

The Use of *Moringa Oleifera* to Enhance Holistic Care for Orphans

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Abstract

This text will address why orphanages providing holistic care should grow and implement a *Moringa oleifera* (Moringa) project onsite. Not only do the leaves of the Moringa tree contain vital nutrition and vitamins which can fight malnutrition when consumed, but growing Moringa on site could be developed as an entrepreneurial endeavor, potentially generating an income for an orphanage, helping it to become self-sustainable and better able to provide holistic care to children. Through the involvement of the children in growing and harvesting Moringa, this agricultural project also offers an educational opportunity, a vocational skills training tool, and a way to build self-esteem and responsibility.

The Use of *Moringa Oleifera* to Care for Orphans

As of 2008, UNICEF estimated there were 210 million orphans in the world and 35,000 children dying every day from hunger and malnutrition (Mission One Million, 2008). Thus, countless orphanages attempt to alleviate such dire circumstances by providing holistic care to these children. In doing so, they aim to provide for every aspect of the children's needs, though the grim reality is that they are often under-staffed and under-financed, making this goal difficult to achieve. Often, this lack of resources leads to malnutrition and other dangerous repercussions. Centers often do not have the funding to provide each child with a balanced diet; instead, they are forced to purchase the cheapest product available, which then becomes the source of every meal. However, there may be a solution waiting to be harvested high above the heads of many people around the world in the branches of the *Moringa oleifera* (Moringa) tree.

With Moringa often growing in the same locations as those who are living in poverty and who are malnourished, this tree could be a valuable resource. This fact is especially urgent for children who lack access to needed vitamins and minerals to grow and thrive. Moringa has many beneficial qualities and can be used as an integral part in providing holistic care for orphans. From access to necessary nutrition, to a form of empowerment and learned trade, orphanages will be able to best serve children in a holistic manner with the development of a Moringa project. Whether planting Moringa on an orphanage's property or growing Moringa in a pot if land is not available, orphanages could greatly increase their holistic programs through a Moringa gardening project.

Holistic Orphan Care

In order to understand how a Moringa project could enhance holistic orphan care, we must define what it means to provide holistic care. Holistic orphan care is now considered a

“buzz” word in the realm of orphan care, often being used in a broad and unclear way. Therefore, it is important to examine what it means to be providing holistic orphan care. Since there is not a set definition as to what it means to provide holistic care to orphans, it is important to look at what it means to be holistic. Typically holistic refers to taking every part of something into account, with each of these aspects being interconnected and dependent on the other. Bryant Myers (1999) explained in *Walking with the Poor* that a holistic framework “views the world as a seamless spiritual-physical whole” (p. 153). When caring for orphans, this translates into taking care of the physical, emotional, and spiritual components of a child.

Reverend John Kameru, founder of Ah-Gah-Pay Mercy Children’s Center (AMCC) in Thika, Kenya explained that, to them, holistic orphan care means caring for every part of the child, seeking to meet the physical, academic, and spiritual needs of every child they help (personal communication, July 3, 2012). They do this by providing three meals a day to each child, making sure each child is attending school, requiring each child to spend time each day studying, and by encouraging each child to spend time each day in their own form of worship. In doing so, they are aiming to help the children grow in every aspect of their lives.

The practice of holistic care, however, does not follow a strict model. For example, Compassion International (2013) described their model of holistic child development as something that needs to be fostered from the beginning and earliest stages of a child’s development, then continued through young adulthood:

This long-term model benefits children today and equips them with the skills they need to be independent Christian adults. It's dedicated to helping children find a path out of poverty through the love of Jesus Christ. By working with local churches, the Child Sponsorship Program offers educational opportunities, health care and health-related

instruction, nutrition, life-skills training, and opportunities to hear about and respond to the gospel. (Compassion's Holistic Child Development Model section)

Considering all of the above definitions, for the purpose of this paper I will be defining holistic care as taking care of the entire being of the child. This care includes caring for the physical, emotional, and spiritual wellbeing of each child at the facility.

