Workshop Summary

Prioritizing Zoonotic Diseases for Multisectoral One Health Collaboration in Colombia

Bogotá, Colombia

Photo 1. Worker with fresh picked coffee beans on a plantation in Colombia.

DISCLAIMER

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

TABLE OF CONTENTS

Photo 2. Woman selling fruits in Cartagena.

PARTICIPATING ORGANIZATIONS

Ministry of Agriculture and Rural Development
(Ministerio de Agricultura y Desarrollo Rural)

Ministry of Environment and Sustainable Development
(Ministerio de Ambiente y Desarrollo Sostenible)

Ministry of Health and Social Protection
(Ministerio de Salud y Protección Social)

National Institute for Drug and Food Surveillance
(Instituto Nacional de Vigilancia de Medicamentos y
Alimentos—INVIMA)

Colombian Agricultural Institute (Instituto Colombiano
Agropecuario—ICA)

National Institute of Health (Instituto Nacional de Salud—INS)

Colombian Corporation of Agricultural Research
(Corporación Colombiana de Investigación Agropecuaria—Agrosavia)

Regional Autonomous Corporation of Cundinamarca
(Corporación Autonoma Regional de Cundinamarca)

Regional Autonomous Corporation of Magdalena
(Corporación Autonoma Regional de Magdalena)

Pan American Health Organization (PAHO)
(Organización Panamericana de la Salud—Colombia)

CES University (Universidad CES)

Forest University (Universidad del Bosque)

INCCA University (Universidad INCCA)

Javeriana University (Universidad Javeriana)

National University of Colombia (Universidad Nacional de Colombia)

Rosario University (Universidad del Rosario)

La Sabana University (Universidad de la Sabana)

La Salle University (Universidad de la Salle)

Quindío University (Universidad del Quindío)

University of Cauca (Universidad del Cauca)

University of Córdoba (Universidad de Córdoba)

Wildlife Conservation Society

United States Centers for Disease Control and Prevention (CDC)

SUMMARY

The purpose of the One Health Zoonotic Disease Prioritization (OHZDP) workshop for Colombia was to prioritize zoonotic diseases of greatest concern using a multisectoral, One Health approach with equal input from representatives of human, animal (livestock and wildlife), and environmental health sectors (ecosystem and wildlife) and other relevant partners.

The specific workshop goals were to use a multisectoral, One Health approach to:

1. **Prioritize zoonotic diseases of greatest One Health concern**

2. **Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health sectors and partners in Colombia**

During the workshop, participants developed a list of zoonotic diseases for prioritization for Colombia, defined the criteria for prioritization, and determined questions and weights relevant to each criterion. Six zoonotic diseases were identified as a priority by participants using a mixed methods prioritization process, the One Health Zoonotic Disease Prioritization Process, developed by the U.S. Centers for Disease Control and Prevention (CDC) (Appendix A).

After the participants selected the priority zoonotic diseases, they developed next steps and action plans to address the diseases in collaboration with One Health partners.

The priority zoonotic diseases for multisectoral, One Health collaboration for Colombia are (Table 1):

- **Avian Influenza**
- **Brucellosis**
- **Leptospirosis**
- **Equine Viral Encephalitis (Western Equine Encephalitis, Venezuelan Equine Encephalitis, West Nile Encephalitis, and Eastern Equine Encephalitis)**
- **Zoonotic Tuberculosis**
- **Rabies**

This report summarizes the One Health Zoonotic Disease Prioritization Process used to prioritize zoonotic diseases of greatest concern for Colombia, as well as next steps and action plans to jointly address these zoonotic diseases using a multisectoral, One Health approach including human, animal, and environmental health ministries and other relevant sectors.

Table 1. Priority Zoonotic Diseases Selected in Colombia by Participants in the One Health Zoonotic Disease Prioritization Workshop Conducted August 29–30, 2019

Zoonotic Disease	Agent	Human Disease Burden	Animal Disease Burden	Availability of Diagnostics, Treatment, and Prevention
Avian Influenza	Influenza A virus	According to the World Health Organization, there has not been a confirmed case of avian influenza in humans in Colombia between 2003–2019[3]	Prevalence in animal species ranges between 2.6% and 13.4%[4] In one study, testing of animal species to detect the virus found that 2.6% of poultry and 3.6% of wild birds in Colombia were positive[4]	Annual vaccination in humans is recommended for influenza[3] Antiviral treatment is available for humans[3] Diagnosis is by isolation or detection of viral RNA or antibodies[4]
Brucellosis	*Brucella* spp.	In 2015, the seroprevalence in humans was 3.8%[1] A review of studies on the prevalence of brucellosis in humans reported a range between 0.14% and 10.4%[2]	From 2005 to 2015, the seroprevalence of brucellosis in animals ranged between 2.8% and 6.1%[1] In 2018, the Department of Antioquia declared an outbreak of brucellosis in dairy cattle[1]	Prevention measures include mandatory immunization of bovine and buffalo females with live attenuated vaccine[1] A screening test followed by a confirmatory test is a standard procedure for diagnosis in animals[1] Antibiotics is the standard treatment
Leptospirosis	*Leptospira* spp.	A review of studies on human prevalence reported a range of 6% to 25%[7]	It is estimated that the prevalence of leptospirosis is between 41% and 60.9% in cattle, 10.3% in pigs, between 12% and 47.14% in canines, 23.07% in non-human primates and up to 82.7% in rodents[7]	Treatment for humans and animals include antibiotics Diagnosis includes serological tests and blood or urine tests Vaccine is available for animals
Equine Viral Encephalitis (Western Equine Encephalitis, Venezuelan Equine Encephalitis, West Nile Encephalitis, and Eastern Equine Encephalitis)	Equine encephalitis virus	A 1995 outbreak of Venezuelan equine encephalitis caused an estimated 75,000 cases and 300 deaths[8] In 2017, the National Institute of Health reported 17 cases in 4 departments[8]	Equines are generally susceptible to the virus and the mortality rate for horses is between 20 and 80%[8] In 2017, two outbreaks in horses were reported in the department of Córdoba, and several cases in Canalete and Puerto Libertador[8]	There is no antiviral treatment for animals, but a vaccine is available No antiviral treatment nor vaccine is available for humans Diagnosis includes serologic tests and cerebrospinal fluid analysis
Zoonotic Tuberculosis	*Mycobacterium bovis*	In 2017, 14,187 cases of tuberculosis were reported, however the number of those cases that were *M. bovis* are unknown[10] 1,083 tuberculosis deaths were recorded in 2017[10]	Studies carried out at the National Institute of Health in 2011 identified the circulation of *M. bovis* in cattle in five departments of Colombia[11]	Several institutions of the tuberculosis laboratory network in Colombia use molecular tests for diagnosis but do not have the methods available for the differentiation of species of the tuberculosis complex[10] Treatment for humans and animals includes antibiotics

| Zoonotic Disease	Agent	Human Disease Burden	Animal Disease Burden	Availability of Diagnostics, Treatment, and Prevention
Rabies	Rabies virus	Between 2000 and 2017, 38 confirmed cases of human rabies were identified and in 2018 there were no cases[12]	In 2018, there were no cases in dogs or cats in relation to the urban transmission cycle, but there was a new case in January 2019 in a dog[12] In the wild cycle, in 2018, 101 outbreaks were reported in production animals distributed among 14 departments[12]	A vaccine is available for animals and humans Diagnosis requires many tests of saliva and cerebrospinal fluid Treatment includes post-exposure vaccinations

Photo 3. Colorful houses in Guatape, Colombia.

