

Outcome of the Alaska One Health Zoonotic Disease Prioritization Workshop

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CDC's One Health Zoonotic Disease Prioritization Tool

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Prioritizing Zoonoses: A Proposed One Health Tool for Collaborative Decision-Making

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Abstract

Emerging and re-emerging zoonotic diseases pose a threat to both humans and animals. This common threat is an opportunity for human and animal health agencies to coordinate across sectors in a more effective response to zoonotic diseases. An initial step in the collaborative process is identification of diseases or pathogens of greatest concern so that limited financial and personnel resources can be effectively focused. Unfortunately, in many countries where zoonotic diseases pose the greatest risk, surveillance information that clearly defines burden of disease is not available. We have created a semi-quantitative tool for prioritizing zoonoses in the absence of comprehensive prevalence data. Our tool requires that human and animal health agency representatives jointly identify criteria (e.g., pandemic potential, human morbidity or mortality, economic impact) that are locally appropriate for defining a disease as being of concern. The outcome of this process is a ranked disease list that both human and animal sectors can support for collaborative surveillance, laboratory capacity enhancement, or other identified activities. The tool is described in a five-step process and its utility is demonstrated for the reader.

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Introduction

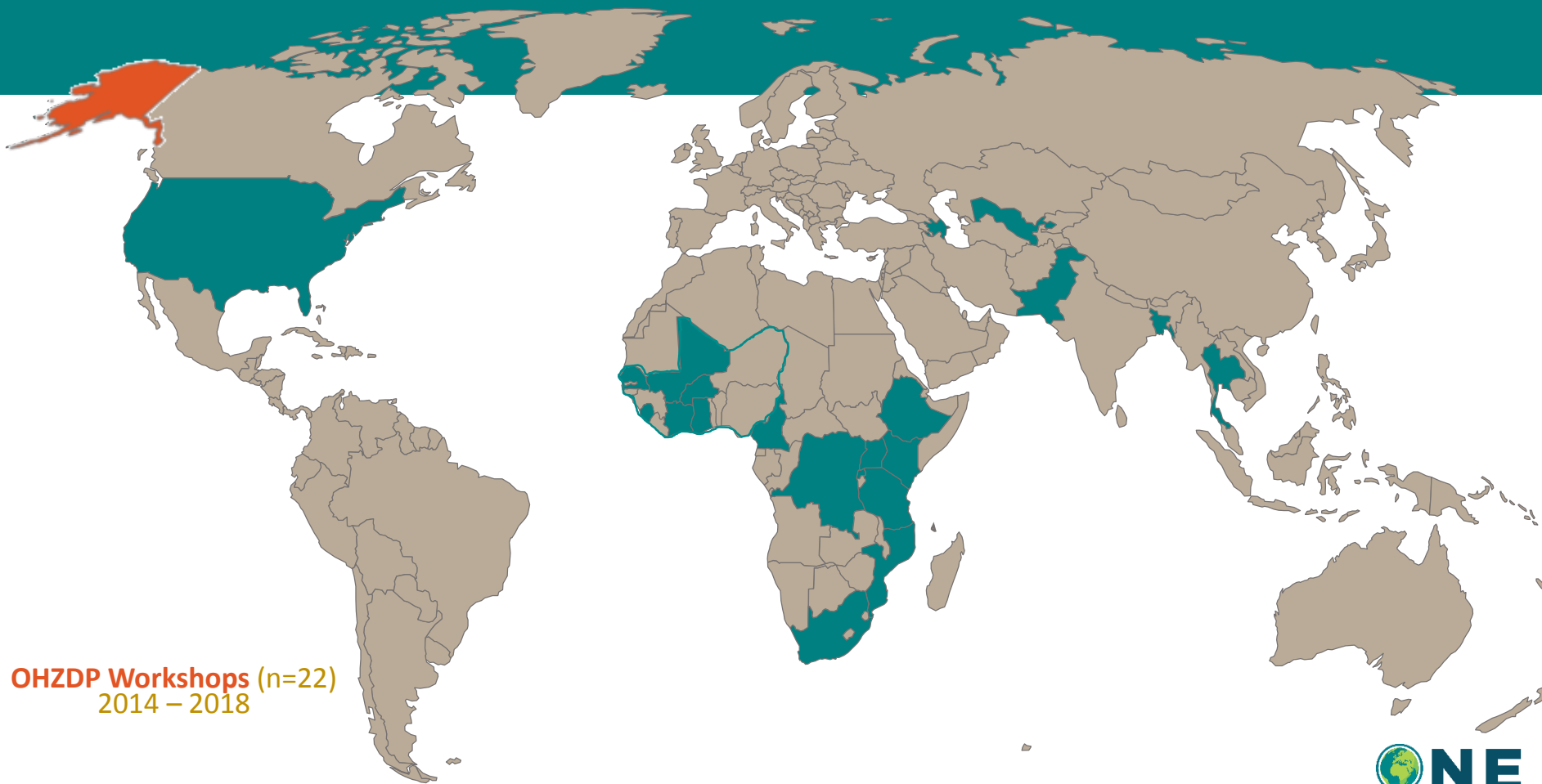
The majority of emerging or reemerging infectious diseases originate in animals [1,2], with over 250 zoonoses documented in the literature as newly discovered or rapidly increasing in incidence or geographical range in the past 70 years [3,4]. In addition to the emergence of zoonotic pathogens, an estimated 20% of all human illness and death in the least developed countries are attributable to endemic zoonoses [5]. Globally, the top 13 zoonoses deemed most impactful to poor livestock keepers in developing countries are responsible for an estimated 2.7 million deaths and 2.4 billion cases of human illness each year; the majority of these diseases also have negative effects on livestock production [4]. The global impact of emerging and endemic zoonoses on both human and animal populations make their control and prevention a natural starting point for collaboration between human and animal health sectors. As collaboration efforts move forward, identifying zoonotic disease priorities of jurisdictional importance to governments and institutions becomes critical.

