation over the next year.

David

On Wed, Aug 16, 2017 at 7:08 AM, Molly Turner <turner@ecohealthalliance.org> wrote:

FYI
---------- Forwarded message ----------
From: **Ariful Islam** <arif@ecohealthalliance.org>
Date: Tue, Aug 15, 2017 at 6:47 AM
Subject: Fwd: PREDICT-2 Y4 Bangladesh work plan brief
To: Ava Sullivan <sullivan@ecohealthalliance.org>, Emily Hagan <hagan@ecohealthalliance.org>, Melinda Rostal <rostal@ecohealthalliance.org>, Jon Epstein <epstein@ecohealthalliance.org>, Molly Turner <turner@ecohealthalliance.org>, Evelyn Luciano <luciano@ecohealthalliance.org>

Dear Emily:
Please below comments from kelly regarding Y4 work plan brief. As I discussed with you that Kelly wants Y4 work plan with measurable terms thnat is with M& E tools. we need to adress her comments. She wants work plan as per GHSA guideline

with best,
Arif

---------- Forwarded message ----------
From: **Kelly O'Neill** <keoneill@usaid.gov>
Date: Tue, Aug 15, 2017 at 4:14 PM
Subject: Re: PREDICT-2 Y4 Bangladesh work plan brief
To: Ariful Islam <arif@ecohealthalliance.org>

Good morning, Arif,
Thank you for sending me this draft. I understand that this is similar to what PREDICT used last year, but the document is extremely vague and does not fit in the format that the GHSA office has requested. Do you have the guidelines that were sent out by Washington? (If not, I can forward them to you). Where are the JEE indicators and scores against which you will be measuring?

As you know, the workplan needs to be a document against which we can determine if objectives are being met. As it is, there are no measurable objectives or specific activities. Specifically, please make changes to the draft to include the following:

Overall:
-Please include measurable parameters
-Please include a time-frame for your activities
-Please mention what JEE indicators these activities are addressing

Surveillance- how many samples will be collected and of which species? How often do you do this- once? one a week? once a month? how will you measure success?
-If you are training forestry department staff- how often? what skills are they learning? Will this improve the capacity of the forestry department and if so, how? How will it be measured

Data: There is nothing in your workplan about getting results from any of the surveillance- this needs to be clearly articulated. When will you get the results from the surveillance? How is the data shared? How does this improve things in Bangladesh? Do the results change how and where surveillance is conducted and if so, what is the mechanism/timeframe for evaluating that?

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-This section is very vague. What does "continued support" mean- how does PREDICT support the lab, which labs?
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- How does this help the government of Bangladesh? How will it be measured/evaluated?

One Health Capacity:
-This section is also very vague.
-In what role will you participate? Will PREDICT be hosting any meetings or just attending?
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-How will PREDICT "support outbreak response"- what does this mean? Please be specific. What is the goal of doing this? Are you supporting IEDCR? DLS? DOF? How does this build the capacity of the Government of Bangladesh?

Economic Fellow:
-This paragraph comes the closest to having objectives but should be much stronger. You state that the fellow will "collect data"but do you know how this data will be collected? How will the results be shared? To whom?

I am happy to discuss with you if this is helpful. Thank you,

Kelly E. O'Neill, DVM, MBA
Global Health Security Advisor
U.S. Agency for International Development - Dhaka, Bangladesh
Madani Avenue, Baridhara, GPO Box 323, IVG Post Code Dhaka 583
Phone: +88025566, extension 2648
Mobile: REDACTED
E-mail: keoneill@usaid.gov

On Mon, Aug 14, 2017 at 5:05 PM, Ariful Islam <arif@ecohealthalliance.org> wrote:

Dear Kelly:

I hope, this email email finds you well.

We have recently developed Y4 work plan and submitted to PREDICT global team. I've attached the Y4 work plan brief in this email for your information.

would you kindly review the work pkan and let me know if you have any concerns or critical changes need to be made?

with best regards,
Arif

--
Molly Turner
Federal Grants Coordinator

EcoHealth Alliance
460 West 34th Street – 17th floor
New York, NY 10001

1.212.380.4461 (direct)
REDACTED (cell)
www.ecohealthalliance.org

From: David J Wolking <djwolking@ucdavis.edu>
Sent: Thu, 17 Aug 2017 10:41:19 -0700
Subject: Fwd: PREDICT-2 Y4 Bangladesh work plan brief
To: "Clements, Andrew (GH/HIDN)" <AClements@usaid.gov>, Alisa Pereira Emerging Threats Division <apereira@usaid.gov>
Cc: "Prof. Jonna Mazet" <jkmazet@ucdavis.edu>, "predict@ucdavis.edu" <predict@ucdavis.edu>, Elizabeth Leasure <ealeasure@ucdavis.edu>

Hi Andrew and Alisa,
Just sharing with you an example from Bangladesh (GHSA Phase 1) of what Mission engagement involves during the workplan process. Arif has been under a lot of pressure the past few weeks as have many of our coordinators balancing the global and country-level workplanning requirements. All of our Phase 1 teams are busy integrating plans into the new GHSA template so hopefully once those are shared some of this pressure will be alleviated.

We will have time to discuss some of these challenges on our management team call this Monday.

David

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Date: Wed, Aug 16, 2017 at 7:08 AM
Subject: Fwd: PREDICT-2 Y4 Bangladesh work plan brief
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Cc: Emily Hagan <hagan@ccohcalthalliancc.org>, Jon Epstcin <cpstcin@ccohcalthalliancc.org>, Ariful Islam <arif@ecohealthalliance.org>, Melinda Rostal <rostal@ecohealthalliance.org>

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I am happy to discuss with you if this is helpful. Thank you,

Kelly E. O'Neill, DVM, MBA
Global Health Security Advisor
U.S. Agency for International Development - Dhaka, Bangladesh
Madani Avenue, Baridhara, GPO Box 323, IVG Post Code Dhaka 583
Phone: +88025566, extension 2648
Mobile: +[REDACTED]
E-mail: keoneill@usaid.gov

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> I hope, this email email finds you well.
> We have recently developed Y4 work plan and submitted to PREDICT global team. I've attached the Y4 work plan brief in this email for your information.

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with best regards,
Arif

From: Andrew Clements <aclements@usaid.gov>
Sent: Tue, 29 Aug 2017 09:36:22 +0200
Subject: Fwd: MERS-CoV - FAO Risk Assessment "Human exposure to MERS-CoV from livestock or wildlife species"
To: Dennis Carroll <dcarroll@usaid.gov>, Cara Chrisman <cchrisman@usaid.gov>, "Lisa Kramer (Nairobi/EA/RHH)" <lkramer@usaid.gov>, Akmal Elerian <aelerian@usaid.gov>, "Daniel Schar (RDMA/OPH)" <dSchar@usaid.gov>, "Sudarat Damrongwatanapokin (RDMA/OPH)" <sDamrongwatanapokin@usaid.gov>, lparish@usaid.gov, William Karesh <Karesh@ecohealthalliance.org>, Jonna Mazet <jkmazet@ucdavis.edu>, Christine Kreuder Johnson <ckjohnson@ucdavis.edu>, Kevin Olival PhD <olival@ecohealthalliance.org>, "Dr Maria Van Kerkhove, REDACTED
Attachment
FAO_RA_MERSCoV_Aug2017.pdf

FYI

Andrew P. Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

Begin forwarded message:

From: "VonDobschuetz, Sophie (AGAH)" REDACTED
To: "VonDobschuetz, Sophie (AGAH)" <REDACTED
Cc: "Lubroth, Juan (AGAH)" <REDACTED, "ElIdrissi, Ahmed (SP5)" REDACTED "Raizman, Eran (AGAH)" REDACTED Emma Gardner REDACTED "Morzaria, Subhash (TCE)" REDACTED, "Bruni, Mirko (AGAH)" REDACTED "Makonnen, Yilma (FAOKE)" <REDACTED>, "Tibbo, Markos (AGAS)" REDACTED, "Palamara, Elisa (AGAH)" REDACTED "Ciarlantini, Claudia (AGAL)" REDACTED
Subject: MERS-CoV - FAO Risk Assessment "Human exposure to MERS-CoV from livestock or wildlife species"

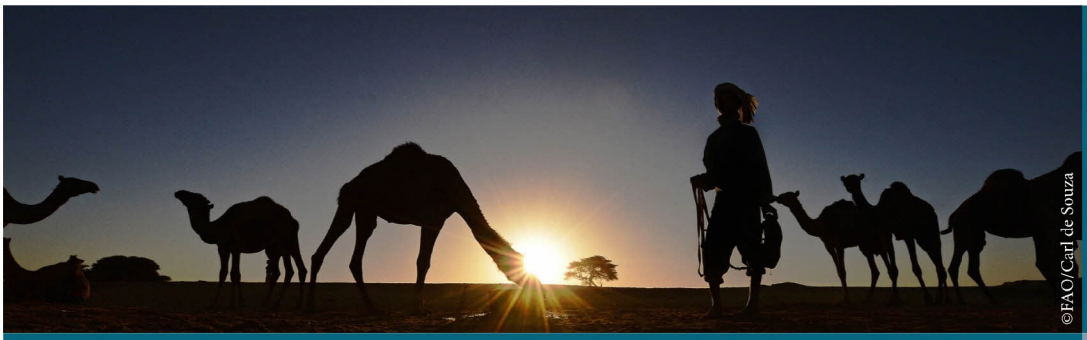
Dear colleagues,

I am pleased to inform you that our risk assessment "Human exposure to MERS-CoV from livestock or wildlife species" is now available online at the following link: http://www.fao.org/3/a-i7706e.pdf .
Please find a copy attached.

Happy reading!
Sophie
Sophie von Dobschuetz, DVM, PhD, MSc
Veterinary Epidemiologist
Animal Health Service – FAO
Rome, Italy
REDACTED
EMPRES-i: http://empres-i.fao.org/

Food and Agriculture Organization of the United Nations

August 2017



ANIMAL HEALTH **RISK ANALYSIS**

ASSESSMENT No. 4

HUMAN EXPOSURE TO MIDDLE EAST RESPIRATORY SYNDROME CORONAVIRUS FROM LIVESTOCK OR WILDLIFE SPECIES

A Qualitative Risk Assessment (Exposure)

SUMMARY

The likelihood of humans being exposed to MERS-CoV in affected areas through:

- Direct contact with dromedary camels can be considered
  - Moderate to high (occupational exposure) in MERS-CoV-endemic* regions;
  - Negligible in other regions.
- Handling or consumption of dromedary products (meat and milk), body fluids and excreta can be considered
  - Negligible to low (contamination) for raw milk;
  - Negligible to low (contamination) for raw meat;
  - Negligible for urine or faeces;
  - Nil for pasteurized milk or thoroughly cooked meat.
- Contact with other domestic species can be considered
  - Negligible to low (incidental hosts) for alpacas and llamas;
  - Negligible for goats, swine and rabbits;
  - Nil for cattle, buffalo, chickens, ducks, sheep, Bactrian camels, bank voles, shrews, mice, hamsters and ferrets.
- Contact with bats and other wildlife species can be considered
  - Negligible through direct contact with bats (absence of scientific evidence of MERS-CoV in bats);
  - Negligible through direct contact with non-human primates (lack of evidence of naturally occurring infection; replication restricted to the lower respiratory tract).
- The environment and fomites at the animal-human interface can be considered
  - Negligible.

* Endemicity is defined here as the constant presence of a zoonotic pathogenic agent or health condition affecting animals and/or humans within a given geographic area or population.

INTRODUCTION

Recurrent outbreaks of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in humans have been reported, mainly from the Arabian Peninsula, since 2012, with a notable outbreak in Republic of Korea from May through July 2015.

To evaluate the role of domestic and wild animals, in particular dromedary camels and bats, and assess the likelihood of human exposure[1] to MERS-CoV (i) through direct contact with these animals, (ii) while handling and consuming their products (milk, meat, urine) and (iii) from the environment at the animal-human interface (e.g. farms, households, slaughterhouses, markets, etc.), FAO prepared the following qualitative release assessment.

This assessment is based on information available as of 19 May 2017 and will be revised as circumstances change. It focuses on livestock-related aspects[2] and is therefore restricted to an exposure assessment at the animal-human interface (i.e. a description of biological pathways necessary for exposure of humans to MERS-CoV released from animals and the estimation of its probability). For further aspects of the human infection and detailed consequence assessments, please refer to risk assessments by the World Health Organization (WHO)[3].

The reader should note that the overall uncertainty in the assessment is considered high, since many data gaps remain (See Annex 2). Our understanding of MERS-CoV epidemiology still requires improvement in order to be able to provide a more precise assessment of risk to human health.

The detailed background information used to conduct this qualitative risk assessment can be found in Annex 1.

RISK QUESTIONS ADDRESSED

What is the likelihood of humans being exposed to MERS-CoV in affected areas through[4]:

a. Direct contact with dromedary camels;
b. Handling or consumption of dromedary products (meat and milk), body fluids and excreta;
c. Contact with other domestic species;
d. Contact with bats and other wildlife species;
e. The environment and fomites at the animal-human interface?

TABLE 1. *Definition of the different levels of likelihood*

Level of likelihood	Definition
High	Highly likely to occur
Moderate	Potentially occurring
Low	Unlikely to occur
Negligible	Extremely unlikely to occur
Nil	No risk at all

ASSESSMENT

Question 1: What is the likelihood of humans being exposed to MERS-CoV in affected areas through:

a. Direct contact with dromedary camels

Considering that:

- In Arabian culture, contact between humans and dromedary camels in both professional and recreational husbandries is very close due to the fact that these animals present social and economic value (i.e. dairy and meat production, racing, caravans, use of skin and fibre valued for clothing and for furniture items).
- MERS-CoV was identified in nasal swabs of several camels in contact with two confirmed human cases. There was 99.9 percent similarity in phylogenetic analysis between the camel isolate and virus isolated from a farmer. However, the direction of transmission could not be confirmed (Haagmans *et al.*, 2014; Muhairi *et al.*, 2016).
- Test results from archived dromedary camel specimens (restricted to serology), suggest that MERS-CoV, or a closely related virus, has been circulating in dromedary camels in Saudi Arabia for at least two decades (since 1992) (Alagaili *et al.*, 2014) or even for over 30 years in Sudan, Somalia and Egypt (Mueller *et al.*, 2014).
- A serological study in Qatar demonstrated the presence of neutralizing antibodies in people (7 out of 109) with occupational exposure to dromedary camels (i.e. slaughterhouse workers). The study findings strengthen evidence of the role of dromedary camels as a source of human infection and indicate that unrecognized, asymptomatic or mild infections are likely to occur at low rates in occupationally exposed persons (Reusken *et al.*, 2015).
- The clinical presentation of MERS-CoV in camels is generally asymptomatic. However, in some cases mild respiratory signs have been observed, with short periods of purulent nasal discharge (Jores, 2015) and lachrymation (Khalafalla *et al.*, 2015).
- Viral replication appears to be limited to the upper respiratory tract (Adney *et al.*, 2014).

[1] Exposure: to come into contact with a pathogen, in this case MERS-CoV.
[2] Please note that aspects of human-to-human transmission are not considered in this assessment.
[3] WHO updates and other material (e.g. maps and epicurves) can be accessed at: http://www.who.int/emergencies/mers-cov/en/
[4] Because of current knowledge gaps on the existence of seasonal patterns in the transmission of MERS-CoV in the animal reservoir, we did not include any time reference regarding the likelihood of humans being exposed to the virus in affected areas.

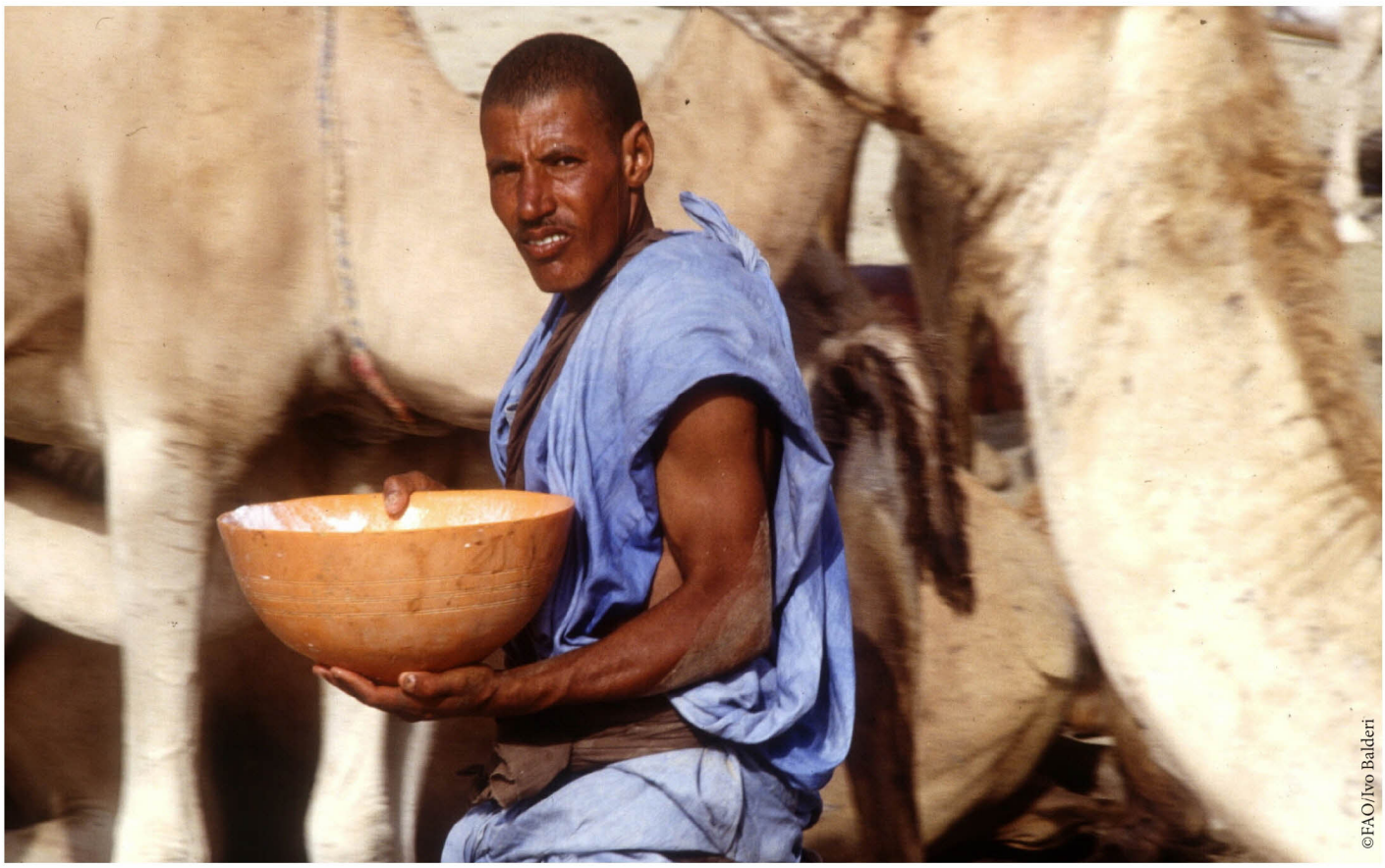
Dromedary camels are considered the primary reservoir hosts of MERS-CoV.

- Results of studies currently available indicate contact (direct or indirect) with infected dromedary camels as the main probable source of primary infection for humans (Gossner *et al.*, 2014).
- According to current knowledge and based on the scientific evidence available, dromedary camels are considered the primary reservoir hosts of MERS-CoV (Mohd *et al.*, 2016; Nowotny and Kolodziejek, 2014). The role of other species including bats in the reservoir system is not fully known but is considered to be minor (see section c. on contact with other species).
- Events that involve increased human exposure to dromedary camels (*e.g.* camel racing, religious gatherings, festivals, camel shows, etc.) have not been thoroughly investigated.
- MERS-CoV viral nucleic acids are more frequently detected in juvenile than in adult animals. Calves may be a source of infection for humans after the fourth month of life, when MERS-CoV specific antibodies begin to wane, and during the first year of life in endemic regions. This is the period when calves appear to be more susceptible to MERS-CoV infections due to their naïve immunological systems (Alagaili *et al.*, 2014; Meyer *et al.*, 2016).
- The exact route(s) of transmission is (are) not well understood. However, based on findings from epidemiological studies and surveillance to date, it can be assumed that MERS-CoV spills over to humans through direct contact with infected dromedary camels (Mohd *et al.*, 2016).
- Environmental conditions are thought to affect MERS-CoV transmission from dromedary camels to humans as suggested by environmental niche models for MERS-CoV transmission risk (Reeves *et al.*, 2015).
- The livelihoods of pastoralists are entirely dependent on camels, implying a close interaction (i.e. direct and prolonged contact) on a day-to-day basis.

Therefore, the likelihood of humans **being exposed** to MERS-CoV in affected areas through **contact with dromedary camels** can be considered:

- **Moderate to high** in MERS-CoV-endemic[5] regions, with higher risk for people in regular close contact with these animals (*e.g.* occupational exposure);
- **Negligible** in regions where no positive samples have been detected through serological or virological testing in dromedary camels.

[5] Endemicity is defined here as the constant presence of a zoonotic pathogenic agent or health condition affecting animals and/or humans within a given geographic area or population.



Human exposure to MERS-CoV through handling or consumption of raw dromedary milk is unlikely to occur if milk is collected under hygienic conditions.

More than half of the reported human cases result from secondary human-to-human transmission in health care settings, as multiple nosocomial outbreaks have been identified since the emergence of MERS-CoV (Kahn *et al.,* 2016; WHO, 2016).

b. Handling or consumption of dromedary products (meat and milk), body fluids and excreta

Considering that:

- As described in section a., the absence of systemic replication and viremia, and the concentration of the virus in the upper respiratory tract indicate that there is unlikely to be hematogenous spread of MERS-CoV in dromedary camels to extra-respiratory tissues, and therefore infectious virus is unlikely to be found in other body compartments or products such as meat, milk and urine.
- No infectious virus or viral ribonucleic acid (RNA) was detected in any serum or whole blood samples (Adney *et al.*, 2014).

Milk

- Most camel milk in Saudi Arabia is produced for own consumption and small-scale commerce, and is mainly consumed raw or fermented (Faye, 2016) (Calistri, personal communication, 2017).
- MERS-CoV RNA was demonstrated in dromedary camel milk samples from dams shedding the virus. However, it is not clear if the virus was excreted in the milk or if the milk was contaminated through the milking process or by an infected suckling calf (Gossner *et al.*, 2014; Reusken *et al.*, 2014).
- Milk contaminated with MERS-CoV (camel, goat or cow), can survive for prolonged periods (72 hours when stored at 4 °C or 48 hours at 22 °C) (van Doremalen *et al.*, 2014).
- Since camels are milked under less-than-optimal hygienic conditions (i.e. the udder is rarely cleaned before milking, so the source of virus could be through secondary infections), raw milk could be a medium for human infection following contamination.
- In order to stimulate milk production, the newborn calf is often left to suckle the dam. If the calf is infected with MERS-CoV, it can be considered a potential source of contamination of milk (Reusken *et al.*, 2014).
- Pasteurized milk is safe to handle and consume. Virus particles are destroyed by heat treatment at 63 °C for 30 minutes (van Doremalen *et al.*, 2014; WHO, 2015a).

Meat

- Camel meat is an important animal product and is mostly consumed in North Africa, the Arabian Peninsula and China (Faye and Bonnet, 2012).

- While there is no evidence to date of MERS-CoV in camel meat, by extrapolation from what is known about other similar viruses like Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), it is possible that the fall in pH of meat with maturation inactivates the virus (Rabenau *et al.*, 2005) and that proper cooking kills the virus, given that virus particles are destroyed by heat treatment (van Doremalen *et al.*, 2014; WHO, 2015a; Gossner *et al.*, 2014)[6].

Urine

- Camel urine is considered as having medicinal properties, especially among Bedouins and camel-herding people. It is used to wash the hands, face and hair and is also consumed, sometimes mixed with fresh milk (Gossner *et al.*, 2014).
- Low titres of MERS-CoV virus RNA have been found in the urine samples of an infected human (Drosten *et al.*, 2013; Gossner *et al.*, 2014).
- In experimentally inoculated dromedary camels, none of the camels shed viral RNA through urine (Adney *et al.*, 2014).

Faeces

- Livestock faeces (including those from camels) are used as fertilizer in MERS-CoV-endemic regions (Bhakat and Sahani, 2006).
- To date, MERS-CoV RNA has not been detected in faeces or rectal swabs using reverse transcription polymerase chain reaction (RT-PCR) (Haagmans *et al.*, 2014; Hemida *et al.*, 2014; Meyer *et al.*, 2014; Reusken *et al.*, 2014; Sabir *et al.*, 2015).

Therefore, the likelihood of humans **being exposed** to MERS-CoV in affected areas through **handling or consumption of dromedary products (meat and milk), body fluids and excreta** can be considered:

- **negligible** to **low** for **raw milk** when considering the possibility of milk contamination with the virus through calves (i.e. suckling), udder contamination or through milkers' hands in pastoral regions; **negligible** for milk collected under **hygienic conditions**, considering that virus shedding through milk is unlikely to occur;
- **negligible** to **low** for **raw meat** due to cross-contamination while handling the carcasses and preparing the meat in slaughterhouse and non-slaughterhouse facilities;
- **negligible** for **urine**, which could be cross-contaminated like raw milk and meat;
- **negligible** for **faeces**;
- **nil** for **pasteurized milk**, if following FAO's recommendations on food preparation and consumption, avoiding cross-contamination;
- **nil** for **thoroughly cooked meat**, if following FAO's recommendations for food preparation and consumption, avoiding cross-contamination (as with *Salmonella sp.* or *E. coli*).