INTRODUCTION AND BACKGROUND

Zoonotic diseases are diseases that spread between animals and people. Most known human infectious diseases and up to three-quarters of newly emerging infection diseases originate in animals.

The Republic of Colombia is a country in northwestern South America. The country has more than 1,800 miles (2,900 km) of coastline with the Caribbean Sea and the Pacific Ocean, and borders Panama to the northwest, Venezuela and Brazil to the east, and Peru and Ecuador to the south. The country is covered by rugged terrain and lies very close to the equator, resulting in a variety of vegetation and soil types. Colombia has a tropical and isothermal climate with little variation in temperature throughout the year. The climate varies only according to precipitation and differences related to elevation. There are five distinct geographic regions of Colombia: the Atlantic lowlands, the Pacific coastal region, the Andean region, the Llanos, and the Amazon rainforest. The Amazon and Llano areas make up approximately two-thirds of the country's land area but are sparsely inhabited.[13]
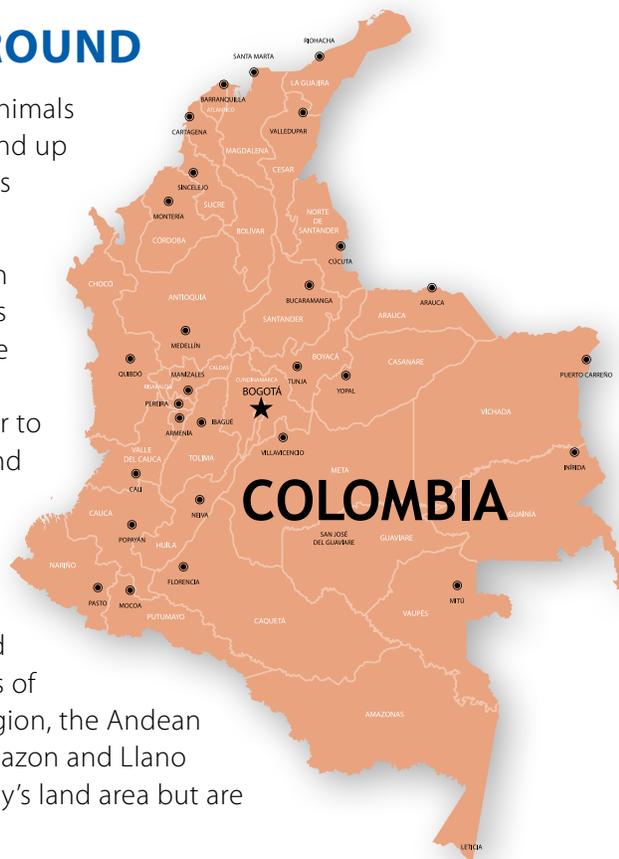
In addition to the Andean mountains, Colombia has 59 natural areas belonging to the National Natural Parks System, including areas within the Amazon. These natural areas contain more than 14,268,224 hectares (142,682 km2) of surface.[14] The country is home to many river systems, the main rivers being the Magdalena, Cauca, Caquetá, Putumayo, Guaviare, Meta and Atrato.

In 2018, the estimated population of Colombia was 42,771,000. Approximately 81% of the Colombian population lives in urban areas, with only 19% in rural areas.[15] More than 88% of Colombia's population is under 60 years of age, and 50% of Colombia's population is under 30 years of age.

The Colombian agricultural sector was estimated to have increased by 2.4% in 2018, driven by the growth of poultry and pig farming.[16] In addition, it is estimated that Colombia contains 14% of the world's biodiversity.[17] The expansion of agriculture and Colombia's rich biodiversity increase the country's vulnerability to the effects of zoonotic diseases.

Colombia's forests are teeming with a variety of animals, including anteaters, sloths, various species of monkeys, tapirs, peccaries, spectacled bears, deer, and large tropical rodents such as agoutis, pacas, and capybara. There are also carnivores such as pumas, jaguars, and raccoons. Birds vary by elevation, including toucans, hummingbirds, and North American migratory birds. The varieties of reptiles in the country include turtles, lizards, snakes, alligators, and crocodiles. In terms of livestock, ranching is an important economic activity, particularly in the lowlands. Cattle are raised throughout Colombia, as well as poultry. Additionally, dairying occurs in some of the plateau regions. Fishing takes place mainly in rivers, despite the country bordering two seas, and even river fishing has decreased due to water pollution. The Colombian economy is heavily based on agriculture; however, the industry and service sectors are growing.

Zoonotic diseases that occur in large numbers impact society in three main ways. They:

- Threaten the health of animals resulting in illness, loss of productivity, and death, and thus the livelihood of a large segment of the population dependent on livestock as a major source of income.
- Threaten national economic stability through loss of tourism, trade bans, and quarantine.
- Threaten the health of people with the ability to cause a large number of illnesses and deaths, which is associated with significant social instability and economic losses.

To best address zoonotic disease threats, a multisectoral, One Health approach is needed. One Health means a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.

To begin to address zoonotic disease challenges in Colombia, a One Health Zoonotic Disease Prioritization workshop was held August 29–30, 2019, at the Hotel Tryp in Bogotá. The purpose of this workshop was to prioritize zoonotic diseases of greatest concern using a multisectoral, One Health approach with equal input from representatives of human, animal (livestock and wildlife), and environmental health sectors and other relevant partners.

The specific workshop goals were to use a multisectoral, One Health approach to:

1. Prioritize zoonotic diseases of greatest concern for Colombia

2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health sectors and partners

To build in-country capacity to conduct future One Health Zoonotic Disease Prioritization workshops, six local partners from the following relevant One Health sectors and partners were trained by CDC on the One Health Zoonotic Disease Prioritization Process:

- Colombian Agricultural Institute (Instituto Colombiano Agropecuario-ICA)
- National Institute of Health (Instituto Nacional de Salud-INS)
- Ministry of Health and Social Protection of Colombia (Ministerio de Salud y Protección Social de Colombia)

Photo 4. Panoramic view of Guatape from the Rock (La Piedra del Penol), near Medellin, Colombia.

