

Protein Malnutrition in Rural Swaziland: Introducing Moringa as a Nutritional Supplement

"I am always afraid to come in to work on Monday," I heard Tandi say from the back seat, *"I do not like worrying how many children died over the weekend."* At Mbabane General Hospital (MGH), many children die over the weekend. Weekend or not, most children admitted to MGH for severe malnutrition die during their hospital stay. *"How many children are admitted to MGH for malnutrition?"* Eileen asked. *"At least half,"* Tandi responded. This week, over 30 of the total 60 hospitalized children are very malnourished.

- Weblog excerpt, [Pediatrician in Swaziland](#), Dr. Ryan Phelps, MD-MPH, 3/8/2007

Introduction to Swaziland

Swaziland is a small country nested between South Africa and Mozambique. The country's geography ranges from the mountains of the north to the forests and savannas of the south. The 1.2 million Swazi citizens have political peace and stability under a king and parliament system. Its GDP ranks it as a middle-income country. However, in the past few decades, this country's economic and social structure has been drastically marred by poverty and HIV. Our objective will be to fight malnutrition and HIV by introducing one very promising tree.

HIV/Poverty and the Role of Protein Malnutrition

HIV and poverty are known for their devastating effects, but when combined can create conditions far worse than otherwise. Swaziland has the highest HIV prevalence rate in the world at 40%. It also has 70% of its population living in poverty and 30% in extreme poverty. Despite being a middle-income country, Swaziland is ranked as having one of the worst wealth distributions in the world. Lastly, we should note that Swaziland just suffered its 5th consecutive year of drought and crop failure, leaving more than 30% of the population dependent on the World Food Program. When general malnutrition is estimated to be at 12% of the population, protein malnutrition is undoubtedly much higher.

In addressing the HIV epidemic, the government provides free anti-retroviral treatment (ARV). Although this is an important first step, ARV patients with protein deficiency are affected by toxic side effects. Beyond personal health, the HIV pandemic has a number of dire consequences which includes a reduction in the labor force and a mounting orphan and vulnerable children (OVC) population.

Rural poverty encourages households to have diets of cheap foods which provide little nutritional value beyond caloric energy. The poor protein intake weakens the immune system and makes the body more susceptible to infections. This protein malnutrition also stunts physical and mental development in children, handicapping them as they attend school, work in the fields, and try to lead normal lives.

The combination of all these constraints (consecutive drought years, high HIV prevalence, reduced labor force, high poverty, and widespread malnutrition) create a situation where traditional interventions have little chance of success.

Malnutrition both results from and contributes to HIV and poverty. Given that these are the two most important issues in Swaziland's development, protein nutrition must be enhanced to ensure sustainable progress of HIV treatment.

One Very Promising Tree

Through our research and preparations we have found a plant that, with proper application holds the very unique potential to significantly improve the quality of life in rural Swaziland. The plant is the Moringa Oleifera tree.

It has been extensively documented to be drought resistant, low maintenance, highly productive and quick growing. It has remarkably high protein, mineral, and vitamin concentrations. The lower altitude regions of Swaziland, the Midveld and Lowveld, are the hardest hit areas of malnutrition and poor crop yields. Coincidentally, the Moringa tree prefers lower altitudes and is able to survive the prolonged droughts in these regions. For over 10 years it has been introduced in other countries to address malnutrition and has proved to be quite successful. With assistance from experts at the ECHO agricultural development group and by the efforts of the swaziAID team we hope to introduce this tree to rural Swaziland by means of a community service project for Waterford Kamhlaba United World College (UWC-WK).

While this plant holds high potential, it must be properly introduced and managed. There are three conditions that maximize the tree's success: The first is that it must be appropriate and adaptable to local tastes as well as the local growing conditions. The second is that the plants should develop a strong market value. Thirdly, the plants must have means of propagation and distribution that is scalable and replicable.

The action plan is divided into three subsequent stages. Stage 1 and 2 will be executed in April-August 2008 by the swaziAID team along side participating WK volunteer students through the support of the *100 Projects for Peace* Grant. Stage 3 will be done afterwards by swaziAID's funds and operations. The project will be based out of Mbabane and UWC-WK has offered to arrange housing for the team and help provide accessibility to transportation and ground resources. If this plan is well executed, participants will enjoy the numerous benefits of a more protein rich and nutritious diet. They will see their children get stronger, the ARV medications actually work, and their lives become more enjoyable.