This risk evaluation is associated with a high degree of uncertainty due to the limited studies conducted in this area to date (Annex 2).

c. Contact with other domestic species

Considering that:

- No antibodies were found during field surveys in: goats (Perera *et al.* 2013, Hemida *et al.*, 2013, Reusken *et al.*, 2013, Buchholz *et al.*, 2013); cattle, sheep (Perera *et al.*, 2013, Hemida *et al.*, 2013, Reusken *et al.*, 2013); chickens (Hemida *et al.*, 2013); swine, ducks, buffalo (Perera *et al.*, 2013) and equids (Meyer *et al.*, 2015).
- Experimentally infected young goats showed seroconversion to MERS-CoV (Adney *et al.*, 2016b).
- MERS-CoV specific Immunoglobulin G (IgG) antibodies were also found in alpacas (*Vicugna pacos*) in the Al-Shahaniya region of Qatar (endemic region) (Reusken *et al.*, 2016). However, no human cases were shown to be related to exposure to alpacas.
- Presence of virus shedding and neutralizing antibodies against MERS-CoV was confirmed in experimentally infected alpacas (Crameri *et al.*, 2016), as well as in alpacas in close contact with them (Adney *et al.*, 2016). Also, *in vitro* replication (Eckerle *et al.*, 2014) and virus excretion (Vergara-Alert *et al.*, 2017) were observed in experimentally infected llamas (*Llama pacos*).
- To date, MERS-CoV specific antibodies have mostly been detected in dromedary camels (Mohd *et al.*, 2016). Surveys conducted on MERS-CoV in Bactrian camels (*Camelus bactrianus*) in Kazakhstan have demonstrated absence of the virus. A total of 550 camels (455 dromedaries and 95 bactrians) were sampled from four different regions. The representativeness of the sample size in the camel population in this area is not indicated in this study. Sera samples were analysed using the MERS-CoV spike protein pseudoparticle neutralization test and no positive results were found (Miguel *et al.*, 2016).
- No neutralizing antibodies against MERS-CoV have been detected so far in camelids outside Africa or the Middle East, i.e. the United States and Canada (Alexandersen *et al.*, 2014; n=6), Europe (except the Canary Islands) (Meyer *et al.*, 2014; n=16; Reusken *et al.*, 2013) Kazakhstan (Miguel *et al.*, 2016; n=550) and Australia (Hemida *et al.*, 2014); n=25).
- The virus was shown not to replicate *in vitro* using sheep, bank voles (*Myodes glareolus*), shrews (*Crocidura*

6 As such a fall in pH is not observed in lymph nodes and bone marrow, persistence of infectious virus in these organs, even though highly unlikely, cannot be excluded and should be futher investigated.

suaveolens), cattle (Eckerle *et al.*, 2014); mice (Coleman *et al.*, 2014); hamsters (de Wit *et al.*, 2013) and ferrets (*Mustela putorius furo*) cells (Raj *et al.*, 2014), nor was it shown to replicate *in vivo* in studies conducted on ferrets (Raj *et al.*, 2014).

- *In vivo* replication was observed in goats (Eckerle *et al.*, 2014) and rabbits (Haagmans *et al.*, 2015).
- Experimentally infected rabbits (Haagmans *et al.*, 2015) and pigs (Vergara-Alert *et al.*, 2017) excreted infectious virus from the upper respiratory tract; however, it remains to be investigated if rabbits and pigs in MERS-CoV-endemic areas have sufficient opportunity for exposure to camels in order to become infected and, further, if they could be a source of infection for humans.
- So far, no research has been carried out for non-livestock domestic animals (i.e. cats and dogs).
- It is highly unlikely that other animal species act as maintenance hosts for MERS-CoV due to the lack of serological and virological findings.

Therefore, the likelihood of humans **being exposed** to MERS-CoV in affected areas through **contact with other domestic species** can be considered:

- **negligible** to **low** for **alpacas and llamas** as they can be incidental hosts;
- **negligible** for **goats, swine** and **rabbits**;
- **nil** for **cattle, buffalo, chickens, ducks, sheep, Bactrian camels, bank voles, shrews, mice, hamsters** and **ferrets**.

For assessing the risk from **non-livestock species (cats, dogs)** the information available is insufficient due to the fact that there is no further research about prevalence of the virus in these species.

d. Contact with bats or other wildlife species

Considering that:

- There are over 900 species of bats around the world, making up about one quarter of all mammal species. They live in very diverse ecosystems, with different ecobehaviours and food preferences.
- Bats are known to host a wide diversity of coronaviruses (Munster *et al.*, 2016).
- Bats have been found to carry coronaviruses with genetic similarity to MERS-CoV (de Wit *et al.*, 2013). MERS-related CoVs RNA have been found in roost faeces, faecal pellets and rectal swab samples of the following bat families: Emballonuridae (*Taphozous perforatus*), Pteropodidae (*Eidolon helvum*), Rhinopomatidae (*Rhinopoma hardwickii*), Vespertilionidae (*Pipistrellus kuhlii*) (Memish *et al.*, 2013; Anthony *et al.*, 2017; Chan *et al.*, 2011).
- Findings of MERS-related CoVs were obtained in regions without confirmed human or animal MERS-CoV infections (ten different species from Ghana and *Pipistrellus spp* from European countries) (Mohd *et al.*, 2016).
- MERS-related CoVs microscopic lesions were also found in the respiratory tract during bat necropsies. None of the animals showed clinical signs (Munster *et al.*, 2016); there is no clinical disease in infected bats reported to date (Shehata *et al.*, 2016).
- Novel lineage C betacoronavirus closely related to human MERS-CoV and camel MERS-CoV was identified in *Vespertilio superans* bats (Yang *et al.*, 2015).
- To date, no infectious MERS-CoV has been isolated from bats. The first and only identification of MERS-CoV in one Egyptian tomb bat (*Taphozous perforatus)* presented total nucleotide identity with the virus from a linked human index case patient after PCR amplification in Saudi Arabia. However, MERS-CoV was not successfully cultured (Memish *et al.*, 2013).
- MERS-CoV has not been detected in bats in China (Du *et al.*, 2016), Saudi Arabia (Memish *et al.*, 2013), Lebanon and Egypt (Shehata *et al.*, 2016). Only alpha-CoV genera were found in eastern bent-wing bats (*Miniopterus fuliginosus)* through PCR assays in different regions in China (Du *et al.*, 2016).
- Experimentally infected Jamaican bats (*Artibeus jamaicensis*) demonstrated MERS-CoV replication and shedding through the respiratory tract (Munster *et al.*, 2016).
- Laboratory models using African green monkeys (*Chlorocebus sabaeus*) (Eckerle *et al.* 2014), rhesus macaques (*Macaca mulatta*) (de Wit *et al.* 2013) and common marmosets (*Callithrix jacchus*) (Falzarano *et al.*, 2014; Johnson *et al.* 2015) showed *in vivo* replication.
- Non-human primate experimental models to date do not mimic naturally occurring disease (de Wit *et al.* 2013).

Therefore, the likelihood of humans **being exposed** to MERS-CoV in affected areas through **contact with bat or other wildlife species** can be considered:

- **negligible** through direct contact with **bats** due to the absence of scientific evidence of MERS-CoV in bats;
- **negligible** through direct contact with **non-human primates** due to lack of evidence of naturally occurring infection and replication restricted to the lower respiratory tract.

e. The environment and fomites at the animal-human interface

Considering that:

- MERS-RNA, related to human cases, was detected in: anterooms, medical devices, bed sheets, air-ventilating equipment, radiographic devices, bedrails, and intravenous fluid hangers in hospital facilities in Republic of Korea (WHO, 2016). Findings matched with MERS-CoV RNA retrieved from patients through virus sequencing (Seo *et al.*,

Camels act as the reservoir for MERS-CoV without showing obvious clinical signs. Under favourable conditions, exposure of humans to the virus can lead to human infections.

2016). MERS-CoV RNA was also detected on two surfaces in a hospital's intensive care unit in Saudi Arabia (Khan *et al.*, 2016).

- There is limited data available on how long the MERS-CoV survives on objects and environmental surfaces. One experiment showed longer MERS-CoV survival on surfaces (up to 48 hours) when compared with influenza A (H1N1) viruses (less than four hours), but shorter survival when compared to SARS-CoV (up to five days) (van Doremalen *et al.*, 2013).

Therefore, the likelihood of humans **being exposed** to MERS-CoV in affected areas through **the environment and fomites** can be considered:

- **negligible** for **fomites,** depending on the level of disinfection.

This risk evaluation is associated with a high degree of uncertainty due to the limited studies conducted in this area to date (Annex 2).

GAPS

To increase precision of the assessment, our understanding of MERS-CoV epidemiology needs to be improved. It is important to note that the uncertainty associated with each of the qualitative risk estimates in this assessment remains high because of significant current information gaps (see Annex 2 for an inventory of gaps and suggestions on how to address them).

EVALUATION OF CONSEQUENCES

As MERS-CoV-infected camels present minimal or no clinical signs, infection may not lead to any negative effects on camel husbandry or production, or to veterinary expenses. Restrictions on camel trade and/or transboundary movements may be applied by affected countries on a case-by-case basis.

The disease in humans can range from no, or mild, respiratory symptoms, to severe acute respiratory syndrome in individuals with co-morbidities. If severe, the disease can lead to respiratory failure requiring intensive care and mechanical ventilation support, which implies high treatment costs. Over 677 human deaths due to MERS-CoV were reported to WHO between April 2012 and February 2017. Absence of patients from their workplace due to disease can be considered a loss, which may be aggravated when nosocomial outbreaks include health care workers.

Camels act as the reservoir for MERS-CoV from which humans can be exposed to the virus, leading to human infection under favourable conditions (environmental and host factors).

Control measures may result in costs to camel owners, e.g. standstill of animals until MERS-CoV shedding has ceased.

Even though the majority of human cases acquired the disease through human-to-human transmission, especially in health care settings, primary human infections (through camel-to-human transmission) do happen regularly.

Camel-importing countries, such as Egypt, therefore implement a testing and quarantine policy to identify active shedders, and camels can be held at border points in Egypt. Animals are kept in public and private quarantine stations between 3 and 14 days. In private quarantine stations, about ten percent of camels are also sero-tested for MERS-CoV. If positive animals are detected within this sample, the rest of the animals are then also tested. Negative animals are released for sale in markets while positive camels are sent to slaughter, which implies direct economic losses to camel traders owing to business being halted, as well as premature slaughtering of seropositive animals.

Some countries also run an active surveillance programme in native camel herds to determine MERS-CoV sero-prevalence and/or identify active shedders. While active surveillance combined with quarantine or elimination of positive animals helps reduce circulation of the virus in dromedary populations, which consequently lowers opportunities for human infection, it involves costs for the veterinary services. These costs include logistics and manpower, sampling equipment, testing materials, transport of samples, laboratory analysis, etc. Control measures may also imply socio-economic costs to camel owners due to standstill of animals until shedding has ceased and additional public health measures taken, such as testing of owners and their family members.

Since no food-borne pathway has been documented for MERS-CoV to date, negative effects on consumer behaviour, such as avoidance of certain camel or livestock products, are not expected unless as a result of consumer misinformation or negative propaganda.

This consequence assessment needs to be further elaborated as research gaps are being filled.

MITIGATION MEASURES AVAILABLE

The following mitigation measures should be considered to reduce the risk of human exposure to MERS-CoV from animals:

- Test dromedary camels prior to transport for slaughter and, if found virus-positive (or PCR-positive), do not slaughter but isolate them to avoid virus dissemination until shedding has ceased[7]. A sampling strategy should be utilized to ensure that positive animals are not sent to slaughter (i.e. either with a robust sub-sample that confers a high degree of confidence in a zero-positive herd, or by testing all animals). Once entering the slaughter facilities, animals should be slaughtered and not released alive to farms or

[7] To date, the duration of shedding is still unknown. Also, if and when intermittent shedding may occur still needs to be confirmed.

markets. As a general public health rule, never slaughter feverish or sick animals for consumption.

- Screen prized camels for the absence of MERS-CoV, or other high-impact disease agents, prior to gatherings (i.e. competitions or shows). Camel identification can be introduced as a practice for facilitating camel movement, traceability and sanitary control.
- For camel-importing countries: strengthen screening of camels at ports of entry, in particular for dromedary camels coming from infected areas, and quarantine virus-positive animals until infection has cleared.[7]
- Isolate PCR-positive animals from other animals and humans until infection has cleared. Positive findings should be reported from farmers, animal markets and slaughterhouses to competent veterinary and public health authorities.
- Implement disinfection protocols in facilities where infected animals were held. As infected camels may not show any clinical signs, general hygiene, with regular cleaning and disinfection, is recommended for any camel holding, live animal market, slaughterhouse or similar facility.

WHO provides a MERS-CoV factsheet which advises on methods to prevent human infection (WHO, 2015a):

- Wash hands with soap often to inactivate and remove any virus. This should always be done after handling dromedary camels.
- For camel farms, slaughterhouse, racing and market workers: wear protective clothing, which should be removed after work and washed daily. Avoid exposure of people to soiled work clothing, shoes, or other items that may have come into contact with camels or camel excretions.
- In MERS-CoV enzootic areas, implement enhanced hygiene and biosecurity procedures for juvenile camels (<2 years of age) which seem to be most at risk of active infection. Also, personal protection of people in regular close contact with this camel age-class should be considered, such as wearing face masks and gloves.
- Promote public health services to people showing clinical signs of fever or respiratory symptoms after being in contact with dromedary camels.
- As zoonotic transmission pathways have yet to be elucidated, the possibility of food-borne transmission cannot, to date, be excluded. Eat only well-cooked camel products, prepared under hygienic conditions, and avoid consumption of raw meat, milk or urine.

- The Codex Alimentarius provides General Principles of Food Hygiene (Codex, 2003).
- Develop communication strategies to ensure appropriate and science-based messages to the public on MERS-CoV and associated risks.
- Engage with the private sector (racing associations, breeding enterprises, meat packing, etc.) to ensure input, improved communication, and compliance with the measures suggested.

Annex 1
BACKGROUND INFORMATION USED

- In 2012, a newly emerged human pathogenic coronavirus (CoV) caused a still-ongoing human epidemic in the Arabian Peninsula. The novel coronavirus, designated Middle East Respiratory Syndrome (MERS-CoV), belongs to the lineage C beta coronavirus, closely related genotype with bat CoVs from the same lineage (Mohd *et al.*, 2016).
- MERS-CoV in humans was first reported in September 2012 in Saudi Arabia. Retrospectively, health officials identified the first known cases in Jordan in April 2012.
- Coronaviridae is a family in the order Nidovirales, enveloped and RNA-positive stranded virus. They possess a spike protein on the surface and can be classified in subfamilies: alpha, beta, gamma and delta.
- The clinical presentation of MERS-CoV infection in humans ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death.
- The clinical presentation of MERS-CoV in camels is usually asymptomatic or is marked by mild respiratory signs.
- The number of human cases reported by the World Health Organization was 1 980, including 699 deaths, as of 8 June 2017. Around 157 of all reported human cases were estimated to be primary cases. Considering the high case fatality rate of MERS-CoV in human patients and the non-availability of preventive vaccines or viral treatments, the disease remains a public health concern (Mohd *et al.*, 2016).
- MERS-CoV has spread to many countries but most of the human cases are linked to the Arabian Peninsula, where new outbreaks continue to occur. The countries presenting human cases are[8]: Algeria*, Austria*, Bahrain, China*, Egypt*, France*, Germany*, Greece*, Iran, Italy*, Jordan, Kuwait, Lebanon*, Malaysia*, Netherlands*, Oman, Philippines*, Quatar, Republic of Korea, Saudi Arabia, Thailand*, Tunisia, Turkey, United Arab Emirates, United Kingdom*, United States of America* and Yemen.
- The origin of the virus remains under research but epidemiological studies show that dromedary camels are likely to be the main reservoir of infection.
- Antibodies against MERS-CoV have been detected in dromedary camels in:
  - Canary Islands (Reusken *et al.*, 2013)

[8] (*) denotes cases with travel to/through the Middle East/Arabian Peninsula.

- Egypt (Chu *et al.*, 2014; Perera *et al.*, 2014; Muller *et al.*, 2015)
- Ethiopia (Reusken *et al.*, 2014)
- Jordan (Reusken *et al.*, 2013)
- Kenya (Deem *et al.*, 2015; Corman *et al.*, 2014)
- Kuwait (OIE, 2014)
- Nigeria (Reusken *et al.*, 2014; Chu *et al.*, 2015)
- Oman (Reusken *et al.*, 2013)
- Pakistan (Saqib *et al.*, 2017)
- Qatar (Reusken *et al.*, 2014; Haagmans *et al.*, 2014; Miguel *et al.*, 2016)
- Saudi Arabia (Hemida *et al.*, 2014; Alagaili *et al.*, 2014; Hemida *et al.*, 2013; Memish *et al.*, 2014)
- Tunisia (Reusken *et al.*, 2014)
- United Arab Emirates (Wernery *et al.*, 2015; Alexandersen *et al.*, 2014; Meyer *et al.*, 2014)
- Somalia (Muller *et al.*, 2015)
- Sudan (Muller *et al.*, 2015).

• Animals from the United States of America and Canada (Alexandersen *et al.*, 2014), Europe (except from Canary Islands) (Reusken *et al.*, 2013; Meyer *et al.*, 2013), Kazakhstan (Miguel *et al.*, 2015) and Australia (Hemida *et al.*, 2014) have not presented antibodies against MERS-CoV:
  - (Alexandersen *et al.*, 2014): sequential serum samples from dromedary camels (11), sheep (3) and horses (3) collected in Dubai (2005) and from dromedary camels (6) for export/import testing between Canada and USA in (2000-2001) were tested. Nine out of 11 dromedary camels from Dubai tested positive for MERS-CoV through neutralization test and ELISA. None of the dromedary camels tested in North America showed positive findings. These animals were imported from Australia around the 1990s when import was allowed. A geographic separation between Australian, Middle Eastern and Asian dromedary camel populations can be noted.
  - (Hemida *et al.*, 2014): sera collected from 25 adult dromedary camels in Australia (17 feral dromedaries from central Australia transported to an abattoir in Caboolture, Queensland, and eight from a dromedary farm in Coominya, Queensland) in 2014; slaughterhouses in Egypt in 2014; and archived sera from the King Faisal University collected in 1993 from different provinces in Saudi Arabia (Al Hasa, Eastern Province (27); As Sulayyil, Ar Riyad province (30); Hafar Al-Batin, Eastern Province (45) and Medina, Al Medinah (29)). No positive findings were found in Australian samples.

• Virological evidence of MERS-CoV in dromedary camels has been detected in:
  - Egypt (Chu *et al.*, 2014)
  - Oman (Nowotny *et al.*, 2014)
  - Qatar (Haagmans *et al.*, 2014; Raj *et al.*, 2014)
  - Saudi Arabia (Hemida *et al.*, 2015; Hemida *et al.*, 2014; Alagaili *et al.*, 2014; Meyer *et al.*, 2014; Sabir *et al.*, 2016; Memish *et al.*, 2014)
  - United Arab Emirates (Wernery *et al.*, 2015).

• Considering epidemiological patterns, when it comes to:
  - Age distribution: i. dromedary camel infection probably within first year of life (Hemida *et al.*, 2013), at 4 to 6 months (Wernery *et al.*, 2015); ii. the sero-prevalence is higher in adult dromedary camels (>2 years of age) than in juvenile dromedary camels (≤2 years of age) (Alagaili *et al.*, 2014, Deem *et al.*, 2015); iii. Viral nucleic acids are more frequently detected in juvenile than in adult animals (Alagaili *et al.*, 2014).
  - Management factors: no statistical effect observed considering prevalence (Deem *et al.*, 2015) in different production systems (commercial herds, commercial/ pastoralist herds or nomadic herds) or based on herd isolation (high, intermediate and low isolation levels).

• No antibodies were found in: goats (Perera *et al.*, 2013, Hemida *et al.*, 2013, Reusken *et al.*, 2013, Buchholz *et al.*, 2013); cattle, sheep (Perera *et al.*, 2013, Hemida *et al.*, 2013, Reusken *et al.*, 2013); chickens (Hemida *et al.*, 2013); swine, ducks, buffalo (Perera *et al.*, 2013) and equids (Meyer *et al.*, 2015):

Goats

- No positives found during screening of sera collected from goats in Egypt with micro-neutralization test (Perera et al., 2013);
- No positives found during screening of 45 animal sera in Saudi Arabia with pseudoparticle neutralization test (Al-Ahsa = 15, Taif = 10, Madinah = 10 and Qatif = 10) (Hemida *et al.*, 2013);
- No antibody reaction against IgG MERS-CoV antibodies in sera samples from 150 goats sampled in Zarqa and Mafraq, Jordan (Reusken *et al.*, 2013).

Equids

- A total of 1053 sera samples were collected from equids in MERS-CoV- endemic and non-endemic areas in United Arab Emirates (192 horses) and Spain (697 horses, 82 donkeys and 82 mules) were analysed and submitted to ELISA test using spike protein S1-domain as antigen: all showed similarities between the amino acid residues critical for virus entry between humans and horses DPP-4 (Meyer *et al.*, 2015).
- No reactivity observed in recombinant immunofluorescent or micro-neutralization assays, suggesting no precedent exposure to MERS-CoV in the countries studied. The 50 most reactive tests were confirmed by micro-neutralization and recombinant immunofluorescent assays (Meyer *et al.*, 2015).

Cattle

- No positives found during screening of sera collected from cows in Egypt with micro-neutralization test (Perera *et al.*, 2013);

Although experimentally infected young goats showed seroconversion to MERS-CoV, serological field surveys in goat populations have not revealed any MERS-CoV positive animals to date.

- No positives found during screening of sera collected from 50 animals in Saudi Arabia with pseudoparticle neutralization essay (Al-Ahsa = 17, Taif = 13, Madinah = 10 and Qatif = 10) (Hemida *et al.*, 2013);
- No IgG antibody reactivity in sera of 91 cows sampled in Jordan (Zarqa and Mafraq) (Reusken *et al.*, 2013).

Buffalo

- No positives found during screening of sera collected from water buffalo in Egypt with a micro-neutralization test (Perera *et al.*, 2013).

Chickens

- No positives found during screening of sera from 240 chickens sampled in Saudi Arabia with pseudoparticle neutralization assay at 1:20 dilution (Al-Ahsa = 120, Dammam and Alkhober = 80, Abqaiq = 40) (Hemida *et al.*, 2013).

Swine

- No neutralizing activity for MERS-CoV in micro-neutralization assays used on swine sera collected in Hong Kong (Perera *et al.*, 2013).

Ducks

- No neutralizing activity for MERS-CoV in micro-neutralization assays used on wild northern pintails (Anas acuta) or Eurasian wigeon (Anas Penelope) sera collected in Hong Kong (Perera *et al.*, 2013).

Sheep

- No positive results when screening sera collected from sheep in Egypt with a micro-neutralization test (Perera *et al.*, 2013).
- In Saudi Arabia (Al-Ahsa) a total of 100 sheep were sera-sampled and none were positive for pseudoparticle neutralization test (Hemida *et al.*, 2013).
- A total of 126 Awassi-breed sheep were sampled in Jordan in the regions of Zarqa and Mafraq from June to September 2013. The study presented males and females from all ages and sera, and faecal samples were collected from all animals. Samples were tested for the presence of IgG antibodies against MERS-CoV. Six out of 126 sera presented antibodies against MERS-CoV S1 antigen. However, no neutralizing activity was observed on the positive samples in neutralization assay (Reusken *et al.*, 2013).
- The virus did not replicate in *in vitro* studies conducted on sheep, bank voles (*Myodes glareolus*), shrews (*Crocidura suaveolens*), cattle (Eckerle *et al.*, 2014); mice (Coleman *et al.*, 2014); hamsters (de Wit, *et al.*, 2013) and ferrets (*Mustela putorius furo*) (Raj *et al.*, 2014). Nor did it do so in *in vivo* studies conducted due to lack of evidence of naturally occurring infection. Non-human primate experimental models to date do not mimic naturally occurring disease in ferrets:

Contact between humans and dromedary camels is very close as these animals represent social status and economic value.