WORKSHOP METHODS

The One Health Zoonotic Disease Prioritization (OHZDP) Process uses a mixed methods prioritization process developed by CDC's One Health Office. The methods have been previously described in detail (Appendix A). Workshop organizers began to prepare and plan for this workshop several months in advance. During the workshop, participants first reviewed the initial zoonotic disease list for prioritization. A zoonotic disease was selected if it was known to be spread between humans and animals and was of concern for Colombia. Zoonotic diseases on human or animal reportable disease lists were included on the initial list. Voting members agreed upon a list of 43 zoonotic diseases for prioritization through the OHZDP Process, shown in Table 2.

During the workshop, participants developed five criteria for ranking the 43 zoonotic diseases (See Table 2). Once the five criteria were developed, one categorical question was developed for each criterion through group discussion. The questions were created to best measure each criterion. All questions had ordinal, binomial, or multinomial answers. The ordinal nature is necessary for the scoring process and each answer choice was given a score determined by the participants. Voting members then individually ranked their preferences for the relative importance of each criterion. Each individual voting member's ranking was then inputted into the One Health Zoonotic Disease Prioritization Tool by a facilitator and a group weight for each criterion was calculated.

Workshop participants answered each question for each zoonotic disease using data that were identified through an extensive literature search, as well as information from the World Health Organization (WHO), the World Organisation for Animal Health (WOAH), ProMED, and other relevant websites. Data on disease transmission, severity, pandemic and epidemic potential, economic impact, prevention and control, and environmental impact were collected for each zoonotic disease.

Photo 5. Nanny and kid on a goat farm in Colombia.

If information for a particular zoonotic disease was not available for Colombia, global data or data from the region were used. Articles were collected with zoonotic disease-specific information on transmission, severity, pandemic and epidemic potential, economic impact, prevention and control, and environmental impact for the country, region, and world. These references were compiled and shared with all workshop participants.

After scoring all zoonotic diseases, decision tree analysis was used to determine the ranked zoonotic disease list. Each weighted criterion was applied across each question's answers for each zoonotic disease. The scores for all five questions for each zoonotic disease were summed. The largest raw score was then normalized giving that zoonotic disease a normalized score of 1. See Appendix C for a complete listing of raw and normalized scores for all zoonotic diseases that were considered for prioritization.

The zoonotic diseases with their raw and normalized scores were presented to the participants for discussion. Workshop participants then used the ranked OHZDP list to discuss and decide on a final priority list of six zoonotic diseases (Table 1). After the participants decided on the final priority zoonotic disease list, participants developed next steps and action plans to address the priority zoonotic diseases.

Criteria and Question Description Developed

The criteria for ranking zoonotic diseases selected by the voting members in Colombia are listed in order of importance below. A description of how the questions assessed the criteria are listed below. For the full question and answer choices, see Appendix D.

Table 2. Criteria for Prioritization and Weighting of Zoonotic Diseases in Colombia, August 2019

Rank	Criteria	Weight	Description
1	Epidemic/Pandemic Potential	0.36	Pandemic in animals or humans, epidemic, or epizootic
2	Severity	0.24	Lethality and consequences caused by the disease in humans, domestic animals, and wild animals
3	Economic, Social, & Ecological Impact	0.17	Animal productivity, public health, the ecosystem, and trade/tourism
4	Diagnostic Capacity	0.16	Ability to diagnose in Colombia by clinical (suspected) or laboratory (confirmed) diagnosis in humans or animals
5	Multisectoral Collaboration	0.08	Surveillance, prevention, and control

Priority Zoonotic Disease List for Colombia

The six priority zoonotic diseases for One Health collaboration for Colombia according to the results of the workshop are (Table 1):

- Avian Influenza
- Brucellosis
- Leptospirosis
- Equine Viral Encephalitis (Western Equine Encephalitis, Venezuelan Equine Encephalitis, West Nile Encephalitis, and Eastern Equine Encephalitis)
- Zoonotic Tuberculosis
- Rabies

Photo 6.   San Andres Island in the Caribbean Sea is Colombia's largest island.

NEXT STEPS AND ACTION PLANS

After finalizing the list of priority zoonotic diseases, workshop participants discussed next steps and action plans to address the diseases using a multisectoral, One Health approach. Then, participants were asked to determine next steps specifically for their sectors. Next steps and action plans were developed around One Health coordination, laboratory capacity, surveillance, outbreak response, preparedness and response/ prevention and control, and workforce. A summary of the recommendations organized by thematic area follows below:

One Health Coordination

➤ Involve more sectors in One Health coordination, including defense and lawmakers

➤ Support the environmental approach in One Health coordination

➤ Plan and implement technical working groups in the following sectors: environment, air quality, water, food safety

➤ Generate regulations aligned with elements of strong government support

➤ Work with an organization for advice and guidance

➤ Create working groups to address areas not currently operational

➤ Generate regulations for One Health coordination

➤ Strengthen and expand existing structures by applying a One Health approach and coordinating between sectors and technical areas to create a One Health strategy or workplan

Laboratory Capacity

➤ Focus on diagnostic tests that are available and know which tests are available to address the prioritized diseases

➤ Expand laboratory planning and validation to strengthen laboratory capacity

➤ Consider diagnostic algorithms for different scenarios and zoonotic diseases

➤ Review the approaches of diagnosis for the priority zoonotic diseases

➤ Expand the diagnostic network within the private sector and the university research sector so that tests processed in different laboratories can be comparable

➤ Protect and guarantee reference and counter-reference sampling, transport, and laboratory logistics

➤ Technical strengthening in reference and counter-reference activities

➤ Create infrastructure for a network of laboratories with diagnostic capacity both at the local and departmental levels

➤ Clarify sample protocols for sample quality, taking into account additional environmental factors that may affect results, to ensure acceptable sample processing

