

ADVANCING HUMANITY in TANZANIA

2014 - 2015 Learning Community

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AN EXAMINATION OF THE VARIETY OF MODELS OF MICROFINANCE IN RURAL TANZANIA

Jeremy Taylor, McMaster Fellow, Tanzania 2014 – 2015

Introduction

Microfinance has quickly become a vanguard approach to providing rural populations with access to business capital. This trend is important because rural entrepreneurs are normally unable to take advantage of traditional lending sources. Banks and other mainstream institutions are reluctant to lend to rural operators for a number of reasons including improper bookkeeping, market volatility, and the informal nature of the prospective debtors' businesses. Thus rural entrepreneurs are often left "shut-out" from traditional lending markets and unable to expand their business. To combat this problem, many rural communities have established community-lending groups to provide local operators with varying amounts of credit.¹

In May 2014, the first McMaster team for Tanzania traveled to Mvomero. Mvomero is a rural farming community in Morogoro District. Mvomero is approximately 155 miles west of Tanzania's economic capital—Dar es Salaam—and 250 miles south of Arusha. Mvomero has a population of approximately 37,300 with a 1:1 male to female ratio.² Our visit to Mvomero provided our first opportunity to examine micro-lending practices in Tanzania. Community members in Mvomero had established a Village Community Bank ("ViCOBA") group. In this model, group members pay a membership fee and a weekly investment to the group. This money is held collectively and used to make small loans to group members. Borrowers are given six months to repay the loan principal and ten percent interest. After all loans are repaid, the money is divided and each group member receives a dividend payment. The Mvomero ViCoBA group is made up of a mixture of both genders and different business sectors, including farmers, seamstresses, and restaurant owners. Members reported using the loans to improve their businesses by purchasing new equipment, more supplies, and a variety of other means. Overall, respondents reported that the ViCOBA lending model was a positive and necessary part of their businesses.

In May 2015, the Tanzania McMaster team traveled to Katunguru. Katunguru is a small, primarily farming community located on the southwestern coast of Lake Victoria in northern Tanzania. The village is in Sengerama District, Mwanza Region. Katunguru has a population of approximately 20,000. Prior to departure, the team requested an opportunity to speak with a local ViCOBA group in the village. When we arrived, we discovered that Katunguru, despite having a smaller population than Mvomero, had approximately 14 different ViCOBA groups. We also learned that none of the groups followed the traditional ViCOBA model employed by the Mvomero group and around other areas of eastern Africa. Instead, each of the groups developed rules and lending practices that fit their particular needs.

Project Design and Methodology

This project consisted of oral interviews with leaders from each group. Interviews were conducted with the assistance of a translator either at members' business or in a village common area. Note takers were used to transcribe answers and each group was photographed. Questions were asked informally and respondents were given the opportunity to expand as much or as little as desired. Each group was asked questions about the following subject matters:

1. Group Name;
2. Membership Demographics;
3. Membership Requirements;
4. Lending Practices;
5. Group Capital;
6. Group Challenges; and
7. Group Goals.

Results and Discussion

Micro-lending practices in Katunguru are dramatically different than those practiced in Mvomero. The primary difference is that microfinance groups in Katunguru do not have diverse memberships. Instead, each group is made up of members that work in the same economic sector. For example, there are different groups for pig farmers, cabbage farmers, tailors, corn wholesalers, bean resellers, market vendors, and small retailers. These groups work very similarly to traditional guilds. Although competing against each other for a market share, individual members pay into the group and are willing to make loans to expand their competitors' business. This phenomenon was most readily observed during interviews conducted at the Katunguru local market. Members of the cassava sellers' group operated their stands all in the same area and openly competed against each other. Group members charged different prices for goods despite pooling financial resources. Despite the homogenous nature of group demographics, no groups reported that being part of a certain industry was an absolute

1 Ron Weber and Oliver Musshoff, "Price Volatility and Farm Income Stabilisation: Modelling Outcomes and Assessing Market and Policy Based Responses." Paper Presented at the 123rd EAAE Seminar, Dublin, Ireland February 23-4 2012.

2 National Bureau of Statistics. *2012 Census of the United Republic of Tanzania*, np. <http://www.nbs.go.tz>.



requirement for membership. Rather, most groups reported that—although all of their members work in the same field—their membership was open as long as one was able to pay the membership fees and dues. We encountered one individual that was an officer in several groups. When asked about his rationale, he responded that because he had resources investing in various groups provided him an opportunity to make money.

Lending practices and the use of group funds differed slightly between groups. Some groups—such as the pig farmers, cabbage farmers, and women’s groups—used membership dues to invest in group businesses. Although individual members could request loans, portions of all dues were used to generate capital for the group. The pig farmers, for example, used their group dues to manage and operate a group pig farm. They hired a full-time caretaker to oversee the operations. When asked if the group farm competed with their individual farms, the president responded that the group farm merely provided an increased revenue stream for the members. Likewise, the cabbage farmers operated a group farm. One member explained the “collective farming” model as an opportunity for someone to get into the business if they did not have the money to start a farm on their own. Group businesses, however, were not confined to the agriculture sector. A group of single mothers formed a group to open and operate a small hotel and restaurant. Their group had only operated for six months, but they felt that they had strong prospects for the future. There were a few commonalities that all groups expressed with regards to the groups’ lending practices to individuals. Loans were always given for a six-month term and required a ten-percent interest payment. Groups also reported that the default rate was virtually non-existent.