History of Moringa

The *Moringa oleifera* is best known of the thirteen species of genus Moringaceae. The Moringa tree is native to northern India, Pakistan, and Nepal, but has “become naturalized well beyond its native range” (Roloff, Stimm, Lang, & Weisgerber, 2009). It can now be found growing naturally in Africa, Asia, Latin America, the Caribbean, and Oceania (Trees For Life, 2011). Thus, “12 [Moringa] deciduous tree species [are] native to semi-arid habitats from North Africa to Southeast Asia” (Roloff et al., 2009). Trees for Life (2011) reported that historically, this tree was highly valued by the Romans, Greeks, and Egyptians who extracted its edible oil from the seeds. They used this oil in personal luxuries such as lotion and perfume. In the 19th century, however, there was a shift. Moringa went from being used by those growing and harvesting it, to an item of trade and commodity. At this time, Moringa oil began to be utilized on plantations in the West Indies and exported for profit. Shipments of Moringa oil began being exported to Europe to be used in perfumes and lubricants for machinery. (Trees for Life, 2011)

Besides being historically used for oils, perfumes, and lubricants, Moringa has been used by traditional healers for those facing sickness. Depending on its location in the world, Moringa has been used to treat a variety of ailments. For example, in India, Moringa historically has been given to people to treat the following ailments:

anemia, anxiety, asthma, blackheads, blood impurities, bronchitis, catarrh, chest congestion, cholera, conjunctivitis, cough, diarrhea, eye & ear infections, fever, glandular swelling, headaches, abnormal blood pressure, hysteria, pain in joints, pimples, psoriasis, respiratory disorders, scurvy, semen deficiency, sore throat, sprains, and tuberculosis.

(Dolcas Biotech, 2008)

Due to its extremely useful nature, Moringa has been used for a variety of things in each country where it grows. For example, in both Malaysia and Puerto Rico, it has traditionally been used to treat intestinal worms, and in Guatemala it has been used to treat skin infections and sores, whereas in the Philippines it has been used to treat anemia, glandular swelling, and lactating.

(Dolcas Biotech, 2008).

Moringa a Gift from God

In the Bible, God has made it clear that He calls those on earth to care for the orphaned. In Psalm 82:3, God gives specific instruction to “Defend the weak and the fatherless; [and] uphold the cause of the poor and the oppressed” (New Living Translation Bible). However, He does not leave us stranded to independently to care for these children. Rather, He has provided us with a tool to use to help make sure this commandment is fulfilled. As previously mentioned, the Moringa tree grows in the exact locations where those who need it the most live. Generally speaking, this is around the equatorial region of the earth.

Echoing the same map as those living in extreme poverty, it appears as though the Moringa tree has been strategically placed, as a gift, resource, and tool provided by God. (See Appendix A for a map comparing the locations where Moringa grows and where extreme poverty exists.) If God has provided a way for every person on earth to be well

nourished, we need to access this provision. Those in a Christian setting, caring for children, need to use the gifts that God has provided. By not doing so, we are not respecting this amazing gift.

Moringa Fitting in the Model of Holistic Care

A Moringa project, on site at an orphanage, is ideally suited for holistic care. Growing and harvesting Moringa not only provides a new opportunity for learning, but enhances each category that is already defined as part of holistic care. Including children in the process of growing and harvesting Moringa on site at an orphanage will enrich the children physically, emotionally, and spiritually.

Through the consumption of Moringa, children will be consuming necessary vitamins and nutrients. Hypothetically, with the added intake in vitamins, children will be able to better fight off illness with an increased immune system, have more energy, and more focus in activities such as school. This information will be expanded upon in the section: Moringa and Malnutrition. Emotionally, through the active participation in a Moringa project, children will be able to take ownership and pride in the project. This will help to boost their self-worth and self-esteem. A Moringa project could also have effects such as friendships being developed between the children through the common goal of growing and harvesting the tree. A Moringa project could help the children within orphanages to bond over a singular focus, strengthening and growing relationships within the facility. Spiritually, the children will be able to see that God has provided this special gift for them. This may result in the children feeling closer to God or reassurance that He loves them incredibly.

