

# ADVANCING HUMANITY in GHANA

## 2011 - 2012 Learning Community

Deborah Dalke, PhD., McMaster Fellow

Sara Beth Brown, B.S., McMaster Associate Fellow

Mercedes Clay, M.B.A., McMaster Associate Fellow

Phoenix Golnick, McMaster Scholar

Jerika Hennes, McMaster Scholar

Sammi Stevens, McMaster Scholar

Ellen Stryffeler, McMaster Scholar

Asia Williams, McMaster Scholar



## Solar Cooking Project

*Deborah Dalke, McMaster Fellow, Ghana 2011 - 2012*

The purpose of my trip to Ghana was to introduce solar cookers to our community partners in the Volta region. Currently, about 90% of Ghanaians use wood or charcoal as cooking fuel (Acheampong, 2010). The need for wood fuel is contributing to deforestation, which is a serious problem in Ghana. Removal of trees along rivers increases soil run-off which reduces soil fertility and may lead to fish kills (Acheampong, 2010). Deforestation itself impacts the climate, and this effect is compounded by the pollution produced by the burning of biofuels.

Wood smoke contains small particles that when inhaled, can cause physical and biochemical changes in the lungs (Pierson, W. E., Koenig, J. Q., & Bardana, E. J., 1989). Exposure to wood smoke is associated with health problems such as asthma, pneumonia, and cataracts (Fitzspartrick, 1997). Wood smoke may also affect cardiovascular health (McCracken, J., Smith, K. R., Stone, P., Díaz, A., Arana, B., & Schwartz, J., 2011). Some of the chemicals in wood smoke are considered carcinogens. It has been estimated that the lifetime cancer risk from exposure to wood smoke may be 12 times greater than the cancer risk from exposure to a similar amount of cigarette smoke (as cited in Washington State Department of Ecology, 1997, updated 2004). Thus, reducing the amount of time people are around wood fires can have health benefits.

In the Volta region, about 80% of the households obtain firewood by collecting it from forests, and people travel an average of 5.9 kilometers to find the fuel (as cited in Asare, 2004, p. 49). About 15% of households purchase the wood needed for fuel (as cited in Asare, 2004, p. 49). Paying for fuel can pose a hardship, as the annual household income in the Volta is the third lowest among the 10 regions in Ghana (Ghana Statistical Service, 2008). Thus, switching to solar energy can have a positive economic impact by either reducing the cost of purchasing fuel or increasing the amount of time available for earning an income.

In addition to preparing food, solar cookers can be used to purify water. Diseases that are caused by contact with contaminated water include diarrhea, cholera, typhoid, dysentery, and polio. Many of these diseases could be prevented by treating the water before it is used (Safe Drinking Water Foundation, n.d.).

In summary, the documented benefits from using the solar cookers include improved health due to reduced exposure to wood smoke, improved finances due to a reduced need to purchase fuel, and a reduction of the time needed to acquire fuel and tend the fire (Owino, M., & Porter, K., 2010).

A problem with the cookers is that they take more time to cook food than does a fire. Because of this, the initial target recipients for the cookers were the seniors who attend the Shepherd Centre of Aging in Peki. The seniors do not tend the fields, so the inconvenience of the longer cooking time would be less of a problem.

### *Methodology*

The staff members at the Shepherd Centre of Aging were trained on the use of the solar cookers. The cook and I prepared rice for lunch. The seniors all had a chance to observe the cookers, and most expressed amazement that the pot became too hot to touch just by sitting in the sun. Several seniors expressed a desire to have one of the cookers. Five solar cookers were donated to the Shepherd Center to distribute to the people who would most benefit from them.

I interviewed the seniors as a group about their cooking methods. None of the seniors spoke English, so the information was gathered with the assistance of a staff member. All of the seniors indicated that they cooked three meals a day, although lunch is served at the senior center most days. The most common type of fuel was wood, although charcoal was occasionally used. The wood is either collected or purchased at the cost of 3 cedi (\$1.50 US dollars) per head (amount of wood that can be carried on the head). This amount of firewood would last for about three days.

Cooking is done outside in good weather and inside in bad weather. The homes have a separate room for the kitchen to keep the smoke away from the living quarters. The seniors reported that the smoke generated by the fires is very irritating. The smoke hurts the eyes, and sometimes the smoke is so intense that it is hard to keep the eyes open. The clients also reported coughing and breathing problems. The solar cookers can also be used to purify water, so I asked the clients from where their water came. Almost all of the seniors had access to piped water, which was described as "treated." However, it is unclear exactly what this means. From talking to people, it appears that the water is only treated for sediments. The clients only reported occasional problems with diarrhea. Thus, the need to use solar cookers to purify water is unclear, but additional research needs to be conducted.