- (Eckerle *et al.*, 2014): cultivation of cell lines from goats, sheep, cattle, camelids (dromedary and alpaca), rodents, insectivores, bats, human and non-human primates and bat and primate cells were used as controls because they are known to be permissive to MERS-CoV. The quantification of the virus replication was done by RT-PCR. Replication was not observed in sheep, cattle, rodent or insectivore cells.
- (Coleman *et al.*, 2014): MERS-CoV (strain HCoV-EMC/2012) was inoculated intranasally into 129 mice (BALB/c, 129S6/SvEv and 129/STAT12/2 species). Infected mouse lungs were tested by TCID assay and no signs of viral replication were identified. The experiment also handled an RT-PCR assay for lung cells with negative results for genomic sequencing.
- (de Wit, *et al.*, 2013): three groups of 40 hamsters each were experimentally infected with MERS-m (HCoV-EMC/2012) with different doses and different means of administration (4x102 TCID50 via aerosols; 103 TCID50 and 106 TCID50 intratracheally). The animals were observed for 21 days for clinical signs, body weight and temperature. All showed disease symptoms, increase of body temperature and weight loss. Swabs (nasal, urogenital, rectal and oropharyngeal) were daily taken until day 11. After histopathological analysis, immunohistochemistry assays in lungs, kidney small intestine, colon and urinary bladder by using an α-DPP4 antibody; RNA extraction; RT-PCR upE assay and ELISA test no cell replication was observed.
- (Raj *et al.*, 2014): *in vitro* and *in vivo* experiments were conducted on four ferrets. Animals were intranasally and intratracheally inoculated with MERS-CoV. After infection, RT-qPCR detected low levels of viral RNA inputs and no infectious virus. *In vivo* bind of recombinant protein spike S1 was observed.
- (Vergara-Alert *et al.*, 2017): virus excretion confirmed through PCR, titration of infectious virus, immunohistochemistry, and *in situ* hybridization in nasal swabs of pigs and llamas. Pigs showed mild clinical respiratory signs and white mucus excretion. Seroconversion was also detected in both species. Findings show susceptibility of species regarding MERS-CoV infection. Sheep and horses did not have any viral replication in the upper respiratory tract. The study population was composed of eight llamas (6–8 months of age), eight horses (6–8 months), 14 sheep (2–3 months), and 14 pigs (two months). Animals were obtained from Spain and France (private sales). All animals were intranasally inoculated and monitored daily for clinical signs (e.g. sneezing, coughing, nasal discharge, dyspnoea) and body temperature. Sampling

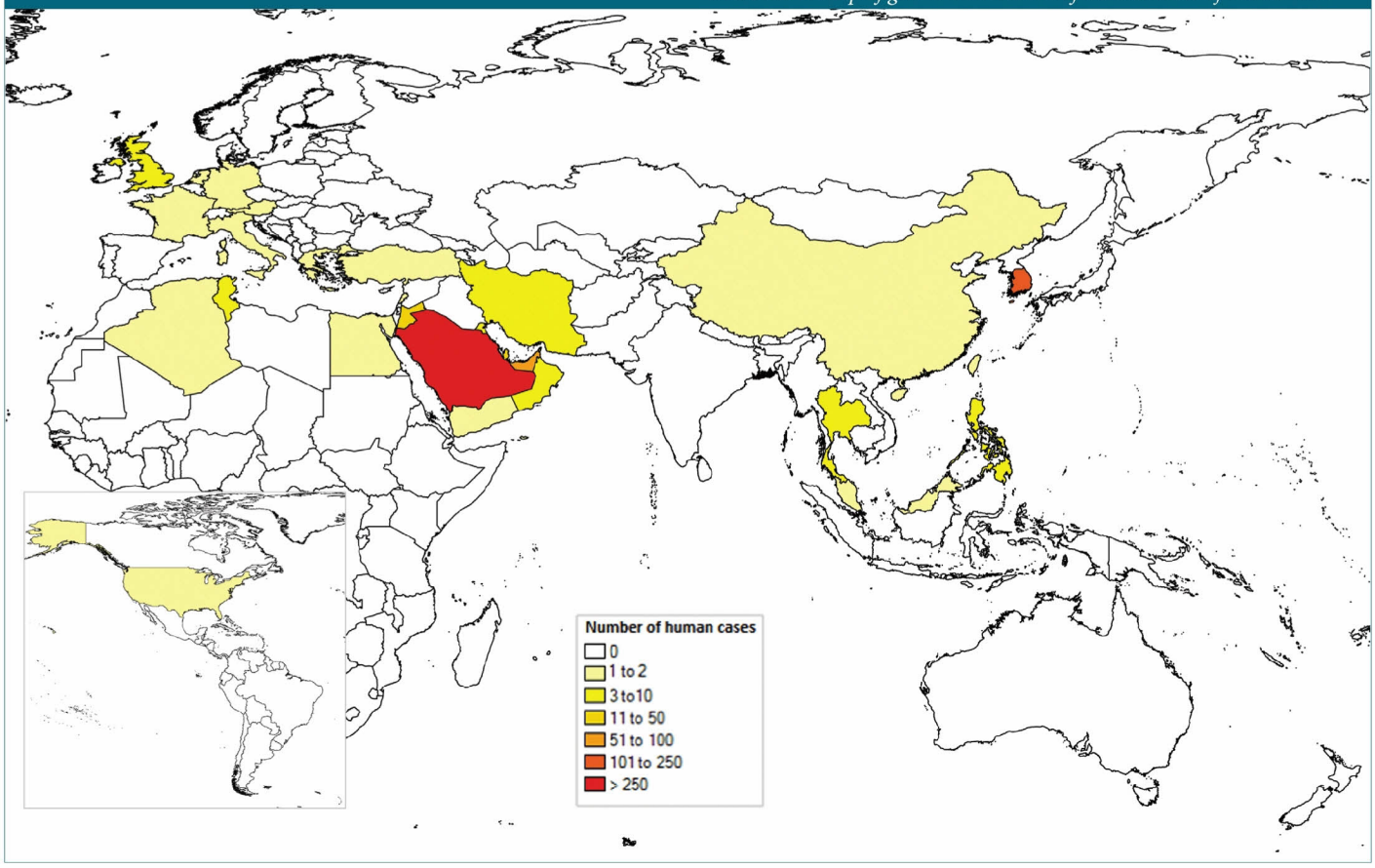
(nasal and faecal swabs and sera samples) were obtained until day 24 post-inoculation and sera samples were tested before and after inoculation.

- Bactrian camels (*Camelus bactrianus*) in Kazakhstan tested negative to MERS-CoV. A total of 550 camels (455 dromedary and 95 bactrian) were sampled in Kyzylorda (105 animals from two herds), Zanakorgan (35 animals from one herd), Sholak-Korgan (110 animals from two herds), and Akshiy (205 animals from four herds). Sera samples were submitted to MERS-CoV spike pseudoparticle neutralization test and no positive results were found (Miguel *et al.*, 2016).
- Virus neutralization tests (VNT) titres for dromedary camels were much higher than those for the alpacas. In Australia, three female alpacas from a commercial supplier were experimentally infected with a camel isolate of MERS-CoV passing through challenge and rechallenge. Animals were oronasally exposed and observed for 21 days; for re-exposure another 14 days. RNA extraction and RT-PCR were performed (Crameri *et al.*, 2016).
- Laboratory models tested:
  - *In vitro* virus replication in African green monkeys (Eckerle *et al.*, 2014).
  - Marmosets used as an animal model representative of severe human infection with MERS-CoV. Infection and disease after oropharyngeal inoculation, resulting in extensive lesions in lungs, virus replication, seroconversion in surviving marmosets and death (seven out of nine) was reported by one group (Falzarano *et al.*, 2014). However, other groups were unable to repeat this result and reported only limited viral replication and mild or moderate clinical signs (Johnson *et al.*, 2015).
  - Cynomologous macaques (*Macaca fascicularis*) presented mild macroscopic and microscopic lesions in the respiratory tract after intranasal and intratracheal inoculation with MERS-CoV.
  - Rhesus macaques (*Macaca mulatta*) used as animal model representative of mild human infection with MERS-CoV. Infection and disease reported after oropharyngeal inoculation. Virus replication was observed mainly in the lower respiratory tract. Virus shedding predominantly happened through the nose and, to a limited extent, the throat. In macaques, the disease seems to be transient and is more comparable to mild human cases (de Wit, Rasmussen, *et al.*, 2013).

Bats

- No infectious virus MERS-CoV findings confirmed in bats to date. First and only identification of MERS-CoV in one Egyptian tomb bat (*Taphozous perforatus*) in 1 out of 29 bats sampled in Bisha Ruins (Saudi Arabia). However, MERS-CoV was not successfully cultured (Memish *et al.*, 2013).
- Experimentally infected Jamaican bats (*Artibeus jamaicensis*) showed replication and shedding through the respiratory tract. MERS-CoV-related lesions were also found in the respiratory tract during necropsy. None of the animals showed clinical signs (Munster *et al.*, 2016).
- MERS-related CoVs have reportedly been found in bat families: Emballonuridae (*Taphozous perforates*), Pteropodidae (*Eidolon helvum*), Rhinopomatidae (*Rh. Hardwickii*), Vespertilionidae (*P. kuhlii*) (Memish *et al.*, 2013; Anthony *et al.*, 2017).
- Detection of MERS-related CoVs in: oral, rectal, lung and liver samples in cave-dwelling bat species in Lebanon and Egypt (Shehata *et al.*, 2016).
- So far, MERS-related CoVs were found in regions with no cases of human or animal infections.
- A total of 5 030 faecal samples from bats (4 758 from ten different species from Ghana and 272 Pipistrellus from European countries) were submitted to RT-PCR for coronavirus RNA detection. In Ghana, 185 Nycteris bats tested positive to 2c betacoronavirus (1 percent of the tested population); as for Europe, 40 bats tested positive for this close-related MERS-CoV (Mohd *et al.*, 2016).
- Only alpha-CoV genera found in *M. fuligionous* bats through PCR assays in different regions in China (Du *et. al.*, 2016).
- Like human CoV-229E and SARS-CoV, ancestors of MERS-CoV might exist in Old World insectivorous bats belonging to the family *Vespertilionidae*. Knowledge of the close relatedness of PML/2011 (a positive specimen with a novel betacoronavirus termed in 2011) and MERS-CoV, which contrasts with the more distant relatedness of CoVs in bats from the Americas and Asia, raises the possibility of an African origin for bat reservoir hosts of MERS-CoV ancestors (Ithete *et al.*, 2013).
- Two MERS-like viruses in bats revealed two mutations in the spike that allow bat viruses to infect human cells (adaptation of human cellular protease). The two mutations were similar to others found to allow the virus that causes SARS to jump from animals to humans (receptor binding). Although MERS-CoV spike might also need to adapt to human DPP4 receptor upon infecting human cells, such adaptations might only have incremental effects on the infectivity of MERS-CoV in human cells. In contrast, the two mutations adaptive to human cellular proteases transformed MERS-CoV spike from completely lacking to fully owning the capacity to mediate viral entry into human cells, and thus they likely played the most critical role in the bat-to-human transmission of MERS-CoV (Yang *et al.*, 2015).
- MERS-CoV remains viable for 48 hours at 20 °C and 40% relative humidity (comparable to an indoor environment) on plastic and metal surfaces. The viral particles are sensitive to

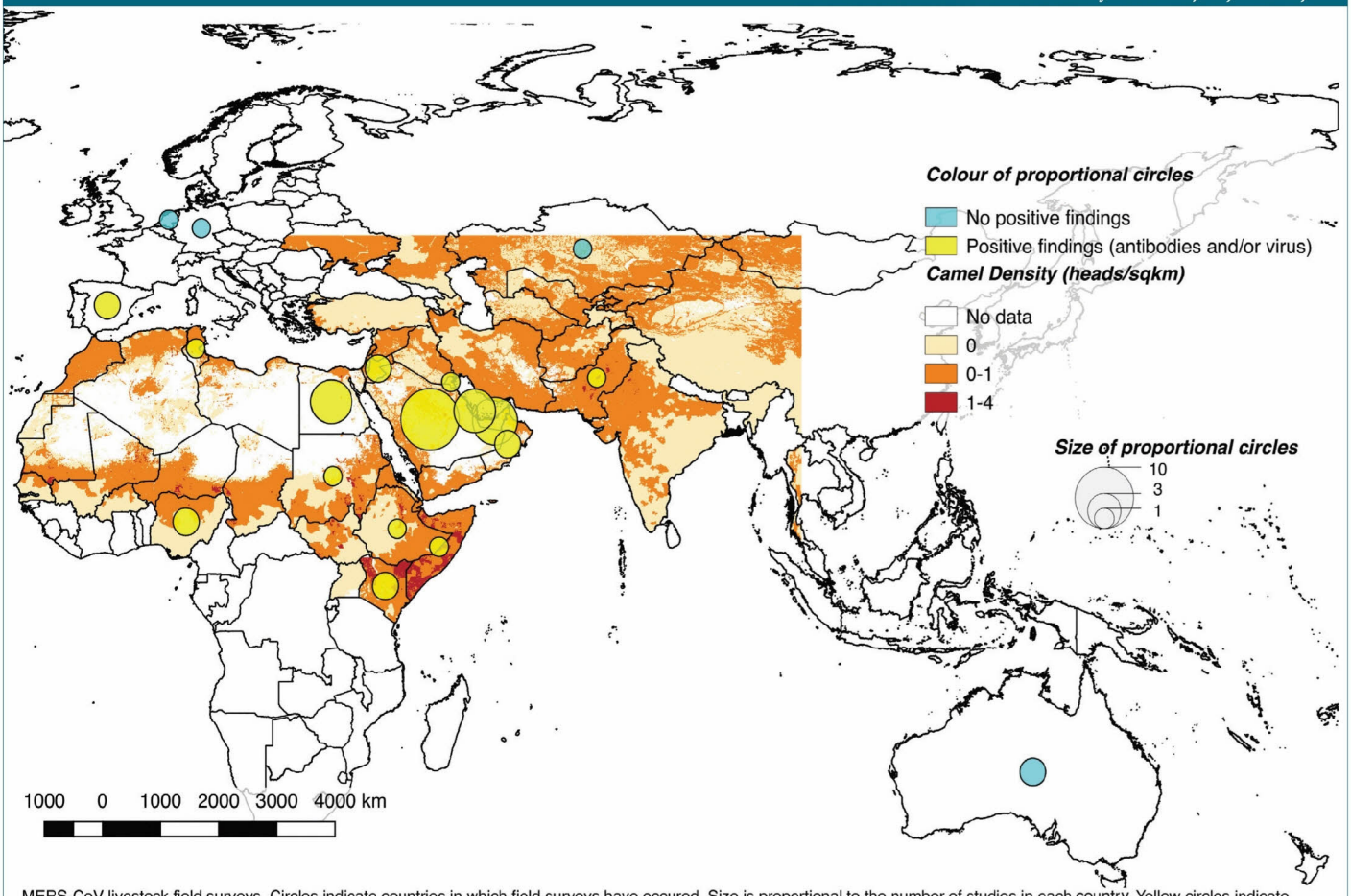
FIGURE 1. *Map of global distribution of human cases of MERS-CoV*



heat, lipid solvents, non-ionic detergents, oxidizing agents and ultraviolet light (van Doremalen *et al.*, 2013).

- Considering the outcomes of Meyer *et al.*, (2016), newborn dromedaries can be a source of infection for humans after the fourth month of life, when MERS-CoV specific calostral-derived antibodies wane, and during the first year of life in endemic regions. This period is when calves are most susceptible to MERS-CoV infections due to their naïve immunological systems.
- Dromedary camels are seasonal breeders based on photosensitivity, usually when day length decreases. Different periods are reported in different regions of the world
  (Al Eknah, 2000):
  - Arabian Peninsula: November-March
  - Egypt: December-May
  - India: November-March
  - Pakistan: December-March
  - Somalia: April-May
  - Sudan: March-August
  - Saudi Arabia: October-April
  - Tunisia: December-March.
- Based on data from Hijmans *et al.*, (2005), in 2015 Reeves *et al.* developed models related to the ecology and geography of MERS-CoV to explore environmental association patterns and possible implications for the geography of MERS-CoV transmission. Two niche models were developed, one for all cases and another for cases with reported dromedary camel contact only. Real and modelled occurrences were compared. The first model showed a broader distribution across the Arabian Peninsula, Africa and some areas in Asia. As for the second model, a concentration in Saudi Arabia was noticed. Both models were submitted to the annual mean temperature and precipitation levels of the studied region. These models represent and reconstruct the relationship between environmental and occurrence data, showing a restricted set of environmental conditions for the transmission of MERS-CoV in primary cases (those exposed to dromedary camels).
- There remains a lack of studies related to dromedary camel production systems and animal trade in terms of risk of virus introduction or spread. It is known that nomadic production systems tend to have bigger animal movement through different regions. From an epidemiological point of view, as for other diseases, animal trade can be an important point for disease spread when it comes to livestock. Also, camel racing can attract a variety of animals from different regions and increase contact between contaminated and healthy animals.

FIGURE 2. *MERS-CoV livestock field surveys by country*



MERS-CoV livestock field surveys. Circles indicate countries in which field surveys have occured. Size is proportional to the number of studies in each country Yellow circles indicate positive findings in livestock (antibodies or antigen), while turquoise circles represent the lack of positive findings. Please note that the circle in Spain indicates positive findings from the Canary Islands. The density map includes dromedary and bactrian camel distribution, and is a regional GLW 3.0 modelled map (http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0150424)

Note: Positive findings in Spain refer to samples taken in the Canary Islands.

Annex 2
ADDRESSING INFORMATION GAPS

a. Addressing information gaps related to human exposure from dromedary camels

- Further studies are needed to understand why human cases are reported from the Arabian Peninsula but not from Africa, despite endemic MERS-CoV circulation evidenced in dromedary camels in both areas.
- Conduct serological studies in human populations in areas where MERS-CoV is endemic in dromedary camels.
- Properly investigate and document events that involve increased human exposure to MERS-CoV from dromedary camels.
- Identify critical points in livestock value and supply chains to implement risk reduction measures.
- Further research is needed to better understand risk factors that facilitate human exposure to MERS-CoV from dromedary camels, such as farming systems, human behaviour, agro-ecological factors, climate, etc.

b. Addressing information gaps related to MERS-CoV transmission

- Conduct studies to understand the direction of transmission, potential pathways, and factors that may increase infection risk within dromedary herds and between dromedaries and humans.
- Determine incubation period as well as amount of MERS-CoV shedding in dromedary camels over time.
- Conduct specific studies to investigate MERS-CoV occurrence and survival in meat (i.e. investigate virus persistence in the environment and virus inactivation in meat) and/or potential MERS-CoV excretion through milk and urine.
- Conduct studies to investigate MERS-CoV occurrence and survival in carcasses, placenta and body fluids.
- Conduct studies to investigate MERS-CoV survival in different climatic conditions, agro-ecological and farming systems (i.e. humidity, ambient temperature, etc.); such factors are important to consider in droplet-transmitted diseases.

- Conduct studies to investigate the transmission of the virus through fomites, water, while handling laboratory specimens or during necropsies.

c. Addressing information gaps related to MERS-CoV host species

- Conduct field studies to investigate other potential host species and relationships between different host populations that may facilitate spillover and/or zoonotic disease transmission. E.g. targeted bat surveys performed to date in MERS-CoV-endemic regions are lacking description of vicinity to dromedary camel and/or human populations and geographical distribution of populations (humans, bats and dromedary camels); differences between camel breeds.
- Conduct controlled infection experiments to understand pathogenesis and immunity in different animal species. Conduct surveillance and screening in different bat species, particularly in MERS-CoV endemic regions. Considering the high number of bat species that have not been investigated yet, more research is warranted to confidently claim MERS-CoV absence.

The following activities should be promoted to help fill knowledge gaps in understanding human MERS-CoV exposure from dromedary camels:

- Develop guidelines for joint outbreak animal/human investigations (see WHO, 2014 and 2015b for guidance on surveillance and outbreak investigation in occupationally exposed populations).
- Understand human behaviour and potential exposure parameters.
- Conduct proper field disease investigations, including molecular studies for further virus characterization, to be able to link suspect primary human cases to infected dromedary camels and collect information on settings where the risk of human exposure from camels may be increased.
- Conduct case-control studies to identify possible risk factors for human exposure from dromedary camels.
- Strengthen active surveillance by engaging camel owners, herders, traders and pastoralists in a participatory disease search through awareness raising of MERS-CoV clinical signs in humans, dromedary camels and other livestock.

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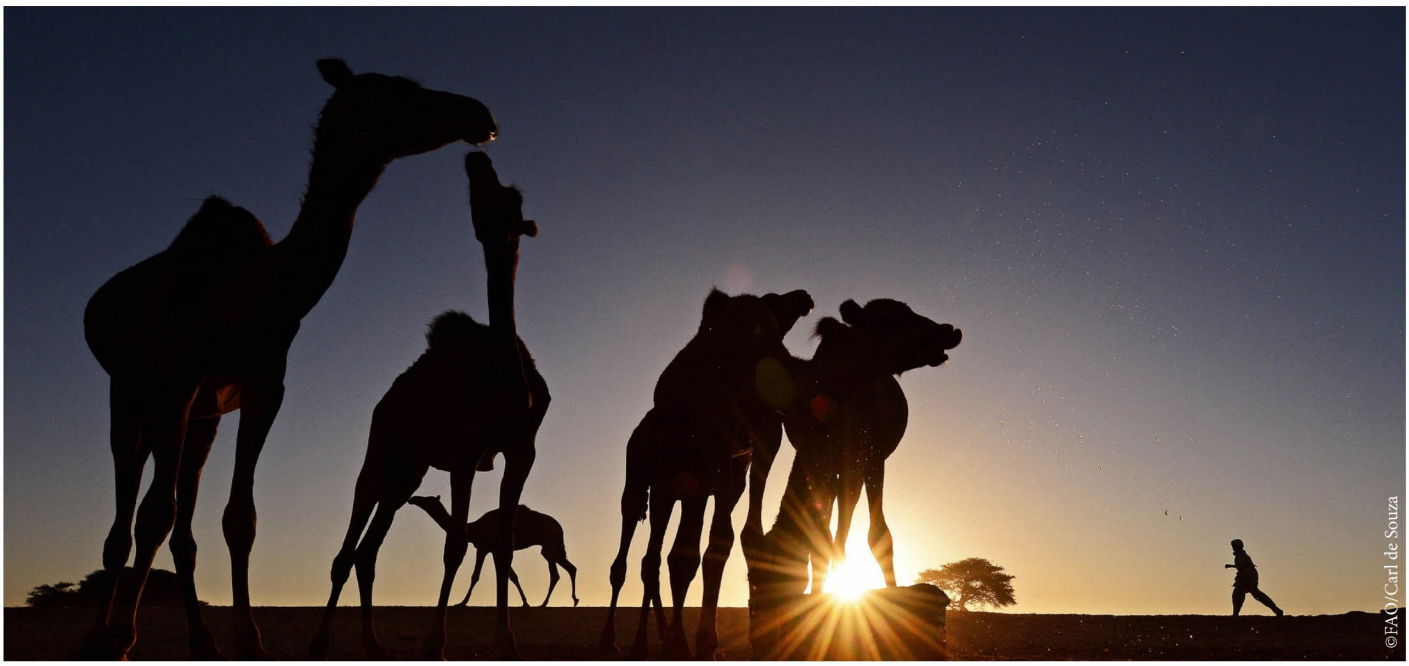
EXPERTS CONSULTED

- Allal, Lotfi (FAO, Regional Office for Near East and North Africa)
- Ben Embarek, Karim (WHO)
- Hietala, Sharon (University of California, Davis, USA)
- Nega Tewolde (FAO, Ethiopia)
- Okuthe, Sam (FAO, Kenya)
- Pfeiffer, Dirk (City University of Hong Kong)
- Van Kerkhove, Maria (WHO)
- Walelign, Elias (FAO, Ethiopia)

NOTES



RISK ANALYSIS IN ANIMAL HEALTH

Risk analysis is a procedure, which we all do intuitively in our everyday life as we also do in our professional work to assess the risk of any hazard or threat. In animal health, risk analysis has been most widely used as a decision tool about the most appropriate health interventions to support disease control strategies, guide disease surveillance and support of disease control or eradication strategies.

It should be remembered that risk is not equal to zero and never stays static. Risks changes as drivers or factors of disease emergence, spread or persistence change such as intensification of livestock production, climate change, civil unrest and changes in international trading patterns. Risk analysis should therefore not be seen as a "one off" activity and it should be seen as a good practice of animal health systems to conduct their regular activities. Therefore, risk analysis process should be repeated and updated regularly.

Risk analysis comprises the following components:

Hazard identification: the main threats are identified and described.

Risk Assessment: risks of an event occurring and developing in particular ways are first identified and described. The likelihood of those risks occurring is then estimated. The potential consequences or impact of the risks if they occur are also evaluated and are used to complete the assessment of the risk.

Risk Management: involves identifying and implementing measures to reduce identified risks and their consequences. Risk never can be completely eliminated but can be effectively mitigated. The aim is to adopt procedures that will reduce the level of risk to what is deemed to be an acceptable level.

Risk Communication: an integrated processes that involves and informs all stakeholders within the risk analysis process and allows for interactive exchange of information and opinions concerning risk. It assists in the development of a transparent and credible decision-making processes and can instil confidence in risk management decisions.

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Authors
Jéssica Kayamori Lopes, Ludovic Plee, Sophie von Dobschuetz, Emma Gardner, Heba Mahrous, Akiko Kamata, Paolo Calistri, Lidewij Wiersma, Sibylle Bernard-Stoecklin, Mirko Bruni, Elisa Palamara, Ahmed El Idrissi, Julio Pinto, Juan Lubroth.
Food and Agriculture Organization of the United Nations (FAO)

Contact
For any queries or questions regarding this issue of the assessment please write to FAO-GLEWS@fao.org

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From: "William B. Karesh" <karesh@ecohealthalliance.org>
To: Jonna Mazet <jkmazet@ucdavis.edu>
Cc: David Wolking <djwolking@ucdavis.edu>, Predict inbox <predict@ucdavis.edu>, Evelyn Luciano <luciano@ecohealthalliance.org>
Subject: travel to RoC - onboarding new country liaison
Sent: Fri, 8 Sep 2017 16:00:27 +0000

Hi there,
We've selected Dr. Anne Laudisoit this week as our new country liaison for ROC. She will begin full-time for us at the end of November, but she is currently working/living in DRC and then moving at the end of September.

She is available to do a day trip on the ferry to go over to Brazzaville from Kin on the 25th of September to see and meet the lab folks and the behavior team.

I don't want to push for an ITA at such short notice and we can cover the expense from other funds. I can still let the USAID rep in Brazzaville know about it and copy the regular group.

Just want to check with you to see if you are comfortable with this approach.

BK

William B. Karesh, D.V.M
Executive Vice President for Health and Policy

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President, OIE Working Group on Wildlife

Co-chair, IUCN Species Survival Commission - Wildlife Health Specialist Group

EPT Partners Liaison, USAID Emerging Pandemic Threats - PREDICT-2 Program

From: Elizabeth Leasure <ealeasure@ucdavis.edu>
To: Andrew Clements <aclements@usaid.gov>, Ryland Marbray <rmarbray@usaid.gov>
Cc: Patricia Bradley <pbradley@usaid.gov>, Jonna Mazet <jkmazet@ucdavis.edu>, David John Wolking <djwolking@ucdavis.edu>, Matthew Blake <mblake@ucdavis.edu>
Subject: RE: Predict 2 requested ceiling increase
Sent: Fri, 8 Sep 2017 19:24:24 +0000

Predict 2 ceiling increase
Please Dial: REDACTED
Pin: REDACTED

Elizabeth Leasure
One Health Institute
University of California, Davis
530-754-9034 (office)
REDACTED (cell)

From: Andrew Clements [mailto:aclements@usaid.gov]
Sent: Friday, September 08, 2017 12:23 PM
To: Ryland Marbray
Cc: Elizabeth Leasure; Patricia Bradley; Jonna Mazet; David John Wolking; Matthew Blake
Subject: Re: Predict 2 requested ceiling increase

Is there a phone number? thanks

On Fri, Sep 8, 2017 at 6:09 PM, Ryland Marbray <rmarbray@usaid.gov> wrote:
3:30 EDT is fine. I will provide a conference number to call.

On Fri, Sep 8, 2017 at 11:51 AM, Elizabeth Leasure <ealeasure@ucdavis.edu> wrote:
Hi Ryland. We can do a call at 12:30 pm PDT (3:30 pm EDT). Would that work?

Elizabeth Leasure
One Health Institute
University of California, Davis
530-754-9034 (office)
REDACTED (cell)

From: Ryland Marbray [mailto:rmarbray@usaid.gov]
Sent: Friday, September 08, 2017 7:49 AM
To: Elizabeth Leasure
Cc: Patricia Bradley
Subject: Predict 2 requested ceiling increase

Good Morning Elizabeth,

I was hoping we could set up a brief call today around 1:30 or 2:00 est to revisit the ceiling increase discussions. Please let me know if your available. .