By growing Moringa on site, children will be able to be involved in the process. Involving children in the process of a Moringa project would add additional value and

opportunities for growth within each aspect of holistic care. Such a project could provide a valuable experience for children to participate, learn a trade, take responsibility and ownership, and create an avenue of pride for an achievement. From increasing physical to emotional health and self-worth, a Moringa project would enhance each component of holistic care.

One point of concern that an orphanage may have in considering starting a Moringa project is that the initial start-up cost would detract from what is currently being used to provide for the children. However, benefit of a Moringa project is that the start-up and maintenance costs of growing Moringa are relatively low. For example, Dave Richardson, founder of the organization His Heart My Voice, located in Thika, Kenya, found he could purchase a Moringa sapling from a local plant nursery for less than 0.50 USD (Richardson, 2011). This cost would vary, however, depending on the region in which the project takes place, along with the access the organization has to Moringa. Not only is the cost of starting a Moringa project however than other business startup costs, but it could potentially develop into a self-sustaining, entrepreneurial endeavor.

Frequently underfunded, orphanages are not always able to provide the care they would like to for the children in their organization. For example, at the end of finishing secondary school in Kenya, each student must take a national exam. If a student scores high enough they are automatically admitted into a University. If they do not score high enough they are not permitted to continue their education at the University level. At Ah-Gah-Pay Mercy Children's Center, there was an 18 year old boy in Kenya who did not score high enough on the national exam to be admitted to a University. He expressed to the staff that since he could not continue his education at the University level, he would instead like to take a 9 month long course on Project Management at the Thika Institute of Technology, since he did not have the opportunity

to further his education at the university (personal communication, July 7, 2012). In doing so, he is hoping to one day give back, and become a staff member at AMCC so that he could help and mentor other children just as the staff has done for him. However, AMCC did not have the finances to support him in further vocational training. In conducting interviews with various orphanages, the biggest and similarity that they each expressed was not having the finances to provide the holistic care that they desired. For example, when talking with the staff of Judah Care Foundation, they explained that their biggest challenge was securing food for the children in their care (personal communication, July 5th, 2013). When talking to the staff at St. Paul's Children Home, they explained that their biggest challenge was having the finances to pay for the children's school fees. This would often result in the children being sent home from school for outstanding fees (personal communication, July 1st, 2013). This is where added income from a Moringa project could be utilized.

After harvesting various components of the tree, leaves could be sold as food, or the seed could be sold to biofuel companies. The oil could also be sold for cooking or machinery lubricant. The Enzyklopädie der Holzgewächse (2009) explained that, "The oil is highly valued by perfumers for its power of absorbing and retaining odors, and by watchmakers as a lubricant" (p.6). Such income could help the orphanage increase the quality of each component of their current care model. With an increased income, orphanages will be able to provide better and more complete holistic care.

Harvest for Food

Almost every aspect of the Moringa tree is harvestable and edible. The actual harvesting of various components of the tree is not difficult, and something that children can take part in regularly. However, it is important to note that the branches of the Moringa tree are very brittle

and unsuitable for both adults and children to climb (Moringa Association of Ghana, 2006). In order to preclude the need for people to climb the tree to harvest it, the tree must be trimmed to a height that makes it convenient to harvest without climbing branches. Ideally, the tree should be trimmed to the height of tall bushes. Trimming the tree in this way will also increase maximum growth and production.

In the harvesting of the tree, the leaves can be picked and consumed either fresh or dried. Through studies compiled by the Agroforestry Database (2009), it was found that, “Young plants can be eaten as a tender vegetable” and the green peas and surrounding white material can be removed from larger pods and cooked in various ways” (p.3). The pods can also be “browned in a skillet, mashed and placed in boiling water” (Agroforestry Database, p.3). This produces excellent cooking oil which floats to the surface. This oil is said to resemble olive oil. The Moringa oil can then be sold, or used for personal use in cooking. The flower of the tree is also edible and can be directly consumed or made into tea (Agroforestry Database, 2009). Each of these forms of consumption provides valuable intake of vitamins and nutrients that may otherwise not be present in a child’s diet. Thus, Moringa can directly fight malnutrition, and it can do so in the form of a single plant.