Based on the information collected, the use of solar cookers will improve the lives of people in the Volta region and will be accepted by at least some members of the community. Goals for the 2013 trip are: (1) conduct tests of lung functioning to more precisely measure the potential health benefits of using solar cookers; (2) interview the people who are using the cookers to assess how often they are used and perceived benefits of solar cooking; and (3) collect data on the feasibility of manufacturing the solar cookers in Ghana.

### References

- Acheampong, E. A. (2010). Environmental costs of utilizing Ghana's forest for fuel wood. *GhanaWeb*. Retrieved from <http://www.ghanaweb.com/GhanaHomePage/features/artikel.php?ID=196516>
- Asare, Y. B. O. (2004). *Household water security and water demand in the Volta Basin of Ghana* (Doctoral dissertation, GLOWA Volta Project). Retrieved from [http://www.glowa-volta.de/fileadmin/template/Glowa/Downloads/thesis\\_osei.pdf](http://www.glowa-volta.de/fileadmin/template/Glowa/Downloads/thesis_osei.pdf)
- Ghana Statistical Service. (2008). Ghana living standards survey: Report of the fifth round (GLSS5). Retrieved from [www.statsghana.gov.gh/docfiles/glss5\\_report.pdf](http://www.statsghana.gov.gh/docfiles/glss5_report.pdf)
- McCracken, J., Smith, K. R., Stone, P., Díaz, A., Arana, B., & Schwartz, J. (2011). Intervention to lower household wood smoke exposure in Guatemala reduces ST-segment depression on electrocardiograms. *Environmental Health Perspectives*, *119* (11), 1562-1568.
- Owino, M., & Porter, K. (2010). Improving women's finances with cleaner cooking technologies. *Solar Cooker Review*, *16*(2). Retrieved from [http://solarcooking.org/newsletters/scrnov10\\_.htm#Finances](http://solarcooking.org/newsletters/scrnov10_.htm#Finances)
- Pierson, W. E., Koenig, J. Q., & Bardana, E. J. (1989). Potential adverse health effects of wood smoke. *Western Journal of Medicine*, *151*(3), 339-342. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1026893/pdf/westjmed00121-0093.pdf>
- Safe Drinking Water Foundation. (n.d.). Facts and figures: Water and health. Retrieved from [http://www.wateryear2003.org/en/ev.php-URL\\_ID=1600&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://www.wateryear2003.org/en/ev.php-URL_ID=1600&URL_DO=DO_TOPIC&URL_SECTION=201.html)
- Solar Cookers World Network, (n.d.). Ghana. Retrieved from <http://solarcooking.wikia.com/wiki/Ghana>
- Washington State Department of Ecology. (1997, updated 2004). Health Effects of Wood Smoke. Retrieved from <https://fortress.wa.gov/ecy/publications/publications/92046.pdf>



*Deb Dalke, fellow, using solar cooker in Ghana*

*Ghana 2012, Phoenix Golnick, scholar, interviewing farmers*



## Soil Nutrient Survey

*Phoenix Golnick, McMaster Scholar, Ghana 2011 - 2012*

Deforestation is a major problem in southeastern Ghana due to farmers using unsustainable farming methods such as slash and burn. While in the Volta region, agricultural surveys were conducted to determine the area's needs. Seven sites were surveyed using a modified version of the schema Observational Approach to Soil Health, the Munsell scale, and a pH meter. Soil extracts were also taken from each site and tested for macro and micro nutrients as follows:

<b>Macronutrients (Lamotte, 2004)</b>		<b>Micronutrients (LaMotte, 2004)</b>	
<b>Nutrient</b>	<b>Protocol</b>	<b>Nutrient</b>	<b>Protocol</b>
Nitrate-Nitrogen	Cadmium Reduction Method	Manganese	Periodate Method
Nitrite-Nitrogen	Diazotization Method	Iron	Bipuridyl Method
Phosphorus	Ascorbic Acid Reduction Method	Chloride	Direct Reading Titrator Method
Potassium	Tetraphenylboron Method	Copper	Diethylzthiocarbamate Method
Calcium	Schwarzenbach EDTA Method	Ammonia-N	Nesslerization Method
Magnesium	Schwarzenbach EDTA Method		

Results from these tests showed an excess of nitrates in the soil at all 7 sites. There was also a shortage of phosphorus at six of the seven sites. This means that phosphorus is the limiting nutrient and should be monitored more carefully.

