A geospatial analysis was conducted on primary data from a cluster randomized control trial (RCT) to examine the relationship between the spatial distribution of households & use of the HWTS technology by the index HH. This trend suggests that HHs closer to the index HH predicted HWTS use; additionally, a possible “threshold effect” with 4 or more HH also predicts HWTS use.

**Gift of Water**

Gift of Water (GoW), is a US-based non-governmental organization dedicated to providing filtered and treated drinking water to the third world communities that it serves. GoW began working in Haiti in 2005 to provide a treatment bucket purifier that uses chlorine tablets together with polypyrrole filters & activated carbon to deliver high-quality drinking water (GoW). GoW is currently working in over 100 rural communities across Haiti, including Belladonne commune.

**Data Collection**

- **Surveys captured demographic & health information about the HH & its inhabitants; follow-up surveys also asked about use, maintenance of the HWTS.**
- **Enumerators also collected samples of drinking water from the top & bottom bucket of the water filter to test for free chlorine residual (FC), a measure of whether the water had been treated with chlorine within the previous 24 hours.**
- **Spatial coordinates for HHs were captured using Garmin eTrex Legend hand-held GPS units.**
- **Paper surveys were administered & later entered into an Excel database.**

**Geospatial Analysis**

Spatial distribution of HHs served as a proxy for measuring “social support.” This was calculated by stratifying the proximity of other surveyed HH with verified use that lay within the various buffer zones around each index HH, obtained to produce the crude estimates of household density. HH density was separated into 4 categories: 1) HH within buffer zone; 2) HHs within buffer zone; 3) HHs within buffer zone; and, 4) or more HHs within buffer zone.

**Statistical Analysis**

- **After extracting the number of households with verified use of the HWTS technology across varying radii lengths & across the different categories for HH-density, Fisher’s Exact Test was used to determine whether HH density was a statistically significant predictor (p<0.05 & p<0.10) of HWTS use in the index HH.**
- **The spatial distribution among users was shown to be more geographically isolated than HHs with verified HWTS use. Results from significant testing, (p<0.05 & p<0.10) confirmed this relationship. (Table 1) Across the increasing buffer radii, when there were 4 or more HHs within the buffer zone, index HHs were more likely to use the HWTS indicating a possible “threshold effect” for adoption.**

**RESULTS**

There were a total of 338 HHs who received the GoW HWTS intervention. Of these HHs, 244 HHs had both a GPS location & FCR test results at Follow-Up 1; 230 HHs had both a GPS location & FCR test results at Follow-Up 2; 230 HHs had both a GPS location & FCR test results at Follow-Up 3; and, 225 HHs had both a GPS location & FCR test results at Follow-Up 4. Due to similar HWTS use rates across the control & experimental groups, data was pooled for treatment comparisons to examine the outcomes of interest. Results for confirmed vs. correct use across the follow-up show a reduction in both confirmed use & correct use over time among study HHs. The spatial distribution among users (Figure 3) shows that non-users, both measured by confirmed & correct use, were more geographically isolated then HHs with verified HWTS use. Results from significant testing, (p<0.05 & p<0.10) confirmed this relationship. (Table 1) Across the increasing buffer radii, when there were 4 or more HHs within the buffer zone, index HHs were more likely to use the HWTS indicating a possible “threshold effect” for adoption.

**DISCUSSION & CONCLUSIONS**

Overall, the exploratory geospatial analysis provides evidence of an association between the spatial distribution of households & use of the HWTS technology by the index HH. This trend suggests that HHs closer to the index HH predicts HWTS use; additionally, a possible “threshold effect” with 4 or more HH also predicts HWTS use.

**Limitations**

The following issues preclude our ability to develop more robust methods of analysis, such as regression models, and move beyond an exploration to association or causation between our variables.

- This was a retrospective secondary analysis so we were restricted to the original data collected during the training period.
- Between a 1/3 to a 1/2 of the HHs in this evaluation were missing GPS coordinates or FCR test results, significantly diminishing the sample size for analysis.
- In both communities, not all HHs received the HWTS technology. For non-surveyed HHs, we have no data on their HWTS behaviors, nor their GPS locations within the communities. It is possible that HHs behaviors of these HHs might influence & confound any relationship we see within the data.
- Spatial distribution serves as a proxy for social support, but we have no data on the actual social network relationships between HHs within the two communities and therefore quantify peer influence as social support.

**Conclusions**

There is a paucity of knowledge about the behavioral determinants of HWTS adoption in real-world program implementations. Our results suggest that community-based modalities for adoption may more effectively foster adoption of HWTS adoption over time. Furthermore, geospatial methods are a promising new approach to studying behavioral determinants of long-term HH technology adoption.

**REFERENCES & ACKNOWLEDGEMENTS**

**Figure 1**. Geospatial mapping of HHs served as a proxy for measuring “social support.” This was calculated by stratifying the proximity of other surveyed HH with verified use that lay within the various buffer zones around each index HH, obtained to produce the crude estimates of household density. HH density was separated into 4 categories: 1) HH within buffer zone; 2) HHs within buffer zone; 3) HHs within buffer zone; and, 4) or more HHs within buffer zone. The spatial distribution among users (Figure 3) shows that non-users, both measured by confirmed & correct use, were more geographically isolated than HHs with verified HWTS use. Results from significant testing, (p<0.05 & p<0.10) confirmed this relationship. (Table 1) Across the increasing buffer radii, when there were 4 or more HHs within the buffer zone, index HHs were more likely to use the HWTS indicating a possible “threshold effect” for adoption.

**Table 1**. HHs served as a proxy for measuring “social support.” This was calculated by stratifying the proximity of other surveyed HH with verified use that lay within the various buffer zones around each index HH, obtained to produce the crude estimates of household density. HH density was separated into 4 categories: 1) HH within buffer zone; 2) HHs within buffer zone; 3) HHs within buffer zone; and, 4) or more HHs within buffer zone. The spatial distribution among users (Figure 3) shows that non-users, both measured by confirmed & correct use, were more geographically isolated than HHs with verified HWTS use. Results from significant testing, (p<0.05 & p<0.10) confirmed this relationship. (Table 1) Across the increasing buffer radii, when there were 4 or more HHs within the buffer zone, index HHs were more likely to use the HWTS indicating a possible “threshold effect” for adoption.