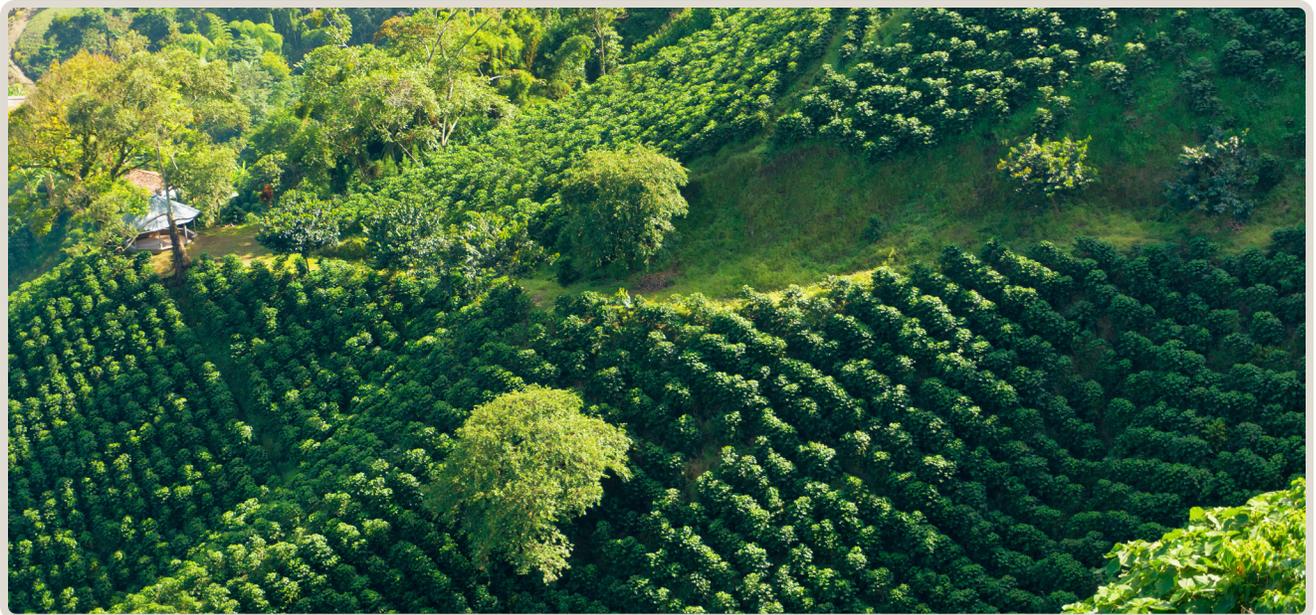**Photo 7. Colombian farmer picks coffee from her farm.**

Photo 8. Looking down on a landscape of hills covered in coffee plants near Manizales, Colombia.

A. Surveillance

➤ Develop an integrated surveillance system between different sectors

➤ Create documentation for all surveillance processes that arise in this type of prioritization and that are outside the current surveillance system

➤ Create a clear regulatory framework, guaranteeing that the different sectors and establishments generate clear information within the surveillance systems and have updated information on the present cases

➤ Establish and review key indicators for monitoring and evaluation of the priority zoonotic diseases under surveillance

➤ Ensure adequate disclosure of information to generate shared knowledge within all sectors and levels

➤ Apply a One Health approach to developing knowledge and research

➤ Allocate sufficient resources and human talent (availability, continuity, and training)

➤ Establish an alliance and an international cooperation agreement with associated organizations to improve surveillance and diagnostic processes

B. Outbreak Response

➤ Create a unified zoonosis surveillance system, including both humans and animals, with an emphasis on prevention

➤ Develop education and prevention plans to serve the most susceptible populations

➤ Protect against potential transmission mechanisms through expanded diagnostic and treatment practices

➤ Work with susceptible populations to reduce resistance to public health measures

➤ Measure vaccination, treatment, culling, and epidemiological indicators to inform epidemiological models and implement information systems

➤ Observe the different perspectives in outbreaks and be attentive to the cases that do not clinically manifest the disease; surveillance for these cases must capture incidence and prevalence to generate continuous control in outbreaks

➤ Assigned personnel must be specialized in the surveillance, control, and treatment of priority zoonotic diseases

C. Preparedness and Planning for Outbreaks

➤ Identify and follow what is known about an outbreak and incorporate defined protocols and processes that must be followed

➤ Protocols for the priority zoonotic disease should include animal, human, and environmental components

➤ A cross-sectoral team must be prepared and ready to actively respond to outbreaks

➤ Provide support through systems that have been developed in an intersectoral manner

D. Promotion, Prevention, and Control

➤ Initiate a process of promotion, prevention, and control from basic primary education to university life using a One Health scenario from the 2030 Agenda

➤ Strengthen the National Liaison Center by integrating the environment, so that it can develop the capacity to send animals to the laboratory and share epidemiological information

➤ Strengthen all information systems to carry out a good intersectoral analysis based on good information (IDEAM, generating inclusion of the environment sector)

➤ Strengthen locally established capacity for the prevention and control of the priority zoonotic diseases

➤ Create and carry out prevention activities based on current known information from all sectors

➤ Expand vaccination of humans and animals in a unified way, to support other inclusive prevention and control activities between animals and humans

➤ Integrate aspects of the environmental sector in prevention and control measures by including the use of different environmental tools in standard practice

➤ Create and distribute education and communication activities jointly

➤ Expand regulations to strengthen all sectors

➤ Collaborate with working groups and IDEAM to develop a base to strengthen and incorporate One Health into other areas, including in climatic and environmental studies and the changes generated by climate change

E. Strengthening Workforce Capacity

➤ Increase visibility and knowledge about zoonotic diseases among all professionals involved

➤ Strengthen diagnostics at the educational level, from the One Health perspective

➤ Institutional leaders join the One Health policy, generating a comprehensive empowerment for the management of all-inclusive factors, generating a comprehensive integration system

➤ Build a comprehensive tool that can make decisions based on unified information

F. Occupational Health

➤ Ensure that laboratory staff are highly qualified, and that the workplace has a very good structure and up-to-date technology

➤ Provide adequate training in biosafety to all fields and adequate personal protective equipment when applicable to guarantee coverage of occupational risks, especially to people with direct contact with animals

➤ Provide hands-on training to staff on risks and ensure proper use of all safety equipment emphasizing its importance

➤ Determine the person in charge of taking samples from companies endorsed to transport them properly

➤ Review of the regulatory framework against diseases in decree 1477/2014, looking at the table of occupational diseases

NEXT STEPS BY SECTOR

Each One Health sector and other relevant sectors present at the workshop then developed specific next steps for their sector and institution.