All groups reported similar responses when asked about challenges and goals. The primary challenge for all groups was the inability to increase their capital, and, likewise, the primary goal for each group was to raise more capital. Groups reported that increased capital would provide them the opportunity to improve their businesses. When asked about outside support or grants from NGOs, each group reported that they had received no outside assistance. Furthermore, groups reported that they could not borrow money from a bank because of distance and the inability to meet lending requirements.

Conclusion

Microfinance is a generic term to describe providing access to lending products for those unable to utilize traditional sources in developing nations. In rural Tanzania there is no singular model for community microfinance. Instead, the practice varies from village to village. Based on observations and discussion, one might conclude that the microfinance sector in Katunguru is oversaturated and might improve opportunity for local villagers if groups were to consolidate. Consolidation, however, would inhibit opportunity rather than expand it. Under the current system individuals are able to find a group that fits with their needs, goals, and skills. One way to alleviate the challenges faced by the various groups, would be the creation of a community development fund. This would allow for groups to apply for grants that can be used to increase group capital or expand group businesses. A community development fund would provide groups with an opportunity to overcome challenges and achieve goals.

QUALITY OF LIFE INDICATORS IN KANTUNGULU

Emily Denhard, McMaster Scholar, Tanzania 2014 – 2015

Michael Vanderkolk, McMaster Scholar, Tanzania 2014 – 2015

The purpose of this project was to survey the rural Tanzania area of the Kantungulu Bible Training School regarding demographics and their quality of life, and to contribute to a growing construct of data acquired by previous McMaster Scholars. Specifically, self-report surveys administered by previous scholars were only distributed in English, thereby severely limiting the sample size of previous studies. Knowing and understanding the needs of this rural developing community will provide the crucial information that can be used to further the mission of the McMaster School for Advancing Humanity. The data collected from this project regarding food security, nutrition, infant mortality, pregnancy problems, road and water safety, and overall health will be used by future McMaster fellows and scholars to develop productive community based initiatives.



While this is only the second year traveling to the Kantungulu Bible Training School in Tanzania, the McMaster School is still in the process of acquiring data about the specific needs of this community. Quality of life surveys are a useful tool to develop data that the McMaster School can use in developing worthwhile community based initiatives. Specifically, we determined that it was more efficient to focus our inquiry on studying quality indicators on the subjects of health and public safety. In order to collect data we constructed and administered a survey for community members to complete. This survey will provide better insight into the needs of community members. Moreover, this information will allow future researchers to develop projects that cater to the needs expressed.

Based on the research relating to challenges faced by communities in rural locations in Africa—such as Kantungulu—we developed a survey instrument to assess health and public safety concerns likely to be encountered by Kantungulu. This survey instrument inquired about subjects including; personal health, food security, prenatal health care, alcohol and drug use, and prevalence of illness. Moreover, this instrument also sought to observe the prevalence of injuries while traveling, the distance from the nearest health care providers, and challenges encountered while obtaining water. Finally, the survey also inquired as to the age of the subject, the number of people who speak English, the location of their water sources, and the availability of electricity.

This survey instrument was then delivered to our translator, Lillian Mkony, who translated each of the questions into Swahili. After this survey instrument was administered, the results of the surveys were compiled into an Excel spreadsheet which allows for easy analysis using graphs and charts. We distributed 250 surveys to our community partners and received 206 completed surveys. The data showed that roughly 40% of the participants were men and 59% were women. The majority of the respondents were the ages of 35-50 representing 28% of the participants. We received no responses from individuals under the age of 13.

Twenty-six percent of respondents reported that within the last week they skipped zero meals, 26% stated they had to skip 1-2 meals, and 30% stated they had to skip 3-6 meals. Eighty-nine percent of respondents reported that they did not use alcohol or tobacco products. Only 6% reported drinking alcohol either weekly or monthly. Community members were also asked how often they had been sick in the past six months. Fourteen percent of respondents reported never being sick, 47% reported being sick one to three times, 21% reported being sick four to six times, and 11% reported being sick more than ten times.

Two questions on the survey referred to the number of preterm births, and the number of children lost pre and post pregnancy. Eighty-six percent of female respondents reported zero preterm births, and 69% reported zero child deaths. Sixteen percent of female respondents reported that they lost one child pre-or-post pregnancy. Public safety was the final

quality of life indicator for which data was collected in this instrument. Specifically, inquiries in this area focused on road and water safety. Thirty-one percent of respondents reported that they had been injured while traveling on local roads.

The results from the survey distributed to the Kantungulu Bible Training School and the three surrounding villages provided significant insight into the challenges faced by our community partners. Because we were able to distribute translated copies of our survey instrument, we were able to acquire a fuller assessment of the demographic and quality of life data points inquired upon therein. The data acquired from this project will likely assist future McMaster Scholars and Fellows in developing community based projects that will cater to the needs of this community.