--

Ryland Marbray
Agreements/Contracting Officer

USAID Office of Acquisition & Assistance
M/OAA/E3
1300 Pennsylvania Ave., NW,
Rm. 567-B, SA-44
Washington, DC 20523

Phone: (202) 567-5328|rmarbray@usaid.gov

--

Ryland Marbray
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Andrew Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
E-mail: aclements@usaid.gov

For more information on USAID's Emerging Pandemic Threats program, see: http://www.usaid.gov/ept2

From:	Peter Daszak <daszak@ecohealthalliance.org>
To:	Johnson Christine Kreuder (ckjohnson@ucdavis.edu)" <ckjohnson@ucdavis.edu>;Jonna Mazet (jkmazet@ucdavis.edu)" <jkmazet@ucdavis.edu>;Damien Joly <djoly@metabiota.com>
CC:	Kevin Olival, PhD <olival@ecohealthalliance.org>;Evan Eskew <eskew@ecohealthalliance.org>;Anna Willoughby <willoughby@ecohealthalliance.org>;Aleksei Chmura <chmura@ecohealthalliance.org>
Sent:	9/10/2017 9:17:02 PM
Subject:	Proposal for PREDICT-wide M&A project

Dear all,

Late of course!!! Looking forward to our meeting tomorrow evening to discuss project-wide M&A activities, 5:30-6:30pm. Ahead of that, I wanted to circulate the attached proposal for the bat seasonality project. It has been a year and a half since we first agreed to start feeling this out as a global project. Evan Eskew has been leading the work here, and he reached out to Nistara and Diego (UCD PhD students) to make sure there wasn't overlap in the approach or analyses planned before putting this together and exploring the data.

I really want to get your feedback and then bring this up on Monday or Tuesday so that we can get buy-in from everyone in the room and get volunteers from across the P2 consortium for people who want to be more involved.

I know this is short notice, but the results so far are pretty straightforward. If possible please glance over before our meeting tomorrow night. Kevin will bring some hardcopies along also, if you don't have time before 5:30pm.

Cheers,

Peter

Peter Daszak
President

EcoHealth Alliance
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New York, NY 10001

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EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that prevent pandemics and promote conservation.

EcoHealth Alliance

Proposal and Data Exploration for PREDICT-wide Modeling & Analytics Project: Seasonality and Other Factors Affecting Viral Shedding in Bats

Project Rationale

Recent examples of emerging viruses with serious public health consequences, including SARS, Ebola, and Zika, have highlighted the need for a better understanding of the wildlife reservoirs of these pathogens and the processes that result in their spillover into humans. An obvious and necessary condition enabling spillover is active infection in the animal species that serve as pathogen reservoirs. Thus, knowledge of spatial and temporal dynamics of natural infection in wildlife reservoirs should allow for more effective, targeted surveillance, strategies to avoid high risk periods and regions, and generally improve our ability to predict and manage viral spillover.

Bats are a particularly important reservoir host taxon given their propensity to carry zoonotic viruses and their involvement in spillover of prominent EIDs. A central question regarding viral dynamics in bat hosts is whether bats are more likely to be infected during certain time periods and, if so, why. For example, hypotheses have been published that link seasonal migration, hibernation, communal synchronous birthing and other factors, but it is unknown how significant these issues are to viral dynamics, or how widespread. Seasonal viral shedding patterns have been found in several bat-virus systems, yet the potential mechanisms driving these patterns are diverse and not well resolved. For example, seasonal breeding activity alone could be linked to infection status and viral loads in bat populations through multiple, complementary processes, including:

- Increased population density and intraspecific contact, allowing for pathogen transmission
- An influx of susceptibles into the population
- Changes in individual reproductive or nutritional status that affect susceptibility

In this proposed work we aim to work with key staff across the PREDICT partnership to develop a generalizable, analytical framework that can parse out the relative influence of these factors on bat viral shedding while controlling for confounding factors. Testing this framework using the large PREDICT dataset (i.e. not limited to single bat host species or a single geographic region, or single year) will allow for broader generalizations about seasonality of viral shedding than has ever previously been possible.

Project Outline

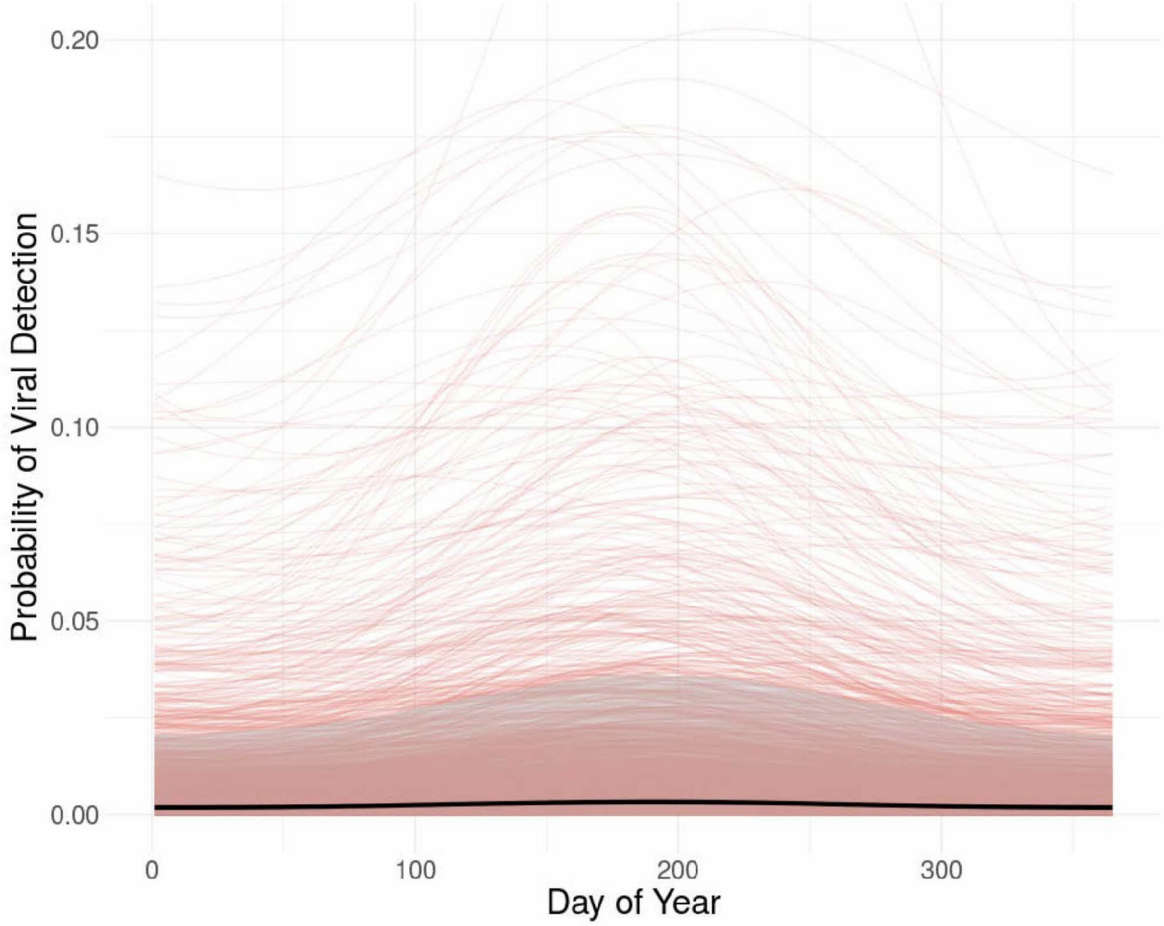
To address these knowledge gaps, we propose an analysis using PREDICT-1 (project-wide, government approved) bat viral detection data collated in EIDITH. PREDICT-1 is a heterogenous data source, and thus our general strategy will be to use Bayesian modeling implemented within the Stan programming language in order to enable the fullest use of data while accurately representing uncertainty in parameter estimates and predictions where data is sparse. In addition, we will control for some variability by initially limiting our

dataset to conventional PCR tests (excluding real-time PCR, sequencing, and serology results). An outline of our analysis strategy and relevant variables is as follows:

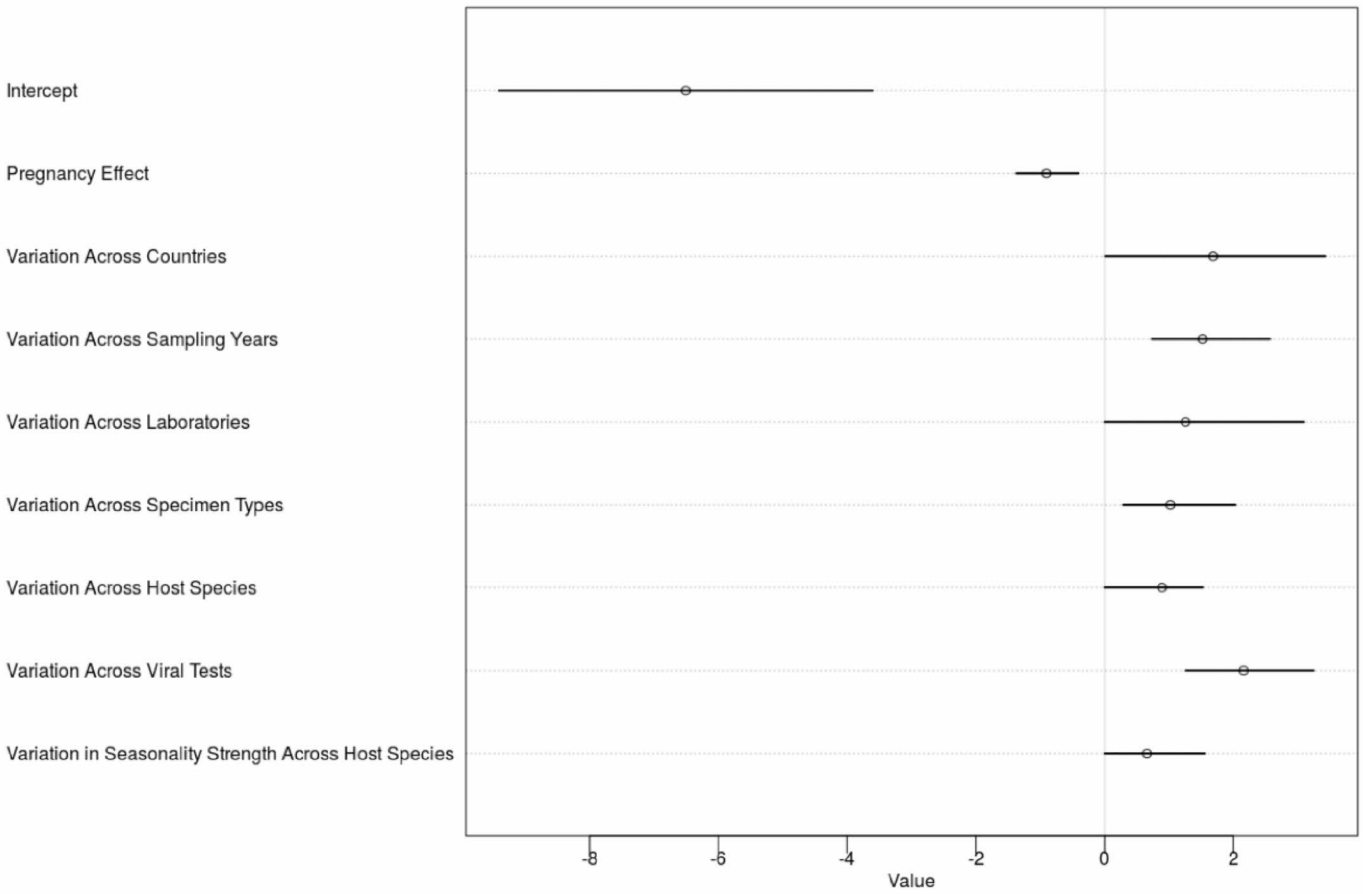
- The binary outcome variable for all models will be viral detection, at the level of the individual PCR test
- All models will allow for seasonal trends in viral shedding, modeled using a sine function
    - By defining the sine function to have yearly periodicity, we can sensibly model seasonal fluctuations across the year. Thus, our modeling will describe smooth changes in viral detection across day of year (0 to 365) rather than relying on coarser, categorical descriptors of seasonality (i.e., wet vs. dry season or month of year). This flexible framework is needed as PREDICT data have been collected from various latitudes where wet/dry seasons vary across the calendar month. It will allow us to interpret these differences and their implications more easily and rapidly.
    - Bayesian modeling techniques allow us to incorporate data across host species while making strong inferences only in cases where there is data support (i.e. "seasonality" for data-poor species will effectively shrink to constant viral detection across the year except in cases where data provide evidence of strong seasonal trends)
- All models will control for variation (by incorporating varying intercepts) across important categorical variables within the EIDITH dataset, including: bat host species from which the specimen was collected, country of specimen collection, year of specimen collection, specimen type, viral family tested for, and the diagnostic laboratory conducting the testing
    - Parameter estimates for these variables can be explicitly interpreted in cases where there is clear biological meaning underlying potential variation (e.g. differences in viral detection across bat host species may represent inherent differences in viral susceptibility) or they can be treated solely as variables that are being controlled for (e.g. differences in viral detection across years may simply represent stochastic variation)
- Models will be constructed to investigate the relative explanatory power of additional predictor variables (main effects) on viral detection, including: rainfall (which drives food availability and potentially social behaviors), lactation status of adult female bats, and pregnancy status of adult female bats
    - While the above models are intended to apply specifically to adult female bats, whose reproductive status is clearly defined, alternative models could be constructed including data on male and/or juvenile bats that incorporate predictors related to adult female reproductive status. These models would address potential effects of reproductive seasonality/social behaviors on viral shedding at the population-level. This is important because reproductive activity in a given species at a given time may serve as a proxy for social interactions and contact that promotes viral sharing and therefore affects both sexes and potentially multiple age classes.
- Analogous models run on subsets of the data (i.e., subset down to a single bat host species or viral family) could be used to validate more general results from global models and strengthen inferences

Although results would be most robust and useful when incorporating as much PREDICT-1 data as possible, our methodology allows for easy iteration and refinement of the exact model structure and underlying data if there are data sensitivities.

Preliminary Results (Using EHA-only Data)



Example Figure 1. Seasonal probability of viral detection in the bat species *Pteropus giganteus*. Estimates of the seasonal trend in viral detection for *P. giganteus* (using only adult female data) were generated from a Bayesian model run using Stan for a total of 4000 iterations. Each red line represents the seasonal trend implied by the parameter estimates of a single model iteration. Thus, there are 4000 seasonal trends plotted, representing the full uncertainty inherent in the modeling process. These seasonal trends are fit using testing data spanning multiple viral families (13 in total), hence our results represent general patterns in viral dynamics. The black line represents the median seasonal trend derived from these estimates. The gray shaded area represents the 95% highest posterior density interval for the seasonal trends. This 95% interval highlights a peak in viral detection at approximately day of year 200. The more data that are used for modeling, the more likely we are to be able to finely resolve seasonal trends across species. Note that viral detection probability ranges from 0.00 - 0.20 in this figure.



Example Figure 2. Dotplot of parameter estimates from a Bayesian model of bat viral shedding. This model, using data on adult female bats captured by EHA, was fit using Stan with a total of 4000 iterations. Means (dots) and 95% highest posterior density intervals (HPDI; black lines) for parameters are shown. Note the vertical dotted line representing a value of zero. The overall model intercept is extremely negative, indicating a low baseline viral detection rate. Interestingly, this data subset suggests that pregnant female bats are less likely to host viruses (the 95% HPDI for the Pregnancy Effect is entirely negative). Heterogeneity in the data attributable to various other biological and technological factors are being accounted and controlled for. These include country of specimen collection, year of specimen collection, diagnostic laboratory conducting the testing, specimen type, bat host species from which the specimen was collected, and viral family tested for. Magnitude of the variation along each of these dimensions is reflected in the mean parameter estimate for the corresponding variation terms in the model. Finally, the strength of the seasonality effect varies across bat host species, allowing for a seasonal trend in viral detection if the data supports such a pattern.

From: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
To: [redacted] "Dr. Jonna Mazet" <jkmazet@ucdavis.edu>
Cc: Peter Daszak <daszak@ecohealthalliance.org>
Subject: Viral ranking slide for M&A session tomorrow?
Sent: Mon, 11 Sep 2017 14:25:24 +0000
viralrankingslide.pptx
ATT00001.htm

Hi Jonna and [redacted]

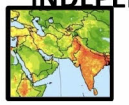
Peter and I wanted to include a viral ranking update slide in the M&A talk tomorrow. Attached is a placeholder slide currently in the deck. Do you have an updated slide to include that has more details on what's been done? If so, that would be great.

Sorry for the last minute.

Cheers,
Kevin

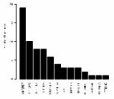
Update: Viral ranking (Jonna/UCD)

VIRUS-INDEPENDENT + **VIRUS-SPECIFIC TRAITS** = **RISK OF SPILLOVER**



GEOGRAPHIC HOTSPOTS FOR EMERGENCE

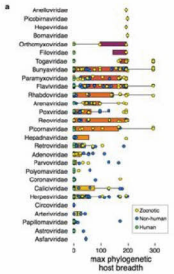
HOST SPECIES TRAITS, GEOGRAPHIC RANGE, RELATEDNESS



HOST ABUNDANCE

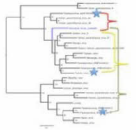
VIRAL PREVALENCE IN HOST

EPIDEMIOLOGICAL/ CONTACT INTERFACE



HOST BREADTH/PLASTICITY

PROPORTION KNOWN ZOONOSES IN VIRUS FAMILY



PHYLOGENETIC RELATEDNESS TO KNOWN ZOONOSES

OTHER VIRUS-SPECIFIC TRAITS

USAID FROM THE AMERICAN PEOPLE

Emerging Threats Program

Sent: Mon, 11 Sep 2017 11:49:29 -0700
Subject: Fwd: Viral ranking slide for M&A session tomorrow?
From: Jonna Mazet <jkmazet@ucdavis.edu>
To: "Kevin J. Olival" <olival@ecohealthalliance.org>, Peter Daszak <daszak@ecohealthalliance.org>
Cc: [redacted]
viralrankingslide_ZG.pptx

Hi Kevin & Peter,
[redacted] pulled a few of our in-progress data slides for inclusion if desired. Slide 3 & 4 show the same data in a different way (and slide 4 is adjusted). You can choose one or keep both, whatever you like.
These are not quite finished and will be updated/included in a pub, so let's not use them beyond this meeting until we finalize them.
Thanks,
J

From: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
Date: Monday, September 11, 2017 at 3:25 PM
To: [redacted] Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Peter Daszak <daszak@ecohealthalliance.org>
Subject: Viral ranking slide for M&A session tomorrow?

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Kevin

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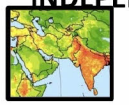
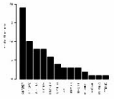


GEOGRAPHIC HOTSPOTS FOR EMERGENCE

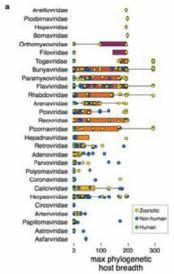
HOST SPECIES TRAITS, GEOGRAPHIC RANGE, RELATEDNESS



HOST ABUNDANCE

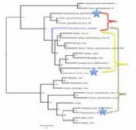
VIRAL PREVALENCE IN HOST

EPIDEMIOLOGICAL/ CONTACT INTERFACE



HOST BREADTH/PLASTICITY

PROPORTION KNOWN ZOONOSES IN VIRUS FAMILY



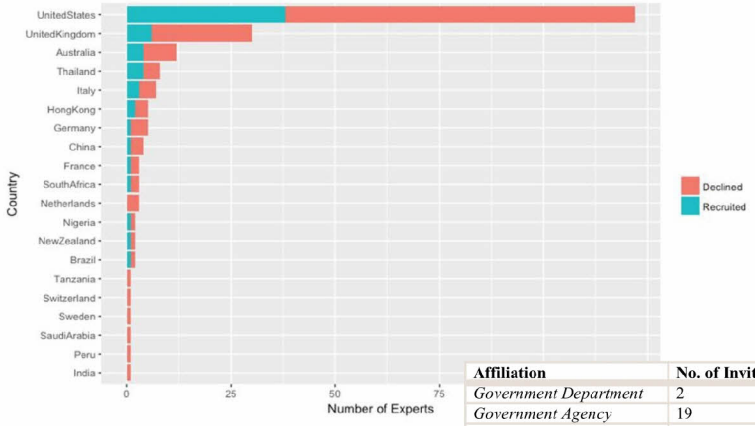
PHYLOGENETIC RELATEDNESS TO KNOWN ZOONOSES

OTHER VIRUS-SPECIFIC TRAITS

USAID FROM THE AMERICAN PEOPLE

Emerging Threats Program

Solicitation of Expert opinion



Number of experts (total = 150) recruited (blue, n = 65) versus declined (red) to participate in the risk ranking survey by Country of residence.

Affiliation	No. of Invitations
Government Department	2
Government Agency	19
Government Research Institute	4
International Organization	9
Private Foundation	13
Private Organization	3
University	100

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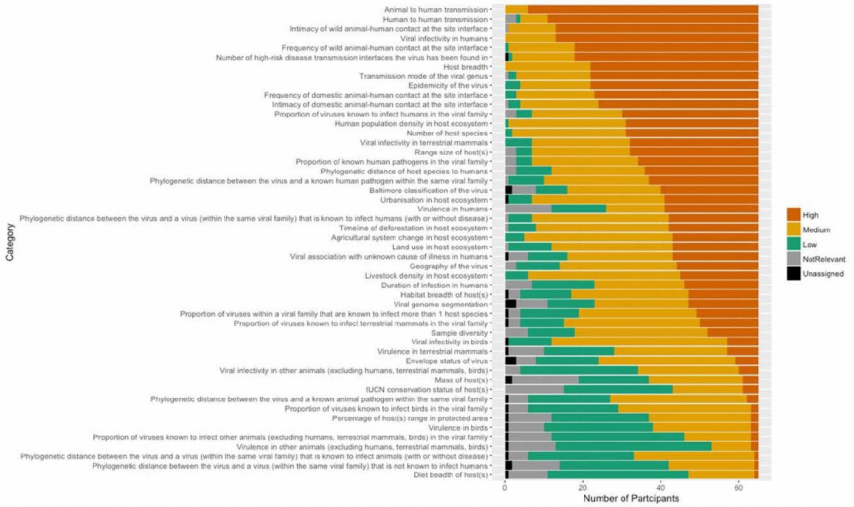
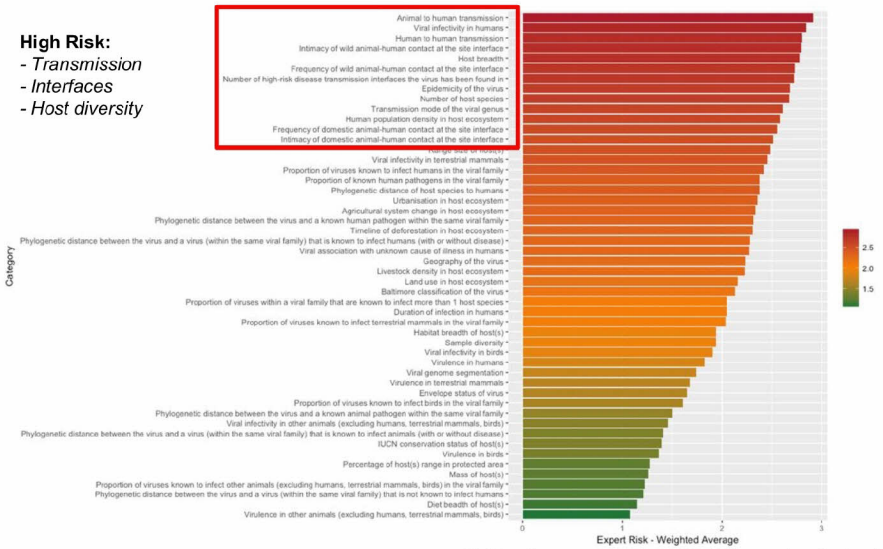
Expert opinion: The results



Participant (n = 65) responses to risk ranking assessment of host, virus and environmental attributes that could contribute to the risk of a new human viral spillover or epidemic event of animal-origin. Risk was categorized as High (red), Medium (orange), Low (green) or Not relevant to spillover (grey). If the participant did not provide an answer, it was categorized as Unassigned (black).

Expert opinion: The results

High Risk:
- *Transmission*
- *Interfaces*
- *Host diversity*



Weighted average categorical risk accounting for level of expertise of participants. Weighted risk values range from no risk (0) to high risk (3).

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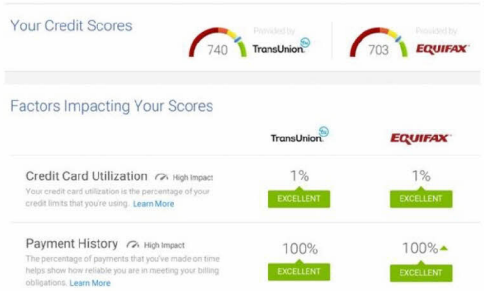
Risk Ranking PREDICT viruses

- Integration of PREDICT data, global datasets and expert opinion
  - Virus Risk scores – 'credit report'
  - 'Spillover' App development



From: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
To: "Dr. Jonna Mazet" <jkmazet@ucdavis.edu>
Cc: Peter Daszak <daszak@ecohealthalliance.org>, [redacted]
Subject: Re: Viral ranking slide for M&A session tomorrow?
Sent: Mon, 11 Sep 2017 19:04:03 +0000

Great, thank you! Peter will integrate these!

Kevin J. Olival, PhD
Vice President for Research

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On Sep 11, 2017, at 2:49 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Hi Kevin & Peter,
[redacted] pulled a few of our in-progress data slides for inclusion if desired. Slide 3 & 4 show the same data in a different way (and slide 4 is adjusted). You can choose one or keep both, whatever you like.
These are not quite finished and will be updated/included in a pub, so let's not use them beyond this meeting until we finalize them.
Thanks,
J

From: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
Date: Monday, September 11, 2017 at 3:25 PM
To: [redacted] Jonna Mazet <jkmazet@ucdavis.edu>
Cc: Peter Daszak <daszak@ecohealthalliance.org>
Subject: Viral ranking slide for M&A session tomorrow?

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Peter and I wanted to include a viral ranking update slide in the M&A talk tomorrow. Attached is a placeholder slide currently in the deck. Do you have an updated slide to include that has more details on what's been done? If so, that would be great.

Sorry for the last minute.