Given the importance of zoonotic diseases to both public health and animal health institutions in all countries, joint prioritization of zoonoses has the potential to benefit both sectors as efforts are made to conduct efficient and effective surveillance, develop laboratory capacity, target outbreak response, implement disease control strategies, and identify research activities. However, accomplishing the task of prioritization in a

manner that is transparent and useful for all stakeholders can be challenging even in the best of situations; the paucity of quantitative data for decision-making and lack of framework required for multi-sectoral collaboration can significantly impede the process. Taking a collaborative approach to the priority-setting process ensures equal input from stakeholders in both human and animal health sectors, and ideally results in a ranked list of zoonoses that can inform joint efforts in areas of overlapping interest.

Historically recognized methods for prioritization have been adapted by health officials to identify infectious diseases, of both public and animal health importance, for national surveillance and risk-assessment [6–12]; several publications have focused specifically on the prioritization of zoonoses [13–22]. In general, after determining the pathogens to be prioritized, the ranking processes have employed a hybrid of methods to 1) select the criteria used to define the importance of pathogens, 2) apply weights to individual criteria, and 3) to score the pathogens within each criterion. Criteria weights and associated criteria scores are then combined in some manner to produce the final ranked list of pathogens. The scoring of pathogens are often described as qualitative, quantitative, or semi-quantitative in nature based on the scoring system used and the type of data required (Table 1).

Published descriptions of infectious disease prioritization processes vary by the number of pathogens ranked, the number of criteria chosen and the methods used for ranking criteria and