Beneficial Qualities of Moringa to Fight Malnutrition

The Moringa Oleifera is often referred to as the “miracle tree” because each part of the tree offers specific, beneficial qualities. From providing nutrition, purifying water, and being used in biofuel and as a lubricant for machinery, this tree contains many parts that could enhance the lives of orphans around the world. When properly consumed, the leaves of this tree contains vitamin C, which fights a host of illnesses including colds and flu; vitamin A, which acts as a shield against eye disease, skin disease, heart ailments, diarrhea, and many other

diseases; Calcium, which builds strong bones and teeth and helps prevent osteoporosis; Potassium, which is essential for the functioning of the brain and nerves, and Proteins, the basic building blocks of all our body cells. (Trees For Life, 2011)

There are two main ways of consuming Moringa. First, the leaves can be picked by hand and consumed fresh after using water to clean any dirt that may be on the leaves. Second, the leaves can be harvested, washed, and laid to dry. Once the leaves are dry they can be ground into a fine powder, which can then be added to food (Moringa Association of Ghana, 2006).

Various parts of the Moringa tree, from the leaves to the seeds, also contain numerous other vitamins, such as Vitamin A, B1, B2, B3, C, Calcium, Chromium, Copper, Iron, Magnesium, Manganese, Phosphorus, Potassium, Zinc, and all of the essential amino acids (Trees for Life, 2011). Dolcas Biotech (2008) found that, “Many of the listed vitamins, minerals and amino acids [found in Moringa] are very important for a healthy diet” (p.2). Offering a complete protein, with all the amino acids present, Moringa is an especially rare tree because through the consumption of the leaves, it can basically take the place of meat in a diet. There are very few plants in the world which can do this. This knowledge could be an asset for those facing malnutrition, especially children.

Physically, through the consumption of the Moringa leaves, children could acquire valuable nutrients and vitamins to which they may not have access otherwise. In conducting interviews with various orphanages, I found that one of the main challenges faced by organizations seeking to care for orphans and vulnerable children is access to important, vitamin-rich foods. By lacking vitamin-rich foods and variety in a daily diet, malnutrition often occurs. This results in over 40,000 children dying every day (Oxford University Press, 2013).

Not only is death a possibility for someone who lacks proper nutrition, but “nutritional deprivation as a child has irreversible negative effects in adulthood” (Sabates-Wheeler, Devereux, & Hodges, 2009, p.112). Some of these effects include stunted growth and development. The World Health Organization (WHO) found that

One out of every three pre-schoolers in developing countries exhibits stunted growth (defined as height-for-age being two standard deviations below international norms) (de Onis and Blössner 2003). Stunting is a manifestation of chronic (long-term) malnutrition, and for this reason improving the nutritional status of preschoolers is fundamental to the achievement of several development goals. (Sabates-Wheeler et al., Devereux, & Hodges 2009. p.111)

This is specifically the case for those at AMCC who face malnutrition from the lack of variety of food. Reverend John explained that, though their center provides food for each of the children, they do not have enough money to provide the children with a variety of foods, thus, inadvertently subjecting the children to malnourishment. Unfortunately, they are only able to feed the children inexpensive foods such red kidney beans and maize. (personal communication, June 26, 2012).

While eating only beans or maize may be better than a child not eating, such a simple diet has adverse effects on the children’s growth and development, along with other side-effects. I saw the effects of malnutrition while in Kenya. An 18 year old girl, who had been consuming only red kidney beans and maize for her entire life, fainted and was taken to the doctor. After the doctor ran tests and examined her, he found that due to her lack of variety in diet, along with consuming only foods which are harder for the body to digest, she has developed severe stomach and intestinal problems. This is a direct

effect of malnutrition. Red beans are also found to release hemagglutinin, a toxin which is an “antibody that causes red blood cells to clump” (Live Strong, 2013). This has shown to cause many health problems for people who consume high amounts of this bean, including diarrhea, abdominal pain, nausea, and vomiting (Live Strong, 2013).