Ministry of Health

- Ministry of Health will work with technical legislations to regulate the sector
- INS and INVIMA will carry out passive and active surveillance of zoonotic diseases, have a national reference laboratory, organize, and lead the national network of laboratories
- Information is provided through active surveillance in the food sector and public health in humans. Sharing information between institutions towards ICA, especially on zoonoses, to produce data that is used for interventions according to labor problem competencies.
- Work to strengthen health and public health laboratory networks and the food sector
- Carry out active surveillance and respond immediately to different public health events

Colombian Agricultural Institute

- Increase offers of diagnostic capacity
- Improve resource management to ensure operability
- Expand the diagnostic capacity in the centers to cover a large number of diseases and with the door open for the implementation of new techniques
- Build active and passive surveillance strategies, which can be made available for articulation with other surveillance systems
- Promote coordination with other ministries to improve activities and monitoring of selected diseases
- Improve and implement training activities

Environment Sector

- Draw attention to the implementation of One Health and the environmental health sector, with training focused on the role of One Health, exposing positive and negative experiences in intersectoral work (definition of needs regarding pathologies)
- Consult at the laboratory level if they can commit to performing necessary tests, generating a validation protocol

Academia

- Incorporate the academic sector's thematic expertise in required areas to better generate different aspects into protocols
- The academic sector has a lot to contribute and should be engaged and considered when making decisions
- Further incorporate the participation of academic partners in zoonotic disease activities
- Administradora de Riesgos Laborales (Occupational Risk Administrator): In addition to protecting workers from zoonotic diseases, mandate protection from the risks of zoonotic diseases for students as well
- Appoint a One Health chair to coordinate all aspects of education and research programs
- Disseminate results from scientific investigations to communities and decision makers

Strengthening the prevention and control of zoonotic diseases in the context of COVID-19

Colombia's OHZDP workshop was held in 2019 prior to the COVID-19 pandemic. While the workshop was conducted before the pandemic, the outcomes identified there can be applied to emerging zoonotic disease threats, such as COVID-19. The OHZDP Process identified areas of opportunity to build and strengthen One Health capacity in coordination, surveillance, laboratory, outbreak response, preparedness, outreach, prevention and control, workforce, and occupational health for priority zoonotic diseases. Countries can develop and strengthen capacity in these areas to address the priority zoonotic diseases, and ultimately strengthen capacity to address other emerging zoonotic disease threats.

The COVID-19 pandemic had a major impact on the behavior of zoonotic diseases and the components of One Health. In 2020, a decrease was observed in the reporting of many zoonotic diseases in surveillance systems, possibly due to the quarantine protocols put into place during the pandemic. However, an unusual increase in zoonotic disease cases was seen in some regions of the country during the quarantine period. This is in large part due to public health efforts focusing on the pandemic instead of human interactions with animals and their environments. Therefore, a specific assessment and prioritization is required given the different problems of the various regions.

For this reason, it is necessary to develop strategies to disseminate the prioritized diseases from the Colombia OHZDP Workshop to the current directors of the participating entities in a strategic and intersectoral manner. The prioritized next steps and action plans from the 2019 workshop should be reinforced to define regional prioritization plans, integrating the perspective of all the One Health sectors and considering the challenges of establishing management, surveillance, response, and coordination actions within the framework of a pandemic.
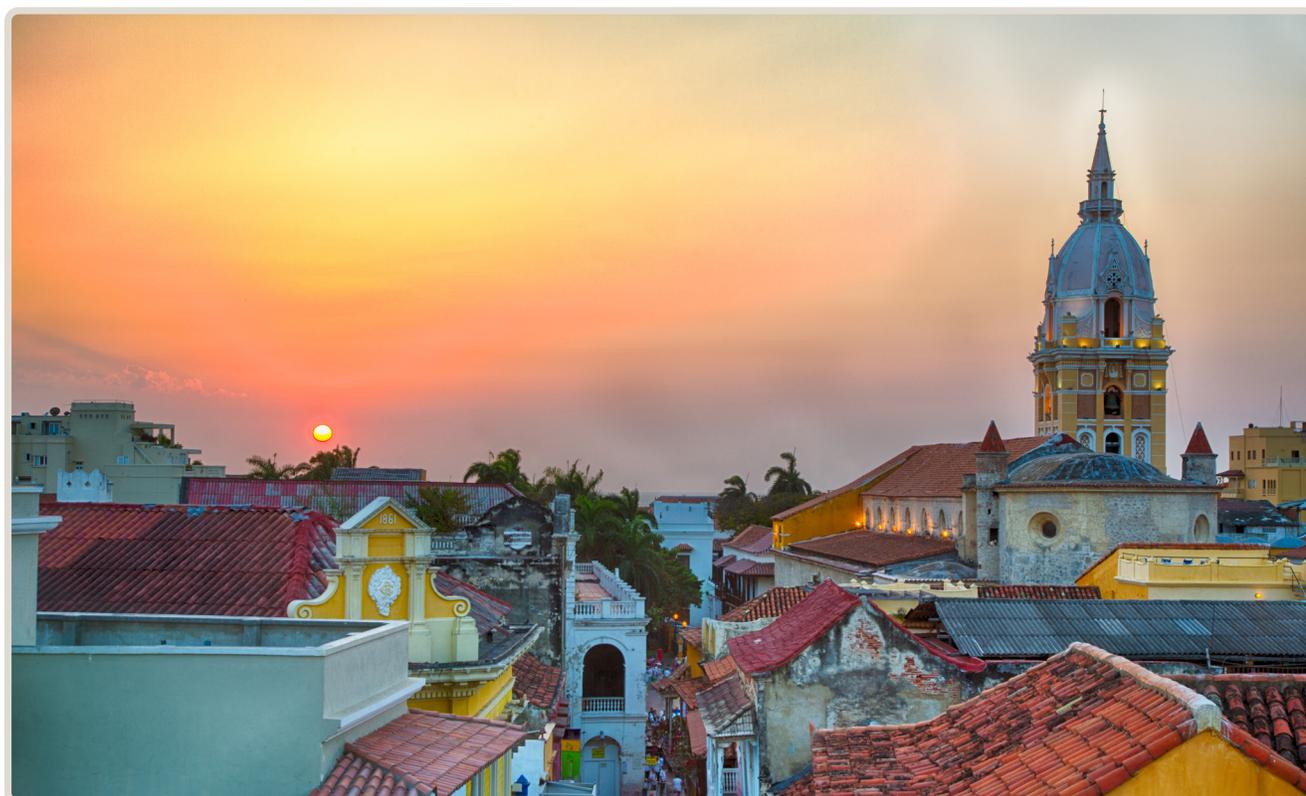

Photo 9. View over the rooftops of the old city of Cartagena.

