Reviewer's report

Title: Water purification and sanitation infrastructure is predictive of diarrheal disease burden in remote Nicaragua

Version: 1 Date: 3 September 2010

Reviewer: Brendan Flannery

Reviewer's report:

The manuscript is clearly written and provides information about diarrhea prevalence in a marginalized population with limited access to health care in an isolated region in Nicaragua. Major comments are related to the analytical design and previous work on use of water purification or treatment methods.

Major Compulsory Revisions:

1. The analytical design considers the household as the unit of analysis but does not adjust for the number of household occupants included in the survey. The statistical analysis could be done using PROC PHREG or other methods to adjust the household prevalence of diarrhea in the past 2 weeks by the number of household occupants.

2. The methods regarding collection of data on water treatment need to be specified. What questions were asked regarding use of treatment prior to drinking water? Were these multiple choice questions, or semi-quantitative (i.e. sometimes, always, never). Were multiple questions asked about each type of treatment to increase validity of response (i.e. asking if they used the treatment the most recent time they retrieved water). Were there any inspections to see what kind of filters were used or what conditions they were in, or to see if chlorine was available in the household at the time of the interview?

3. The survey did not find a statistically significant protective effect of use of chlorine or water filters, although the prevalence of diarrhea tended to be less in households that reported treating their drinking water. Authors should include a discussion of this finding--various methods of water treatment have been found to reduce the incidence of diarrhea and the authors should provide additional references. Depending on how the use of water treatments are measured (i.e. self-report versus observation), findings may differ--literature on measurement of water treatment methods should be discussed as they may be relevant for interpretation of these findings.

4. Conclusions may overemphasize importance of latine overflow as a marker, whereas latine overflow may be related to other factors. More careful analysis may help to inform interventions beyond better construction of latrines.

Minor Essential Revisions:
1. Study design, page 4: Explain "compass" method (i.e. going to the center of a village and spinning a bottle). Mention whether design was assumed to be self-weighting. Because EPI cluster survey was designed for sampling children less than 5 years, it is not clear whether it is a self-weighting design when choosing 7 households.

2. Statistical analysis, page 6: Use of prevalence differences is uncommon. Authors should explain the measure and the normal distribution assumption for using this as a dependent variable in linear regression. How were 95% confidence intervals calculated for this measure?

3. Explain "directed acyclic graphs" and how they are used to identify potential confounders

4. Results, page 6: "16 randomized and selected communities" not clear--assume these are 16 communities selected using probability proportional to estimated size, including 30 clusters.

Discretionary Revisions:

1. Background, page 3, consider using "study area" rather than RAAN to avoid this unfamiliar abbreviation

2. Background, page 3, rather than using "crossfire", give specifics and include a reference for the civil conflicts

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests.