Water and Sanitation Practices Surrounding Lake Bunyonyi Uganda

A general assessment and proposal for sanitation practices in Southern Uganda

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Introduction

Global Livingston Institute was created in 2009 by Jamie Van Leeuwen after traveling to Uganda as part of a Livingston Fellowship. Since that time hundreds of students have traveled with Global Livingston Institute to learn about international development in the developing world. In 2013 Global Livingston Institute completed work on Entusi, a resort that would serve as a community hub for community development, leadership, research, and the formation of new partnerships. The authors of this paper worked closely with Global Livingston Institute to complete the research described in this paper.

Water is critical for human life and for day to day activities. It is an important resource that needs to be protected. Access to clean water and basic sanitation can lead to healthier lives and the prevention of morbidity and mortality caused by diseases related to unclean water and poor sanitation practices. Worldwide at least 1.8 billion people are exposed to microbial contaminants in their water, and an estimated 2.4 billion people lack access to adequate sanitation (1). Of the top 20 health burdens for developing countries, unsafe water, sanitation and hygiene fall among the most important issues (2).

These three burdens: poor water quality, sanitation and hygiene account for at least 1.7 million deaths yearly. Most deaths occur in the developing world in which 90% are of children (2). The World Health Organization (WHO) estimates that 88% of the world's diarrhea is directly related to unclean water and sanitation practices; and in 2012, diarrhea was the fourth leading cause of death in Uganda killing 18,500 people (3). In Uganda, diarrhea causes 8% of the mortality rate in children under five years old (2). While diarrhea is an important disease issue, unsafe water can also lead to Typhoid, Cholera, Salmonellosis, and Giardiasis. Additionally, improper sanitation can also lead to hepatitis, rotavirus, and adenovirus (1). In Uganda, 21% of people lack access to safe water (~8 million people) and 87% do not have access to improved sanitation facilities (~32 million people) (4).

This research was conducted as part of class assignments and a capstone by students at Colorado State University, and the University of Colorado. The capstone serves as a final project cumulating the wealth of knowledge and skills learned in the Masters of Public Health Program. This research was not only important in finishing assignments for school but, as an opportunity to gain experience working on health issues in the developing world. This research will be used as a reference in the future for work done

addressing water and sanitation disparities in the developing world.

The purpose of this research project is to first observe and assess water and sanitation issues in rural Uganda around Lake Bunyonyi. This will be accomplished by using a questionnaire that assesses the potential for microbial disease in these communities due to water and sanitation practices. The second purpose of this project is to offer proposals and recommendations to help improve water and sanitation in these communities. Ideally, these recommendations will lead to lower rates of morbidity and mortality in the area surrounding Lake Bunyonyi and improve the overall quality of life.

Methods

Survey Development

W.A.S.H. Guidelines and protocols were researched to serve as a baseline set of questions and indicators that were pertinent for key informant interviews and assessment of the local villages. These questions were then reevaluated and reformatted to invoke the most in-depth response possible. Before interviews, Meetings with English-speaking Ugandan locals were important to help phrase questions appropriately and maintain cultural sensitivity. 23 Key informant interviews were conducted. This research was done over a two-month period. The first two weeks were used to research W.A.S.H. protocols and create the questions for key informant interviews. The next four weeks were used to set up interviews and conduct them. The final two weeks were for data analysis and the creation of this paper.

Village Selection

Village selection was based on a few main factors. First, villages were selected based on the community's receptiveness to engage with foreigners. Additionally, villages that had personnel such as health care workers and health officials were selected for these people's in depth knowledge about health issues in their community. Finally, the Global Livingston Institute's ties to the communities were heavily accessed due to its expedience of interactions and convenience of an established network rather than generating new connections.

Interview Respondents

Interviews were with a wide range of people, but the focus was to find people who could speak about their village as a whole in a general manner. Village leaders, village health team personal, school teachers and school administrators, and health clinic officers were interviewed. Some interviews were conducted with students and other willing participants in the community.

Interviews

During interviews, some questions that could be answered with a yes or no were not generating any useful data and were subsequently revamped and/or restructured. While a general questionnaire was used to guide the interviews, every person was not asked every question uniformly. Some questions were not pertinent with certain responses while some

questions are specific to women necessitating flexibility and adaptability during the interview process. These interviews were more of an open-ended discussion about water and sanitation within the village. The goal of the interviews was to let the community speak honestly about their interpretation of sanitation and hygiene habits. Some questions were rephrased because it was found that they were leading respondents into a specific answer rather than gaining useful information.

Most interviews generally lasted twenty to thirty minutes. Data extracted from these interviews may not be addressed specifically by the questionnaire as uniformly as generally desired by scientific standards. However, it is important to note that the issues encountered caused a natural evolution in the methods and questionnaire between the interviews. This evolution led to higher yields of valuable data.

Global Livingston Institute involvement

Global Livingston Institute was vital in the completion of this work. Staff members helped set up key informant interviews and were used to translate between English and the local language. GLI was used for its vast array of connections in the communities surrounding lake Bunyonyi. The staff served as reliable sources of insight in how to go about collecting data and how to format questions in a culturally sensitive manner. Global Livingston staff was also important in transportation, and getting the research team into the communities. Staff members who lived in some of these communities were used in the key informant interviews.

Results

Average income

Survey results found that most respondents claimed the average income was 5,000 shillings a day or less. While 5,000 was the average, respondents noted that variation in income among different families existed. Another common finding was the prevalence of people who are subsistence farmers. These farmers generate minimal amounts of money depending on how their crops do. If they have extra crops to sell, little profit is generated. However, many do not have enough to sustain their own families and selling crops is not an option. Alongside with the subsistence farmers, five respondents reported that the average earning a day was less than 3,000 shillings. This is considered by the W.H.O, the U.N, and the Millennium Development Goals as extreme poverty (5).

Price of soap

Most respondents surveyed agreed that soap is expensive within their community. While some respondents were not able to give an exact cost, the most common answer was a price ranging from 2,000- 5,000 shillings for a bar of soap. 2,000 shillings was for a lesser quality brand and a smaller size bar of soap. There were few responses of soap being 500-1,000 shillings, but this was for a very small bar. In general, these 500 shilling bars were enough soap to wash clothes for Sunday church.

Price of sanitary pads

The price of sanitary pads for women was 3,000 shillings according to most respondents. Depending on the location and availability at the market, the price range was from 2000 to 4,000 shillings from all respondents. The women interviewed claimed that there cost makes it difficult to afford. Respondents indicated that few women could afford pads, while most women used cloth strips layered multiple times that could be washed and reused.

Boiling of water

Most respondents claimed that water was boiled before use if they were using water from Lake Bunyonyi. A few respondents said they did not boil their water. When inquiring about the community as a whole, the most common response was that some people boil water, but the majority do not. Not boiling water was due to a multitude of different reasons according to the respondents.

- Access to firewood. If the local natural resources were limited in trees, difficulty in obtaining firewood would limit their ability to boil the water.
- Water source was considered safe. Such as a protected stream, a river, or their own rain water catchment system.
- Lack of knowledge. At schools near Lake Bunyonyi, children drank directly from the lake or streams without awareness to the associated health risks. Additionally, some people believed that boiling water could lead to getting sick with the flu.
- Normal habits. Two Village Health Team (VHT) workers claimed that people in the community had access to firewood and knew the importance of boiled water, however many or most did not. The VHT's attributed this to laziness and personal habits.

Hand washing

Hand washing prevalence was low when the respondents talked about practices happening in their community. Most respondents claimed that they personally washed their hands. Yet, of the villages assessed firsthand, only one village had a limited number of hand washing stations. Most other villages had no physical indicators of hand washing stations outside or around the latrines. The price of soap compared to the average daily income limited hand washing practices in communities in addition to the difficulty to water access. One VHT stated that in her village hand washing practices did not happen due to unawareness and lack of information on why, when, and how they should wash their hands. Three respondents claimed that some people used wood ash to wash their hands; however, this practice was not wide spread. At schools, hand washing was minimal. Schools have no hand washing stations set up and could not afford to provide soap to the children. One school had implemented a hand washing station, but the supplies were repeatedly stolen. From the schools visited and from members of schools interviewed it was found that if children wished to wash their hands at school they had to bring soap from home.

Distance from water and time spent collecting it

The distance from a water source varied from community to community. Some communities had water sources within a five-minute walk, while other communities the closest water source was 8km away. In general, most people were 1-2km from their water source. Most villagers resided higher up in the hills necessitating a walk down to the lake. Jerry cans averaged around 20L and were carried and supported on the head making for a strenuous activity. Respondents noted that the day's activities dictated the number of times needed to retrieve water which was usually between 3-6 times a day.

The average response for how long it takes to collect water was two to three hours daily. Depending on the source of water, collecting water could be an all-day activity. At some springs, if there was low water flow, the amount of time spent collecting could be up to four hours.