APPENDIX A: Overview of the One Health Zoonotic Disease Prioritization Process

U.S. Centers for Disease Control and Prevention: Overview of the One Health Zoonotic Disease Prioritization Workshop https://www.cdc.gov/onehealth/global-activities/prioritization.html

ONE HEALTH ZOONOTIC DISEASE PRIORITIZATION PROCESS OVERVIEW

Goals of the One Health Zoonotic Disease Prioritization Process

► To use a multisectoral, One Health approach to
1. Prioritize zoonotic diseases of greatest concern
2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners

OHZDP Workshop Process

BEFORE THE WORKSHOP

Prepare and Plan for the Workshop

- Contact the CDC One Health Office at least 3 months before scheduling a workshop.
- Identify Core Planning Team and obtain financial resources to accommodate for workshop logistics, venue, materials, travel, and translation.
- Identify workshop participants (facilitators, voting members, advisors) from human, animal, and environmental health sectors and other related partners.
- Generate an initial list of zoonotic diseases to be considered for prioritization using reportable disease lists, literature, and input from all represented One Health sectors.
- Conduct a literature review on the initial list of zoonotic diseases by reviewing publications, reports, grey literature, etc.

DURING THE WORKSHOP

Develop Criteria

- 5 criteria will be used to prioritize the list of zoonotic diseases; criteria are locally appropriate and address the needs of each unique location.

Develop Questions

- 1 categorical question will be developed to measure each criteria.

Rank Criteria

- Each voting member will rank criteria in their preferred order, allowing each sector to address their sector's priorities and needs. Individual rankings are combined to produce a combined ranked list of criteria.

Prioritize Zoonotic Diseases

- Score each zoonotic disease by answering the categorical questions for each weighted criterion and entering this data into the OHZDP Tool.
- The ranked zoonotic disease list from the OHZDP Tool is used to facilitate discussion among the participants to finalize the priority zoonotic disease list.

Discuss Next Steps and Action Plans for Multisectoral, One Health Engagement

- Discuss next steps and action plans for identifying areas for One Health engagement for prevention and control of the prioritized zoonotic diseases.

AFTER THE WORKSHOP

- Stakeholders advocate and implement recommended next steps and action plans to implement a One Health approach for the priority zoonotic diseases.

OHZDP Workshop Outcomes

- A list of priority zoonotic diseases of greatest concern agreed upon by all represented One Health sectors
- Recommendations for next steps and action plans for multisectoral, One Health engagement to address the priority zoonotic diseases
- Understanding of the roles and responsibilities of all represented One Health sectors
- The creation or strengthening of multisectoral, One Health coordination mechanisms and networks
- A report highlighting the outcomes of the workshop to help advocate for One Health priorities

www.cdc.gov/onehealth/global-activities/prioritization.html

APPENDIX B: One Health Zoonotic Disease Prioritization Workshop Participants for Colombia

Voting Members

Name	Organization	Title/Position
Jairo Hernández	Ministry of Health and Social Protection (Ministerio de Salud y Protección Social)	Coordinator, Grupo Territorio Saludable
Eduin Pachón	Ministry of Health and Social Protection (Ministerio de Salud y Protección Social)	Specialized Professional
Diana Marcela Walteros	National Institute of Health (Instituto Nacional de Salud—INS)	Deputy Director
Esther Cristina Barros	National Institute of Health (Instituto Nacional de Salud—INS)	Assistant Director, Prevention, Surveillance and Health Control Pública
Carolina Linares	Colombian Agricultural Institute (Instituto Colombiano Agropecuario—ICA)	Specialized Professional
Jairo Angulo Negrette	Ministry of Agriculture and Rural Development (Ministerio de Agricultura y Desarrollo Rural)	Surveillance Epidemiologist
Javier Fernando Medina Villalba	Ministry of Agriculture and Rural Development (Ministerio de Agricultura y Desarrollo Rural)	Specialized Professional
Claudia Rodríguez	Ministry of Environment and Sustainable Development (Ministerio de Ambiente y Desarrollo Sostenible)	Contractor
Laura Castro	National Institute for Drug and Food Surveillance (Instituto Nacional de Vigilancia de Medicamentos y Alimentos—INVIMA)	Specialized Professional
Cesar Alfonso Rodriguez Villamil	National Institute for Drug and Food Surveillance (Instituto Nacional de Vigilancia de Medicamentos y Alimentos—INVIMA)	Specialized Professional
Walberto Naranjo	Regional Autonomous Corporation of Magdalena (Corporación Autonoma Regional de Magdalena)	Specialized Professional

Advisors/Observers

Name	Organization	Title/Position
Sandra Alicia Reina Gómez	Ministry of Environment and Sustainable Development (Ministerio de Ambiente y Desarrollo Sostenible)	Specialized Professional
Arturo Díaz	Ministry of Health and Social Protection (Ministerio de Salud y Protección Social)	Specialized Professional
Andres Osejo	Colombian Agricultural Institute (Instituto Colombiano Agropecuario -ICA)	Specialized Professional
Edilberto Brito Sierra	Colombian Agricultural Institute (Instituto Colombiano Agropecuario—ICA)	Specialized Professional

Name	Organization	Title/Position
Patricia Fuya Oviedo	National Institute of Health (Instituto Nacional de Salud—INS)	Specialized Professional
Diego Ortíz Ortega	Agrosavia (Corporación Colombiana de Investigación Agropecuaria)	Investigator
Juan Pablo Pinedo Mendez	Regional Autonomous Corporation of Cundinamarca (Corporación Autonoma Regional de Cundinamarca)	Contractor
Andrea Paredes	Pan American Health Organization (PAHO) (Organización Panamericana de la Salud—Colombia)	Contractor
Maria Mercedes Muñoz Ramírez	Pan American Health Organization (PAHO) (Organización Panamericana de la Salud—Colombia)	Contractor
Victor Alberto Olano Martínez	Forest University (Universidad del Bosque)	Research Investigator
Reinel Vasquez	University of Cauca (Universidad del Cauca)	Research Investigator
Piedad Agudelo	CES University (Universidad CES)	Research Investigator
Camilo Antonio Guzman	University of Córdoba (Universidad de Córdoba)	Research Investigator
Julio Cesar Giraldo	INCCA University (Universidad INCCA)	Research Investigator
Marylin Hidalgo	Javeriana University (Universidad Javeriana)	Research Investigator
Gersain Rodriguez Toro	La Sabana University (Universidad de la Sabana)	Research Investigator
Natalia Cediel Becerra	La Salle University (Universidad de la Salle)	Research Investigator
Diego Soler	La Salle University (Universidad de la Salle)	Research Investigator
Jorge Enrique Gómez	Quindío University (Universidad del Quindío)	Research Investigator
Beatriz Gómez	Rosario University (Universidad del Rosario)	Research Investigator
Jorge Alberto Cortés Luna	National University of Colombia (Universidad Nacional de Colombia)	Research Investigator
Luis Polo	National University of Colombia (Universidad Nacional de Colombia)	Research Investigator
Luz Dary Acevedo	Wildlife Conservation Society	Leader, Health and Traffic
Alfredo Sanchez	-	External Advisor
Cecilia Saad Acosta	-	Research Investigator

Trained National Facilitators

Name	Organization	Title/Position
Andrea Tatiana Medina	Colombian Agricultural Institute (Instituto Colombiano Agropecuario—ICA)	National Project Coordinator
Fabiola Rodríguez Arevalo	Colombian Agricultural Institute (Instituto Colombiano Agropecuario—ICA)	Directorate of Animal Health Technical—Epidemiology
Alejandra Pinilla Farias	National Institute of Health (Instituto Nacional de Salud—INS)	Directorate of Public Health Risk Surveillance and Analysis—Zoonosis Referent

Name	Organization	Title/Position
Angélica Rojas Bárcenas	National Institute of Health (Instituto Nacional de Salud—INS)	Directorate of Public Health Risk Surveillance and Analysis—Zoonosis Referent
Flavio Garzón Romero	Ministry of Health and Social Protection (Ministerio de Salud y Protección Social)	Subdirectorate of Communicable Diseases
Karina Rodriguez	Ministry of Health and Social Protection (Ministerio de Salud y Protección Social)	Directorate of Epidemiology and Demography

External Facilitators and Other Key Staff

Name	Organization	Title/Position
Casey Barton Behravesh	Centers for Disease Control and Prevention, One Health Office	Director
Grace Goryoka	Centers for Disease Control and Prevention, One Health Office	Program Analyst
Radhika Gharpure	Centers for Disease Control and Prevention, Waterborne Disease Prevention Branch	Epidemic Intelligence Service Officer
Italo B. Zecca	Centers for Disease Control and Prevention, One Health Office	Epidemiologist
Amihan F. Crisostomo	Centers for Disease Control and Prevention, One Health Office	Global Health Monitoring & Evaluation Fellow

Core Planning Team

Name	Organization	Title/Position
Carlos Alberto Marin Correa	National Institute of Health (Instituto Nacional de Salud—INS)	Advisor
Franklyn Edwin Prieto Alvarado	National Institute of Health (Instituto Nacional de Salud—INS)	Director, Public Health Risk Analysis and Surveillance
Angelica Rojas Bárcenas	National Institute of Health (Instituto Nacional de Salud—INS)	Directorate of Public Health Risk Surveillance and Analysis—Zoonosis Referent
Alejandra Pinilla Farias	National Institute of Health (Instituto Nacional de Salud—INS)	Directorate of Public Health Risk Surveillance and Analysis—Zoonosis Referent
Diana Walteros Acero	National Institute of Health (Instituto Nacional de Salud—INS)	Deputy Director, Public Health Risk Analysis and Surveillance
Oscar Lozano	National Institute of Health (Instituto Nacional de Salud—INS)	Contractor
Grace Goryoka	Centers for Disease Control and Prevention, One Health Office	Program Analyst
Casey Barton Behravesh	Centers for Disease Control and Prevention, One Health Office	Director
Radhika Gharpure	Centers for Disease Control and Prevention, Waterborne Disease Prevention Branch	Epidemic Intelligence Service Officer

APPENDIX C: Final Ranked Zoonotic Disease List for Colombia from the One Health Zoonotic Prioritization Tool

Rank#	Zoonotic Disease	Etiologic Agent	Raw Score	Final Score
1	**Avian influenza**	**Influenza A virus**	**0.907**	**1.000**
2	Plague	*Yersinia pestis*	0.872	0.961
3	**Brucellosis**	***Brucella* spp.**	**0.802**	**0.885**
4	**Leptospirosis**	***Leptospira* spp.**	**0.751**	**0.828**
5	Swine Influenza	Influenza A virus	0.750	0.827
6	**Western equine encephalitis**	**Western equine encephalitis virus**	**0.748**	**0.824**
7	Anthrax	*Bacillus anthracis*	0.740	0.816
8	**Zoonotic tuberculosis**	***Mycobacterium bovis***	**0.725**	**0.799**
9	**Rabies**	**Rabies virus**	**0.713**	**0.786**
10	**Eastern equine encephalitis**	**West Nile virus**	**0.709**	**0.781**
11	**Venezuelan equine encephalitis**	**Venezuelan equine encephalitis virus**	**0.655**	**0.722**
12	Q Fever	*Coxiella burnetii*	0.629	0.693
13	Psittacosis	*Chlamydia psittaci*	0.629	0.693
14	Echinococcosis	*Echinococcus granulosus*	0.611	0.674
15	Bovine spongiform encephalopathy	Bovine spongiform encephalitis	0.586	0.645
16	Cysticercosis Taenia solium	*Taenia saginatum*	0.572	0.631
17	Fascioliasis	*Fasciola* spp.	0.572	0.631
18	Listeriosis	*Listeria monocytogenes*	0.570	0.628
19	Cryptosporidiosis	*Cryptosporidium*	0.550	0.606
20	Giardiasis	*Giardia* spp.	0.550	0.606
21	Rickettsiosis	*Rickettsia* spp.	0.531	0.585
22	Toxocariasis	*Toxocara canis*	0.530	0.584
23	Hantavirus	Hantavirus	0.530	0.584
24	Borreliosis	*Borrelia* spp.	0.526	0.580
25	Toxoplasmosis	*Toxoplasma gondii*	0.520	0.573
26	Yellow Fever	*Yellow Fever virus*	0.519	0.572
27	Leishmaniasis	*Leishmania* spp.	0.495	0.545
28	Trichinosis	*Trichinella*	0.493	0.540
29	Salmonellosis	*Salmonella* spp.	0.477	0.526
30	**Eastern equine encephalitis**	**Eastern equine encephalitis virus**	**0.461**	**0.508**
31	Colibacillosis	*Escherichia coli*	0.452	0.498
32	Murine typhus—Typhus endemic	*Rickettsia felis, Rickettsia typhi*	0.451	0.497
33	Epidemic typhus	*Rickettsia prowazekii*	0.451	0.497

Rank#	Zoonotic Disease	Etiologic Agent	Raw Score	Final Score
34	Vaccinia	Vaccinia virus	0.451	0.497
35	Cryptococcosis	*Cryptococcus neofmans, Cryptococcus*	0.451	0.497
36	Histoplasmosis	*Histoplasma capsulatum*	0.451	0.497
37	Angyostrongiloidiasis	*Angiostrongylus* spp.	0.447	0.493
38	Ehrilichiosis	*Ehrlichia* spp.	0.401	0.442
39	Campylobacteriosis	*Campylobacter* spp.	0.373	0.411
40	Yersiniosis	*Yersinia enterocolitica*	0.372	0.410
41	Cowpox	Cowpox virus	0.372	0.410
42	Coccidioidomycosis	*Coccidioides* spp.	0.372	0.410
43	Bartonellosis	*Bartonella* spp.	0.368	0.406

Photo 10. Cityscape in Bogotá with tall, colorful buildings.