FUNDRAISING FOR WATER FILTRATION SYSTEMS IN TANZANIA

Dava Donaldson, McMaster Scholar, Tanzania 2014 – 2015

In May of 2014, a team of research scholars of the McMaster School for Advancing Humanity travelled to Katunguru, Tanzania and formed a partnership with the Katungulu Bible Training School (“KBTS”). Needs expressed by our community partners included updated equipment and training for medical professionals in a local clinic, health and sexual education for the women of the KBTS and the surrounding community, practical teaching methods for hands-on education in the secondary school, extensive water testing, and general community development. When analyzing potential projects for this returning visit, it was apparent that unclean, inaccessible water is the root of many of the problems faced by the KBTS.

This fundraising project focused on addressing the water issues. By raising funds for temporary water filtration systems—and researching and fundraising for a permanent solution in the future—the KBTS is better able to move in a healthier direction in terms of health, sanitation, economics, and education. From a disciplinary perspective, this project provides the opportunity to create meaningful data and research concerning modern fundraising techniques—such as crowdfunding, the use of social media, and more—as there is not much research on the topic at this point compared to that of traditional techniques. In addition, this project puts to use communication, organizational, marketing, and business skills as traditional fundraising techniques—such as a letter campaign, benefit concert, and organizational presentations to raise funds. The implementation of clean water sources, in addition to other community based research projects conducted by McMaster Scholars, will better inform the community of KBTS of the possibilities for improved living while working alongside McMaster School Scholars and Fellows, KBTS, and the wider village of Katunguru.



The majority of the research and implementation for this project was accomplished throughout the academic school year, and our Tanzania Learning Community. Through our fundraising efforts, we were able to raise over \$2,500 for water solutions at the KBTS. With these funds we purchased four LifeStraw community water filters that were installed at the KBTS. These filters are able to hold twenty-five liters of dirty water and twenty-five liters of clean water, and filter twelve liters per hour. The filters remove over 99% of bacteria, viruses, and protozoan parasites, are endorsed by the World Health Organization, and satisfy the United States EPA standards concerning clean water. The filters were introduced to the members of KBTS and we gave a demonstration on how to assemble and use these filters. Members of the KBTS then asked questions they had concerning the filters.

The project positively influenced the Defiance College community, the local Defiance area, those around the nation connected to social media accounts, and the community of the KBTS. As the project was being conducted throughout the year to raise funds, members of these communities were learning about the challenges that the KBTS faces and came together to help change improve that situation. The KBTS were direct beneficiaries of these endeavors as they now enjoy increased access

to clean water. Moreover, this project strengthened the partnership between the McMaster School and the KBTS thereby benefiting future McMaster initiatives. This project provided the opportunity for local community members of Defiance College and its wider community to be directly involved in the mission of the McMaster School for Advancing Humanity while improving the human condition in Tanzania. This project has prompted people to become more aware of global issues and their role in such issues.

IMPROVING MALARIA DIAGNOSES IN KATUNGURU

Ryan Edelbrock, McMaster Scholar, Tanzania 2014 – 2015

The goal of this project is to increase our community partners' access to equipment necessary to diagnose malaria and other diseases in Katunguru, Tanzania. In Katunguru, Tanzania malaria is a common health issue for the villagers. Accordingly, community partners have expressed to previous McMaster scholars a need for new microscopes so that the lab technicians can accurately identify malaria and other diseases in blood smear, stool, and urine samples. New microscopes were necessary because the oil immersion objective lens in the former microscope was broken prohibiting professionals from identifying abnormalities.

During the implementation of this project I discussed with our community partners in the clinic the current method for testing a patient for diseases and parasites. I then proposed an alternative method for diagnosing diseases and parasites based on research and best practices, using a new microscope with an operative oil immersion objective lens. It is important to use the new microscope and method so that the medical professionals can clearly identify the abnormalities in the patient's sample. Having a clear view of the abnormalities in the sample will allow the medical professionals to accurately diagnose and effectively treat the patient.



This project will better enable the clinic in Katunguru to diagnose diseases and parasites thereby enabling the clinic to be a more effective resource for the residents of Katunguru. The head doctor of the clinic expressed his belief that the new equipment and methods will better allow the community members to trust the clinic and be more willing to go to the clinic when feeling ill. Professionals at the clinic now have more resources to better diagnose community members who go to the clinic so as to ensure that they are treated effectively. This project will help eliminate the emergence of resistant strains of malaria by decreasing the number of incorrectly diagnosed patients who are given anti-malaria medication. Future McMaster scholars should continue to focus on providing the clinic with new equipment and training materials that will aid the clinic in serving the residents of Katunguru.

WOMEN'S CONFERENCE IN TANZANIA

Alicia Kalik, McMaster Scholar, Tanzania 2014 – 2015

Genelle Castro, McMaster Scholar, Tanzania 2014 – 2015

Community partners in Tanzania have previously expressed to McMaster Fellows and Scholars that they lack adequate knowledge about business, health and sex education, malaria prevention, water safety, and empowerment. The purpose of this project was to enhance the lives of the women at the Katungulu Bible Training School (“KBTS”) by undertaking educational initiatives on the subjects of leadership, entrepreneurship, health education, water safety, malaria prevention, and empowerment. We accomplished these ends by means of a two-day women’s educational conference. The KBTS is a school for individuals who would like to become evangelical pastors. Families live at the KBTS for a four-year period, often times very far away from any kind of extended family or community they are familiar with.