Source of water

Most of the respondents and the communities we visited partially relied on the lake for water. About half of the respondents reported having an additional source for water. These secondary sources included springs, and protected springs. These secondary sources were generally considered safer sources of water. The distance to the lake or the secondary source was a determinant of what source would be used. Another factor was convenience. people were more likely to chose the lake if they knew a line was forming at the spring. Lake water was used more during the dry season to compensate for low levels of water from springs. Five respondents stated that their community solely relied on the lake for water because there was not another source nearby. Three respondents claimed that they had a protected spring in which two of the villages were verified to have protected springs. One community had access to piped water at certain access points, but the water holding tank became inoperative three years ago and has not been repaired by the government.

Availability of water

For communities far away from the lake water availability decreased substantially during the dry season from July to September. Respondents stated with low water flow from streams and rivers it could take up to five hours to fill their jerry can. It was also noted, If the water was too muddy from the spring it was difficult to use. Water availability decreased in communities that had access to the lake during the dry season as well. Access to water from protected streams or springs decreased substantially causing many to rely on the lake more as a primary source during the dry season. During the rainy season water availability went up for all respondents. Some used pots or pans to collect rain water while some people had access to rain water catchment systems that allowed for water running off a house gutter to go into a collection tank.

Animal source of water

Most respondents stated that there was a different water source for animals and people. Lake Bunyonyi water consumers would also take their animals to the lake. Some respondents took their animals to a

spring, but claimed it was a different area of the spring downstream from the water for drinking purposes. One respondent stated that animals were taken to the base of the protected spring where people collect water from. Some interviewees mentioned a government decree that animals and humans should not drink from the same water source and that people could be heavily fined if caught bringing animals to the source for drinking water.

Illness

When asked about water-borne illness in their community most respondents mentioned dysentery, flu, typhoid and malaria. A VHT member and another health care official stated that people could contract malaria from water. Some interviewees mentioned cholera as a potential water- borne sickness. There were scattered responses of general symptoms such as stomach aches and headaches. When asked about the frequency of diarrhea, respondents claimed that it was much higher in children and during the rainy season. Some respondents believed that the frequency of diarrhea was high due to the lack of water boiling in their community. There were three cases in which people reported that there was no water-borne diseases affecting their community. A VHT answered that while there was no water borne illness in her community, she still highly recommended boiling water before use.

Sanitation education

Most interview respondents said they learned about sanitation and clean water in school, or from a VHT member. All respondents who were part of the VHT said that they taught people in their community about clean water and sanitation. There were mixed responses confirming if VHTs provided sanitation education. Some claimed that they learned about sanitation through the VHTs, while others said the VHTs mainly distributed medicine and made sure people had latrines. The teachers interviewed claimed that sanitation and clean water were built into the curriculum. One head master stated that he would have an assemble every Monday where he stressed the importance of clean water and sanitation practices to his school.

Recommendations

Soap production in communities to promote sanitation and as an economic opportunity

With the price of soap compared to the average daily income it is not surprising that hand washing practices are not common within these communities, however people have been making soap for hundreds of years. It is a very simple process which can be done with the boiling of wood ash to get lye, and then using animal fat and lye to produce soap. This process could be performed in the village setting. This would potentially lower the cost of soap and make soap affordable. The soap producer in the community could potentially sell soap to the whole community at a cheaper rate than the standard 2,500-5,000 shillings. This would help lessen the effects of disease transmission and be a source of economic benefit to the producer. In communities where most people are subsistence farmers,

soap could be traded for crops or other goods.

Implementing this would require a few different procedures. First, people would have to be taught how to make soap from basic ingredients. Since lye is a dangerous chemical, lye's hazardous potentials would need to be heavily emphasized and safety measure and protocols established for safe soap production. Determining steady access to animal fat and wood ash to produce soap would be another important aspect in implementation of a soap production plan. The soap producer would have to partner with people in their community to bring unconsumed animal fat or leftover wood ash to obtain the proper ingredients.

Since there is some risk associated with lye if G.L.I is not comfortable with teaching people this process an alternative idea would be to promote the use of wood ash as a soap substitute for hand washing. While some people surveyed used wood ash this practice is not wide spread.

Educational programs for VHT to strengthen their knowledge biological basis of disease

The VHT serves a highly important job in the community and are usually selected by the village council. The VHT's we interviewed were all trained at official government training seminars and went to annual events to learn more and discuss potential problems. The VHTs discussed how they carried out their duties and responsibilities within the community. Investment in extensive training of these VHTs could prove to be another worthwhile option to improve sanitation and hygiene in Uganda. Some VHTs interviewed had misinformation about disease spread and clean water. While these issues where not highly troubling, there exists the potential for improvement with consistent and accurate education. Additionally, it could prove highly effective to teach the VHTs about the biological basis of disease with production of educational materials for referencing. Information could include excerpts on different diseases, what they are, how to treat them, and what are the signs and symptoms. This information packet would hopefully enhance the VHTs ability to teach other people. It would also give them correct information on how to address false claims such as, "boiling water gives us the flu." Since the village health team is selected by the community these people have the respect and connections to illicit behavior change within their community. From the interviews it seemed like most people thought of the village health team as someone credible they could listen to. With further education and training the research team believes these people will be more effective in teaching people correct information, and helping change their behavior to potentially more sanitary and hygienic practices.