APPENDIX D: Criteria, Criteria Weights, and Questions Developed

1. **Epidemic/Pandemic Potential (Criterion weight = 0.356)**

   Question: Does the disease have epidemic or pandemic potential in the region?

   Answer:

   ☐ Pandemic in animals and humans (4)

   ☐ Epidemic and epizootic (3)

   ☐ Pandemic in animals or humans (2)

   ☐ Epidemic or epizootic (1)

   ☐ None (0)

2. **Severity (Criterion weight = 0.237)**

   Question: What is the lethality and sequelae caused by the disease in Colombia?

Lethality	
Humans	≥5% or sequelae
Domestic animals	≥10% or sequelae
Wild	yes or no lethality

   Answer:

   ☐ High lethality or sequelae in humans and animals (3)

   ☐ High lethality or sequelae in humans but not animals (2)

   ☐ High lethality or sequelae in animals but not in humans (1)

   ☐ Low lethality and no sequelae in humans and animals (0)

   Priority should be given to data from Colombia, otherwise regional/global data can be taken. Lethality defined with treatment in Colombia. If the disease or diagnosis does not exist, we use regional/global data.

3. **Socioeconomic and environmental impact (Criterion weight = 0.171)**

   Question: Does the disease affect animal productivity, public health, the ecosystem, and trade/tourism?

   Answer:

   ☐ 4 factors (4)

   ☐ 3 factors (3)

   ☐ 2 factors (2)

   ☐ 1 factor (1)

   ☐ No factor (0)

   Animal productivity = reduction of animal production; public health = # incapacities (days and $), $$TTO and social security; ecosystem = # species affected (wild, domestic), water, soil; trade = international trade or impacts on tourism.

4. Diagnostic capacity (Criterion weight =0.15578)

Question: Is there the capacity to diagnose zoonotic disease in Colombia by clinical (suspected) or laboratory (confirmed) diagnosis in humans or animals?

Answer:

☐ None (4)

☐ Clinical or Laboratory in a single sector (3)

☐ Clinical and Laboratory in a single sector (2)

☐ Clinical or Laboratory in more than one sector (1)

☐ Clinical and Laboratory in more than one sector (0)

Clinical diagnostic = National protocol exists; Laboratory = in-country confirmatory test; Sectors = human, agriculture, environment/wild. If more than one sector has clinical or laboratory diagnosis and another has only clinical or laboratory diagnosis, select the lowest value. If there are clinical and laboratory diagnosis in different sectors, this received a value of 2.

5. Multi-sectoral collaboration (Criterion weight = 0.080689)

Question: Is there more than one sector in the country that performs these activities for the disease:

(1) surveillance

(2) prevention (vaccination or testing)

(3) control (treatment-cure or isolation/quarantine or sanitary euthanasia)

Answer:

☐ None (3)

☐ One of three (2)

☐ Two of three (1)

☐ Three out of three (0)

Represents more possibilities for collaboration

REFERENCES

1. Avila-Granados, L.M., et al., Brucellosis in Colombia: *Current Status and Challenges in the Control of an Endemic Disease*. Frontiers in veterinary science, 2019. 6: p. 321–321.

2. Guarnizo, P.L., *Descriptive study of the prevalence of brucellosis in humans in Colombia from 2000 through 2012*. Revista de Medicina Veterinaria, 2014. 28: p. 67–79.

3. WHO, *Cumulative number of confirmed human cases for avian influenza A (H5N1) reported to WHO, 2003–2020*, in *Cumulative number of confirmed human cases of avian influenza A (h5N1) reported to WHO*, W.H. Organization, Editor. 2020, World Health Organization: World Health Organization.

4. Karlsson, E.A., et al., *Prevalence and characterization of influenza viruses in diverse species in Los Llanos, Colombia*. Emerging microbes & infections, 2013. 2(4): p. e20–e20.

5. Gaitonde, D.Y., F.C. Moore, and M.K. Morgan, *Influenza: Diagnosis and Treatment*. Am Fam Physician, 2019. 100(12): p. 751–758.

6. Swayne, D.E. *Avian Influenza*. MSD Veterinary Manual [cited 2020 February 5].

7. Carreno, L.A., D. Salas, and K.B. Beltran, *[Prevalence of leptospirosis in Colombia: systematic literature review]*. Rev Salud Publica (Bogotá), 2017. 19(2): p. 204–209.

8. Rivas, F., et al., *Epidemic Venezuelan Equine Encephalitis in La Guajira, Colombia*, 1995. The Journal of Infectious Diseases, 1997. 175(4): p. 828–832.

9. Guzmán, C., et al., *Eco-epidemiology of the Venezuelan equine encephalitis virus in bats of Córdoba and Sucre, Colombia*. Acta Trópica, 2019. 191: p. 178–184.

10. Martínez JC, l.C., Valbuena YA, *La importancia de investigar Mycobacterium bovis muestras clínicas de procedencia humana*. Biomédica, 2019. 39: p. 117–24.

11. Leal-Bohorquez, A.F., et al., *[Tuberculosis caused by Mycobacterium bovis in workers of bovine tuberculosis sanitation farms in Antioquia, Boyaca and Cundinamarca]*. Rev Salud Publica (Bogotá), 2016. 18(5): p. 727–737.

12. Ospina Martínez, M.L.P.A., F.E. Pacheco García, O. Quijada Bonilla, H., *Semana epidemiológica 14, in Boletín Epidemiológico Semanal*. 2019, Instituto Nacional de Salud.

13. Garavito, C., Gilmore, R.L., et. al. *Colombia*. 2020 February 11, 2020 [cited 2020 February 12]; Available from: https://www.britannica.com/place/Colombia.

14. Colombia, P.N.N.d. *Sistema de Parques Nacionales Naturales*. 2020 [cited 2020 February 12]; Available from: http://www.parquesnacionales.gov.co/portal/en/

15. (FAO), F.a.A.O.o.t.U.N. *FAO STAT: Columbia*. 2018; Available from: http://www.fao.org/faostat/en/#country/44.

16. Administration, I.T. *Columbia Commercial Guide: Agricultural Sector*. 2019 October 13, 2019 [cited 2020 February 12]; Available from: https://www.trade.gov/knowledge-product/colombia-agricultural-sector.

17. Atlas, G.F. *Forest Governance—Columbia*. [cited 2020 February 12]; Available from: https://globalforestatlas.yale.edu/amazon-forest/forest-governance/forest-governance-colombia.

Photo 11. Caño Cristales, "The River of Five Colors", in the National Park Serrania de la Macarena.