Determining project feasibility and assessing the

House

Water Chlorination and Health Education: Collaboration to Decrease Water Contamination and Water-Related Illnesses in Rural Peru

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BACKGROUND

Students and faculty from Public Health Without Borders (PHWB) and Engineers Without Borders (EWB) worked collaboratively to conduct qualitative and quantitative research in a rural Andean community.

- Componé is a small community of approximately 800 farmers located in the Southern Highlands of Peru.
- Members of the community identified improved health education and improved access to clean water as health priorities.

METHODS

The project consisted of three phases (Fig. 1):

1) Determining project feasibility and assessing the health needs of the community.
2) Implementing a water chlorination system and educational health interventions.
3) Evaluating impact of the intervention.

WATER CHLORINATION SYSTEM:

Extensive field water testing revealed the presence of known disease causing microorganisms that spread gastro-intestinal illnesses from water-borne viruses, bacteria, and cysts.

- In January 2014, a water chlorination system was constructed in the sector of Ayllu San Isidro.
- Five water samples were collected from different points of the water distribution network around the community of Ayllu San Isidro to measure levels of E.coli and fecal coliform.
- In-person interviews, educational workshops, and focus group sessions were conducted with members of the community.

MATERIALS:

- Health educational curriculum (workbooks and flyers) on oral rehydration therapy, proper water use, and basic hygiene.
- An electric chlorometer was used to collect and measure water samples.

RESULTS

WATER TESTING

- In phase 1, water samples tested positive for E.coli and fecal coliform.
- 18 months after the implementation the water tested negative for bacterial contamination.

Table 1.1: January 2013 ASI Water Analysis before water chlorination system

<table>
<thead>
<tr>
<th>Test Number</th>
<th>1- Spring Box</th>
<th>2- House B</th>
<th>3- House C</th>
<th>4- House D</th>
<th>5- House Next to Church</th>
<th>EPA Standards (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliforms</td>
<td>NMP 64/100ml</td>
<td>NMP 14/100ml</td>
<td>NMP 23/100ml</td>
<td>NMP 75/100ml</td>
<td>NMP 64/100ml</td>
<td>0</td>
</tr>
<tr>
<td>Fecal Coliforms</td>
<td>4.4*10 ufc/ml</td>
<td>6*10 ufc/ml</td>
<td>3.5*10 ufc/ml</td>
<td>5*10 ufc/ml</td>
<td>1.5*10 ufc/ml</td>
<td>0</td>
</tr>
<tr>
<td>E. Coli</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1.2: January 2015 ASI Water Analysis 18 months after implementation of chlorination system

<table>
<thead>
<tr>
<th>Test Number</th>
<th>1- Spring Box</th>
<th>2- House B</th>
<th>3- House C</th>
<th>4- House D</th>
<th>5- House Next to Church</th>
<th>EPA Standards (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliforms</td>
<td>NMP 36/100ml</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Fecal Coliforms</td>
<td>2x102 ufc/ml</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>E. Coli</td>
<td>Positive</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>0</td>
</tr>
</tbody>
</table>

HEALTH CLINIC

- The number of diarrhea related visits to the health clinic dropped.
  - In 2013 there were 7 cases of diarrhea related visits (4 children and 3 adults).
  - In 2014 there were 3 cases of diarrhea related visits (2 children and 1 adult).

IN-PERSON INTERVIEWS

- Members of the community report that they understand how water chlorination systems function. However, interviewees note that they sometimes still boil water due to cultural practices and habit.
- “Having clean water is the first step to develop our community. We are far behind the rest of the world, but we are willing to learn and educate ourselves.”

CONCLUSIONS

Data collected throughout all phases of the project suggest that:

- Collaborative public health and engineering projects can have a positive impact on community health.
- Following implementation of the water chlorination system and health curriculum, the number of diarrhea cases decreased.
- After the success of the chlorination system, the Peruvian government implemented 5 other chlorination systems in nearby sectors.

LIMITATIONS:

Due to limited availability of waterborne illness data from the community and the health center, we cannot confirm a relationship between the decrease in diarrhea cases and the teams’ implementation of water chlorination and relevant health education.

FUTURE DIRECTION

- Our team will continue to engage with the community and evaluate the impact of the collaborative chlorination and health education projects.
- During an assessment trip in January 2015 the community expressed a need for projects focused on road safety and first.