When possible, one on one interviews with the Volta farmers were also conducted to determine their practices and the major needs. The heavy use of commercial fertilizers and pesticides/herbicides was consistent with the farmers who sell their goods. However, the famers that produce goods for their own use relied on various forms of manure for fertilization. The greatest concerns expressed by the farmers were related to irrigation during the dry season and global warming. Results from the tests and suggestions for improvement were distributed to the farmers through the Evangelical Presbyterian Church in the Village of Ho.

### **Reference**

LaMotte. (2004). Smart 2 Electronic Soil Manual and Test Instructions.

## Water Quality Testing in the Volta Region of Ghana

*Jerika Hennes, McMaster Scholar, Ghana 2011 - 2012*

Modern water treatment facilities are not common in Ghana. Research has indicated that biological contaminants are the most common type of water contaminant. While testing has been done for lead, the results have been inconclusive and additional testing is needed (Parker, 2000).

My project was to assess the quality of the drinking water in the villages of Peki and Ho in the Volta region of Ghana, a rural area located east of Lake Volta with a population density of about 79.5 persons per square kilometer as declared by the census in 2000 (Government of Ghana, n.d.). No water quality tests had been conducted in these villages. Children between the ages of 0-14 are the most common age group in the Volta region, leading to an overall dependency ratio of 92 dependents for 100 working people (Government of Ghana, n.d.). In this area, the primary source of income is self-employment in the agriculture/hunting/forestry industry, with approximately eight out of every ten individuals being self-employed (Government of Ghana, n.d.). Furthermore, the illiteracy rate in this area is 42.1% of the population, and the education systems have poor conditions resulting from a lack of books, supplies, and even teachers (Government of Ghana, n.d.). The low economic status of the people in this area leaves much of the population susceptible to illnesses caused by biological contaminants in drinking water.

While on the ground in Ho, I worked with Dr. Richmond Mfodwo of the Evangelical Presbyterian Church. He had been using a solar process to purify water, in which bottles of water were set in the sun to kill the pathogens. This method is tedious and

less than satisfactory because the material used to remove the sediments changes the taste of the water. Solar purification also does not eliminate chemical contaminants such as lead.

In addition to testing the water, I introduced an alternative method of purifying water: ceramic filter pots. The ceramic filters work by first straining out large particles such as dirt and bacteria, then a silver nitrate solution kills the microbes on contact, and a final fine filtration process eliminates the smaller particles (Resource Development International—Cambodia, 2003). The filters have a flow rate of about 1.8-2.5 L per hour and do not need the sun to operate correctly; so weather is not an impediment to the process (RDIC, 2003). The ceramic water filters have shown a 46% reduction in diarrheal illnesses, an average 95.1% reduction of *E. coli* and an average of about 90.0-99.9% overall reduction of viruses in water in Cambodia (RDIC, 2003). Using money from our fundraiser, I purchased eight ceramic pot water filters for our community partners and explained the process to them.

To test the water, I used the Quality Check PRO-II Well Water Test Kit and the Pesticide and Lead Test Kit ordered from H2O.com. I tested three well sources, a stream outside of Kpetoe, three piped water sources, water from the Volta River, and two already purified samples (bottled water and a sachet of water). My analyses showed that there were no lead contaminants in any of the water sources sampled. However, bacteria were present in the stream by Kpetoe and the sachet of water received from the Mawuli Primary School. Additionally, the stream by Kpetoe showed a high level of nitrates, which should be further tested because water from this source is frequently used for drinking and bathing. These results were given to the community partners in Ghana.

### References

- Government of Ghana. (n.d.). Introduction. Retrieved from [http://www.ghana.gov.gh/index.php?option=com\\_content&view=article&id=1212:Introduction&catid=40:volta&Itemid=192](http://www.ghana.gov.gh/index.php?option=com_content&view=article&id=1212:Introduction&catid=40:volta&Itemid=192)
- Parker, K. (2000). *Bacterial contamination of drinking water in rural Ghana* (Master's thesis, California State University, Sacramento). Retrieved from [http://csus-dspace.calstate.edu/bitstream/handle/10211.9/1544/ParkerK\\_2011Thesis.pdf?sequence=1](http://csus-dspace.calstate.edu/bitstream/handle/10211.9/1544/ParkerK_2011Thesis.pdf?sequence=1)
- Resource Development International—Cambodia. (2003). Retrieved from <http://rdic.org/>