■ Completed ■ Upcoming

Example: Final Workshop Report, Uganda

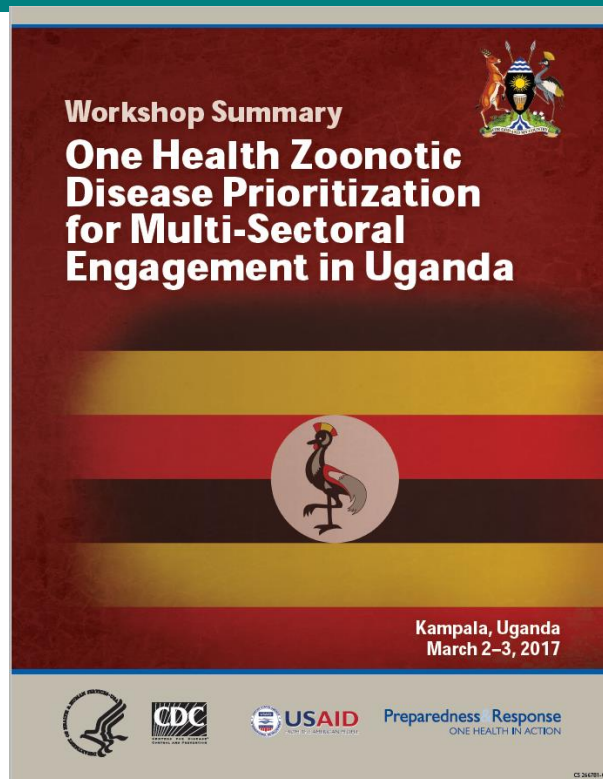
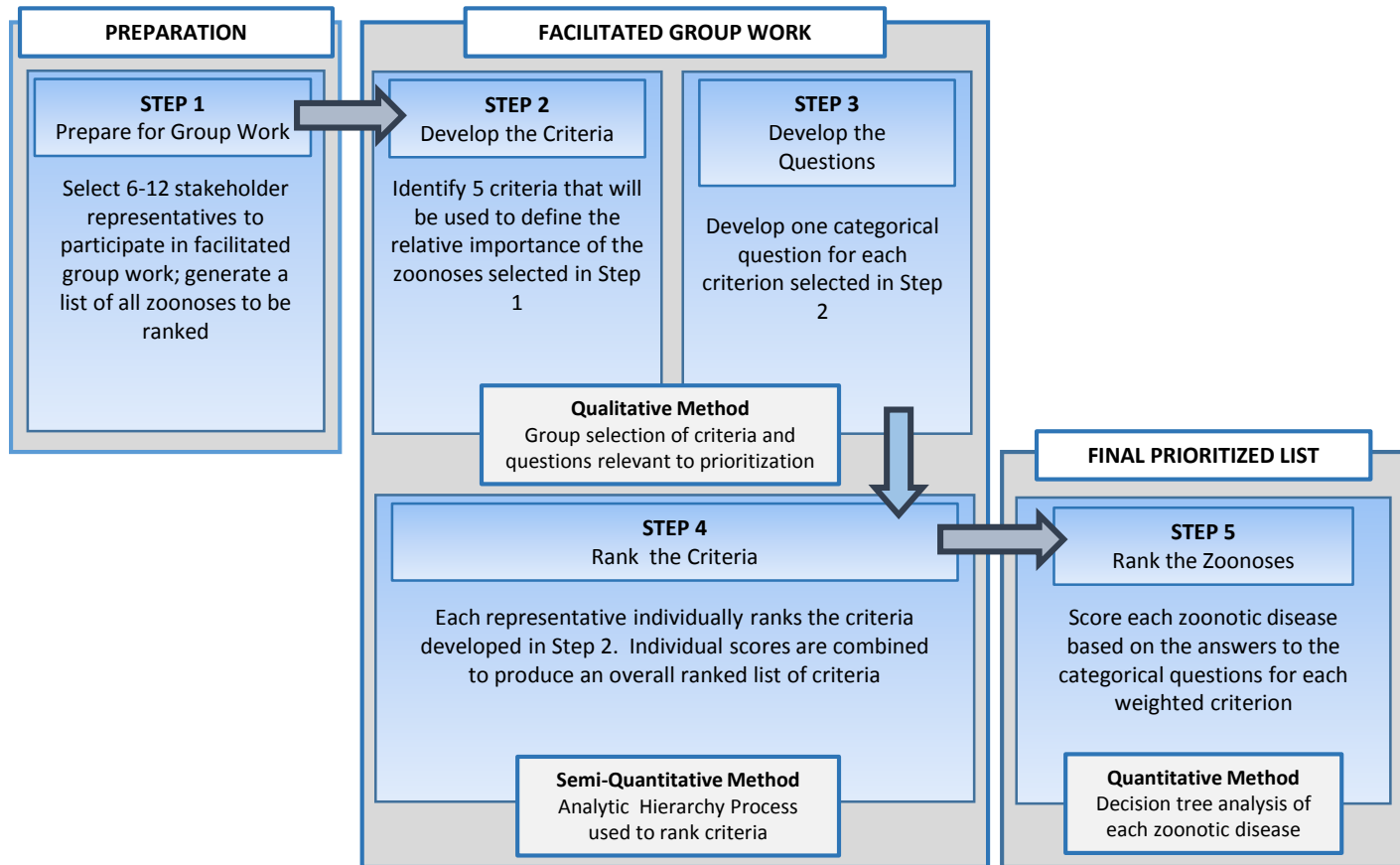