Traditional gender roles in Tanzania are very defined and patriarchal. Men hold a strong dominance in the society, which leaves little room for women to have a voice. Having a voice as a female is uncommon in the Tanzanian culture and this project represented an effort to give women at the Katungulu Bible Training School a forum to articulate their opinions. The main focus of the discussion is for the women to share anything that they want to talk about and to educate about the aforementioned concepts through a bilateral constructive dialogue. Our discussions will give the McMaster School direction in formulating further community based research projects.

The women’s conference was created after a discussion female McMaster Scholars had with the women of the Katungulu Bible Training School in 2014. Thereafter, our two-day women’s conference permitted us to have a more in-depth conversation about issues faced by our community partners. Additionally, we sought to answer the questions the women had for us, while guiding the discussion in a way to answer our potential questions.

Our women’s conferences consisted of three sessions spanning the course of two days. The first session focused on empowerment and encouraging community members to articulate their goals in the short and long term. Some of the themes observed in this session were the community’s commitment to their faith, their desire to learn, and their desire to contribute economically. In the second session, we focused on the women’s stated desire to contribute to their local economy. We discussed the possibility of forming a cooperative community tailoring and embroidery business. The establishment of this business may be a fruitful opportunity for McMaster Scholars to pursue in the future.



Finally, the third session focused on local women’s health issues. We discussed issues relating to women’s hygiene, and effective contraceptives. Many of the health issues encountered by the women result from inadequate access to clean water. Others stem from myth and folklore about the effectiveness of commercial hygiene products. My discussions with community partners leads me to conclude that future McMaster Scholars should consider further research on the subjects of the community’s access to clean water, and educational initiatives about health issues faced by the community.

This project helped to enhance the knowledge of the women which will help to enhance their lives significantly. Through this project we were able to help these women articulate their short and long term goals to us. Further, we conceived the idea that one means by which to achieve those goals may be through the incorporation of a cooperative business. Finally, our health discussion effectively helped community members develop more effective health practices, and provided us with ideas to pursue in further McMaster initiatives. This project effectively helped the McMaster School develop relationships with this community and will serve as a catalyst for future projects as we endeavor to implement sustainable solutions to the challenges encountered by this community.

WATER TESTING IN TANZANIA

Katelyn Haydett, McMaster Scholar, Tanzania 2014 – 2015

During the previous McMaster trip to Tanzania in May of 2014, researchers met with the officials of the Katungulu Bible Training School (“KBTS”) and discussed the challenges faced by the community as a whole. Community partners at the KBTS identified the inadequacy of clean and safe water as the primary challenge faced by the community. Reports from the village clinic indicate that individuals frequently suffer from diarrhea, intestinal worms, stomach discomfort, urinary tract infections, malaria, and numerous other illnesses. McMaster scholars hypothesize that these problems result from the community’s use of contaminated water. Accordingly, the purpose of this project was to improve the community’s access to clean and safe water.



The goals of this project were accomplished by taking water samples from six different locations within the village of Katunguru. Each of the sampled locations lie within five miles of Katungulu and are used daily for bathing, cleaning, cooking, and drinking without any form of filtration or purification prior to consumption. Before this project, village members were under the influence that boiling water kills the nutrients in the water, thus making the water “bad.” In order to provide visible results of the water contamination, this project used suction filtration and HACH whirl bags. Through suction filtration village members were able to see actual organisms living in the water, the difference in water turbidity post filtration, and DNA extraction to identify the presence of specific contaminants—such as Leptospirosis, an emerging zoonotic disease. HACH bags were used in the schools, with the women’s conference, and at the village meeting to show the dark discoloration and large amount of precipitate, signifying the presence of microbial contaminants.

In addition to the village education initiatives that benefitted from this project, the data obtained from this project will also serve future McMaster initiatives as they endeavor to research and develop a suitable permanent water treatment system. During suction filtration, different filter sizes were experimented with to determine the effectiveness in the removal of contaminants, finding that the temporary filtration LifeStraw units installed by other McMaster scholars were effective. Additionally, water samples were tested for levels of phosphates, free chlorine, ammonia, nitrates, and pH to serve as an initial basis for future water improvement comparisons. The data collected in this project was shared with our community partners in the village of Katunguru, and will serve as the initial data for future water testing and sustainable solutions to come.