Cheers,

Kevin

<viralrankingslide_ZG.pptx>

From: Peter Daszak <daszak@ecohealthalliance.org>
To: Jonna Mazet <jkmazet@ucdavis.edu>, "Kevin Olival, PhD" <olival@ecohealthalliance.org>
Cc: [redacted]
Subject: RE: Viral ranking slide for M&A session tomorrow?
Sent: Mon, 11 Sep 2017 19:08:47 +0000

This is great – thanks [redacted]! We'll put them in the talk for tomorrow and you can talk to them when it comes up…

Cheers,

Peter

Peter Daszak
President

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From: jonna.mazet@gmail.com [mailto:jonna.mazet@gmail.com] **On Behalf Of** Jonna Mazet
Sent: Monday, September 11, 2017 2:49 PM
To: Kevin Olival, PhD; Peter Daszak
Cc: [redacted]
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To: Peter Daszak <daszak@ecohealthalliance.org>, "Johnson Christine Kreuder (ckjohnson@ucdavis.edu)" <ckjohnson@ucdavis.edu>, "Jonna Mazet (jkmazet@ucdavis.edu)" <jkmazet@ucdavis.edu>
Cc: "Kevin Olival, PhD" <olival@ecohealthalliance.org>, Evan Eskew <eskew@ecohealthalliance.org>, Anna Willoughby <willoughby@ecohealthalliance.org>, Aleksei Chmura <chmura@ecohealthalliance.org>
Subject: Re: Proposal for PREDICT-wide M&A project
Sent: Mon, 11 Sep 2017 20:27:03 +0000

Hi Peter,

This looks great from my perspective. Two minor comments:

- Just to clarify, by limiting to PCR results (first sentence, top of page 2), I assume you mean those specimens with "Confirmation Result" = Positive? (i.e., not just those with a band)

- Do you have plans on how to deal with situations where you have multiple specimens from one animal? In some initial fiddling with the P1 data, I found suggestion that an individual animal was more likely to be positive when more specimens were collected with that animal.

Thanks, and sorry I'll miss the discussion this afternoon,

Damien

_____

Damien Joly, PhD

Head, Data Research

Metabiota

Assoc. Adjunct Professor · Dept. of Ecosystem and Public Health · Faculty of Vet. Med. · U. of Calgary
Information Management Coordinator · Emerging Pandemic Threats - PREDICT program

[redacted]

djoly@metabiota.com · *tel +1 250 616 4961* · *skype* damienjoly

http://www.metabiota.com

From: Peter Daszak <daszak@ecohealthalliance.org>

Sent: September 10, 2017 9:17:02 PM
To: Johnson Christine Kreuder (ckjohnson@ucdavis.edu); Jonna Mazet (jkmazet@ucdavis.edu); Damien Joly
Cc: Kevin Olival, PhD; Evan Eskew; Anna Willoughby; Aleksei Chmura
Subject: Proposal for PREDICT-wide M&A project

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Subject: Re: Proposal for PREDICT-wide M&A project
Sent: Mon, 11 Sep 2017 21:33:52 +0000
wolfe2002.pdf

Cool, thanks Kevin.

While dated, the approach in the attached paper might be helpful (e.g., multiple specimens might be considered analogous to multiple follicles).

Nice work!

Damien Joly, PhD

Head, Data Research

Metabiota

Assoc. Adjunct Professor · Dept. of Ecosystem and Public Health · Faculty of Vet. Med. · U. of Calgary
Information Management Coordinator · Emerging Pandemic Threats - PREDICT program

[redacted]

djoly@metabiota.com · *tel +1 250 616 4961* · *skype* damienjoly

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From: Kevin Olival, PhD <olival@ecohealthalliance.org>
Sent: September 11, 2017 1:39:31 PM
To: Damien Joly; Evan Eskew
Cc: Peter Daszak; Christine Kreuder Johnson; Dr. Jonna Mazet; Anna Willoughby; Aleksei Chmura
Subject: Re: Proposal for PREDICT-wide M&A project

Hi Damien,
Thanks for the comments. Regarding your first point, yes, to my knowledge these are all only for P1 sequenced, confirmed, and gov't approved data.

Regarding the latter question about two positives from one animal… I'll let Evan handle that as I'm sure he's thought about

this and encountered it in the analysis. Evan?

Cheers,
Kevin

Kevin J. Olival, PhD
Vice President for Research

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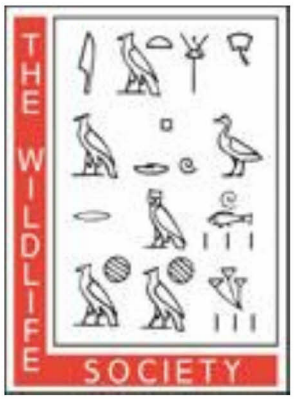

Evaluation of Antemortem Sampling to Estimate Chronic Wasting Disease Prevalence in Free-Ranging Mule Deer

Author(s): Lisa L. Wolfe, Mary M. Conner, Thomas H. Baker, Victoria J. Dreitz, Kenneth P. Burnham, Elizabeth S. Williams, N. Thompson Hobbs and Michael W. Miller

Source: *The Journal of Wildlife Management*, Vol. 66, No. 3 (Jul., 2002), pp. 564-573
Published by: Wiley on behalf of the Wildlife Society
Stable URL: http://www.jstor.org/stable/3803124
Accessed: 26-06-2016 21:09 UTC

EVALUATION OF ANTEMORTEM SAMPLING TO ESTIMATE CHRONIC WASTING DISEASE PREVALENCE IN FREE-RANGING MULE DEER

LISA L. WOLFE, Colorado Division of Wildlife, Wildlife Research Center, 317 West Prospect Road, Fort Collins, CO 80526, USA, and Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA
MARY M. CONNER, Colorado Division of Wildlife, Wildlife Research Center, 317 West Prospect Road, Fort Collins, CO 80526, USA, and Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523, USA
THOMAS H. BAKER, Colorado Division of Wildlife, Wildlife Research Center, 317 West Prospect Road, Fort Collins, CO 80526, USA, and Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA
VICTORIA J. DREITZ, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA
KENNETH P. BURNHAM, Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, CO 80523, USA
ELIZABETH S. WILLIAMS, Wyoming State Veterinary Laboratory, Department of Veterinary Sciences, University of Wyoming, 1174 Snowy Range Road, Laramie, WY 82070, USA
N. THOMPSON HOBBS, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA
MICHAEL W. MILLER,[1] Colorado Division of Wildlife, Wildlife Research Center, 317 West Prospect Road, Fort Collins, CO 80526, USA

Abstract: We conducted a field study to evaluate tonsillar biopsy immunohistochemistry (IHC) as a tool for diagnosing chronic wasting disease (CWD) in live, free-ranging mule deer (*Odocoileus hemionus*) and estimating CWD prevalence. Initially, we evaluated and refined techniques for collecting tonsillar biopsies from mule deer. Using a simple mouth gag and a 6-mm biopsy forceps, and taking the biopsy starting at the rostral rim of the tonsillar sinus, we obtained 155/161 (96%) samples that yielded ≥1 lymphoid follicle. To compare antemortem and postmortem survey techniques and assure biopsy-based estimates would not substantially underestimate "true" prevalence, we examined tonsillar biopsies from 161 free-ranging mule deer from 2 populations where CWD is endemic. We then calculated prevalence (p_b) and compared this to prevalence (p_h) estimated from tonsil samples from 161 deer harvested or culled in spatial and temporal proximity to our study areas; we considered the latter a close approximation of "true" prevalence. Biopsy-based prevalence estimates exceeded prevalence estimated by tonsillar IHC of samples from harvested or culled deer. Although 95% CIs for $p_h - p_b$ included 0 for area-specific estimates, biopsy-based estimates were ≥3 times higher than harvest-based estimates in both study areas. Moreover, when data from both study areas were combined, p_h (= 0.025) was lower than p_b (= 0.081) and the 95% CI for $p_h - p_b$ (–0.104 to –0.007) did not include 0. Observed differences in prevalence most likely reflected spatial or temporal variation in populations (or subpopulations) of deer sampled. Tonsillar biopsy IHC appears to be reliable for detecting CWD infections in live mule deer and estimating prevalence in affected populations, thereby representing a new tool with potential utility in CWD management, particularly in areas where harvest-based sampling is infeasible.

JOURNAL OF WILDLIFE MANAGEMENT 66(3):564–573

Key words: chronic wasting disease, Colorado, diagnosis, immunohistochemistry, mule deer, *Odocoileus hemionus*, prion, transmissible spongiform encephalopathy.

Chronic wasting disease (Williams and Young 1980, 1982) is an endemic prion disease of free-ranging deer (*Odocoileus* spp.) and elk (*Cervus elaphus nelsoni*) populations in northeastern Colorado and southeastern Wyoming, USA (Miller et al. 2000). In deer, and perhaps in elk, unmanaged CWD epidemics appear to pose a substantial threat to long-term viability of infected populations (Gross and Miller 2001). Consequently, preventing the spread and reducing the occurrence of CWD in endemic areas have become the primary goals for managing infected deer and elk populations in northeastern Colorado (Colorado Division of Wildlife 2001).

Successful management of CWD appears dependent on early detection and elimination of infected individuals and endemic foci (Gross and Miller 2001). Unfortunately, strategies for detecting and managing foci of CWD presently are hampered by the lack of reliable methods for diagnosing infection in live deer and elk. Reliance on postmortem samples from harvested or culled animals limits opportunities for identifying infected subpopulations, particularly in suburban and rural residential areas of northeastern Colorado where few deer may be harvested annually and public support for culling ostensibly healthy animals is at best tenuous. As a result, both new and existing CWD foci may persist undetected in such areas and serve as reservoirs for the maintenance and geographic spread of CWD in the wild (Gross and Miller 2001).

[1] E-mail: mike.miller@state.co.us

Management of scrapie, a relatively common prion disease of domestic sheep, also has suffered historically from unavailability of an antemortem (live-animal) test. Recently, however, observations that lymphoid accumulation of disease-associated prion protein (PrP^{res}) precedes development of detectable neurological lesions and clinical signs led to development of immunohistochemistry (IHC) for use in preclinical and clinical diagnosis of scrapie in sheep (Miller et al. 1993; Schreuder et al. 1996, 1998; van Keulen et al. 1996; O'Rourke et al. 1998*a*,*b*, 2000; Andréoletti et al. 2000). Positive staining of lymphoid tissues (particularly retropharyngeal lymph nodes, tonsils, and mesenteric lymph nodes) also has been observed in mule deer exposed to CWD (Sigurdson et al. 1999; Miller et al. 2000; Miller and Williams 2002), and appears to be an early indicator of preclinical disease in this species as well. Tonsillar IHC using monoclonal antibody (MAb) F99/97.6.1 (O'Rourke et al. 2000, Spraker et al. 2002) is both sensitive and specific in detecting CWD-infected mule deer in harvest-based epidemiological surveys (Miller and Williams 2002): false-positive results have not been observed using tonsillar IHC, and false-negative results are rare.

Antemortem scrapie tests are based on biopsy and examination of lymphoid tissues, typically from tonsil or nictitating membrane (O'Rourke et al. 1998*b*, 2000; Schreuder et al. 1998). Similarly, preliminary data from captive and free-ranging mule deer indicate that tonsillar biopsy has potential application in antemortem diagnosis of CWD (Colorado Division of Wildlife, unpublished data). Here, we evaluated the utility of antemortem sampling to estimate CWD prevalence in free-ranging mule deer populations. The specific objectives of our study were to evaluate tonsillar biopsy as a tool for antemortem diagnosis of CWD in free-ranging mule deer and to compare estimated CWD prevalence based on tonsillar biopsy data to prevalence estimated from harvest-based survey data for deer from the same populations.

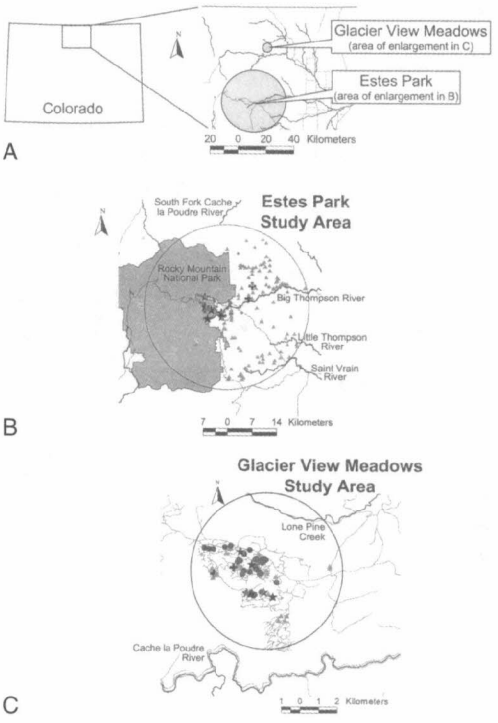

Fig. 1. Study areas in north-central Colorado, USA, where tonsillar biopsy immunohistochemistry was evaluated for diagnosing chronic wasting disease in free-ranging mule deer. (A) One population resided primarily in Estes Park (EP) and the other in the mountain residential area of Glacier View Meadows (GVM). (B) Deer captured and biopsied in the 1,662-km^2 EP study area came primarily from residential areas and national park lands, whereas deer harvested in this area came primarily from national forest and private lands east of the town of Estes Park. (C) Deer captured and biopsied in the 50-km^2 GVM study area came from approximately the same residential areas where deer had been culled previously. Circles represent biopsy-negative deer, stars represent biopsy-positive deer, triangles represent negative harvested (EP) or culled (GVM) deer, and crosses represent positive harvested or culled deer; lines represent rivers and roadways.

STUDY AREA

Our study focused on sampling 2 native mule deer populations residing in portions of north-central Colorado where CWD was endemic (Miller et al. 2000). One population resided primarily in Estes Park (EP) and the other near the mountain residential area of Glacier View Meadows (GVM; Fig. 1). Deer habitat in the 1,662 km^2-EP study area included coniferous mountain shrub types intermixed with agricultural, recreational, and suburban developments at lower elevations; deer habitat in the 50 km^2-GVM study area primarily was coniferous mountain shrub type intermixed with suburban developments throughout. These 2 areas represent geographically separate deer populations from 2 different river drainages (Fig. 1A). Some individual deer in each of these populations were sedentary, and others moved seasonally to higher elevation alpine summer ranges (M. M. Conner and M. W. Miller, unpublished data). We captured and sampled most deer during April–June and August–October 2001 while they were on winter and transitional ranges.

METHODS

Tonsillar Biopsy Sampling Technique

Initially, variations on techniques described elsewhere (Schreuder et al. 1998; Colorado Division of Wildlife, unpublished data) were systematically evaluated to develop a repeatable sampling method. We sampled 58 free-ranging mule deer in these preliminary evaluations in conjunction with ongoing field studies of deer movement patterns (M. M. Conner and M. W. Miller, unpublished data). All deer were anesthetized with various combinations of thiafentanil, carfentanil, ketamine, tiletamine and zolazepam, medetomidine, and xylazine prior to biopsy sampling (L. L. Wolfe and M. W. Miller, unpublished data). Deer were captured either by darting or Clover trapping (Clover 1956); those deer not already anesthetized during capture were anesthetized before tissue samples were collected. In addition, we sampled 17 deer captured and euthanized in conjunction with CWD management programs to allow multiple sample collections from a single animal. Biopsies were performed by a veterinarian (L. L. Wolfe and/or M. W. Miller) with previous experience in these procedures. Minor bleeding, when it occurred, was controlled with a gauze pad and mild pressure on the biopsy site. All live deer sampled were marked with individually identifiable metal ear tags and either flexible neck bands, plastic ear tags or, in some cases, radiocollars and given penicillin G benzathine and procaine (1.8×10^6 units, injected subcutaneously) prior to recovery and release. Biopsy instruments were disinfected between uses by soaking for ≥1 hr in a phenolic solution (LpH®ag; Steris, St. Louis, Missouri, USA) followed by autoclaving at 134 °C and about 2 atmospheres pressure.

Technique variables included methods for visualizing the tonsillar sinus, biopsy instrument, and specific tissue sampling approach. We evaluated 3 visualization techniques (manually holding the mouth open, using a simple mouth gag, or inserting a swine vaginal scope attached to a flashlight); in all cases, supplemental lighting was provided via a head lamp worn by the operator and/or a small hand-held flashlight. Tissue biopsies were collected using a 30-cm Jackson rectal biopsy forceps (Sontec Instruments, Englewood, Colorado, USA); 2 cup sizes (4 and 6 mm) were evaluated. Three sampling approaches also were compared: biopsies were taken by inserting the biopsy forceps directly into the tonsillar sinus, rostral to the sinus, or by taking the first bite at the rostral rim of the sinus. At least 4 tissue bites were taken with each technique for evaluation. We abandoned specific technique combinations as soon as it became apparent that they failed to consistently yield usable samples.

Extracted tonsillar tissue was preserved in 10% neutral buffered formalin for histological evaluation. Tonsillar biopsies were examined via histopathology and IHC using MAb F99/97.6.1 (VMRD, Pullman, Washington, USA); IHC techniques were as described previously (Miller and Williams 2002). Biopsies initially were evaluated microscopically for presence of lymphoid follicles and the number of follicles recorded. Biopsies containing at least 1 lymphoid follicle were regarded as usable; these were further evaluated for the presence of IHC staining in follicles and categorized as CWD-positive or -negative based on staining. We used Fisher's exact tests to compare proportions of usable samples obtained under different sampling strategies, and used $\alpha = 0.05$ in assessing significant differences between strategy-specific proportions of usable samples.

Sample Quality and Correction for Potential False Negatives from Biopsy Samples

Based on preliminary field data, we anticipated that even with optimal sampling technique some proportion (≤10%) of the biopsies might be inadequate for evaluation because no lymphoid follicles were discernable. However, to minimize the number of otherwise wasted captures, we wanted to assure that all samples containing at least 1 follicle could be used in estimating prevalence. Because a single positive follicle could be considered sufficient to classify a sampled deer as CWD-positive, we also wanted to use samples with a single negative follicle in estimating prevalence.

Although false-positives were unlikely (Miller and Williams 2002), we recognized that false-negative biopsy samples could occur when few follicles were available for examination. If false-negative samples were common among biopsy samples, then prevalence estimates based on biopsy likely would underestimate prevalence when compared to estimates derived from examining entire cross-sections of tonsils collected from harvested deer. Consequently, we wanted a means of using the number of follicles present in negative samples to correct the probability of a negative classification based on examination of few versus many follicles. To make this correction, we derived a correction factor for sample quality based on the probability a deer was actually CWD-positive given that n negative follicles were

present in the tonsil biopsy (see Appendix 1).

We used IHC slides from 64 harvested deer previously identified as CWD-positive (Miller and Williams 2002) to count the number of positive and negative follicles in a representative cross-section of tonsillar tissue. Only intact follicles were counted. From these count data, we constructed a frequency distribution for the relative proportions of positive follicles encountered in CWD-infected deer. We then used these data and local CWD prevalence estimates to calculate the correction factor for negative biopsies based on the number of follicles discernable in each biopsy sample collected (see Appendix 1 for detailed mathematical explanation).

Comparison of Prevalence Estimates

We compared CWD prevalence estimated from tonsillar biopsies (p_b) to prevalence estimated from existing harvest-based survey data (p_h; also estimated via tonsillar IHC on tissues collected postmortem). Our study was designed to determine whether prevalence estimates derived from these 2 techniques were comparable. Thus, our null and alternative hypotheses were reversed from their typical order: our alternative hypothesis was that there was no difference between the methods. Based on preliminary data and our experience with CWD diagnostic techniques (Miller and Williams 2002; Spraker et al. 2002), it seemed unlikely that biopsy-based estimates would overestimate prevalence as compared to harvest-based estimates. Assuming that the latter prevalence estimate averaged about 0.1 for our study areas (Miller et al. 2000; M. W. Miller, unpublished data), and given the variation in prevalence observed annually, we regarded ≤50% differences in estimates between tests as a reasonable benchmark for comparing techniques.

Because we were not interested in detecting a small difference between the methods, but rather in ensuring that these 2 methods were comparable, we did not use traditional power calculations to determine the sample size. Instead, we used a more intuitive approach examining the 95% confidence interval (CI) of the difference between prevalence estimates (K. P. Burnham, unpublished data). We assumed that the sampling distribution of the estimated difference in prevalence, $\hat{p}_h - \hat{p}_b = \hat{d}$, was normal with some mean, $p_h - p_b = d$, and theoretical variance

$$\frac{p_h(1-p_h)}{n} + \frac{p_b(1-p_b)}{n}.$$

For simplicity, we also assumed equal n for each method. We wanted the lower end of the 95% CI to be slightly greater than zero if a difference in estimates existed; we regarded 0.001 as the critical limit for this difference. Consequently, n was calculated based on the lower 95% CI; because only underestimation of prevalence was of concern, we used $Z_a (= 1.645)$ rather than $Z_{a/2}$. It followed that

$$0.001 = (p_h - p_b) - 1.645\sqrt{\frac{p_h(1-p_h)}{n} + \frac{p_b(1-p_b)}{n}},$$

where p_b was the prevalence estimated from biopsy samples and p_h was the prevalence estimated from harvest-derived samples; both p_b and p_h were unknown parameters that would be estimated from the data. Based on preliminary data from our study areas, we estimated $p_h = 0.1$; assuming a 50% lower estimate for p_b, $p_b = 0.05$. It followed that solving for n, $n = 155$. Thus, we estimated that comparisons based on usable biopsies from a random sample of ≥155 captured deer and a geographically corresponding sample of ≥155 harvested deer would be sufficient to allow us to decide whether tonsillar biopsy-based prevalence estimates could be regarded as equivalent to harvest-based estimates in future studies.

For comparisons of prevalence estimates, we captured, sampled, and handled free-ranging mule deer from the EP and GVM populations as described above; samples were stored, processed, and evaluated as described above. The number of follicles in each sample, and the number staining positive, were recorded for each sample. We estimated CWD prevalence as the ratio of positive to total samples. For harvest-based estimates of prevalence, we used data from mule deer harvested (EP) or culled (GVM) in spatial and temporal proximity to sites of biopsy sampling (M. W. Miller, unpublished data). For the EP area, we estimated prevalence via harvest samples collected during 1999 and 2000 fall hunting seasons that were within 23 km of the center of Estes Park (Fig. 1B); we used combined October–December 1999 and October–December 2000 harvest data because October–December 2000 data alone yielded an inadequate sample size. This 23-km radius area encompassed similar habitats for both sampling methods and was the minimum area sufficient to provide an adequate number of harvest samples. For the GVM area, we estimated prevalence from a sample of apparently healthy deer randomly culled during April 2001. We used

this sample because, by design, it was collected close in space (Fig. 1C) and time to tonsillar sampling. We regarded the culling sample as similar to a harvest sample in that deer were opportunistically taken from the GVM area.

Only adult (≥1 yr old) deer were used to estimate prevalence for all samples, and only deer with ≥1 discernable lymphoid follicle were used to estimate prevalence via biopsy sampling. We calculated the difference and standard error of the difference in prevalence estimates between harvest and tonsil samples ($p_h - p_b$) as described for estimating sample sizes needed for comparisons. As above, we used 0.001 as the critical limit for demonstrating a difference between sampling techniques: if the lower bound of the 95% CI on the difference in prevalence estimates was <0.001, then biopsy-based estimates did not underestimate "true" prevalence as estimated by examining samples from harvested and culled deer.

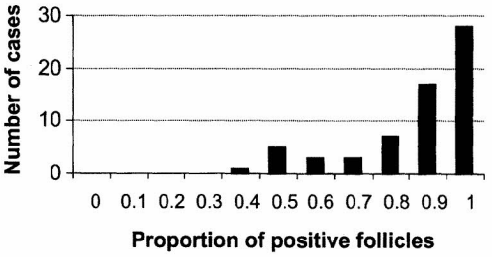

Fig. 2. Frequency distribution of lymphoid follicle involvement (positive/total) in cross-sections of tonsils from 64 mule deer infected with chronic wasting disease (CWD), as determined by immunohistochemistry (IHC). Data from this distribution were used in deriving an equation to correct the probabilities of IHC-negative biopsies based on the number of discernable follicles as a means of correcting biopsy-based CWD prevalence estimates.

RESULTS

Tonsillar Biopsy Sampling Technique

The quality of biopsy samples was dramatically affected by sampling technique ($P = 0.000007$). Biopsy cup size (4 mm vs. 6 mm) appeared to have the greatest influence on number of follicles recovered—using a biopsy forceps with a 6-mm cup consistently yielded more samples with follicles (38/50) than a 4-mm cup (8/25) across various visualization and site combinations. We attributed this difference to the ability to collect larger tissue pieces with the 6-mm cup. Manually holding the mouth open proved dangerous to the operator and instruments and was discontinued. Using the swine vaginal scope was easy, provided good visualization of the tonsillar sinus, and protected the biopsy instruments; however, usable sample yield (10/30) was much lower than when using the mouth gag (36/45). In retrospect, it appeared that the scope may have somehow distorted tonsillar tissue when pressed against the soft palate, thereby diminishing sample quality.

The most consistent biopsy approach was taking the first bite at the rostral rim of the tonsillar sinus, then rotating the biopsy forceps to take subsequent bites that included the sinus; using this approach, 23/24 samples had follicles (vs. 12/17 when sampling directly from the sinus; other variables held constant). Inserting the forceps directly into the sinus or attempting to take deep bites seemed to bypass follicular tissue altogether in many cases. Overall, by using a simple mouth gag and a 6-mm biopsy forceps, and by taking the biopsy starting at the rostral rim of the tonsillar sinus, we collected 155/161 (96%) samples that yielded 1 lymphoid follicle.

Sample Quality and Correction for Potential False Negatives from Biopsy Samples

We used CWD-positive deer from the harvest sample to estimate the distribution of the proportion of positive follicles for the correction factor. Sections of tonsillar tissue from 64 CWD-positive deer included 8 to 196 identifiable follicles. Follicle counts represented the minimum number of follicles actually included in a sample. In most samples, additional follicles were present but were distorted in sampling; regardless of staining, these were not counted in estimating follicle numbers or proportion of follicles involved in positive cases. Among these cases, the proportion of follicles staining positive in cross-sections of tonsil ranged from 30.4% (17/56) to 100% (143/143); in 43.8% (28/64) of the deer examined, >90% of the discernible follicles stained positive (Fig. 2). On average, 83% of follicles stained positive in CWD-positive deer examined.

We collected 161 usable biopsy samples that included at least 1 identifiable follicle from the 2 study areas (Table 1); of these, 79 (49%) had 10 follicles. Thirteen of 161 usable biopsy samples showed positive staining in lymphoid follicles, indicating CWD infection. Biopsies with as few as 3 follicles yielded positive tests. The proportion of positive-staining follicles in biopsy samples ranged from 40% to 100%.