## Guiding Ghanaian Villagers in Adopting Proper Sanitary Practices

*Sammi Stevens, McMaster Scholar, Ghana 2011 - 2012*

According to the World Health Organization, 1.8 million people die each year from diarrheal diseases that are contracted from unclean drinking water. In 2010, 884 million people in the world had unclean drinking water, according to UNICEF (Anderson, Romani, Wentzel, & Phillips, 2010). While these statistics are not specific to areas in Africa and Ghana, they are relevant to the needs in Ghanaian households and villages. One of our community partners in Ghana, Dr. Richmond Mfodwo, who directs a water purification project, expressed a need for posters depicting proper sanitary practices.

For my project, I designed a poster that illustrated and encouraged proper hand washing before coming in contact with food and after performing activities that could cause the hands to become contaminated. I modeled my poster after one that had been created by Dr. Mfodwo, though I was unable to get feedback from him on my design prior to heading for Ghana. The poster was simple and easy to read, with large text and images that depicted each sanitary practice so that young children would understand it.

I distributed the posters to our community partners at the Mawuli primary school and to Reverend Seth Agidi to distribute in other places he deemed useful. I received suggestions for making the posters more culturally relevant to children in very small rural villages who, unlike children in the town of Ho, do not have access to piped water. The poster will be redesigned and taken back to Ghana on the 2013 trip.

### Reference

- Anderson, B., Romani, J., Wentzel, M., & Phillips, H. (2010). *Awareness of water pollution as a problem and the decision to treat drinking water among rural African households with unclean drinking water: South Africa 2005*. (Population Studies Center Report 10-701). Retrieved from University of Michigan, Population Studies Center, Institute for Social Research website: <http://www.psc.isr.umich.edu/pubs/pdf/rr10-701.pdf>

## Exploratory Investigation of Artists in the Volta Region

*Sammi Stevens, McMaster Scholar, Ghana 2011 - 2012*

Project 701 is a non-profit organization run by students at Defiance College. Project 701 is exploring the feasibility of starting a fair trade store to sell artwork produced by our community partners in developing countries. While in Ghana, I searched for artists in the Volta Region, specifically in the town of Ho, who would be interested in selling their artwork through a Project 701 fair trade store. I purchased samples of the artwork to show to the Board of Directors of Project 701. I looked for artists who sold products that were unique, eye-catching and would appeal to consumers in the U.S.

In the city of Ho, I met a seamstress, Philomena, who makes clothing and accessories such as wallets, purses, and water bottle holders. Some of her items are made from a batik fabric. While in Cape Coast, I met with Melanie Popowich who works with Global Mamas, a non-profit fair trade organization that provides income for woman in rural villages. I toured the shop where batik fabric is produced by a method using wax and dye to create patterns on fabric. The fabric is sent to seamstresses who hand-sew clothing, blankets, items for the home, and even items for pets. The products are shipped to various retailers, including some in the United States.

I also visited the Global Mamas retail store in Accra, the capital city of Ghana. At the store, I was able to see a wide variety of products made by the company. Recycled plastic bags are used to make coin purses, computer cases and many other items. I purchased a purse and wallet made of different batik fabrics and a coin purse made from recycled material to show to the Board of Directors of Project 701 some examples of Ghanaian art.

## Health and Wellness Programs for the Elderly in Ghana

*Ellen Stryffeler, McMaster Scholar, Ghana 2011 - 2012*

My project consisted of creating and implementing a fitness program at the Shepherd's Centre of Aging in the village of Peki in the Volta region of Ghana. This center is run by our community partner, the Evangelical Presbyterian Church (EPC)



*Ellen Stryffeler, scholar, taking blood pressure in Ghana*

of Ghana. The focus of my project was to help alleviate the effects of urbanization experienced by some members of the elderly community. Urbanization has caused a deterioration of tradition of family-based eldercare in the Volta region, as adult children are finding it necessary to leave their elderly parents in the small villages in order to find work in the cities. The Leadership Training Manual of the Shepherd's Centre of Aging (2001) states that people should not be ashamed of growing old and being dependent on others for care and help. Traditionally in Ghana, caring for one's aged family members is actually found to be a source of pride and achievement for the family. If this tradition is broken by the children needing to leave their elderly parents to find work, it poses a problem for the elderly and the social systems that must step in to provide needed services. That is precisely the situation that many elderly Ghanaians are now facing, and one that the Shepherd's Centre of Aging is trying to remediate.