Table 1. Prioritized zoonotic diseases selected in Uganda during the One Health Zoonotic Disease Prioritization workshop in March, 2017.

Zoonotic Disease	Causative Agent	Human Disease Burden	Animal Disease Burden	Diagnostics, Treatment, and Prevention
Anthrax	Bacteria	Exact numbers are unknown but cases are reported. ³	Anthrax is endemic in Uganda. ⁴	An effective animal vaccine and treatment for humans exists. ⁴
Zoonotic influenza viruses	Viruses	No human cases of Highly Pathogenic Avian Influenza have yet been reported in Uganda.	Uganda experienced an avian influenza outbreak in 2017. ⁵	Vaccines for swine influenza viruses available for both animals and humans. ⁶ Avian influenza vaccines in development. Treatment for humans includes supportive care and antiviral agents. ⁷
Viral Hemorrhagic Fevers (Ebola, Rift Valley Fever, Crimean Congo Hemorrhagic Fever, Marburg)	Viruses	Outbreaks of multiple hemorrhagic fevers have been reported in Uganda. ⁸	Cases have been reported though exact numbers are unknown. ⁹	Currently, there are no animal vaccines. Human Ebola vaccines are undergoing clinical trials. Treatment for humans is supportive care. ¹⁰
Brucellosis	Bacteria	Studies indicate a >10% human seropositivity in areas within Uganda. ^{11,12}	Cattle and goats test positive for <i>Brucella</i> within Uganda. Prevalence can be >5%. ¹²	Vaccines are available for animals and treatment available for humans. ^{13,14}
Trypanosomiasis (African Sleeping Sickness)	Parasite	Uganda is reporting fewer than 100 cases per year. ¹⁵	In Uganda, trypanosomiasis is prevalent in cattle and being spread by cattle movements. ¹⁶	No vaccines are available. Effective prophylactic and curative treatment is available for animals. Effective treatment for humans is available. ¹⁵
Plague	Bacteria	Outbreaks of plague have been reported in Uganda. ¹⁷	No data are available regarding the burden of plague on livestock and wildlife.	Effective human treatment is available and human vaccines are in development. ¹⁸
Rabies	Virus	Information on recent human cases are not available. However, the virus does circulate in Uganda. ¹⁹	In Uganda, rabies virus is actively circulating in dogs which are the main source of exposure for humans. ¹⁹	Effective animal vaccine exists and human vaccines are available. Post-exposure prophylaxis is available but treatment is not. ²⁰

If approved by the government, all final reports will be hosted at:
<https://www.cdc.gov/onehealth/global-activities/prioritization.html>

5-Step Prioritization Process



Planning Committee

- **State of Alaska, Section of Epidemiology**
 - Joe McLaughlin
 - Louisa Castrodale
 - Kim Porter
- **CDC Alaska**
 - Emily Mosites
 - Tom Hennessy
 - Maya Ramaswamy
- **CDC One Health Office**
 - Grace Goroyka
 - Ria Ghai
- **State of Alaska Veterinarian**
 - Bob Gerlach
- **UAF**
 - Arleigh Reynolds
 - Karsten Hueffer
 - Tuula Holmen
 - Kelsey Gordon