Table 1. Comparison of chronic wasting disease prevalence estimates based on tonsil biopsy samples from live mule deer (p_b) or on postmortem samples from harvested or culled mule deer (p_h) in north-central Colorado, USA.

	Biopsy-based data and estimates			Harvest-based data and estimates			Difference	
Source	Positive/ total	Prevalence (p_b)	95% CI[a]	Positve/ total	Prevalence (p_h)	95% CI[a]	$p_h - p_b$	95% CI
Estes Park	6/117	0.051	0.022–0.103	2/117	0.017	0.004–0.054	–0.034	–0.081 to 0.012
Glacier View Meadows	7/44	0.159	0.074–0.287	2/44	0.046	0.010–0.138	–0.114	–0.238 to 0.011
Total	13/161	0.081	0.046–0.130	4/161	0.025	0.008–0.058	–0.056	–0.104 to –0.007

[a] 95% CI are an equal-tailed Jeffreys prior interval for binomial data (Brown et al. 2001).

Comparison of Prevalence Estimates

Tonsillar biopsy-based CWD prevalence estimates approximated prevalence estimates based on IHC of tonsillar tissues from harvested mule deer (Table 1). Contrary to our initial concerns about underestimation using biopsy data, CWD prevalence estimated via tonsillar biopsy IHC actually exceeded prevalence estimated by sampling harvested or culled deer (Table 1). Although 95% CI for $p_h - p_b$ included 0 for area-specific estimates, biopsy-based estimates were 3 times higher than harvest-based estimates in both study areas (Table 1). Moreover, when data from both study areas were combined, p_h (= 0.025) was lower than p_b (= 0.081), and the 95% CI for $p_h - p_b$ (–0.104 to –0.007) did not include 0.

Adjusting biopsy-based estimates to account for sample quality only exaggerated these differences. Biopsy-based prevalence estimates increased slightly (<1.1%) when we corrected for false negatives: when assumed values of (π) (approximate "true" CWD prevalence in the sampled population at time t if every tonsil follicle was examined for all deer in the population; see Appendix 1) were based on harvest data, the estimated prevalence increased from 0.0508 to 0.0514 in EP and from 0.1591 to 0.1596 in GVM; when assumed values of (π) were based on biopsy data themselves, the estimated prevalence increased from 0.0508 to 0.0526 in EP and from 0.1591 to 0.1610 in GVM.

DISCUSSION

Tonsillar biopsy IHC appears to be a reliable method of detecting CWD infections in live mule deer and estimating prevalence in affected populations. Overall, biopsy-based CWD prevalence estimates exceeded estimates based on sampling of deer harvested or culled in the same vicinity. We regarded this as a real difference because tonsillar IHC served as the basis for both biopsy- and harvest-based prevalence estimates. Moreover, because tonsillar IHC using MAb F99/97.6.1 is highly specific for CWD infection in mule deer (Miller and Williams 2002; Spraker et al. 2002), it is highly unlikely that any of these were false-positive tests. Because PrP^{res} accumulation in tonsil cannot be detected in mule deer early in the course of CWD infection (Sigurdson et al. 1999; E. S. Williams and M. W. Miller, unpublished data), both harvest- and biopsy-based estimates of CWD prevalence still represent slight underestimates of true prevalence. However, data from tonsillar biopsy IHC should be regarded as equivalent to data from tonsillar IHC in harvested or culled deer in estimating CWD prevalence and assessing spatial and temporal epidemic trends.

Our observations of consistently higher prevalence among biopsied deer (Table 1) may offer insights into spatial or temporal dynamics of CWD. Differences in prevalence could be a simple artifact of sampling or spatial variation. For example, 5 of the 7 biopsy-positive deer at GVM came from a relatively small area that was not sampled as heavily during culling (Fig. 1C); similarly, deer biopsied in EP were from residential areas and national park lands where harvest does not occur (Fig. 1B). Temporal variation also may underlie these differences: GVM deer were culled in late winter (Apr) but biopsied in summer and early fall (Aug–early Oct), so observed differences in prevalence could reflect seasonal variation (Conner et al. 2000). Alternatively, these differences could be evidence of greater risk or exposure to the CWD agent among some subpopulations of deer. In the GVM area, about half of the mule deer are seasonally migratory and the others are year-round residents (M. M. Conner and M. W. Miller, unpublished data). Culling occurred in late winter before the migratory subpopulation had begun to move; in contrast, biopsies were collected in summer and early

fall from deer that were more likely to be year-round residents. Higher prevalence in these resident deer may reflect increased dose and/or frequency of exposure to the CWD agent, either as a result of simply having smaller home ranges or as a result of some natural or artificial feature of these home ranges. Because this area is largely residential, the presence of artificial (and illegal) feeding and water sources may be influencing CWD prevalence in the GVM area. Similarly, some biopsied subpopulations of EP deer winter in residential areas (M. M. Conner and M. W. Miller, unpublished data) where artificial feeding and water sources, or some other factor, may increase exposure or otherwise facilitate CWD transmission. Understanding these apparent differences in CWD prevalence on a local level could enhance the efficacy of CWD management efforts, and consequently deserves further study.

Using a simple mouth gag to take biopsies starting at the rostral rim of the tonsillar sinus with a 6-mm biopsy cup, >95% of our biopsy samples contained at least 1 discernible lymphoid follicle. These counts included only intact follicles and thereby represented a minimum number of follicles actually included in the sample. Additional follicles were undoubtedly collected in most samples, but were distorted in sampling. Although damaged follicles were not counted here, the presence of staining in follicular material would still contribute to detection and diagnosis of CWD-positive deer under field applications. Over 80% of the tonsillar lymphoid follicles showed some evidence of PrP^{res} accumulation in >70% of the CWD cases diagnosed among harvested or culled mule deer (Fig. 2); this relatively uniform distribution should minimize false negative rates among biopsy samples. However, we recognize that a few deer may be sampled in a narrow time interval when the proportion of positive follicles is very low (<0.3). For these very early CWD cases, the probability of false-negative tests is higher than estimated by this correction factor.

Because CWD is relatively rare in infected free-ranging deer populations (Miller et al. 2000), few CWD-positive animals are encountered in sampling. Consequently, the likelihood of false-negative tests is already small. When CWD prevalence is estimated using tonsillar biopsy data, sample quality (measured by follicle count) and prevalence estimates can be used to correct the small probability of false negatives for a given sample (see Appendix 1). We used a beta distribution to approximate the distribution of the proportion of positive follicles for our correction factor. A more thorough analysis would seek to estimate the parameter $\pi(t)$ and the parameters of $f(p)$ using a likelihood framework and model selection approach (Burnham and Anderson 1998). Although this approach probably would improve the correction function, for our data, the impact would be very slight because the probability of a false negative was small and because CWD prevalence, as estimated by either harvest or biopsy data, was relatively low (<0.16). We did not pursue a better fit because the correction factor for these data turned out to be trivial (<1.1% change in the estimates). In other situations, where data are collected in an area with higher prevalence and/or where more samples have very few follicles, this correction factor may be important. In such situations, pursuing a more appropriate function to model the proportion of positive follicles may be beneficial.

MANAGEMENT IMPLICATIONS

The availability of a reliable test for diagnosing CWD in live mule deer offers several opportunities for advancing both understanding and management of this important wildlife disease. Antemortem testing may be the most viable alternative for conducting CWD surveillance in national parks and residential areas where deer are not harvested. Moreover, capturing and sampling deer in large numbers probably will be a more publicly acceptable initial means of assessing the infection status of populations residing in urban or rural residential areas in situations where CWD is rare or has not been previously documented. Antemortem testing provides a tool for intensively sampling local deer subpopulations to assess prevalence and identify foci of infection without unnecessarily disrupting established social structures or movement patterns. Our study demonstrates that prevalence data from captured deer can be used to augment data from harvested deer, thereby providing more seamless representation of spatial patterns of CWD distribution; such representations have particular utility in evaluating potential influences of land-use patterns on CWD epidemiology.

Early detection and removal of CWD-infected individuals appears to be the most effective method for managing CWD (Gross and Miller 2001). Selectively culling test-positive individuals should help reduce prevalence rates in endemic areas. Because PrP^{res} accumulates in tonsillar follicles relatively early in the course of CWD infections

in mule deer (Sigurdson et al. 1999; E. S. Williams and M. W. Miller, unpublished data), culling biopsy-positive deer also should aid in reducing transmission rates in populations managed under test-and-slaughter regimes (Gross and Miller 2001). Such management strategies clearly warrant experimental evaluation under field conditions.

Despite its promising utility, we recognize the practical limitations of the CWD testing approach described here. The needs for capturing, anesthetizing, and precisely sampling individual deer limit the broad implementation of this testing approach in managing free-ranging deer populations infected with CWD. At best, this approach may find application in augmenting disease management programs based primarily on manipulating deer densities in endemic areas.

Antemortem testing does, however, offer more immediate application as a tool for screening captive deer to ensure that CWD-infected individuals are not being moved in commerce. Surveillance programs for CWD presently are lacking in the North American deer industry. Consequently, requiring CWD testing in mule deer or white-tailed deer prior to importation may be the most effective means for state and provincial wildlife managers to assure that CWD is not being imported or spread via commercial wildlife sales. (Based on our observations of CWD pathogenesis in white-tailed deer [E. S. Williams and M. W. Miller, unpublished data], tonsillar biopsy should be equally effective in detecting infections in this species.) If deer are being sampled to determine their individual infection status (e.g., for regulatory testing), then ≥9 follicles/sample would be needed to assure (with ≥95% confidence) that an individual deer was not infected with CWD (assuming that 0.3 is the minimum proportion of positive follicles present in a positive sample). Tonsillar biopsy, as described here, offers a relatively reliable live-animal test for CWD in deer. Whole-herd testing of commercial deer herds would be more likely to detect infected populations than testing individual animals, but either approach would be more effective than relying on subjective health certifications in assuring that privately owned deer are free from CWD infections prior to importation.

ACKNOWLEDGMENTS

Deer were captured and handled in accordance with Colorado Division of Wildlife and Colorado State University Animal Care and Use Committee (ACUC) protocols (Colorado Division of Wildlife ACUC 12-1999 and 07-2001, and Colorado State University ACUC 99-320A-01). We thank H. Hseih, C. Krumm, K. Larsen, S. Liss, and R. Opsahl for assistance in the field, P. Jaeger for performing tonsillar IHC, and T. Terrell, Rocky Mountain National Park, and numerous property owners for facilitating access in our 2 study areas. Dr. B. Schreuder provided helpful advice on tonsil sampling techniques. Dr. W. Lance and Wildlife Pharmaceuticals, Inc. (Fort Collins, Colorado, USA), provided both drugs and technical advice instrumental in deer captures. D. Freddy and T. Sanders provided helpful comments on earlier manuscript drafts. Our study was funded by the Colorado Division of Wildlife, Federal Aid in Wildlife Restoration Project W-153-R, and National Science Foundation/National Institutes of Health Grant DEB-0091961.

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APPENDIX 1

This appendix presents a correction factor for sample quality based on the probability that a deer was actually CWD-positive given that n negative follicles were present in the tonsil biopsy (i.e., a false-negative test result). The probability of a false-negative result can be defined as

$$p\{CWD\ positive \mid n\ negative\ follicles\} = \frac{(1-p^n)\pi}{(1-p)^n\pi + (1-\pi)},$$

where, for the biopsy sample representing 1 deer, all n sampled follicles were negative, p was the (unknown) proportion of all its tonsil follicles that were infected at the time (t) the sample was taken, and π was the estimated tonsillar CWD prevalence rate in the population when the sample was taken (i.e., prevalence estimated at time t if every tonsil follicle was examined for all deer in the population). Using this probability, the expected correction factor (C_n) for false-negative samples due to a small number of follicles present in a negative sample was

$$C_n = \int_0^1 \frac{(1-p)^n\pi}{(1-p)^n\pi + (1-\pi)} f_t(p)\,dp.$$

At this point, we needed to determine the probability distribution of p (fixed t, variable Δ) over the sampling population. Variation in $p(.)$ mainly is attributable to variation in Δ (that is unknown). Conceptually, $p(t)$ has some *pdf*, so let $f(.) = f(p) = f(p(t,\Delta))$. Note, however, that the random variable (p) becomes a probability over each deer that would, in fact, be CWD-positive as identified by tonsillar IHC.

We calculated 2 estimates of π, 1 using harvest data collected in close spatial and temporal proximity to biopsy study areas (designed to sample the same population) and a second using tonsil biopsy data. To approximate $f(p)$, we used IHC slides from 64 harvested deer previously identified as CWD-positive (Miller and Williams 2002) to count the number of positive and negative follicles in representative cross-sections of tonsillar tissue. Only intact follicles were counted. From these count data, we constructed a frequency distribution for the relative proportions of positive follicles encountered in CWD-infected deer (Fig. 2). We used these data to assess what $f(p)$ might be most appropriate for calculating the correction factor for false-negatives dependent on the number of follicles present in each biopsy sample collected.

We did not know $f(p)$. However, from our data, p appeared skewed toward 1 (Fig. 2), suggesting that if tonsil tissue tested positive, then generally it was strongly positive. The distribution of p (Fig. 2), supports the assumption that when 1 follicle was positive other follicles also became positive rapidly, so that in a very short time (perhaps weeks) p becomes large (>0.5). This currently is our best approximation of $f(p)$. There appears to be little dependence of $\pi(t)$ on time (Conner et al. 2000), and consequently we also assumed that $f(p)$ was

relatively independent of time (i.e., $p(t)$ and $f(p)$ may change over time, but only slowly). Using these assumptions and the frequency distribution of p, we approximated $f(p)$ with a beta distribution, beta(3,1), that yielded a probability density function of $f(p) = 3p^2$. Substituting this function into C_n,

$$C_n = \int_0^1 \frac{(1-p)^n \pi}{(1-p)^n \pi + (1-p)} 3p^2 dp$$

provided an expression that we numerically integrated to calculate C_n for a given n and π. Note that for π in the vicinity of our data (Table 1), the correction factor is approximately 0, except when n is small (<5). From this the corrected prevalence, π, was estimated as

$$\hat{\pi} = \frac{k_{positive} + \sum_{n=0}^{\infty} C_n(k_{negative}(n))}{k},$$

where k was the number of deer sampled and n was the number of negative follicles present in a biopsy sample. Assumptions underlying this correction factor included (1) the number of tonsil follicles collected in a biopsy was small compared to the total number of tonsil follicles available, (2) positive follicles were randomly distributed throughout the tonsil, and (3) false-positive results did not occur.

From:	Andrew Clements <aclements@usaid.gov>
To:	Jean-Felly Numbi <jnumbi@usaid.gov>
CC:	Katherine Leasure <kaleasure@ucdavis.edu>;PREDICTMGT <predictmgt@usaid.gov>;Jonna Mazet <jkmazet@ucdavis.edu>;Predict inbox <predict@ucdavis.edu>
Sent:	9/26/2017 11:44:52 PM
Subject:	Re: Change to Approved ITA - J. Ayukekbong to DRC October 2

Jean-Felly,

See the change to the previously-approved Predict travel to DRC.

Andrew

Andrew P. Clements, Ph.D.
Senior Scientific Advisor
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On Sep 27, 2017, at 2:29 AM, Katherine Leasure <kaleasure@ucdavis.edu> wrote:

Hi Andrew. Metabiota has submitted an amendment to the previously approved ITA for James Ayukekbong's travel to DRC (below for reference). They are requesting to move his departure date up to October 2, in order to coordinate with the funeral services of a family member that recently passed. Please let me know if you have any questions. Thank you.

Metabiota would like to request travel approval for Dr. James Ayukekbong, PREDICT Regional Coordinator for Central Africa, to travel from Yaoundé, Cameroon to Kinshasa, Democratic Republic of Congo from October 9-16,2017 to perform monitoring and evaluation of Year 3 field activities.

Trip purpose: In Kinshasa Dr. Ayukekbong will perform monitoring and evaluation of Year 3 field activities, discuss and establish strategic and operational plans for Year 4. To reduce the cost of field supplies, Dr. Ayukekbong will be carrying lab materials to the DRC team.

Katherine Leasure
HR/Payroll/Financial Assistant
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From:	Andrew Clements <aclements@usaid.gov>
To:	Katherine Leasure <kaleasure@ucdavis.edu>
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Sent:	9/28/2017 4:08:46 AM
Subject:	Re: PREDICT International Travel Request

Approved

On Thu, Sep 28, 2017 at 2:02 AM, Katherine Leasure <kaleasure@ucdavis.edu> wrote:

Please find below international travel request for your review and approval. Please let me know if you have any questions. Thanks!!

1. Ngay (Belgium): $1030 airfare/$309 (Antwerp) max daily per diem

Travel Request –

1. Metabiota would like to request travel approval for Ipos Ngay, DRC Field Ecologist, to travel from Kinshasa, DRC to Antwerp, Belgium on October 16-20, 2017 to attend the 2017 European Congress on Tropical Medicine and International Health (ECTHIM) in Belgium.

Trip purpose: Ipos will present "Viral Pathogens in Human-Wildlife Interface in DRC: Wild mammals as natural hosts for zoonotic virals". This presentation is related to the PREDICT team efforts during PREDICT 1.

Katherine Leasure

HR/Payroll/Financial Assistant

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kaleasure@ucdavis.edu

predictmgt@usaid.gov
https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/040301d337ed%2419121a70%244b364f50%24%40ucdavis.edu

--

Andrew Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
E-mail: aclements@usaid.gov

For more information on USAID's Emerging Pandemic Threats program, see: http://www.usaid.gov/ept2

From: "Corwin, Andrew L" <CorwinAL@state.gov>
To: David McIver <dmciver@metabiota.com>
Cc: "Schar, Daniel (RDMA/OPH)" <dschar@usaid.gov>, Soubanh Silithammavong <sSilithammavong@metabiota.com>, "Clements, Andrew (GH/HIDN)" <aclements@usaid.gov>, Amethyst Gillis <agillis@metabiota.com>, "Samaiphone, Thepsombandith" <SamaiphoneT@state.gov>, "Kongchay, Vongsaiya (USAID)" <KongchayV@state.gov>, "Huerta, Alexandria I" <AHuerta@state.gov>, "Damrongwatanapokin, Sudarat (RDMA/OPH)" <sdamrongwatanapokin@usaid.gov>, Beth Edison <bedison@metabiota.com>, "Manisone, Muongsene" <ManisoneM@state.gov>, "predict@ucdavis.edu" <predict@ucdavis.edu>, "Clements, Andrew (GH/HIDN)" <aclements@usaid.gov>, Karen Saylors <ksaylors@metabiota.com>, "Louis Duthil, Cassandra (GH/SDI)" <clouisduthil@usaid.gov>
Subject: Re: David McIver Laos TDY Form
Sent: Wed, 27 Sep 2017 01:39:47 +0000

Thanks Dave for the update. We are most appreciative of the importance of this visit to the Project, and will accommodate whatever change in scheduling as best we can.

Please keep us informed.

Best regards,

Andy

From: David McIver <dmciver@metabiota.com>
Date: September 27, 2017 at 4:36:40 AM GMT+7
To: Corwin, Andrew L <CorwinAL@state.gov>
Cc: Damrongwatanapokin, Sudarat (RDMA/OPH) <sdamrongwatanapokin@usaid.gov>, Kongchay, Vongsaiya (USAID) <KongchayV@state.gov>, Amethyst Gillis <agillis@metabiota.com>, Beth Edison <bedison@metabiota.com>, Soubanh Silithammavong <sSilithammavong@metabiota.com>, Schar, Daniel (RDMA/OPH) <dschar@usaid.gov>, Manisone, Muongsene <ManisoneM@state.gov>, Clements, Andrew (GH/HIDN) <aclements@usaid.gov>, predict@ucdavis.edu <predict@ucdavis.edu>, Samaiphone, Thepsombandith <SamaiphoneT@state.gov>, Huerta, Alexandria I <AHuerta@state.gov>, Karen Saylors <ksaylors@metabiota.com>
Subject: Re: David McIver Laos TDY Form

Hi Andy,

I just wanted to reach out to you quickly to let you know that Amethyst Gillis, who has previously sent in an ITA and a TDY to the Lao PDR mission, will be needing to alter her travel days (as you may already have known). Some delays in having laboratory supplies being shipped to Laos, and some delays in laboratory procedures, has necessitated this shift in travel time, but should not affect the purpose or duration of the trip when it occurs. We are currently awaiting confirmation from staff at the National Centre for Laboratory and Epidemiology about their availability.

We are trying to determine Amethyst's new travel days as quickly as we can, and we will let you know as soon as we've got it worked out. I'm very sorry for this change, and we'll be sure to schedule time for Amethyst to visit with you at the embassy.

Thanks,
Dave

David McIver, PhD
PREDICT Asia Regional Coordinator | Epidemiologist

Metabiota

e: dmciver@metabiota.com<mailto:dmciver@metabiota.com>
c: +1 778-269-2965

On Sep 11, 2017, at 8:20 PM, Corwin, Andrew L <CorwinAL@state.gov<mailto:CorwinAL@state.gov>> wrote:

Thanks so much David, and apologies for my initial confusion. Absolutely, we can schedule an Embassy visit in the afternoon on 3 October. And most certainly, we would welcome the opportunity to join you and the PREDICT Partners at DLF on the morning of 3 October.

Could we plan for 13:30 – if that is convenient?

We are still looking to organize an EPT 2 Country Meeting with all implementing and national partners – although we are not yet set on the dates.

Looking forward to meeting with you.

Best regards,

Andy

Andrew L Corwin
Health Program Manager
USAID /Lao People's Democratic Republic (PDR)
Tel: 856.21.487305
Cell: REDACTED
Email: corwinal@state.gov<mailto:corwinal@state.gov>

From: David McIver [mailto:dmciver@metabiota.com]
Sent: Tuesday, September 12, 2017 9:53 AM
To: Soubanh Silithammavong; Huerta, Alexandria I; Corwin, Andrew L
Cc: Beth Edison; Karen Saylors; Eddy Rubin; ,; Samaiphone, Thepsombandith; Manisone, Muongsene; Damrongwatanapokin, Sudarat (RDMA/OPH); Schar, Daniel (RDMA/OPH); Clements, Andrew (GH/HIDN); Kongchay, Vongsaiya (USAID)
Subject: RE: David McIver Laos TDY Form

Hi Andy,

My apologies here, perhaps I misunderstood a previous e-mail where you were suggesting that we put together a meeting with all EPT partners within Lao PDR. But this is not a problem.

As we have previously scheduled meetings with our PREDICT partners at the DLF and DCDC on the morning of October 3rd, in anticipation of this meeting, we are now prepared to meet at that time. Can

we please request to have Soubanh and I meet you all at the Embassy on the afternoon of the 3rd? This will actually work out well, as we should then be prepared to give you our most recent updates from that previous meeting. And thank you for the updated requirements for visiting the embassy, they are duly noted.

Thanks very much, looking forward to seeing you all again.

Dave

David McIver, PhD
PREDICT Asia Regional Coordinator | Epidemiologist
Metabiota

e: dmciver@metabiota.com<mailto:dmciver@metabiota.com>
c: +1 778-269-2965

On Sep 11, 2017, 10:00 PM -0400, Corwin, Andrew L <CorwinAL@state.gov<mailto:CorwinAL@state.gov>>, wrote:

Thanks Ko – good talking with you just now. As I mentioned, please speak to David since USAID contractual arrangements with "metabiota" are clearly outlined in the Approved Work Plan, for which there is no activity identified with regards to responsibilities in organizing or managing an EPT 2 Country Meeting.

Thanks so much for your understanding.

Andy

Andrew L Corwin
Health Program Manager
USAID /Lao People's Democratic Republic (PDR)
Tel: 856.21.487305
Cell: REDACTED
Email: corwinal@state.gov<mailto:corwinal@state.gov>

From: Soubanh Silithammavong [mailto:sSilithammavong@metabiota.com]
Sent: Tuesday, September 12, 2017 8:37 AM

To: Corwin, Andrew L; David McIver; Huerta, Alexandria I
Cc: Beth Edison; Karen Saylors; Eddy Rubin; ,; Samaiphone, Thepsombandith; Manisone, Muongsene; Damrongwatanapokin, Sudarat (RDMA/OPH); Schar, Daniel (RDMA/OPH); Clements, Andrew (GH/HIDN); Kongchay, Vongsaiya (USAID)
Subject: Re: David McIver Laos TDY Form

Dear Dr Andy and Dave,

I am confused about your both email here, as we are planning to have EPT-2 meeting in October 3 at NAHL meeting room, Department of Livestock and Fisheries. For meeting at Embassy should schedule for another day. What do you think?

Best regards,

Ko

Soubanh Silithammavong

PREDICT Laos Country Coordinator

Metabiota

ssilithammavong@metabiota.com<mailto:ssilithammavong@metabiota.com>

C:+ 856 20 55409501

Skype: soubanh.silithammavong

Souphanouvong Avenue, Sikhottabong District

PO Box: 6644, Vientiane Lao PDR

From: Corwin, Andrew L <CorwinAL@state.gov<mailto:CorwinAL@state.gov>>
Sent: Tuesday, September 12, 2017 7:51:42 AM
To: David McIver; Huerta, Alexandria I; Soubanh Silithammavong
Cc: Beth Edison; Karen Saylors; Eddy Rubin; ,; Samaiphone, Thepsombandith; Manisone, Muongsene; Damrongwatanapokin, Sudarat (RDMA/OPH); Schar, Daniel (RDMA/OPH); Clements, Andrew (GH/HIDN); Kongchay, Vongsaiya (USAID)
Subject: RE: David McIver Laos TDY Form

Thanks David, Tuesday morning is good for us. Can you provide a brief paragraph regarding the PREDICT Project and a paragraph introducing yourself (a CV of sorts) so we can begin planning with the front office for the Ambassador's briefing, and a meeting beforehand with Alex, Kongchay and I. I would also like to advise you that no electronics (laptops, tablets, phones, etc) are now permitted into the Embassy. I would ask that you make arrangements to keep whatever at your hotel or somewhere safe while visiting the Embassy.

Looking forward to meeting with you.

Best regards,

Andy

Andrew L Corwin
Health Program Manager
USAID /Lao People's Democratic Republic (PDR)
Tel: 856.21.487305
Cell: [REDACTED]
Email: corwinal@state.gov<mailto:corwinal@state.gov>

From: David McIver [mailto:dmciver@metabiota.com]
Sent: Monday, September 11, 2017 5:56 PM
To: Huerta, Alexandria I; Corwin, Andrew L; Soubanh Silithammavong
Cc: Beth Edison; Karen Saylors; Eddy Rubin; ,; Samaiphone, Thepsombandith; Manisone, Muongsene; Damrongwatanapokin, Sudarat (RDMA/OPH); Schar, Daniel (RDMA/OPH); Clements, Andrew (GH/HIDN)
Subject: RE: David McIver Laos TDY Form

Hi Andy,

Right now our tentative plans are to be in Champasak during the last week of September. We are currently waiting on our partners there to confirm their availability. Given that, I think that a meeting on Tuesday the 3rd would make sense for us. Ko, please jump in here if there is any reason not to schedule for Tuesday.