Urbanization in the Ghana community has seen a marked increase in recent years, and according to the United Nations, Ghana's rate of urbanization will continue to increase. In 2010 the urban population in Ghana was 12,524 and its rural population was 11,808. One year later, Ghana's urban population rose to 12,955, with 12,011 living in rural communities (United Nations, 2011).

One goal of the Shepherd's Centre of Aging is to provide care that will enable the elderly to enjoy a high standard of living while remaining

in their homes, even though the family traditions of eldercare are crumbling. The Shepherd's Centre places great importance on the elderly having a high quality of life while living independently. A wellness plan that focuses on reducing the risks of illness and accidents by increasing muscle mass to improve balance, flexion, and physical fitness will not only improve physical functioning, it could also increase the individuals' quality of life.

While in the town of Ho in Ghana, I worked with Dr. Seth Agidi, pastor and founder of the Shepherd's Centre of Aging. Dr. Agidi informed me that the community members who frequented the center had a desire to learn about aging in America and requested that I give a brief presentation. I was able to conduct internet research on the topics he was interested in and presented this information at the Shepherd's Centre of Aging. In addition to my presentation on aging in America, I led a brief workout routine that American elders might encounter as part of a fitness program. My workout was based on one prepared by Laura Niedziocha (2012) and the knowledge I had acquired as a Wellness and Corporate Fitness major at Defiance College. My exercise program focused on the whole body and incorporated movements that if executed properly, would increase strength, range of motion, and flexion for the individual.

After interacting with the elders and the staff at the Shepherd's Centre, I realized that a typical American exercise program might not be among the highest needs because the elders get a lot of physical activity in their daily lives. Their day-to-day duties and culture keeps them slender and fit. However, an alternate method of preserving meats and flavoring their food without the use of high amounts of salt could provide health benefits for the community as a whole.

### References

- Niedziocha, L. (2011). Leg workout for older women. Retrieved from <http://www.livestrong.com/article/531314-leg-workout-for-older-women/>
- Shepherd's Centre of Aging. (2001). Leadership certificating training manual. Published in-house.
- United Nations, Department of Economic and Social Affairs, Population Division (2012). *World urbanization prospects: The 2011 revision, CD-ROM edition*. Retrieved from <http://esa.un.org/unpd/wup/CD-ROM/Urban-Rural-Population.htm>

## Documenting the Needs of Our Community Partners in the Volta Region of Ghana

*Asia Williams, McMaster Scholar, Ghana 2011 - 2012*

The purpose of my project was to document the needs of our community partner, the Evangelical Presbyterian Church (EPC), in rural villages of the Volta region of Ghana. The EPC and the United Church of Christ (UCC) are both members of Global Ministries, an affiliation of churches that seeks to meet the needs of people throughout the world. Prior to going to Ghana, I contacted Mary Blaufusm and Sandra Gourdet of the UCC Global Ministries to learn about the connection between the EPC and the UCC and was told that the UCC Board for World Ministries began its involvement with the EPC of Ghana in 1946. The UCC, through Global Ministries, provides educational and service programs for the EPC and has also helped with church expansion. Some of the programs supported by the UCC include: Window of Hope in-school HIV/AIDS club, the Christian Council of Ghana, the Evangelical Presbyterian University College, and a scholarship program for girls (Global Ministries, n.d.). As a result of these connections, the UCC and EPC have become a united family.

While in the Volta region, I interviewed and photographed many people, including educators, health care professionals, officers of the EPC, and villagers. From these interviews, I learned that the needs of our community partners include medical equipment, school supplies, improved classrooms, water purification, and solar cookers. There are also volunteer opportunities providing assistance with education, medical care, and sustainable agriculture. I also made connections with several businesses whose ultimate purpose is to give back to the Ghanaian community and would be potential partners for subsequent learning communities.

The distance between Ghana and the United States makes it hard for people in the United States to feel connected to the people in Ghana. To bridge the gap, I created a brochure that highlights the needs and describes fundraising and volunteering opportunities that will make people in the United States more aware of ways they can lend a helping hand to our community partners in Ghana. The brochure will be given to Dr. Marian Plant, Associate Professor of Ministry Studies at Defiance

College, Mary Blaufusm and Sandra Gourdet of Global Ministries for use by the United Church of Christ and Reverend Seth Agidi of the EPC.

### References

Global Ministries. Africa special projects, n.d. Retrieved from <http://globalministries.org/africa/projects/>



*Mercedes Clay, associate fellow, and Asia Williams, scholar, teaching hokey pokey to children in Ghana*