If the moringa tree is successfully introduced, rural Swazi people will gain a more protein rich and nutritious diet. This improved diet will strengthen the immune system, increase ARV effectiveness, increase productivity, and even provide a source of income in a low-resource setting.

Stage 1. Feasibility Trials - April 2008 to June 2008

To see if the plants will fit into the Swazi diet, we will do field tests with orphanages and families with OVC. UWC-WK already works with many suitable families in need just like them. We will first do taste tests with 50 of these families. The moringa leaves will be presented as a powder added to any meal in ways that fit the local diet. Within these families we will conduct standard World Health Organization (WHO) malnutrition measurements over two months. Enough moringa powder will be supplied for two tablespoons per person per day. Checkups and measurements will also be taken regularly to record progress.

Second, we will need to research optimal growth conditions for Swazi soil. The winter months in Swaziland (June-August) are not favorable for field trials. Rather, we will conduct tests in a simple greenhouse using regional soil on the grounds provided by UWC-WK. Thirty tests plants will be grown and good results should be seen within 2 months. This approach is necessary because the first few months of moringa's growth are the most critical.

Stage 2 Home-Nurseries Set-Up and Propagation June 2008 – August 2008

At Stage 2, moringa will be formally introduced. We will work with 10 families to construct simple nurseries on their homestead. Families will be compensated for their participation by being provided a monthly supplementary income. Each of the 10 families will be provided with materials and training to grow 50 plants (500 total). To do this, we will establish local homestead-based nurseries to produce seedlings for distribution and propagation. Each nursery will be supplied with one drip irrigation system and local manure will be sourced for fertilizer if necessary.

Propagation will begin with the taste-trials' families first. At a modest size, 10 plants produce more than enough for a four member household. The moringa nursery trials will last until the end of August. To further distribute the tree to other families, we will provide information pamphlets to UWC-WK for use in future community projects. A strong emphasis will be placed on encouraging current families to recruit others. Working with UWC-WK and ECHO, we will ensure that all materials are culturally appropriate and well accepted. As distribution and demand increases, families will be encouraged to act as host nurseries themselves and to share with neighboring homesteads using the supplied materials.

Stage 3. Productions for Market – August 2008 and Beyond

The plants can be ready for harvesting within several months. In the future, we expect many plants will be grown at each host homestead and eventually these trees will produce enough for household consumption and market sales. The moringa leaf powder and the seed oil have high international market values: more than 14USD/lb for the powder and 5USD/oz for the oil. Beyond the scope of this summer, the swaziAID team plans to follow up with this project using its own funds to develop a revenue-generating enterprise. Equipment will be purchased such as powder mills, driers, and oil presses specifically suited for rural settings. The host families will be networked, the harvested crops centralized and finally processed by community members. This will supply jobs, develop community interaction, and bring the participating families to self-sufficiency.

Within a few years, many rural families can have markedly improved household intake of protein and nutrition, raising health and increasing ARV treatment effectiveness.

swaziAID Team

swaziAID has been in operation since Spring 2006. Our aim has been to learn as much about Swazi culture and issues from a ground research basis. Our focus has been on the development of fund-raising and research into trends, resources, and existing NGO operations. The following team members will travel to Swaziland to put our plan into action. Additional preparatory training and educational session will be hosted by the ECHO organization in the Spring of 2008.

Abhi Lokesh – Third year integrated pre-med biology major. Student ambassador at UF's center for entrepreneurship. Will coordinate management and organizational structure of the swaziAID team. He will work to streamline contacts and information with partners and to create a system by which communication and development initiatives operate on high levels of efficiency and productivity. He will also be constantly searching for and developing suitable financial and media resources that agree with our principles of sustainable business.

Alexandros Theodore – Senior Chemical Engineering student with significant research experience and course studies in Process Design, Integrated Process and Production Design, Process Costing and Economic Analysis. He will be developing and overseeing all technical and agricultural aspects of the initiative.

Edward Lin - Fall 2007 graduate with Bachelor's Degree in Microbiology and Cell Science. Additional courses include Modern African Anthropology, Social Entrepreneurship, Issues in Sustainability, Non-Profit Development and Management, Public Health, Hunger and Disease with additional independent research and case studies. In addition to managing project planning and coordination, he will be specialized in health and nutritional assessment, strategy, and evaluations.