There are many other problems, besides stomach pains, that can arise due to malnutrition. The organization Save the Children (2013) found that malnutrition can cause children to have greater risk of heart disease, diabetes, and kidney damage; further, it can cause children to be “far less able to withstand infection” in comparison to those who receive proper nutrition (Chronic Malnutrition section, para. 4). This can then affect the physical capacity and energy for work that a child has, negatively influencing their chances to succeed in school. Malnutrition can also cause “long-term impacts on brain and nerve development and function...reflected in lower IQs and performance at school” (Save the Children, 2013). However, through the consumption of Moringa, many of these problems can be prevented.

As previously mentioned, Moringa leaves can be eaten fresh or dried. The *Enzyklopädie der Holzgewächse* (2009) found the following:

The tree is mainly valued for its edible, tender pods, which have a taste very similar to asparagus. These are eaten as a nutritious vegetable, either cooked or pickled. The tender leaves taste like watercress and, along with the flowers, are eaten cooked or raw. (Roloff et al., p.6)

By eating these leaves, children will be able to fight against the ailments brought on by malnutrition. This knowledge could aid orphans and those suffering from malnutrition by offering them an inexpensive way to obtain other vitamins and nutrients.

Moringa Project as Skills Training

A side from the valuable nutrition that can be gained by consuming Moringa, a Moringa project could act as a form of skills training. Orphanages often do not have the resources for teaching children a trade or a skill, which could help to better prepare them for when they “age-out” of the facility and face the task of finding a job. When talking to Pastor Ruth of AMCC, she explained that if students do not achieve a high enough score on their college entrance exams in Kenya, they will be forced to find work. This happens to numerous students living at AMCC. Not only could a Moringa project provide an income for the facility and be used to nourish the children, but the actual harvesting of the tree could be used to teach agricultural skills.

With much of the world’s population relying on agriculture for employment, it was found in the year 2000 that agriculture was the main form of employment around the world, with more than one billion people working in this field (Food and Agriculture Organization, 2013). This is especially true for those living in poverty and developing nations. The World Bank estimated that “70 percent of the world’s poor who live in rural areas, [rely on] agriculture... [as their] main source of income and employment” (World Bank, 2013).

Since so much of the world relies on agriculture as their main source of income, orphanages can help the children learn the skill of agriculture by involving children in each step of implementing Moringa at the facility. From growing, to harvesting, and consuming, a Moringa project at could act as a form of agricultural skills training for orphans. In return, a Moringa project would not only be immediately beneficial to those

consuming the byproducts of the tree, but it would be educational and a form of vocational training.

However, if a Moringa project was introduced onsite at an orphanage, leaders would need to take special precautions to ensure that genuine child participation is possible. In “*A Systems Approach to Child Protection*” Forbes et al. explained

Children are also one of the actors in the system, and as such have a role to play in their own protection. Life skills and spiritual development can build children’s capacity to make good decisions, influence their environment positively, and build resilience to difficult situations. Their innate skills of self protection, plus their growing capacities to manage themselves and their environment means that they are able not only to protect themselves but other children as well. (Forbes et al., n.d., p.13)

Child participation is of the utmost importance for the development of children. Roger Hart (1992) explained in “*Children’s Participation: From Tokenism to Citizenship*” that, “it is unrealistic to expect them [children] suddenly to become responsible, participating adult citizens” when they reach adulthood (p.7). By involving the children in a Moringa project, orphanages could be helping the children prepare to be participating adult citizens when no longer living at the children’s center.