A REASSESSMENT OF THE CHALLENGES AND RISKS TO THE KATUNGURU VILLAGE IN TANZANIA

Jeremy B. Taylor, McMaster Fellow, Tanzania 2015 – 2016

In May of 2014, the first McMaster team traveled to the Katunguru Village in Mwanza Region, Tanzania. Katunguru is a rural village located on the southwestern shores of Lake Victoria. It has an approximate population of 2,000 people, who primarily survive through sustenance farming. Rev. Amos Ngeze, principal of the Katungulu Bible Training School (“KBTS”), initially invited the team to Katunguru. During the initial visit, Rev. Ngeze explained that the school—and the wider community—lacked access to clean water. As a result, community members suffered from numerous gastrointestinal illnesses, poor school attendance, and decreased work efficiency. Most citizens gathered their water from Lake Victoria or rustic style wells. Initial water testing in 2014 confirmed that the water being used contained biological contaminants. Ngeze noted that most people do not boil their water before use due to a cultural perception that boiling water removes “the taste and nutrients.”¹

Ngeze and other KBTS leaders explained that the school and village had a windmill to pump water from Lake Victoria, but it had broken beyond repair. They, then, proposed the installation of an electric pump and construction of a pump house to replace the windmill. The pump would send water to a holding tank already possessed by the village. The tank could then be retrofitted with a filter. The tank would then provide clean water, through the current plumbing infrastructure, to the village and school. The estimated cost of this project would be approximately \$15,000.²

Based on the experience in 2014, the team operated under the assumption that the only way to permanently solve the water problem in Kantunguru was to raise funds and build the pump house. In 2015, a second McMaster team traveled back to Katunguru and the KBTS. The team focused on projects that provided short term relief to the water situation and looked for a permanent solution. McMaster Scholar Dava Donaldson focused on raising funds to go towards the pump house construction and researched temporary water filtration solutions. As part of her project, the team purchased four Lifestraw Community Water Filters, manufactured by Vestegaard. Each filter is capable of producing 70,000-100,000 liters of clean water over its multi-year lifetime. The team also brought twenty-five Pack H2O water backpacks to increase the efficiency of water transportation from the lake or wells to the filters. Water testing was expanded, and lessons were taught in primary and secondary schools about the need to boil water before use.³

After the 2015 visit, a basic SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis revealed the following attributes:

- Strengths
 - willing community partner
 - eagerness to try new ideas
 - openness to training
- Weaknesses
 - Lack of financial resources
 - Remote location
 - Broken wind mill
 - Lack of clean water
- Opportunities
 - Existing plumbing infrastructure
 - Installation of electric pump and construction of pump house
- Threats
 - No pre-treatment of water
 - Disease from use of unclean water
 - Crocodile attacks near water source⁴

1 Rev. Amos Ngeze, Oral Interview May 10, 2014. Katelyn Haydett, Tanzania Abstract, 2014.

2 African Inland Church of Tanzania, “A Five Year Strategic Plan,” (August, 2014).

3 Dava Donaldson, Tanzania Abstract 2015. LifeStraw Community by Vestergaard, <http://www.vestergaard.com/lifestraw-community>. Katelyn Haydett, Tanzania Abstract 2015. Jessica Bell, Tanzania Abstract 2015.

4 “Five Year Strategic Plan.”



Upon return to Katunguru in May of 2016, the team continued to operate under the above assumptions. During the first day of water testing, however, those assumptions were challenged and eventually turned upside-down. Team members noticed a concrete, water tank connected to an aboveground spigot on the KBTS campus. After inquiring about the tank, the team learned that the tank was being used to collect rainwater, and the spigot was connected to a village water pump station. Rev. Ngeze explained that the Tanzanian government had installed a water pump in the village, but that it was only sporadically in use. “It is controlled by the politicians,” he continued, “and they only turn it on around election time.” After asking if we could see the pump, Ngeze arranged a visit for the following day.⁵

The Tanzanian government had installed the village pump station in 2014. It consisted of a pump building enclosed by a fence and two guard houses. An initial pump transported water from Lake Victoria through a pre-filter to a holding tank. The main pump, in the pump house, would then push water from the holding tank to a 100,000-liter storage tank located at the top of a nearby hill. At the holding tank, water was supposed to be treated with chlorine, then distributed throughout the plumbing infrastructure to homes and schools in the village.

The pumping station is under the control of a locally elected three-person water commission. After meeting with the board members, we learned that the government had handed over control of the pump to the local board. The board members explained that the pump could only operate if they had enough money to pre-pay for electricity. Therefore, when the electricity credits ran out, the board would have to collect money from subscribers. Because collection times were sporadic, subscribers often did not have the money to pay their water bills. This created a difficult cycle whereby the board could not buy electric credits consistently, the pump would only provide water sporadically, and the village would not have consistent access to clean water.

Our discussion also helped to clear up misperceptions and mistrust between the KBTS and the village administration. Rev. Ngeze and the KBTS community believed that the “politicians” in control of the pump were purposefully withholding clean water from the school and wider community. Whereas the water board, believed that the KBTS did not want to pay their fair share for water.

5 Rev. Amos Ngeze, Oral Interview, May 20, 2016.

The discovery of the water pump has caused the Tanzania McMaster Team to reassess the challenges and threats facing KBTS and the village of Katunguru. Through keen observation and discussion with the vested community interests, we have determined the following needs to be addressed in future years:

1. Examine the feasibility of converting the water pump to solar power. The current pump has low power consumption, but electricity is the most expensive part of the consumers' water bill. The use of solar power would allow the pump to operate around the clock without the need for electrical credits.
2. Provide training to the water board about efficient billing and collection practices. The members of the board specifically asked for advice about how to improve their collection practices. Simply creating a monthly billing schedule, where consumers knew when their bill would be due, would alleviate many of the collection problems. Furthermore, the conversion of the pump to solar would decrease consumer costs and make clean water affordable.
3. Examine the proper chlorine dosage for the water storage tank. Currently, board members are not adding chlorine to the tank consistently. Instead, they "eyeball" an amount of chlorine to add with a scoop occasionally. Water tested from the tank did not have any measurable chlorine, thus making their efforts ineffective. Proper training could provide consistently clean water.

