Designing Healthier Households in Guatemala

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Background

Particulate matter levels in this region reach more than 100 times accepted levels (Von Ritter Figueres, 2010). The inhalation of these harmful emissions leads to high disease rates in rural areas.

<table>
<thead>
<tr>
<th>Guatemala</th>
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<tbody>
<tr>
<td>Growth Rate</td>
</tr>
<tr>
<td>1.86%</td>
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</tbody>
</table>

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Problem Statement

Each year, thousands of children and adults in Guatemala suffer or die from respiratory diseases due to the inhalation of indoor air pollution from biomass burning. Families in this area are unaware of the harmful impacts of open fire cook stoves, and are unable to afford a safer option.

Studies

- We found many case studies that focused on the relation between indoor air pollution and:
  - Loss of life years
  - Rate of disease
  - Breathing problems
  - Infant birth weight
  - Death rates
- We also found pilot studies for modified stove implementation.

Process

We shaped our solution based on current stove designs in such a way that it is adaptable to a wide range of households. We then decided to build a prototype of the stove to find any flaws or difficulties in our design, which led to some modifications and improvements.

The 4-Step Stove - La Estufa de Cuatro Pasos

- Efficient wood burning
- Elevation
- Ventilation
- Table/workspace
- Optional modifications
- Fire bricks for warmth
- Easy to build/repair
- Build-on/upgradable approach (levels)
  - Price increases with level

<table>
<thead>
<tr>
<th>Level</th>
<th>Provides</th>
<th>Total Price (Quetzals)</th>
<th>Total Price (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Efficient Wood Burning</td>
<td>Q 177.80</td>
<td>$22.99</td>
</tr>
<tr>
<td>2</td>
<td>Elevation</td>
<td>Q 188.51</td>
<td>$24.37</td>
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<tr>
<td>3</td>
<td>Ventilation</td>
<td>Q 265.91</td>
<td>$34.37</td>
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<td>4</td>
<td>Table/Workspace</td>
<td>Q 381.62</td>
<td>$49.33</td>
</tr>
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</table>

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References