Lack of Access to Land

The United Nations (2013) stated, “Access to land and land tenure security are at the heart of all successful rural societies and agricultural economies. Having land, controlling it and using it are critical dimensions of rural livelihoods” (Rural Poverty Section, para. 5). However, orphaned children often do not have the rights to land. In the case of orphanages, land can be costly and difficult to acquire. According to the United Nations (2013), “Poorer and

marginalized groups tend to have secondary rights that rarely extend beyond use rights. And what rights they have are often unprotected and weak, especially in the case of women” (Rural Poverty Section, para. 7). This could prove to be an issue when a Moringa project is proposed if proper land is not owned by the orphanage.

Another issue faced by orphans and orphanages is access to farmable land. For example, the main building at AMCC was constructed on a small piece of property. Having limited resources, they were forced to hire an unskilled contractor who did sloppy work. In the process of the construction of the facility, concrete was spilt all around the building and facility. This resulted in any land which the orphanage could have used to grow Moringa being unusable for an agriculture project. However, there is a potential that Moringa could be grown indoors or in pots.

Very little research has been conducted on the possibility of growing Moringa in a pot. However, by knowing Moringa is an evergreen or deciduous tree we can look at how similar species are capable of growing (Roloff, Stimm, Lang, & Weisgerber, 2009). Moringa has many similarities to other trees that thrive when planted in a pot or container. If Moringa can likewise thrive in pots, orphanages that lack access to land rights or land suitable for agriculture could still begin and benefit from a Moringa project.

Moringa for Urban Orphan Care

The World Health Organization (WHO) (2013) estimated that by 2050, seven out of every ten people will be living in urban locations (Global Health Observatory Section, para. 1). With “more than 50 percent of the earth’s people” living in the city, and soon to be “more than one-quarter of the world’s population...living in squatter settlements of the developing world,” the urban population is continually growing (White, 2006). Often this population faces systemic

issues and lack of opportunities, forcing them to inhabit slums and live in poverty. This shift from rural to urban settings is causing an increase in malnourishment faced by the urban poor. The United Nations (1988) indicated that “average food consumption is lower and estimates of undernutrition generally higher in urban areas [than rural].” The low income of the urban poor is also often focused primarily on food for survival. With as much as “60 to 80 percent of the income of the urban poor... spent on the purchase of food,” perhaps an alternative supplement, such as Moringa, could help reduce this percentage, providing opportunity for income to be spent on other needs (Maxwell et al, 2000). Though Moringa has primarily been used by those in rural areas for medicinal purposes, with an increased flux of the population moving to urban locations, it is important to look at the possibilities of Moringa within this scenario.

Due to the resilient nature of the Moringa tree, its usage is not limited to orphan care in rural settings. Rather, it is also a viable option for orphan care in urban locations. The Moringa tree grows along the equator, primarily between 30 degrees north and south of the equator, being able to withstand harsh climates, making it an ideal agricultural product in urban agriculture. Not only is this tree resilient, but the leaves could be harvested and provided to the children as nutritional supplement, just as they would in rural locations.

However, though the tree easily grows in various climates and is adaptable to many locations, including locations prone to drought, it does not always thrive. Once a Moringa tree is grown, it can easily withstand harsh environmental conditions, though to get to that point, the tree needs a lot of water, while not being waterlogged (Farm Radio International, 2004). This has its advantages and disadvantages in relation to urban contexts. Douglas et. al (2008) found, “in the large cities of low latitude countries, it is common for much of the low-income population to live in areas at risk from flooding” (p.187). This could serve as a significant obstacle for the

growing of Moringa. With urban populations often living in areas lacking adequate drainage and infrastructure, soil could easily become waterlogged, killing or lessening the harvest of the tree. Despite the concerns surrounding the actual growing and harvesting of Moringa in an urban setting, the beneficial qualities and opportunities that could be provided from this tree make it worth investigating how it could act as a supplemental form of income and sustainability for the those working with orphans in urban settings. For example, some possible solutions to the obstacles of growing Moringa in urban settings include planting the tree in a pot, a greenhouse, or an elevated garden. Doing so would ensure that the tree would not become waterlogged and thus yield the highest harvest.