Thank you,
Dave

David McIver, PhD
PREDICT Asia Regional Coordinator | Epidemiologist
Metabiotae: dmciver@metabiota.com<mailto:dmciver@metabiota.com>
c: +1 778-269-2965

On Sep 10, 2017, 9:25 PM -0400, Corwin, Andrew L <CorwinAL@state.gov<mailto:CorwinAL@state.gov>>, wrote:
Hi Dave,

I return from travel in the south of Laos on 28 September. We could possibly meet on Friday (29 September), or Monday or Tuesday, 2 or 3 October respectively. I will schedule a briefing during your Embassy visit with the Ambassador. I understand you will be traveling to Champassak during your upcoming visit – do you have tentative dates for that leg of your visit?

Again, looking forward to learning more about Metabiota's activities, current and planned.

Best regards,

Andy

Andrew L Corwin
Health Program Manager
USAID /Lao People's Democratic Republic (PDR)
Tel: 856.21.487305
Cell: REDACTED
Email: corwinal@state.gov<mailto:corwinal@state.gov>

From: David McIver [mailto:dmciver@metabiota.com]
Sent: Thursday, September 07, 2017 10:12 PM
To: Huerta, Alexandria I
Cc: Beth Edison; Karen Saylors; Eddy Rubin; ,; Corwin, Andrew L
Subject: David McIver Laos TDY Form

Hi Alex,

As Andy Corwin suggested, I have completed a TDY form for my upcoming visit to Laos at the end of September, and I have attached it here. If anything is unclear, or there is anything else you need, please let me know.

Thanks a lot, and I'm looking forward to catching up with you.

Dave

David McIver, PhD
PREDICT Asia Regional Coordinator | Epidemiologist
Metabiota

e: dmciver@metabiota.com<mailto:dmciver@metabiota.com>
c: +1 778-269-2965

From: Marguerite Pappaioanou [redacted]
Sent: Fri, 29 Sep 2017 16:21:56 -0400
Subject: Re: Proofs of revised EID Hotspots paper
To: "Kevin Olival, PhD" <olival@ecohealthalliance.org>
Cc: "Dr. Jonna Mazet" <jkmazet@ucdavis.edu>, Peter Daszak <daszak@ecohealthalliance.org>, Daniel Lucey [redacted], "Constance A. Carrino" [redacted] Marguerite Pappaioanou <[redacted]

Dear Kevin,
On behalf of our three person evaluation team, please accept my thanks for forwarding this in press paper. As committed to in the email that I had sent to Jonna, we will keep this paper confidential, will be including an in press citation of the paper in the reference section of the report, and likely will give a brief general summary of what the research addresses in the section of the report where we are describing contributions made by EPT2 to knowledge and gaps. As of now, we are expecting the report to be finalized by the end of the year.

Please let me know if you have any questions.

Thank you Jonna for forwarding our request!

Best wishes, Marguerite

On Fri, Sep 29, 2017 at 3:53 PM, Kevin Olival, PhD <olival@ecohealthalliance.org> wrote:

> Dear Marguerite,
>
> Please find the attached proofs for the "Hotspots II" paper that you referenced in your email below. This is currently In Press at Nature Communications, and we hope will be out in the next 1-3 weeks.
>
> Please let Peter or I know if you have any questions.
>
> Cheers,
> Kevin

--
Marguerite Pappaioanou, DVM, MPVM, PhD, DACVPM
Affiliate Professor
Department of Environmental and Occupational Health Sciences
School of Public Health
University of Washington

Phone: 202-368-0050
Email: [redacted]

From: "Claes, Filip (FAORAP)" [redacted]
To: "William B. Karesh" <karesh@ecohealthalliance.org>
Cc: "Black, Peter (FAORAP)" [redacted] Jonna Mazet <jkmazet@ucdavis.edu>, "Morzaria, Subhash (TCE)" [redacted]
Subject: PREDICT-FAO data meeting
Sent: Tue, 10 Oct 2017 04:52:59 +0000

Hello Billy,
Greetings from Bangkok.
Can't remember where we met last time, but I recollect we talked about the possibility of still having a meeting about data and data sharing between PREDICT and FAO. At least for Asia, where we still have synchronized surveillance.
Are you still aiming to have such meeting, and if yes, is the plan to have it in BKK around PMAC?
Best wishes,
Filip

Filip Claes, PhD
Regional Laboratory Coordinator
Emergency Centre for Transboundary Animal Diseases (ECTAD)
Food and Agriculture Organization of the United Nations (FAO)
Regional Office for Asia and the Pacific
[redacted]
Tel: (+[redacted]
Email: [redacted]

Food and Agriculture Organization of the United Nations

From: Andrew Clements <aclements@usaid.gov>
Sent: Fri, 13 Oct 2017 11:46:45 +0200
To: "predict@ucdavis.edu" <predict@ucdavis.edu>
Cc: PREDICTMGT <predictmgt@usaid.gov>
Subject: [predict] Fwd: One Health Congress: extended deadline for Fellowship Fund applications

FYI

---------- Forwarded message ----------
From: **Marilyn Crane** <mcrane@usaid.gov>
Date: Thu, Oct 12, 2017 at 10:23 PM
Subject: Fwd: One Health Congress: extended deadline for Fellowship Fund applications
To: "GHSD Unit Mail List (USAID)" <ghsdunitmaillistusaid@usaid.gov>

FYI...

The 5th OH Congress, Saskatoon, Canada, June 22-25, 2018

The OH fellowship application and abstract submission deadline is now extended to 1 Dec 2017.
Please see details : View this email in your browser.

---------- Forwarded message ----------
From:
Date: Thu, Oct 12, 2017 at 5:05 PM
Subject: One Health Congress: extended deadline for Fellowship Fund applications
To:

View this email in your browser

Deadline for One Health Fellowship applications extended to 1 December 2017

Several early career scientists have informed us that they are unable to submit their research abstract by the 15 October deadline. Submitting an abstract is an essential part of the One Health Fellowship application procedure. The organizers have hence decided to extend the deadline for submission of all required documents to 1 December 2017 (23h59 Central European Time).

The organizers are very pleased to have received so many outstanding entries already. Submitted entries remain valid, and applicants are free to update their submissions until the new deadline of 1 December 2017.

The Call for One Health Fellowship Applications is open to participants from all over the globe. One Health Fellows will receive financial support to cover the registration fee, accommodation for the duration of the conference, and travel

(economy class). If you're interested in applying for the One Health Fellowships, check the eligibility and application guidelines and download the application form from the congress website.

Feel free to share this announcement with anyone you think might be interested in applying. Or download and share the One Health Fellowship announcement flyer.

--

Marilyn Crane
Senior International Higher Education Advisor
Emerging Threats Division

Office of Infectious Disease
Bureau for Global Health
U.S. Agency for International Development (USAID)

Telephone: (202) 712-4724
Cell Phone: ([redacted])4
Email: mcrane@usaid.gov

--

Andrew Clements, Ph.D.

Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global IIealth
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
E-mail: aclements@usaid.gov

For more information on USAID's Emerging Pandemic Threats program, see: http://www.usaid.gov/ept2

From: Benard Ssebide [redacted]
Sent: Wed, 25 Oct 2017 21:18:21 +0300
Subject: Re: Deep Forest Uganda
To: Peter Daszak <daszak@ecohealthalliance.org>
Cc: Kirsten Gilardi <kvgilardi@ucdavis.edu>, Jonna Mazet <jkmazet@ucdavis.edu>, Carlos Zambrana-Torrelio <zambrana@ecohealthalliance.org>, Aleksei Chmura <chmura@ecohealthalliance.org>, Erica Johnson <johnson@ecohealthalliance.org>, Evelyn Luciano <luciano@ecohealthalliance.org>, Mike Cranfield [redacted]

Thank you Kirsten and Peter,
I am happy to help provide any information and or paperwork that might be required from Uganda.

Kind regards,

Benard.

On Tue, Oct 24, 2017 at 7:57 PM, Peter Daszak <daszak@ecohealthalliance.org> wrote:

> Great to hear back Kirsten.
>
> I think we can do this – depending on budget needs. There are some NSF rules that we can't fund Ph.D tuition in foreign countries, but I'll check on these and there are simple work-arounds, e.g. by using NSF funds towards his salary and field costs etc.
>
> Bottom line – it would be great to involve you all and support Benard's work. I'm happy to join a committee if you think that's helpful, also, but bear in mind we might not get the grant, of course!!
>
> We'll continue working on the draft, and get details on potential budgets, forms required etc. over to you by Monday next week.
>
> Cheers,
>
> Peter
>
> **Peter Daszak**
>
> *President*

EcoHealth Alliance

460 West 34th Street – 17th Floor

New York, NY 10001

Tel. +1 212-380-4473

www.ecohealthalliance.org

EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that prevent pandemics and promote conservation.

From: Kirsten Gilardi [mailto:kvgilardi@ucdavis.edu]
Sent: Tuesday, October 24, 2017 10:52 AM
To: Peter Daszak; Jonna Mazet
Cc: Benard Ssebide; Carlos Zambrana-Torrelio; Aleksei Chmura; Erica Johnson; Evelyn Luciano; Mike Cranfield
Subject: Deep Forest Uganda
Importance: High

Hi Peter and Jonna:

Benard and I had a good discussion on this today, and he's definitely interested in participating in Deep Forest research again in Uganda, assuming that the grant could support his enrollment in a PhD program at Makerere University in Kampala — possible?

The upshot here is that he was working closely with Julius Lutwama (UVRI Arbovirology Lab Director and our lab partner for PREDICT Uganda — an exceptional person) on a joint Makerere University-UVRI proposal to the Wellcome Trust for graduate fellowships: the draft proposal outlined five graduate fellowships, of which one was for Benard to conduct EID-related research. Makerere ended up putting forward just two fellowship proposals (one on bioinformatics and the other on vector ecology), so that potential source of support for Benard has dried up (in fact, not even sure the two got funded…).

THAT SAID, Benard still has the mentoring support of Julius L. as well as a potential faculty mentor at Makerere U. who knows about Benard's involvement and experience with PREDICT, and who has been encouraging him to take advantage of the opportunity to work on at least a subset of PREDICT Uganda data for a portion of his PhD. Benard expressed his strong wishes to me today that he might benefit from the guidance of you Jonna or other UCD PREDICT leads (Chris and/or Tracey) on his dissertation work, if he were to delve into PREDICT data…

So if new funding for Deep Forest work in Uganda could support Benard in a PhD program at Makerere, that would be exciting. The in-country partner would need to be UVRI or Makerere (Benard can advise), as he would have to step away from his position at Gorilla Doctors to enroll in a PhD program.

What are next steps?

-Kirsten

Begin forwarded message:

From: Peter Daszak <daszak@ecohealthalliance.org>

Subject: Time Sensitive!! Resurrecting our Coupled Natural-Human Systems proposal to NSF on DEEP FOREST

Date: October 17, 2017 at 12:05:17 PM PDT

To: "Jonna Mazet (jkmazet@ucdavis.edu)" <jkmazet@ucdavis.edu>, "kvgilardi@ucdavis.edu" <kvgilardi@ucdavis.edu>

Cc: Carlos Zambrana-Torrelio <zambrana@ecohealthalliance.org>, Aleksei Chmura <chmura@ecohealthalliance.org>, Erica Johnson <johnson@ecohealthalliance.org>, Evelyn Luciano <luciano@ecohealthalliance.org>

Hi Jonna and Kirsten – a few years ago we submitted a DEEP FOREST proposal to NSF CNH and got semi-decent comments back. We'd like to resurrect it and would like to keep the current focus on DEEP FOREST countries. The plan is to use the DF data from Brazil, Uganda and Malaysia as the basis, but ditch Brazil as a country we're going to continue to work in so that the continued fieldwork will be in Malaysia and Uganda.

The deadline is Nov 21st. Carlos is pulling together the draft and the response to reviewers (reviewer comments attached).

I want to first check with you both that you are interested in doing this – I definitely think it's worth a shot considering the fairly positive reviewers' comments. If so, we'll need to rapidly line up all the paper work, budgets, etc. I've cc'd Carlos and Evelyn who will be able to coordinate.

Hope you'll be part of this and looking forward to getting this grant funded!

Cheers,

Peter

Peter Daszak

President

EcoHealth Alliance

460 West 34th Street – 17th Floor

New York, NY 10001

Tel. +1 212-380-4473

www.ecohealthalliance.org

EcoHealth Alliance leads cutting-edge research into the critical connections between human and wildlife health and delicate ecosystems. With this science we develop solutions that prevent pandemics and promote conservation.

From:	Andrew Clements <aclements@usaid.gov>
To:	Jonna Mazet <jkmazet@ucdavis.edu>
CC:	Amalhin Shek <ashek@usaid.gov>;PREDICTMGT <predictmgt@usaid.gov>;predict@ucdavis.edu <predict@ucdavis.edu>;David John Wolking <djwolking@ucdavis.edu>;Karen L Wood <klwood@ucdavis.edu>
Sent:	10/27/2017 3:01:03 AM
Subject:	Re: Anticipated Accruals: FY18, Q1 & Forecasted Approximate Pipeline

Thanks, Jonna.

Andrew P. Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On Oct 27, 2017, at 1:31 AM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Dear Amalhin,

The accrual information Andrew requested is below. Let me know if you have any questions.

Note that the estimates below assume that subrecipientss will be imminently approved for processing through the ceiling increase process and that we will be able to finalize these awards quickly to start/continue work.

October: $3,755,653

November: $3,514,523

December: $3,467,528

TOTAL: $ 10,737,705

Approximate Pipeline for Jan 1 (Core): -$ 455,650

Approximate Pipeline for Jan 1 (Ebola): $ 20,424,828

Therefore, if we are able to fully implement our work, we will run out of core funds mid-December if an amendment modifying the award is not made by that time.

Thanks for your continued support,

Jonna

--
You received this message because you are subscribed to the Google Groups "PREDICTMGT" group.
To unsubscribe from this group and stop receiving emails from it, send an email to predictmgt+unsubscribe@usaid.gov.
To post to this group, send email to predictmgt@usaid.gov.
To view this discussion on the web visit https://groups.google.com/a/usaid.gov/d/msgid/predictmgt/CAO5tDrEdXG6QP2QU%2BhPtkM9T%3De-Shv2cfdBhY4ZReVV9gimx1g%40mail.gmail.com.

From:	Molly Turner <turner@ecohealthalliance.org>
To:	David M Zachgo <dzachgo@ucdavis.edu>
CC:	luciano@ecohealthalliance.org <luciano@ecohealthalliance.org>;sullivan@ecohealthalliance.org <sullivan@ecohealthalliance.org>;daszak@ecohealthalliance.org <daszak@ecohealthalliance.org>;Matthew Blake <mblake@ucdavis.edu>;David John Wolking <djwolking@ucdavis.edu>;predict@ucdavis.edu <predict@ucdavis.edu>
Sent:	10/27/2017 2:57:49 PM
Subject:	[predict] Re: September 2017 Expense Reports and Certifications [USAID PREDICT 2 - EBOLA]

Hi Dave,

We're working out a few last issues with the invoice and will have for you on Monday. Apologies for any inconvenience.

Best,
Molly

On Fri, Oct 27, 2017 at 9:15 AM, Molly Turner <turner@ecohealthalliance.org> wrote:
Hi Dave,

We'll have our September invoice to you today.

Do you know anything about the payment of our August invoice? It's been a month now since we sent to you guys and we're still waiting -- it's getting to a point where we can't pay any subrecipient invoices, which is obviously a real issue for a lot of people. I spoke to Karen before she left and she seemed to to think it could go out this week, but again, we're still waiting. We'd greatly appreciate anything you can do to speed things along.

Best,
Molly

On Wed, Oct 25, 2017 at 6:41 PM, David M Zachgo <dzachgo@ucdavis.edu> wrote:

RE: September 2017 Expense Reports and Certifications [USAID PREDICT 2 - EBOLA]

Dear Team-

May I please receive your expense reports and certifications from, September 2017? If you've already submitted the report, kindly forward the original email.

We'd very much appreciate receiving your reports, as quickly as possible.

Your attention and cooperation is greatly appreciated!

With gratitude,

-Dave

//*/*/*/*/*/*/*/*/*/

David M. Zachgo

Research Administrator, One Health Institute

UC Davis

--

Molly Turner
Federal Grants Coordinator

EcoHealth Alliance
460 West 34th Street – 17th floor
New York, NY 10001

1.212.380.4461 (direct)
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www.ecohealthalliance.org

EcoHealth Alliance leads cutting-edge scientific research into the critical connections between human and wildlife health and delicate ecosystems. With this science, we develop solutions that prevent pandemics and promote conservation.

--

Molly Turner
Federal Grants Coordinator

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460 West 34th Street – 17th floor
New York, NY 10001

1.212.380.4461 (direct)
1.973.752.4627 (cell)
www.ecohealthalliance.org

EcoHealth Alliance leads cutting-edge scientific research into the critical connections between human and wildlife health and delicate ecosystems. With this science, we develop solutions that prevent pandemics and promote conservation.

From: David J Wolking <djwolking@ucdavis.edu>
To: Andrew Clements <aclements@usaid.gov>
CC: Wolking David <djwolking@ucdavis.edu>;Jonna Mazet <jkmazet@ucdavis.edu>;Karen L Wood <klwood@ucdavis.edu>;PREDICTMGT <predictmgt@usaid.gov>
Sent: 11/3/2017 9:25:40 AM
Subject: Re: Ceiling increase update

Thanks Andrew much appreciated.

David

On Thu, Nov 2, 2017 at 1:20 PM, Andrew Clements <aclements@usaid.gov> wrote:
According to an update from OAA today, the target is for the cost analysis to be completed by the end of business this week. If it's okay, then OAA still would need to generate a modification next week.

Needless to say, no promises on the timing.

Will keep you posted.

Andrew P. Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

From: Andrew Clements <aclements@usaid.gov>
To: David J Wolking <djwolking@ucdavis.edu>
CC: Jonna Mazet <jkmazet@ucdavis.edu>;Karen L Wood <klwood@ucdavis.edu>;PREDICTMGT <predictmgt@usaid.gov>
Sent: 11/3/2017 10:14:18 AM
Subject: Re: Ceiling increase update

Also FYI: we request some "early" FY17 funding for PREDICT which apparently has been approved and will need to be obligated before the end of this month. There is sufficient room in the existing ceiling to accommodate this obligation when it occurs in the near future. The rest of the FY17 funding will be obligated once we get the rest of our funds (and the ceiling increase has been approved).

On Fri, Nov 3, 2017 at 5:25 PM, David J Wolking <djwolking@ucdavis.edu> wrote:
Thanks Andrew much appreciated.

David

On Thu, Nov 2, 2017 at 1:20 PM, Andrew Clements <aclements@usaid.gov> wrote:
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For more information on USAID's Emerging Pandemic Threats program, see: http://www.usaid.gov/ept2

From: Andrew Clements <aclements@usaid.gov>
To: Jonna Mazet <jkmazet@ucdavis.edu>
Sent: 11/4/2017 3:01:55 AM
Subject: Re: Ceiling increase update

Thanks

Andrew P. Clements, Ph.D.
Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

On Nov 3, 2017, at 11:02 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Nope -- you didn't miss anything. We discussed and made a tentative plan but haven't finalized. I pinged Chris, and she is on it/
More soon,
J

On Fri, Nov 3, 2017 at 3:02 AM, Andrew Clements <aclements@usaid.gov> wrote:
apologies if i missed it, but did you send back anything regarding the offer to consider funding more testing? i know we've asked you to do a bunch of stuff and i didn't give you a deadline, but i just wanted to make sure you hadn't responded and i missed it.

On Thu, Nov 2, 2017 at 10:36 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Okay -- thanks for keeping us posted,
J

On Thu, Nov 2, 2017 at 1:20 PM, Andrew Clements <aclements@usaid.gov> wrote:
According to an update from OAA today, the target is for the cost analysis to be completed by the end of business this week. If it's okay, then OAA still would need to generate a modification next week.

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From: Andrew Clements <aclements@usaid.gov>
Sent: Mon, 6 Nov 2017 11:29:50 +0100
Subject: CDC scientists pursue deadly monkeypox virus in Africa - Washington Post
To: ghsdunitmaillistusaid@usaid.gov, Jonna Mazet <jkmazet@ucdavis.edu>, djwolking@ucdavis.edu, Christine Kreuder Johnson <ckjohnson@ucdavis.edu>, William Karesh <Karesh@ecohealthalliance.org>, "Daniel Schar (RDMA/OPH)" <dSchar@usaid.gov>, "Sudarat Damrongwatanapokin (RDMA/OPH)" <sDamrongwatanapokin@usaid.gov>, ajatapai@usaid.gov, "Lisa Kramer (Nairobi/EA/RHH)" <lkramer@usaid.gov>, rcintron@usaid.gov, "Subhash Morzaria (FAORAP)" [redacted]

FYI

https://www.washingtonpost.com/graphics/2017/national/health-science/monkeypox/

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Senior Scientific Advisor
Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health
U.S. Agency for International Development
Mobile phone: 1-571-345-4253
Email: aclements@usaid.gov

From: Jonna Mazet <jkmazet@ucdavis.edu>
To: Billy Karesh <karesh@ecohealthalliance.org>
Sent: 11/15/2017 10:07:12 AM
Subject: One of the EU projects

http://predemics.biomedtrain.eu/cms/default.aspx

My contact was:

Donnelly, Christl A <c.donnelly@imperial.ac.uk>

Prof Christl A Donnelly FMedSci

http://www.imperial.ac.uk/people/c.donnelly

http://predemics.biomedtrain.eu/cms/default.aspx

From:	Sacchetti, Ben <Sacchetti.Ben@bcg.com>
To:	Jennifer Fluder <jfluder@usaid.gov>;Dennis Carroll <dcarroll@usaid.gov>;Amy Lin <amylin@usaid.gov>;erubin@metabiota.com <erubin@metabiota.com>;jkmazet@ucdavis.edu <jkmazet@ucdavis.edu>;Peter Daszak <daszak@ecohealthalliance.org>;mailto:watson@ecohealthalliance.org" <watson@ecohealthalliance.org>;gabrielle.fitzgerald@panoramaglobal.org" <gabrielle.fitzgerald@panoramaglobal.org>;Raelyn Campbell <raelyn.campbell@panoramaglobal.org>;Stroman, Trish" <Stroman.Trish@bcg.com>;Harris, Samuel <Harris.Samuel@bcg.com>;Kabay, Kendra <Kabay.Kendra@bcg.com>
CC:	dstanton@usaid.gov <dstanton@usaid.gov>;pmahanna@usaid.gov" <pmahanna@usaid.gov>;Woods, Wendy <Woods.Wendy@bcg.com>;Rodriguez, Andrew <rodriguez.andrew@bcg.com>
Sent:	11/22/2017 2:43:40 PM
Subject:	GVP Core Team meeting

More details to follow next week! Please forward to anyone I've missed.

Apologies if this first Core Team gathering doesn't work for all parties. Next week, we'll get input on everyone's availability before scheduling these meetings across the next few months. But for now, we just wanted to get something on the books, and available was quite limited.

Happy Thanksgiving!

From: Chris Vanlangendonck <c.vanlangendonck@onehealthplatform.com>
Subject: Science Policy Interface: call for presentations
Sent: Wed, 29 Nov 2017 11:32:00 +0100
Cc: John MacKenzie <J.MacKenzie@curtin.edu.au>, Ab Osterhaus <Albert.Osterhaus@tiho-hannover.de>, David De Pooter <d.depooter@onehealthplatform.com>
To: Jonna Mazet <jkmazet@ucdavis.edu>, Rita Colwell <rcolwell@umiacs.umd.edu>, Lone Simonsen <lone@gwu.edu>, Larry Madoff <madoff@promedmail.org>, Christian Drosten <drosten@virology-bonn.de>, Martyn Jeggo [REDACTED] George F Gao <gaof@im.ac.cn>, Dennis Carroll <dcarroll@usaid.gov>, Tom Monath <tmonath@linkp.com>, Marietjie Venter <marietjie.venter@up.ac.za>, Wang Linfa <linfa.wang@duke-nus.edu.sg>, MARK RWEYEMAMU <mark.rweyemamu@btinternet.com>, Amadou Sall <asall@pasteur.sn>, Penina Munyua <ikg2@cdc.gov>, Nick Juleff <Nick.Juleff@gatesfoundation.org>, Peter Charles Doherty <pcd@unimelb.edu.au>, Peter Daszak <daszak@ecohealthalliance.org>, Derek Smith <djs200@cam.ac.uk>, Jonathan Rushton <J.Rushton@liverpool.ac.uk>, David Heymann <david.heymann@lshtm.ac.uk>, dheymann@chathamhouse.org
OHP_5OHC_SPI_callforpresentations.pdf
OHP_5OHC_universitylounge.pdf

Dear members of the Scientific Advisory Board of the One Health Platform

It is my pleasure - also on behalf of John and Ab - to send you our Call for Presentations for our Science Policy Interface programme track @ our Saskatoon meeting.
Thanks for distributing this widely within your network and for promoting together with us !
We are also inviting Universities to take part in our Lounge - that flyer is enclosed too.

Tx again for your engagement !

And very best regards
Chris

ONE HEALTH PLATFORM
It's all connected
Chris Vanlangendonck
co-founder / management
0032 475 81 38 59
www.onehealthplatform.com <http://www.onehealthplatform.com/>

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THE 5TH INTERNATIONAL

ONE HEALTH PLATFORM one health CONGRESS

Saskatoon
CANADA 22-25 June
2018 www.onehealthcongress.com

University Lounge proposal

Participate in the University Lounge of the 5th International One Health Congress and demonstrate your academic institution's dedication to One Health, engage with other leading universities and share information on courses, post-doc positions and consortia.

The University Lounge is a separate exhibition, centrally located on the congress floor, and is open to universities from all over the globe. The Lounge is specifically designed for academic institutes to showcase their One Health research and to discuss pathways to implement the lessons learned from the congress.