Continued work in school education on teaching clean water and sanitation

The school is an important place for learning about water and sanitation and reaching children at a young age to establish healthy habits. This education should be continued and stressed. Although some interviews articulated the that there was a high proportion of drop-out from schools, emphasizing the importance of general education about health topics such as clean

water and sanitation must be continually emphasized in the community.

School budgeting for soap and cleaning supplies, hand washing stations

The head masters did not budget for materials for like soap and cleaning supplies at their schools. This paper focuses on the information obtained through key informant interviews and possesses limited knowledge of the Ugandan government operations. However, a recommendation could be to request money from the government to provide soap and hand washing stations. While this request may not be granted by the government it is worthwhile to see if the government will provide funds for hygienic practices.

Community meetings addressing water and sanitation

A teacher emphasized that while teaching the children is important, it is ultimately the parent's decision on if they will boil their water. So while education in the school is important, community meetings addressing water and sanitation could a be valuable for these communities. This could help reach many who did not attend school or dropped out at a young age. Community meetings on water and sanitation could help educate people on how to minimize disease outcome and spread. While some respondents told us that there was a fine if you brought your animal to the human water source this was not present in all communities. Teaching people at the community level how to protect their water source would be highly useful. Additionally, having a community leader responsible for the community's water source could ensure that people are following guidelines, and prove critical in decreasing disease and establishing safe water procurement habits.

Communal hand washing stations that cannot be stolen

The implementation of hand washing stations could help improve people's hygiene practices. While things such as a tippy tap are very easy to use and construct we had a few responses that indicated that leaving a jerry can outside would result in someone stealing it. Integrating communal hand washing stations in communities that are studier and cannot be stolen is a possibility.

Slow sand filtration implementation and education on use and maintenance.

Slow sand filtration is an effective way to purify water before use. These systems can be set up in a large 75L plastic bucket. These systems require gravel, sand, and a spicket. The gravel can be substituted for rocks around 6-8cm diameter. The most difficult part in implementing these systems would be getting the correct plastic buckets to communities and installing them. Furthermore, people would have to be educated on how to use and upkeep these systems. While these systems can drastically reduce the microbial load they are not always 100% and can be ineffective against viruses.

Water scarcity

While water scarcity is an important issue during the dry season however there isn't a

low cost solution to fix this. This issue is exacerbated in communities for too far away from the lake to use it as a backup source during the dry season. Further research could be done on these community's water habits. Especially those habits during the dry season. There may be potential to teach people how to maximize the use of their water during the dry season. Until the government is able to supply piped water there are not a lot of viable (low costs and sustainable) options to improve water access.

Behavioral intervention

While education is extremely important in knowledge dissemination it is not the only factor. As noted in some of the responses people knew that they should boil their water, but they did not. This issue could be further researched as to what factors held people back from boiling their water. A behavioral intervention could use any of the recommendations above as components. This intervention should have a theory based approach to induce behavior change in the subject population. Perhaps using the health behavior model and trying to increase the perceived severity and perceived susceptibility of water borne disease could be effective. Getting people to change their behavior is hard and not always a linear pathway. If it were possible to go into communities and help every household set up a tippy tap alongside with some educational campaigns this could be effective in promoting hand washing. Our research team thinks that the convenient choice is often the easy choice. If most people had access to hand washing stations right next to their latrines this would lead to increases in hand washing practices.

Economic improvements

While this paper has focused on water and sanitation practices, an effective positive change does not happen in a silo. When a large population of people are making less than one USD a day, the ability to divert time and resources to learning about and implementing clean water and sanitation protocols are considerably minor issues to the respondents. However, concurrent projects with sustainable farming innovations are currently being explored. With successful implementation of these projects, these projects could serve as model plans for other communities. If people are in a better place economically this could lead to more time and resources available to be spent on clean water and sanitation.