Water Purification:

Those living in poverty often lack access to clean water. The United Nations has found that “more than one in six people worldwide—894 million—don’t have access to improved [clean] water sources” (Drinking Water and Sanitation Section, para. 2). I experienced this while at AMCC in Kenya. At the orphanage they had a water pipe which was installed by the city to combat this issue. This pipe had a lever which could be switched on to allow water to flow into massive water storage tanks. This allowed the water to be stored and used in case they lost access to the city’s water, which happened often. The water from the city would unpredictably stop flowing, leaving the orphanage without access to clean water. This frequently happened for prolonged periods of time, resulting in the orphanage using the entire back-up supply of water. This in turn forced the facility to gather water from a nearby creek. This creek is situated at the bottom of a hill which contains a cattle farm and tea plantation, the result being that anything that was used to treat the tea or that came as waste from the cattle trickled down into this creek. The children at the orphanage were left with no other option than to use this unclean creek water for

everything from bathing, cooking, washing clothes, and drinking when water did not come from the city. There are many adverse effects from drinking and utilizing unclean water.

One of the main effects of consuming unclean water is the increased risk in contracting a disease. UNICEF (2003) explained that some of the most common waterborne diseases are skin keratosis, cholera, fluorosis, guinea worm disease, intestinal worms, schistosomiasis, trachoma, typhoid, and diarrhea. According to the WHO (2008) it was estimated that 1.4 million children die per year due to diarrhea, explaining that diarrhea is often caused “by the ingestion of pathogens, especially in unsafe drinking water” (p. 7). As a result of diarrhea brought on by the consumption of unclean water, children often die from dehydration and malnutrition. Due to repeated periods of diarrhea, children are also more susceptible to other diseases and malnutrition (UNICEF, 2003). According to Postnote (2002), waterborne diseases are one of the main problems in developing countries, “with more than four million people dying from diarrhea each year” (p.1).

If an orphanage is growing Moringa, it can be used as a purifying agent in unclean water. The study on the *Effectiveness of Moringa Oleifera Seed as a Coagulant for Water Purification* (2009) found that after harvesting pods from Moringa trees, opening these pods and grinding the seeds into a fine powder, this Moringa powder can then be used as a water purifying agent. The Agroforestry Database (2009) described that to “prepare the seed for use as a coagulant, remove the seed coat and wings. The white kernel [can] then [be] crushed to a powder, using a mortar or placing it in a cloth and crushing it with a stone” (p.4). When the seeds of the Moringa tree are crushed into a powder, they act as a natural flocculent which can be used to purify dirty water, eliminating between 90-99% of bacteria. After being mixed in the water, the powder clings to the “solids” in the water and floats to the bottom, making the water at the top of the container much

safer to drink (Alford, 2010) (See Appendix B for photographic examples). In testing this method, values were recorded that were acceptable “according to the WHO (2006) guideline for drinking water” (p.3). This could be of great value to those who do not have access to clean water. It could save the lives of children and people who are forced to draw and utilize water from unclean sources.

Relation to Climate Change

In “Climate and Church: How Climate Change will Impact Core Church Ministries,” the Eco-Justice Group Report focused on explaining that global climate change will have the greatest effect on the poor. Studies have shown that “people in poverty around the world will be the least able to deal with the effects of climate change. Increased drought, flooding, and disease will only exasperate the already dire conditions of those living in poverty” (Eco-justice Group Report, p.5). Of the population affected, children will be some of those hit the hardest. The Eco-Justice Group Report found that, specifically in “Ethiopia and Kenya, two of the world’s most drought prone countries, children age 5 and under are 36-50 percent more likely to be malnourished if they were born during a drought” (p.5).

Not only are these countries prone to drought, which has occurred more frequently and with more intensity due to climate change, but each of these countries have an extremely high number of children who are orphaned. Currently, in Ethiopia about 13 percent of the population or 4.6 million children are orphaned (UNICEF, 2013). These numbers are almost as high in Kenya as well, with 12 percent of the population or 2.4 million children orphaned (UNICEF, 2013). With lack of access to rights and resources, these children will be greatly affected by the increased drought, flooding, and disease brought on by climate change. Likewise, they will be more likely to be malnourished as a side effect of these environmental disasters and injustices.