Participants in the University Lounge receive:

- a tabletop stand and brochure display rack
- recognition in the congress programme book
- Recognition on the congress website

To secure their space in the University Lounge, academic institutions need to register and pay for a minimum of 10 delegates. No separate supporter's fees will be charged.

About the 5th International One Health Congress

In June 2018, the 5th International One Health Congress will bring together some 1,500 researchers, policy makers and practitioners from universities, governments and industry who are working towards integrated approaches and effective responses to complex global health challenges.

To capture the multifaceted One Health concept, the congress will have three separate programme tracks. The **One Health Science (OHS)** track focuses on zoonoses and emerging and re-emerging infectious diseases. The **Antimicrobial Resistance (AMR)** track is dedicated to investigating, preventing and controlling antibiotic resistance. The **Science Policy Interface (SPI)** track is a tailor-made programme for public health officials and government representatives, offering information and practical application based on the most recent scientific insights.

A series of plenary sessions and satellite symposia will provide a platform for trans-disciplinary interaction and exchange of ideas in a true One Health spirit.

The 5th International One Health Congress is organized by the **One Health Platform** and the **University of Saskatchewan**, in close collaboration with the **Southern African Centre for Infectious Disease Surveillance (SACIDS)**, **CDC Kenya** and **One Health Eastern & Central Africa (OHCEA)**.

UNIVERSITY OF SASKATCHEWAN

ONE HEALTH PLATFORM

✓ **All information: www.onehealthcongress.com**

SPI SCIENCE POLICY INTERFACE

THE 5TH INTERNATIONAL one health CONGRESS

ONE HEALTH PLATFORM

Saskatoon
CANADA 22-25 June
2018 www.onehealthcongress.com

Call for presentations
Science Policy Interface

You are kindly invited to submit *a presentation proposal* for the Science Policy Interface programme at the 5th International One Health Congress.

The Science Policy Interface (SPI) reflects our strong belief in the need for a dialogue between the scientific and policy-making communities. Interaction and exchange are necessary to ensure the effective role of science in public policy making and to enhance the accessibility of scientific knowledge for policy makers. It is of utmost importance that international institutions and government agencies, NGO's and other organisations share their scientific and/or policy knowledge, practice and expertise in the One Health arena. This programme track therefore aims to bring together science and policy, to share knowledge and expertise and to stir the debate about solutions in order to address major One Health issues.

The audience of the SPI programme generally does not have a scientific background. Presentation proposals for this track should therefore be tailored for a non-scientific audience. They are also expected to bridge science and policy and to be triggers for debate.

Submit your presentation proposal no later than 15 February 2018. Notification of acceptance and instructions for the presenters will be sent by 15 March 2018 via e-mail. Proposals that are not selected for oral presentations may be selected for poster presentations. A separate section for science/policy posters will be made available in the poster exhibition.

No fees are required to submit a proposal.

SESSION 1 **The IMPACTS of Zoonotic diseases - Why should One Health be of importance to policy makers? Lessons learnt from One Health crises –** JOHN MACKENZIE, CURTIN UNIVERSITY, AUSTRALIA

We are welcoming proposals that are addressing previous One Health crises: how did the world address the Ebola crisis? How was the BSE crisis handled – and what were the important issues when dealing with it (like trade issues)? How was the H1N1 pandemic handled, and should we still be concerned about H5N1, H7N9 or H9N2? Is SARS an example of the first prevented pandemic? Effective surveillance, prevention and control of zoonotic diseases pose a significant challenge. The session is open to all different contributors that can show the IMPACT of zoonotic disease in animals, humans and the environment. Furthermore, we are welcoming proposals that focus on economic losses from Zoonotic Diseases and dig into the global economic burden due to zoonotic diseases.

SESSION 2 **Addressing Zoonotic Diseases at the Animal-Human-Ecosystem Interface: what are the threats? How to be prepared? –** AB OSTERHAUS, RESEARCH CENTER FOR EMERGING INFECTIONS AND ZOONOSES, HANNOVER, GERMANY

We are welcoming proposals that provide insights on what to expect from zoonotic diseases and explain where possible threats are situated. Can we prioritize? Which viruses pose a threat to mankind? What lessons can be learnt from other pandemic outbreaks? What are the major components of pandemic preparedness planning? How can we communicate with all stakeholders involved and what communication lines should be taken into account during a pandemic?

SESSION 3 **The DRIVERS of Emerging Zoonotic Diseases –** MOIRA MCKINNON, CANBERRA, AUSTRALIA

We are welcoming proposals that have a focus on drivers in Human-Living Environments (urbanization and human/animal population density- changing demographics – mobility – poverty,...). Drivers in Food and Agriculture Systems (Livestock production – food production) and drivers at the Earth and Ecosystems Level (land use-deforestation – biodiversity loss – trade in live animals – climate change,...) are major topics in this session.

SESSION 4 **Resistance to antibiotics and antivirals: challenges for policy makers and scientists –**
LAURA KAHN, PRINCETON UNIVERSITY, USA

We are welcoming proposals with a focus on how antibiotic resistance evolved from a medical to a One Health problem. What is the impact of antibiotics in humans and animals, in food and agriculture and what is the environmental impact? Presentations on antiviral resistance, showcasing that this issue is following the path of antibiotics are welcome too. This session will also focus on novel strategies for AMR interventions and preparedness and proposals on alternative approaches to tackling resistant infections are welcome. We look out for solutions in this session: what needs to be done? How to use the scientific data to influence or change policy-making?

SESSION 5 **One Health and Global Health Security / Disaster Risk Reduction –**
WILLIAM B. KARESH, EVP FOR HEALTH AND POLICY AT ECOHEALTH ALLIANCE

We are inviting proposals that demonstrate both the value and challenges in implementing the Global Health Security Agenda with a "One Health approach" to counter natural and unnatural disease threats to people, animals and their environment. How can science help with integrated approaches to counter deliberate threats and what challenges are scientists not meeting? Are One Health approaches meeting the needs of current biological engagement, threat reduction, and disaster risk reduction efforts? What is the role of various government and non-governmental sectors and which sectors or actors could be added? What are the barriers and opportunities for One Health science to contribute to One Health action in the realm of GHSA, BTR and DRR efforts?

SESSION 6 **Making One Health operational: the barriers to change and glimmers of hope –** TBA

We are welcoming proposals that plead for "Adopting One Health" worldwide and the need for more scientific research, where are the gaps? We invite international organisations to showcase their agenda and give an insight in the current international situation. We are welcoming proposals that will spark the discussion around "barriers to change": institutional capabilities / information sharing / budgetary constraints/ under-reporting/... and guide the audience to avenues for improvement at the international level. "Glimmers of Hope" will certainly be selected because we aim to demonstrate that One Health can be made operational.

SESSION 7 **One Health in Under-Served, Resource-Poor and marginalized communities / Funding needs and funding mechanisms / Funding policies for One Health –**
MARIETJIE VENTER, UNIVERSITY OF PRETORIA, SOUTH AFRICA

We are welcoming proposals that focus on the threat of emerging and re-emerging diseases in the underserved populations over the world and that provide insight in tools for disease monitoring and community-based interventions for prevention and control.

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UNIVERSITY OF SASKATCHEWAN

ONE HEALTH PLATFORM

✓ **All information: www.onehealthcongress.com/spi**

DOWNLOAD THE SUBMISSION FORM

From: Jonna Mazet <jkmazet@ucdavis.edu>
To: Dennis Carroll <dcarroll@usaid.gov>
CC: KChittenden <KChittenden@usaid.gov>
Sent: 12/1/2017 6:48:19 PM
Subject: Re: Sierra Leone Update & Way Forward

Thanks -- Kendra, let me know what works best for you.
Jonna

On Fri, Dec 1, 2017 at 6:44 PM, Dennis Carroll <dcarroll@usaid.gov> wrote:
Glad to join the call. I will be in Canberra on Tuesday and KL beginning Wed night. Let me know what works for you

Dr Dennis Carroll
Director, Emerging Threats Program
U.S. Agency for International Development
Office: (202) 712-5009
Mobile: (301) 646-6235

On Dec 1, 2017, at 7:18 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Dear Dennis & Kendra,
Please may I have a confidential call with just the two of you next week regarding the finding/publication? Dennis, I know you are traveling, so please suggest a time that suits in your zone, and I will try to make it work. Outside of my work hours is fine, since I am also fully booked. Given our previous discussions and new information, it can not/should not wait. We will want to bring SL & other DC colleagues into the conversation once we are on the same page re way forward.
Thanks in advance for suggesting times,
Jonna

From: Kendra Chittenden <kchittenden@usaid.gov>
To: Dennis Carroll <dcarroll@usaid.gov>
CC: Jonna Mazet <jkmazet@ucdavis.edu>
Sent: 12/3/2017 6:03:49 AM
Subject: Re: Sierra Leone Update & Way Forward

Jonna

I will be starting annual leave on Thur. So M-Wed works best for me. I am very flexible in terms of time. Please let me know what works best for you and within Dennis timezones.

Kendra

On Fri, Dec 1, 2017 at 9:44 PM, Dennis Carroll <dcarroll@usaid.gov> wrote:
Glad to join the call. I will be in Canberra on Tuesday and KL beginning Wed night. Let me know what works for you

Dr Dennis Carroll
Director, Emerging Threats Program
U.S. Agency for International Development
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Thanks in advance for suggesting times,
Jonna

--

Kendra Chittenden, Ph.D. | Senior Infectious Disease Advisor| USAID | mobile (703-209-5424) |KChittenden@usaid.gov

From: Kendra Chittenden <kchittenden@usaid.gov>
To: Jonna Mazet <jkmazet@ucdavis.edu>
CC: Brooke Genovese <bgenovese@ucdavis.edu>;Dennis Carroll <dcarroll@usaid.gov>;Cassandra Louis Duthil <clouisduthil@usaid.gov>
Sent: 12/5/2017 11:54:34 AM
Subject: Re: Sierra Leone Update & Way Forward

Jonna

The best # for me is 703-209-5424. I tried Dennis' mobile but it's not working. If the call does not pan out in 10 min. Let's lock in time tomorrow. Cassandra is in today and can help me find the best # and way to reach Dennis

On Tue, Dec 5, 2017 at 2:50 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:
Hey there, Dennis,
We meeting in 10 mins or no?
If yes, I can call out to you, two. Best numbers?
Thanks,
Jonna

On Mon, Dec 4, 2017 at 9:51 AM, Kendra Chittenden <kchittenden@usaid.gov> wrote:
Brooke-

thanks - any of those times works for me.

Dennis schedule is probably more challenging so depending on what works best for him then I can do.
Kendra

On Mon, Dec 4, 2017 at 12:44 PM, Brooke Genovese <bgenovese@ucdavis.edu> wrote:

Hello Kendra,

My name is Brooke Genovese and I assist Jonna with administrative tasks. She will be teaching at 1:00pm PST tomorrow, but if free from 12:00 – 1:00 PST (would be quite early in Canberra, though) and after 3:30pm (would be a little late on the east coast). She is also free at 2:00pm PST on Wednesday, Dec 6.

Let me know if any of these days/times work for you.

Best,

Brooke Genovese

PREDICT Project Support

Executive Analyst

One Health Institute

School of Veterinary Medicine

Tel: 530-752-6459

bgenovese@ucdavis.edu

From: <jonna.mazet@gmail.com> on behalf of Jonna Mazet <jkmazet@ucdavis.edu>
Date: Monday, December 4, 2017 at 8:24 AM
To: Brooke Genovese <bgenovese@ucdavis.edu>
Subject: Fwd: Sierra Leone Update & Way Forward

---------- Forwarded message ----------
From: **Kendra Chittenden** <kchittenden@usaid.gov>
Date: Mon, Dec 4, 2017 at 5:30 AM
Subject: Re: Sierra Leone Update & Way Forward
To: Jonna Mazet <jkmazet@ucdavis.edu>, Dennis Carroll <dcarroll@usaid.gov>

How about tomorrow Tues at 8 am Canberra, 1 pm Davis, 4 pm D.C.?

Sent from my iPhone

On Dec 1, 2017, at 9:48 PM, Jonna Mazet <jkmazet@ucdavis.edu> wrote:

Thanks -- Kendra, let me know what works best for you.

Jonna

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Dr Dennis Carroll

Director, Emerging Threats Program

U.S. Agency for International Development

Office: (202) 712-5009

Mobile: (301) 646-6235

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Jonna

mobile (703-209-5424) |KChittenden@usaid.gov

--

Kendra Chittenden, Ph.D. | Senior Infectious Disease Advisor| USAID | mobile (703-209-5424) |KChittenden@usaid.gov

From:	Katherine Leasure <kaleasure@ucdavis.edu>
To:	'Ronald Waldman' <ronwaldman@email.gwu.edu>
CC:	'William B. Karesh' <karesh@ecohealthalliance.org>;'Alison Andre' <andre@ecohealthalliance.org>;'Predict inbox' <predict@ucdavis.edu>
Sent:	12/20/2017 2:01:03 PM
Subject:	[predict] Travel Arrangements for PREDICT All-Country Meeting (Brussels)

Good afternoon Dr. Waldman,

We look forward to seeing you at the PREDICT All-Country Meeting in Brussels, January 9-11, 2018. We are working to finalize arrangements for the meeting, and are reaching out to see how we might facilitate your travel. As a member of our External Advisory Panel, your travel costs will be covered in accordance with PREDICT and UC Davis guidelines.

I am including instructions below outlining how to book your reservations in our room block. If you would like us to book the reservation on your behalf, please let me know. We are recommending that reservations be booked by **December 24**, as the hotel can release any unreserved rooms after that date. This means that we would not be able to guarantee accommodation at the negotiated rate (149 EUR/night, including breakfast and all taxes and fees). I would also note that the individual cancellation policy stipulates that **reservations cancelled after December 24 will result in a penalty of the full stay booked (i.e. 596 EUR for a 4-night stay).**

- Use the following link to book a reservation at the Radisson Blu for arrival January 8, and departure January 12: https://tinyurl.com/California2018
- If you will require different dates, please contact our representative Lena (lena.gicquel@radissonblu.com), and copy me (kaleasure@ucdavis.edu) with your request(s).

Attached you will find a visitor guide to assist you as you prepare for travel to Brussels. I'm also including a spreadsheet prepared by Anne Laudisoit from EcoHealth Alliance with some helpful recommendations of local things to do.

For catering purposes, we would ask that you please advise of your meal preference for the group dinner on January 11 (meat or fish), as well as any dietary restrictions by **January 2**.

Best regards,
Katie

Katherine Leasure
HR/Payroll/Financial Assistant
One Health Institute
University of California, Davis
530-752-7526
530-752-3318 FAX
kaleasure@ucdavis.edu

Radisson Blu Royal Hotel Brussels
Location: Rue du Fossé-aux-Loups 47, B-1000 Brussels, Belgium
Telephone Number: +32 2 219 28 28
Website: **radissonblu.com/royalhotel-brussels**

RESERVATIONS

A reminder that the last day to make your reservation is DECEMBER 24. After that date, the hotel can release any unreserved rooms, so we cannot guarantee guests will be able to make a reservation at our negotiated rate (149 EUR/night including breakfast, and all taxes and fees). Use the following link to make your reservation in our room block: https://tinyurl.com/California2018. I've included a couple of notes below to be aware of as you make your bookings :

- The individual cancellation policy for our room block is ***at no cost if cancelled by December 24 (Brussels Time).*** Cancellations made ***after that time will result in a penalty of the full stay booked*** (i.e. 596 EUR for a 4-night stay).
- The reservation dates for bookings made via the link are fixed for arrival January 8 and departure January 12. If you will require different dates, please contact our representative Lena (lena.gicquel@radissonblu.com), and copy me (kaleasure@ucdavis.edu) with your request(s).

ARRIVAL

A reminder that check-in time at the hotel is 3:00pm, check-out is 12:00pm. The hotel may be able to accommodate requests for early check-in, subject to room availability. ***This hotel does not have an option of a cash deposit for incidentals***. Guests will need to provide a credit card upon check-in, or will need to coordinate with their organization to put a credit card authorization on file.

ENTRY INFORMATION

Taxis with a taximeter are permanently available in front of the arrivals hall at Brussels International Airport. Go to the official taxi queue directly outside the airport; avoid drivers offering you a ride (directly inside or outside the airport). The fare from the airport to Brussels city center typically costs approximately 45 EUR; paying by credit card is not possible in all taxis, so ask before departure or have local currency on hand for payment. Below are details on how to recognize approved taxis when traveling in Brussels:

- *Taxis have on their 4 doors, a checkerboard strip of black and yellow, and have on their roof a light with the inscription TAXI, also with a black and yellow checkered pattern.*
- *The first two letters of the license plate must be TX. These letters may be preceded by a number.*
- *In addition, they must be equipped with a rectangular identification plate with 4 yellow numbers on a blue background with the Brussels Iris shown. This plate is attached to the front right bumper of the taxi.*

For travel by train: the Brussels Airport-Zaventem station is located on level-1 of the terminal, at a small distance from the arrivals hall (2nd floor). Travel time to Brussels-Central station is approximately 20 minutes. You can visit the official website of the Belgian Railway Company SNCB to consult schedules and/or buy a ticket. There are luggage restrictions (maximum of 3 items/passenger, total weigh <30kg, must be stored in the overhead space or below your seat), so please plan accordingly. The hotel is approximately 400m from the station, 7-10 minutes by foot.

TIME AND TEMPERATURE

Brussels, Belgium time is in the Central European Time Zone; Central European Standard Time (CET) is 1 hour ahead of Greenwich Mean Time (GMT +1). Brussels experiences very cold temperatures in winter (currently averaging 30-40°F), with the possibility of both rain and snow. **We recommend participants bring cold weather clothing (jackets, gloves, hats), and shoes with adequate coverage and traction. A reminder if you will be walking outside that these weather conditions can produce ice on roads and sidewalks, so please travel carefully.**

INTERNET ACCESS AND BUSINESS CENTER

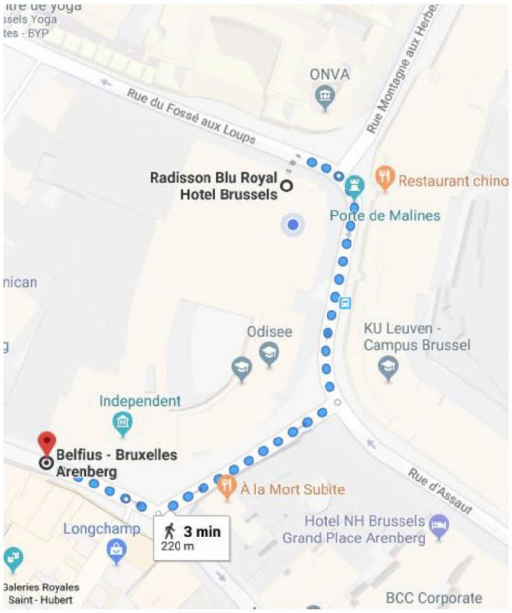
There is free wireless Internet access in hotel rooms and conference space. The Radisson Blu Royal Hotel also offers a Business Center, which includes private workstations and printing services 24 hours a day. Contact the reception desk for assistance with scanning, copying, and fax services.

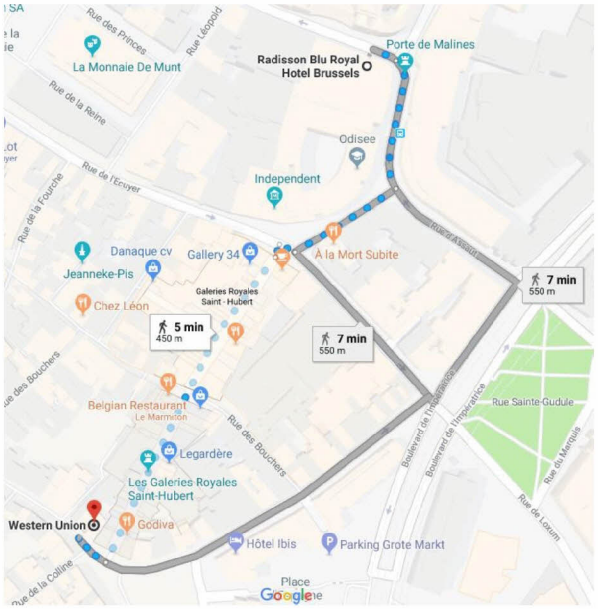
MEALS TO BE PROVIDED

Please note that breakfast is included in the lodging rate of the hotel, lunch will be provided on the second and third days of the meeting (January 10 and 11), and dinner will be provided on the first and final nights (opening reception on January 9, and closing seated dinner on January 11).

CURRENCY EXCHANGE AND ATM

The current exchange rate is 1.00 USD = 0.85 EUR as of 12/14/2017, but the rates of exchange will vary depending on location and any attached fees. Currency exchange is available at Brussels International Airport. Although not available at the hotel, currency exchange and ATM can be found in close proximity to the Radisson Blu. The nearest ATM can be found at Rue de l'Ecuyer 46, and currency exchange is available at the Western Union office, Rue du Marché aux Herbes 88 (maps below).





LOCAL TRANSPORTATION

Our hotel is located just 400m from Brussels Central Station, which connects to both metro and railway lines in in the city and abroad. You can visit https://www.brussels.be/public-transport, which includes many resources to help you navigate the city. If travel by taxi is preferred, the concierge or bellboy can assist you.

HOTEL RESTAURANTS AND BARS (menus and pricing can be found at the following link: https://www.radissonblu.com/en/royalhotel-brussels/restaurants) . *Please note – tipping is not common in Belgium, as restaurant and taxi bills typically include the service charge. If you feel your service was exceptional, you may leave a few Euros more, but you are under no obligation.*

- Atrium Restaurant & Lounge: with a soaring glass dome and a 12th-century Romanesque wall, the Atrium Restaurant lends stylish flair to casual dining. Choose from seasonal Belgian dishes, or relax with a drink in the Atrium Lounge.
- Sea Grill Restaurant: the elegant Sea Grill Restaurant has won several culinary awards, including two Michelin stars and 18/20 from Gault et Millau. Led by Executive Chef Yves Mattagne, the restaurant offers top-quality service. The lobster dish delicacy is prepared tableside by the chef using a silver lobster press created for the Sea Grill by acclaimed French restaurateur Jacques de Divellec.
- PebbleWood Corner: warm and inviting, PebbleWood Corner boasts a unique design with abundant wood and natural daylight. A semi-open kitchen spanning 200 meters complements

this seamless aesthetic. The restaurant offers the Super Breakfast Buffet each morning. a buffet of International cuisine for breakfast, lunch and dinner.

In addition to the restaurants available onsite, and a few notable points of interest below, you will find a spreadsheet attached with even more ideas for exploring the city. Anne Laudisoit, a native of Brussels who recently joined the EcoHealth Alliance team, kindly put together a list of restaurants, shopping destinations, and notable sites to consider as you prepare for your trip. And of course, the Radisson Blu concierge staff is happy to provide recommendations for whatever else you may like to see during your stay.

POINTS OF INTEREST (distance relative to the Radisson Blu Royal Hotel Brussels):

- Royal Galleries - 200 m
- BOZAR Museum - 500 m
- Chocolate Museum - 500 m
- Comic Strip Centre - 500 m
- Magritte Museum - 500 m
- SQUARE Brussels Meeting Centre - 500 m
- The Grand Place - 500 m
- Town Hall - 500 m
- Manneken Pis - 500 m
- The Royal Palace and Park - 1 km
- European Commission - 4 km
- European Parliament - 4 km
- Atomium - 5 km
- Mini Europe - 7 km
- Brussels Expo – Heyzel - 8 km

DEPARTURE

Upon check-out, many hotels will offer you the option of paying in local currency or in US Dollars. Please bear in mind that the exchange rate offered by the hotel is often higher than that offered by your credit card company, so payment in local currency is likely the better option in terms of overall cost.

Travel Policies and Reimbursement

If you require assistance with travel costs or booking arrangements, please contact Katie Leasure (kaleasure@ucdavis.edu). Below are the policies that must be followed when booking travel if reimbursement is required. Please note arrangements must be made in accordance with these policies in order for costs to be reimbursed.

Airfare

We are required to book flights in Economy Class; upgrades beyond that require exception approval, and are only allowed by policy in specific circumstances with supporting documentation. Exceptions include: if business or first class is the only service offered between two points; the use of coach class would be more expensive or time consuming; an itinerary involves overnight travel without an opportunity for normal rest before the commencement of working hours; or the use of business or first class is necessary to accommodate a medical need of the traveler.

We are also required to book airfare on US Flag Carriers, unless an allowable exception applies (i.e. Open Skies). Travel insurance is not reimbursable under policy. We ask that you please forward the desired itinerary to Katie Leasure *(kaleasure@ucdavis.edu)* for review before booking, to help ensure that it meets policy guidelines and the reimbursement process will be smooth.

Lodging

Reimbursement limits for accommodation will be based on US federal per diem guidelines.

Reimbursement

Please note that by policy, we are unable to process reimbursement until after the trip has ended. Below is a list of expenses that may be submitted for reimbursement in relation to your trip:

- Airfare
- Lodging
- Visa Application Fees
- Roundtrip transportation between your home and local airport, and between the hotel and destination airport.
- Meals and Incidentals
    - Those traveling from the United States: from your US departure point to your first international transit point, you may be reimbursed for actual meal costs up to $62 maximum per day. Once outside the US, you will be reimbursed based on federal per diem rates, prorated to reflect any meals provided during your stay in Beijing.
    - Those traveling from outside the United States: you will be reimbursed based on federal per diem rates, prorated to reflect any meals provided during your stay.
    - ***Alcoholic beverage purchases are not reimbursable***

Please submit a list of your expenses, and any required receipts, to Katie Leasure *(kaleasure@ucdavis.edu)* within 21 days of trip end date. Required receipts include: any expense $75 or more, and airfare and lodging costs of any amount. Receipts should be itemized and reflect the method of payment. Electronic submission is acceptable; hard copies are not required.

Produced in Native Format

From: Kendra Chittenden <kchittenden@usaid.gov>
To: Jonna Mazet <jkmazet@ucdavis.edu>;Andrew Clements <aclements@usaid.gov>
CC: Carroll, Dennis(GH/HIDN) <DCarroll@usaid.gov>
Sent: 1/8/2018 12:26:53 PM
Subject: call with Sierra Leone next week

Jonna and Andrew--

Happy New Year@

Khadijat is back to work next week so Dorothy would like to schedule a call. Are there good days and time for you that I can propose?

Thanks! Kendra

--

Kendra Chittenden, Ph.D. | Senior Infectious Disease Advisor| USAID | mobile (703-209-5424) |KChittenden@usaid.gov