Zoonoses in the Bolivian Amazon: Alarming Initial Results from a One Health Initiative

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IMED 2018
Vienna - November 10, 2018
The working area

- Bolivia
- Amazon region (northern part of the country)
- La Paz Department
- Tacana People indigenous territory
- 2 Tacana communities: Buena Vista and Tumupasa
The Tacana indigenous territory
The Tacana indigenous territory (cont.)
Leptospirosis

Marr J. & Cathey J. 2010
NETCAP Project

**NETCAP:** Participatory & cross-sectorial pilot project to prepare networks and capacities for control of diseases spreading between animals and humans in rural communities.

Objectives: Develop **sustainable health solutions** for humans, domestic animals, wildlife and local ecosystems.
Methods and Materials

- Knowledge
- Awareness
- Engagement

Improved:
- Livelihood
- Production
- Health

- Diseases detection
- Surveillance
- Preparedness

- Diseases control
- Connectivity
- Trust

Research

Citizen engagement

Capacity building
Methods and Materials (cont.)

<table>
<thead>
<tr>
<th>Level of Coordination</th>
<th>Public Health Sector</th>
<th>Animal Health Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>PNETRs – MS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Rodent Borne Diseases National Program – Ministry of Health)</td>
<td></td>
</tr>
<tr>
<td>Regional (La Paz Department)</td>
<td>SEDES LP</td>
<td>SENASAG LP</td>
</tr>
<tr>
<td></td>
<td>(La Paz Department Health Service)</td>
<td>(National Veterinary Service – La Paz Service)</td>
</tr>
<tr>
<td>Local/Tacana Indigenous Territory</td>
<td>- Local Health Network – SEDES LP</td>
<td>- SENASAG SBV</td>
</tr>
<tr>
<td></td>
<td>- SBV Hospital</td>
<td>- DDR – GAM SBV (Rural Development Direction – SBV Municipality)</td>
</tr>
<tr>
<td></td>
<td>- DDH – GAM SBV (Rural Development Direction – SBV Municipality)</td>
<td>- NNRR CIPTA (Tacana Indigenous People Council)</td>
</tr>
<tr>
<td></td>
<td>- CIPTA Directory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- CIMTA Directory</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>- Tumupasa and Buena Vista Health Centers and authorities</td>
<td>- Animal holders/ Farmers</td>
</tr>
<tr>
<td></td>
<td>- Family members</td>
<td></td>
</tr>
</tbody>
</table>
### Methods and Materials (cont.)

<table>
<thead>
<tr>
<th>Community</th>
<th>Nº animals sampled/species</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bovine</td>
<td>Porcine</td>
</tr>
<tr>
<td>Tumupasa</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Buena Vista</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>37</td>
<td>13</td>
</tr>
</tbody>
</table>
## Community Sampled

<table>
<thead>
<tr>
<th>Community</th>
<th>Nº individuals sampled</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Tumupasa</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Buena Vista</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Methods and Materials (cont.)
Methods and Materials (cont.)
Results

High proportion of human serum samples contain IgM antibodies directed against *Leptospira* spp. (acute infection).
Results (cont.)

Even higher proportion of PCR-tests of urine samples from humans were Leptospira-positive.

Leptospira sp. in human urine (n=66)

<table>
<thead>
<tr>
<th>Positivos</th>
<th>Negativos</th>
</tr>
</thead>
<tbody>
<tr>
<td>60%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Leptospira sp. in human urine - Tumupasa (n=42)

<table>
<thead>
<tr>
<th>Positivos</th>
<th>Negativos</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Leptospira sp. in human urine - Buena Vista (n=24)

<table>
<thead>
<tr>
<th>Positivos</th>
<th>Negativos</th>
</tr>
</thead>
<tbody>
<tr>
<td>46%</td>
<td>54%</td>
</tr>
</tbody>
</table>
High proportion of PCR-tests of urine samples from animals were Leptospira-positive.
Results (cont.)

Analysis of reported clinical symptoms and some potential risk factors:

• Being **leptospira positive in urine** PCR-test is significantly associated with **back pain** (dorsalgia) even after adjusting for age, gender and occupation.

• Multivariable statistical analysis showed that being **seropositive for lepto** was associated with **having more than one dog, having chickens, working in farm or forest** as opposed to working at home or in an office/shop (need of reassessment on a larger dataset adjusting for clustering effects of family and village).

• **Observing rodents** was not associated with being test positive (maybe because observation is uncertain and rodents are present in many places in both villages).
Results (cont.)

- Other important zoonotic diseases detected in the human samples:
  - Hantavirus (serology)
  - Cysticercosis (serology)
  - *Aerococcus* sp. (PCR)

- No evidence of circulation of *Trypanosoma cruzi* or other hemoparasites was observed in the human samples.
Conclusions

• Before this study, Leptospirosis was not considered in differential diagnosis of fever cases in the San Buenaventura Municipality (unreported disease);

• An important amount of people reported either being ill or having been ill recently (mix of fevers, headaches, muscle pain and others). Those symptoms could be related to both Leptospirosis, Hantavirus but also Dengue;

• Information meetings are been held in the local communities as well as between the health institutions and workers;

• A participatory integrated health intervention strategy is being discussed between partners in the initiative;
Conclusions (cont.)

• Efforts are urgently needed to:

  o Identify the strains of *Leptospira* sp. circulating in domestic animals and humans (Are they the same?);

  o Develop diagnostic tools (easy to use and cheap) for its use in remote tropical areas;

  o Disseminate health information among the Tacana and non-Tacana population along the San Buenaventura Municipality, to prevent and control zoonotic diseases such as Leptospirosis, Hantavirus and Cysticercosis.
RIESGO DE INUNDACIÓN EN EL MUNICIPIO DE SAN BUENAVENTURA

Eventos de inundación
- Evento de inundación (2007)
- Evento de inundación (2008)
- Evento de inundación (2014)

Capitales municipales
- Capital municipal
- Centros poblados
- Limites municipales
- Municipio de San Buenaventura
- Ríos principales
- Territorios indígenas

Tablas de eventos de inundación
- Tabla de eventos de inundación (2007)
- Tabla de eventos de inundación (2008)
- Tabla de eventos de inundación (2014)

Mapa de eventos de inundación
- Mapa de eventos de inundación (2007)
- Mapa de eventos de inundación (2008)
- Mapa de eventos de inundación (2014)
Acknowledgements

• Instituto de Investigación Técnico Científica de la Universidad Policial (IITCUP)
• Unidad de Parasitología, Medicina Tropical y Medio Ambiente (UPAMETROP) del Instituto de Investigación en Salud y Desarrollo (IINSAD) – Universidad Mayor de San Andrés (UMSA)
• Consejo Indígena del Pueblo Tacana (CIPTA)
• Consejo de Mujeres Tacana (CIMTA)
• Servicio Departamental de Salud – La Paz (SEDES LP)
• Servicio Nacional de Sanidad Animal e Inocuidad Alimentaria – Distrital La Paz (SENASAG – LP)
• Gobierno Autónomo Municipal de San Buenaventura (GAM SBV)
• Sub-Alcaldía de Tumupasa (GAM SBV – Tumupasa)
• Corregimiento de la comunidad de Tumupasa
• Corregimiento de la comunidad de Buena Vista
• Hospital de San Buenaventura
• Centro de Salud – Tumupasa
• Centro de Salud – Buena Vista
• Programa Nacional de Enfermedades Transmitidas por Roedores – Ministerio de Salud (PNETRs – MS)
• Wilmer Cruz Huanco and Paola Apaza Huanco (Veterinary School – UPEA), Rosario Barradas and Indira Fessy