Although the primary "need" for clean water that was expressed in 2014 remains the same, the means by which this goal can be achieved has changed. There is no longer a need to build a new pump house. Instead, the main goal, in future years, should be to utilize the resources the community already has in order to provide clean water to the community and improve the human condition.



IMPROVING WOMEN'S ENTREPRENEURIAL SKILLS AND EMPOWERMENT IN TANZANIA

MacKenzie Combs, McMaster Scholar, Tanzania 2015 – 2016

The purpose of this project is to help the women of the Katungulu Bible Training School (“KBTS”) develop basic entrepreneurial skills and gain a sense of empowerment. Women come to KBTS with their husbands—who are training to become pastors with the African Inland Church-Tanzania (“AICT”). While much emphasis is placed on teaching women to serve as a pastor’s wife, women are not often given the opportunity to make a name for themselves and are relegated to a subservient role. This project will build on the work that McMaster Scholars, Genelle Castro and Alicia Kalik, began in 2015. During the 2015 KBTS Women’s Conference, attendees expressed a desire to have additional training on the subject of business and self-empowerment. The importance of this work is to create more opportunities for women to increase their income and provide more support for their families. The research will hopefully help women collaborate with one another to create a sustainable business (Nayihirani, 2014).



Tanzania is a male dominated society. Because men have more power, they are the ones who provide income for the families. Women are the primary caregivers of the family, and working outside the home is typically not an option (Dina, 2012). There is a stigma that women are not as logical as men, and that they are more emotional. Indeed, men have generally been known for having a rational mindset. Moreover, Men have typically been known for their strength, and ability to undertake work that entails hard labor (Elu, 2013).

When a business is successful, it is able to provide a sustainable income. By having two incomes, the family can better financially support their children, along with their other financial obligations. School will be more affordable for children, and they can see what accomplishments their parents have achieved. Children will gain more responsibilities at home, and help them learn new skills along the way (Sagalla & Carney, 2012). Through all of the obstacles that women have faced struggling for the right to have a career, it can be empowering to have a career. Women did not give up, and knew that they had what it took to support a family, as well as themselves. Because it was a challenge, women started working harder for what they wanted, and it helped them become better business women. Their confidence rose, and having more opportunities gave them a purpose (Dina, 2012).

My project consisted of conducting a one-day women’s conference. The first part of the session covered empowerment. I created posters and activities that covered the basic tenets of empowerment. The purpose of this section was to get women to find their strengths and see what they could accomplish for themselves. The next section covered entrepreneurship. In that session attendees were broken into groups in order to observe how well they interacted with each other to form a business. Each group developed a business and a product that they would sell. After about fifteen minutes, each of the groups presented their product while the other groups listened and asked questions. Asking questions helped the interpersonal skills inherent in selling an item, as well as developing an overall understanding of why someone should buy their product. The third section discussed business logistics. They were given various resources that could be found in Tanzania, and tasked with making a product so that the women may apply the skills that they have learned. After developing their products, the groups were provided the opportunity to present their ideas to other groups and receive peer feedback. At the end of the conference, I answered several questions and gave the women the opportunity to sell any handicrafts that they had made to the Defiance College’s Art Box. Selling their products gave participants an opportunity to apply the practical skills they had learned.

The women were able to come up with eight qualities needed in order to establish and maintain a business: determination, confidence, goals setting, communication, organization, time management, honesty, and knowledge of market principles. Once those eight qualities were established, community partners had the opportunity to self-evaluate. At first, it was difficult

to convey the importance of these qualities. Once they finished, however, I observed the women's confidence and their ability to set meaningful goals. Future McMaster initiatives that endeavor to assist with the entrepreneurial skills of these women would be advised to concentrate their efforts on improving general organization and time management skills.

Together, the women of the KBTS and I were able to articulate and improve upon the qualities needed to establish a business. Additionally, we also discussed means available to help build up capital for their business. Through this project the women of the KBTS developed a better understanding of their capabilities and skills. Being able to focus on their strengths and apply that to their lives along with business can help them prosper. It is my desire that this project can be the beginning transition of women establishing themselves as entrepreneurs in Tanzania so that the women in the communities in which we work may have similar opportunities that are available to men.

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WOMEN'S HEALTH EDUCATION IN TANZANIA

Emily Denhard, McMaster Scholar, Tanzania 2015 – 2016

The purpose of this project is to teach the women of the Kantungulu Bible Training School about feminine health. Conducting a women's conference to discuss these issues with the women was a practical approach and created a constructive learning environment. With increased knowledge and a better understanding of their bodies, the women will be better prepared to make more informed decisions about their health and will, accordingly, improve the state of their over-all health. The women will also be able to pass on their knowledge to inform others on the proper health and hygiene techniques, particularly to their children.

