Introduction
Three intestinal helminths: roundworms (Ascaris lumbricoides), whipworms (Trichuris trichiura), and hookworms (Ancylostoma duodenale and Necator americanus) are the main intervention strategy for reducing the occurrence of STH in children living in highly endemic areas. Typically, deworming programs administer single-dose tablets of either Albendazole (ALB) or Mebendazole (MBZ).

This regimen of treatment against Trichuris infection may not be optimal. Several studies have demonstrated that both drugs have low efficacy against this parasite. As seen in Table 1, a recent meta-analysis found an overall cure rate of 43.6% and 23.0% for ALB and MBZ, respectively.

In Honduras, deworming campaigns have been in place for several years but a structured nation-wide program for school-age children (single-dose ALB or MBZ/twice a year) only started in 1998.

National prevalence studies in Honduras have been conducted in 2001, 2005 and 2011. As the graph below shows there is a decrease in STH infections; however, this decrease is likely not solely attributable to the chemotherapy.

Objectives
- To study gender-specific determinants of STH in school-age children in rural Honduras.
- To determine risk factors for STH infection.
- To indirectly evaluate deworming effectiveness by comparing the occurrence of STH in children who had previously been dewormed with children who had not.
- To assess deworming effectiveness at school level.

Methods
The study was conducted between February and March 2011 in eight schools in three rural areas of Catacamas, Department of Olancho, Honduras. Enrolled students in grades three to five were asked to provide one stool specimen and answer a standardized questionnaire for retrieving epidemiological data. Anthropometric measurements were taken to evaluate children’s nutritional status and growth.

Statistical analyses including univariate Chi square, t-test, correlation and multiple logistic regression were performed using SPSS (v.20); SPSS Inc., Chicago, IL.

Results
A total sample of 320 children (aged 7-14, Mean= 9.8) enrolled in grades 3 to 5 completed the study; 48% were girls.

The overall STH prevalence was 72.5%, with 67%, 30% and 16% for Trichuris, Ascaris and hookworm infections, respectively (Figure 3).

The prevalence of STH by sex is described below.

Table 3. p-values obtained in multiple logistic regression of factors associated with STH infection

<table>
<thead>
<tr>
<th>Drug</th>
<th>p-value</th>
<th>Adjusted Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albendazole (400 mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichuris</td>
<td>0.002**</td>
<td>6.08 (3.10-12.02)</td>
</tr>
<tr>
<td>Hookworms</td>
<td>0.148</td>
<td>1.25 (0.71-2.20)</td>
</tr>
<tr>
<td>Mebendazole (160 mg)</td>
<td>0.028**</td>
<td>4.94 (1.08-22.90)</td>
</tr>
<tr>
<td>Trichuris</td>
<td>0.446</td>
<td>1.00 (0.51-1.95)</td>
</tr>
<tr>
<td>Hookworms</td>
<td>0.239</td>
<td>1.25 (0.58-2.70)</td>
</tr>
</tbody>
</table>

The prevalence of STH by sex is described below.

Table 2. Prevalence of STH in school-age children by sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Trichuris</th>
<th>Ascaris</th>
<th>Hookworms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>30%</td>
<td>67%</td>
<td>16%</td>
</tr>
<tr>
<td>Boys</td>
<td>25%</td>
<td>65%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Infection intensity is shown in Figure 4. About 73% of Trichuris infections were light (Mean= 806.9 ± 4269.8 epg) as were 94% of hookworms infections (Mean= 102.9 ± 593.4 epg); whereas 54% of Ascaris infections were moderate (Mean= 4592.7 ± 12585.5 epg).

Figure 5 depicts risk factor analyses specifically for Trichuris showing that open defecation was more strongly associated with trichuriasis than deworming alone.

Conclusions
- Despite previous deworming treatment, the prevalence of STH remained high in the study population.
- A single-dose ALB/MBZ regimen twice a year seems to be more effective against Ascaris and hookworms but not Trichuris infections.
- Honduras’ deworming program would benefit from monitoring not only nation-wide STH prevalence but also from assessing parasite-specific response as well as community-specific risk factors in order to adjust control strategies aimed at reducing STH burden in the country.
- Studies are needed in Honduras to determine the long-term impact of deworming programs.

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