Goal of the Alaska Zoonotic Disease Prioritization Process

**To use a multisectoral, One Health approach
to prioritize endemic and emerging zoonotic diseases
of greatest concern in Alaska
that should be jointly addressed by sectors responsible for
human, animal, and environmental health**



Zoonotic Diseases

Alaska's Initial List of 40 Diseases for Prioritization

Bacteria
Anthrax
Brucellosis
Campylobacteriosis
E. coli
Glanders
Leptospirosis
Listeriosis
Lyme Disease
Melioidosis
Plague
Psittacosis
Q-fever
Salmonellosis
Shigella
Tularemia

Bacteria (cont.)
Vibriosis
Yersiniosis
Zoonotic Tuberculosis

Viruses
Hantavirus Pulmonary Syndrome
Rabies
SARS
West Nile Virus
Zoonotic Influenzas (Avian and Swine)
-Jamestown Canyon Encephalitis
-Snowshoe Hare Encephalitis

Parasites
Anisikiasis
Cryptosporidiosis
Cysticercosis
Cyclosporiasis
Diphyllobothriasis
Echinococcosis
Giardiasis
Metorchiasis
Toxoplasmosis
Trichinosis

Prions
Bovine Spongiform Encephalopathy
Chronic Wasting Disease*

Fungi
Cryptococcus gattii

Other
Paralytic Shellfish Poisoning (PSP)
Amnesic Shellfish Poisoning (ASP)

Participating Organizations

- **State of Alaska**
 - Dept of Health and Social Services, Section of Epidemiology, State Virology Lab
 - Department of Environmental Conservation
 - Dept of Fish and Game
- **Alaska Native Tribal Health Consortium**
- **Aleutian Pribilof Islands Association**
- **North Slope Borough, Department of Wildlife Management**
- **University of Alaska**
- **US Federal Agencies**
 - CDC
 - US Dept of Agriculture
 - US Dept of Interior
 - National Parks Service, USGS
 - Arctic Research Commission
 - NOAA

Name	Agency	Title
Voting Members		
Bob Gerlach	Alaska Department of Environmental Conservation	Alaska State Veterinarian
Kimberlee Beckmen	Alaska Department of Fish and Game	Wildlife Health Veterinarian
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Karsten Hueffer	University of Alaska, Fairbanks	
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Grace Goryoka	United States Centers for Disease Control and Prevention, One Health Office	Health Scientist
Ria Ghai	United States Centers for Disease Control and Prevention, One Health Office	Infectious Disease Ecologist

5 Criteria

- **Clinical Outcome**
 - Case-fatality ratio
 - Number of animal species affected
 - Impact on reproduction, fitness
- **Prevalence and modes of transmission**
 - Does it occur in Alaska?
 - One or many modes of transmission?
- **Food safety/security, social/cultural, economic effects**
- **Response Capacity in Alaska**
 - Surveillance, control measures, outbreak response capacity
- **Climate Change Sensitivity**

Alaska Priority Zoonotic Diseases

- Amnesic Shellfish Poisoning / Paralytic Shellfish Poisoning
- Zoonotic Influenza
- Rabies
- Cryptosporidiosis / Giardiasis
- Toxoplasmosis
- Brucellosis
- Q fever

Priority Zoonoses

United States

- Zoonotic Influenza
- Salmonellosis
- West Nile Virus
- Plague
- Emerging Coronaviruses (SARS, MERS)
- Rabies
- Brucellosis
- Lyme Disease

Next Steps Break-out Groups

- Laboratory and Surveillance
 - Workforce Development/Outreach
 - Outbreak Response / Preparedness
 - One Health Coordination
-
- Report to be approved by participants and made available on CDC One Health website

Options for next steps

- Annual meeting on Zoonosis Priorities
 - UAF One Health Conference, March 2020
 - Alaska Public Health Summit, Jan 2020
 - Other multi-disciplinary meetings
- Student projects on the Priority Diseases
 - “Landscape Reviews”
 - Surveillance evaluation, best practices, preparedness
- Disease-specific working groups (e.g. HABS)
- Research projects
 - Giardia phylogenetics, Andy Ramey, USGS

Thank You!