Last year, the women of the Kantugulu Bible Training School voiced their concerns about their overall health and well-being through a women's conference. Last year's conference allowed the women to discuss various topics related to health, business, and entrepreneurship. Health was amongst the biggest concern expressed by the women. In preparation for this project, I undertook research regarding the biological menstrual functions, menstrual cycle abnormalities, perceptions, feminine health practices, and sexual health education in Africa. This collection of research was combined with the results from last year's women's conference to create an outline for this year's women's conference. The conference highlighted the general health, the menstrual cycle, and sexual health.

The general health section of the conference focused on personal hygiene, emphasizing the importance of always using clean water. The menstrual cycle section discussed what function the menstrual cycle serves, when it begins, what women can expect throughout the cycle, side-effects, and remedies to cope with discomfort. The sexual health section discussed what



sexual transmitted infections are, how they are contracted, the consequences and complications of the infections, and how to protect against them. At the very beginning of the conference each of the women were given paper which they could use to submit topics for discussion throughout the conference. The women used the sheets of paper to write down every piece of information that was given to them through the conference.

The women of the Kantungulu Bible Training School were able to learn how unique and valuable their bodies are while learning how to properly take care of themselves and other women around them. I have confidence that the women retained the contents of our discussion, and will be able to employ that knowledge to improve their general health as well as to transfer the information to family members and others who are close to them. Through this project, the McMaster School was able to transfer knowledge that will assist the women of the Kantungulu Bible Training School in better caring for themselves, and their families, in order to avoid sickness and discomfort.

ESTABLISHING A COMMUNITY DEVELOPMENT FUND IN KATUNGURU

Dava Donaldson, McMaster Scholar, Tanzania 2015 – 2016

The purpose of this project was to implement a community development fund to provide village microfinance groups the opportunity to increase the size of potential loans to stimulate economic development. The community of the Katungulu Bible Training School (“KBTS”) and the wider village of Katunguru suffer from poverty, unemployment, illness and disease, and insufficient educational opportunities. As microfinance has spread through the local village—providing opportunities for economic growth—solutions for other community development problems have become more viable. Accordingly, developing a community development fund to provide capital to microfinance groups will allow those groups to make larger loans, thereby permitting business expansion and more resources for the community.



In May 2014, a team of research scholars of the McMaster School for Advancing Humanity travelled to Katunguru, Tanzania and formed a partnership with the KBTS. Our community partners articulated needs, which included updated equipment and training for medical professionals in a local clinic, health and sexual education for the women of KBTS and the surrounding community, practical teaching methods for hands-on education in the secondary school, extensive water testing, and general community development.

With over a dozen different microfinance groups in the Katunguru community, the community development fund serves as a tool to unite the groups to better serve the wider community and individual businesses. Business types in Katunguru are incredibly diverse including agricultural, livestock, tailoring, motorbike mechanics, petroleum resale, and grocery shops, among other types of small businesses. The implementation of the community development fund stimulates Katunguru’s economy and serve as an educational tool for our community partners on the subject of economics.

Throughout the academic year, I collected primary and secondary sources relevant to this microfinance initiative. Additionally, I reviewed interviews conducted in 2015 of microfinance groups in Katunguru and the academic literature relied upon last year in order to learn best practices for an outside loan source in a rural African village. Thereafter, I raised \$800 for the community development fund three separate microfinance groups were each given a loan of approximately \$250 for the purpose of growing their businesses in a way to impact the community. A group of farmers, motorbikers with a petrol business and mechanics, and a women’s group of rice farmers were the initial recipients of loans from the community development fund. Each loan carried a 5% interested rate and is to be paid back to the fund six months from its disbursement.

Through the development of the community development fund, and its initial capital infusion, the community of the KBTS is able to make positive strides in terms of economics, health, and education. This project further provides the McMaster School the opportunity to create meaningful data and research concerning microfinance, gender equality, poverty alleviation, and community development. As the selected groups report back after the six month loan cycle, additional research can be collected to discover the impact of the loan on the local communities.

WATER QUALITY TESTING IN TANZANIA

Katelyn Haydett, McMaster Scholar, Tanzania 2015 – 2016

A continuation of research aimed at achieving clean, safe drinking water for the community members of Katungulu was completed during the McMaster trip to Tanzania in May of 2016. On a daily basis, individuals of all ages walk up to five miles each way to gather water for their family to use for their cooking, cleaning, and bathing. During the voyage for water their safety is in jeopardy as rough terrain, high traffic, and wildlife all pose threats. It was reported that in the last month alone one man was devoured by crocodiles while fetching water from Lake Victoria—the main water source for this region. In addition, a majority of the water sources serve as breeding grounds for mosquitos, and the larval cesspools collected from the surface are consumed directly by individuals because no pumps are available to draw water from below the surface. Medical side effects of poor water quality and the consumption of surface water observed in the village clinic include diarrhea, stomach discomfort, intestinal worms, urinary tract infections, and malaria.