Discussion

Selection bias

Our respondents were mainly key members in the community who were able to discuss their community and and the behavioral norms and practices of the community as a whole. The partnership with the Global Livingston Institute connected the researchers to people who were willing to engage and give valuable insight into their communities. In general, these respondents had higher levels of education, and therefore caused selection bias. Higher SES populations can potentially have different views than someone of low education and SES. While there is potential for this bias, the

overall commonality resides more in the aspect of general access and education to the community in Uganda. People who were not willing to engage or could not talk about the community as a whole provided little data.

Everyday community village members provided similar responses lending to limited perspectives to offer recommendations. Therefore, selecting individuals with a higher chance to make an impact on the community became an essential direction for the assessment of this project. For purposes, this selection bias is viewed as a positive factor rather than being a detrimental factor.

Translation bias and/or error

When interviewing people in different villages, a translator was needed in over 50% of the interviews. This could potentially skew the results in that what was asked and how the question was answered. In the early stages of the questionnaire's development with the translator, determining the right sentence structure was important. However, this became an issue only when they were potentially leading questions. Yet as the interview process evolved, it became more of a story from the respondents in which more questions were asked to clarify answers and retrieve important data for assessment and recommendation proposals.

About the authors

Evan Thompkins is a recent graduate from Colorado State University with a masters of public health in Global Health and Health Disparities. He is interested in global health and working on health disparities in the developing world. It is his goal to one day live in Africa and work full time on water and sanitation issues.

Jacinta Do is a 2017 graduate candidate for a dual major in MBA Health Administration and MS Management Organization from the University of Colorado Denver. She will be pursuing a career in Health Management both domestically and internationally to create sustainable health programs, with a focus on increased healthcare access and equity for all persons.

Biography

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Appendix

These are the questions used in the key informant interviews. Not every question was asked to every respondent. These questions served as a basis for gaining information in water and sanitation practices in these communities. The key informant interviews were more of a discussion, and opportunity for respondents to talk openly and honestly about their lives and what happens within their community. Therefor sometimes follow up questions and questions not listed in this appendix were asked and utilized.

General questions

Name & Village:

1. M/F
2. Age
3. Household size
4. Occupation / job
5. What are averages earnings in your area?

Water questions: "Tell us about your water access and use" How is water used within your community?

6. Where do you get your water from?
7. What is your water source? Do you get water from lake, spring, borehole?
8. How much time do you spend collecting water?
9. How much water do people fetch per day?
10. How do elderly or disabled people access water?
11. Are there periods of times when you don't have enough water?
12. How much livestock do you have if any?
13. How do you provide water for your animals? Do your animals use the same water source as you?
14. How do you store your water?
15. What kind of container do you use to collect water?
16. Do you do anything to water before use? (do you boil? important not to directly ask) - How often do you boil your water? Are there times you do not boil your water?
17. Do you collect rain water? -If so how?
19. Have you heard of any methods to clean your water?
20. Do you believe your water is safe to drink?

Diarrheal disease -what water related diseases/illness affect your community

21. What is the frequency of diarrhea?

22. What is the frequency of diarrhea in children?
23. Do other water borne diseases affect your community?
24. How do you treat diarrhea? At what point would you feel the need to see a doctor?
25. How does an episode of diarrhea affect your daily life?

Latrines tell us about how and where you go to the bathroom. How are latrines utilized within your community?

26. Where do you go to the bathroom?
27. Do you use a latrine?
28. Are there times when you don't use a latrine?
29. Are you familiar with latrine construction?
30. What do you use to clean yourself after using the bathroom?
31. Do you use toilet paper? How much would you be willing to pay for toilet paper?

Hand washing: "Tell is about your hygiene habits" what habits and practices happen within your community?

32. What are your normal bathroom habits?
33. Do you wash your hands?
34. What are times you feel like you need to wash your hands?
35. How often do you wash your hands?
36. Do you have access to soap? How much do you pay for soap?
37. How much would you be willing to pay for soap?
38. Do you use something else to wash with besides soap?

Bathing Hygiene: "Tell us about your hygiene habits, how do you wash yourself?"

39. How often do you bathe yourself?
40. Do you have facilities to wash yourself? designated areas to wash yourself?
41. What water source do you use to bath yourself?

Women's hygiene How do women deal with menstruation?

42. What do you use to collect menstrual blood?
43. Do you have access to tampons/ pads?
44. How do you dispose of tampons/ pads /menstrual instruments?
45. How does menstruation effect your day to day life?
46. Are you still able to perform all your daily tasks?
47. What would make your menstruation easier to deal with?
48. If you use cloth what water source do you use to clean the cloth?

Waste

48. How do people dispose of their waste/debris?

Sanitation Education

49. Where do people in your community learn about sanitation?
50. What kinds of information are taught and from who?