After initial water testing in May 2014 to signify the presence of microbial contamination, four LifeStraw community filters were presented to the village in May of 2015, to serve as a temporary water filtration system. Water testing at that time analyzed filtration composition and size after field experimentation through suction filtration and additional laboratory analysis. Suction filtration completed in the field tested .5 μ m nitrocellulose filters, and the ability to capture contaminants. Laboratory testing was the first step of water testing in 2016. By using filters from the six locations, samples were collected in 2015 and plating them on selective media, eosin methylene blue (“EMB”) for the growth of *escherichia coli* and LVW agar infused with 5-fluorouracil for *Leptospira sp.* The EMB media served to confirm the methodology used on the ground at all the locations that tested positive for the presence of e.coli by means of HACH Whirl Paks, selective media growth, and polymerase chain reaction analysis.

In May of 2016, all data collected from the locations was compiled into the village water portfolio and presented to community partners at the Katungulu Bible Training School. At this time, Reverend Amos stated, “After seeing these pictures and this data, the people will never drink unfiltered water again.” Since sharing data collected by previous McMaster scholars, and after the implementation of the LifeStraws filtration system, the village clinic is experiencing a drastic decline in cases of diarrhea, dysentery, vomiting, weakness, and water-borne illness. Attendance rates in school have arisen, and the consumption of natural resources used for boiling water has been reduced, and family incomes have due to the installation of the filters.

On the ground research in May of 2016 tested the LifeStraw filters for the removal of contaminants and tested negative for the presence of hydrogen-sulfide producing bacteria, (indication of fecal contamination) through use of HACH Whirl Paks. All locations tested in 2015 were re-tested, in addition to the government implemented water treatment facility, totaling nine locations. Protocols for field testing included suction filtration with .45 μ m and .2 μ m nitrocellulose filters, chemical testing for nitrates and chlorine, and laboratory testing on selective media plating with PCR analysis for *E. coli* and *Leptospirosis* once again.

LifeStraw community filters should continue to be used until the proper chlorine dosing may be determined along with a

sustainable pre-filtration system. It was also determined that the condition of the LifeStaws will be maintained through such pre-filtration for large particles, sand, worms, sticks, etc. and the dangers of retrieving water from Lake Victoria marsh will be avoided with the use of Industrial Fluid Management hand pumps and extension hoses.

Data collected confirms the need for ongoing research on water quality and chemical composition in order to achieve an effective and efficient permanent, sustainable water treatment system. The involvement of men, women, and children with the field testing, data explanation, and implementation of sub-surface pumps places the knowledge of the forward moving progress of the water condition and health of the village in understandable terms through application. Efforts to prevent cross-contamination during transport will continue to be addressed along with alternative options for water treatment for future projects.

SCIENCE EDUCATION IN KATUNGURU

Kaitlyn Kuhn, McMaster Scholar, Tanzania 2015 – 2016

Our community partners with the Katungulu Bible Training School (“KBTS”) previously articulated a desire for increased science education initiatives. Moreover, teachers in Katungulu articulated to us that students do not like science and do not want to take science classes because they think it is too difficult. Additionally, the dearth of science education is further exacerbated by the fact that science teachers stand in a stark minority relative to teachers of other subjects. Accordingly, our community partners have expressed a desire to increase interest in science by developing a hands-on curriculum. The purpose of this project, then, was to establish a “science camp” which consisted of different experiments and practical applications involving the use of microscopes over the course of two days. Indeed, this project was intended to orchestrate



a two-day science camp whereby students could have a more hands-on learning experience. Additionally, teachers were also able to observe different teaching techniques throughout the camp that can benefit the students over the long term. Conducting a two-day science camp has helped students foster an appreciation for the sciences, and be able to recall information they had already learned via in-class lectures.

In preparation for this project, I reviewed four different Tanzanian Science Standard books: General Science, Biology, Chemistry, and Physics. There are four General Competences for Primary School Science in Tanzania coming from the Science Syllabus 2005:

1. Recognize the process of scientific investigation;
2. Use scientific information in a sustainable way;
3. Appreciating and applying scientific principles and use technology in solving social problems; and
4. Using science and technology in a positive way.

These four competencies all have the common theme using science in a way that is beneficial and practical so that was my goal for going about creating this science camp. I then used this information to develop relevant, practical, and hands-on activities for the science camp.

Previous McMaster Scholars have taken microscopes to the KBTS to be used in the clinic. The science camp would utilize those microscopes for educational purposes. Moreover, I created a folder with twenty-five simple experiments along with a small bag of materials. At the KBTS, we started out by going over the parts of the microscopes. Students appeared to have a mastery over the parts of the microscope. We then explained to the students and the teachers how to properly use the microscopes.

The first day of the camp was devoted to learning how to use a microscope. The students were challenged to look into the microscope, focus it, and then draw what they saw. Students then compared their drawings with the classmates. The second day of the camp was devoted to water, how things dissolve in water, what sinks and floats in water, and surface tension. The aforementioned experiments were explained, demonstrated, and then applied by the students in the class. Through this camp, students had an opportunity to hypothesize and then to experiment for themselves to see if their hypotheses were correct.

This science camp was received well by students and teachers alike. Specifically, the students were surprisingly engaged, and willing to try new things. Indeed, they appeared to take a particular interest in using the microscopes. The teachers also asked many questions and helped convey my lessons to the students. Practical science education is not prevalent in the classrooms at the Katungulu secondary school. The teachers and I have a shared desire that the new equipment and engaging lesson plans will encourage students to be more interested in science.