However, orphanages could plant and grow Moringa to combat these issues. Not only does this tree provide necessary vitamins and minerals needed to fight malnourishment, but this tree can withstand the harsh conditions brought on by climate change. Unlike other trees or vegetation, Moringa easily grows in various locations and is adaptable to many climates, including drought (Farm Radio International, 2004). The Moringa Association of Ghana (MAG) (2006) found that this is due to Moringa's quick growth and development of tuberous roots. MAG (2006) found that "Moringa can germinate and grow without irrigation if it is sown during the rainy season. Its tuberous root develops in twenty days and allows young plants to endure drought" (p.24). This tuberous root deeply anchors itself in the ground and is able to store water and nutrients. By not relying on topsoil or water near the surface, Moringa is able to withstand harsh drought. However, to have the highest yield, the tree will be most successful if planted before, not during, a drought.

Community Involvement and Change

By one orphanage deciding to start a Moringa project, an entire community could be affected. As the children and those consuming Moringa begin to acquire better health from the vitamin-rich tree, people in the community will begin to talk. This is especially true in a collectivist society, as knowledge and stories travel quickly throughout such communities. In *Cultures and Organizations: Software of the Mind*, Hofstede (2010) explained that in collectivist societies, high-context communication prevails, and frequent socialization takes place in public locations (p.113). This public communication will lead to people questioning what has caused the change in these children. In return, this will

lead to knowledge about the numerous beneficial health qualities of Moringa being shared throughout the community.

In return, Moringa could provide an opportunity for the orphanage to make an income. Offering their knowledge on Moringa, the center could hold small educational sessions about the tree. This could be done through anything from providing training sessions on how to properly grow, harvest, and consume Moringa, to selling saplings of the trees to those who wish to plant and harvest their own crop. This may possibly develop into a social entrepreneurship endeavor for the orphanage. After all, as described by David Bornstein & Susan Davis, “the heart of social entrepreneurship is a willingness to try out ideas that are helpful to others” (p. 82). By starting a social entrepreneurship out of a Moringa project, this would not only benefit the children at the orphanage, but those in the community.

Conclusion and Recommendations

By orphanages growing and harvesting Moringa it would enhance each category that is already defined within a holistic care approach. Including children in the process of growing and harvesting Moringa onsite at an orphanage will enrich the children physically, emotionally, and spiritually. From providing for the children physically through nutrition gained from consumption of the leaves, emotionally allowing the children to take ownership and be included in each process of the project, to spiritually knowing that God has given them this amazing gift, a Moringa project would better each aspect of holistic care.

Myers (1999) explained, “We must believe that God has given gifts to the poor that can be called out and used by the poor for their own transformation” (p. 154). I truly believe that Moringa is one of these gifts. In order for orphanages to have an idea on how to go about

utilizing and starting a Moringa project, I recommend that a simple Moringa manual be produced and sent to any organization which is interested. Due to language barriers, such a manual would be most effective if translated into the language spoken by the organization, along with utilize pictures. I would like to create a start-up kit which could then be given to orphanages wanting to start a Moringa project. In this kit I would include a Moringa tree sapling or seeds, a manual on the growing and harvesting of the tree, along with a small book that contains recipes and ideas on how to use the Moringa once harvested.

In order to fund these start-up kits and manuals, I will contact local agriculturally focused organizations located in the United States. Funding packets for a Moringa project could provide an outlet for agriculturally focused organizations in the United States who want to help and make a difference, both in the environment and in the lives of people around the world. I will also be looking for grants that could fund this project.

Out of this research, as a first step of working toward the spreading of knowledge about Moringa, I have formed a letter (See Appendix C). This letter will be sent to various organizations which practice holistic approaches when caring for orphans. In this letter I will be advocating for the use of Moringa Projects in conjunction with a Holistic Orphan Care model (See Appendix D for a list of the organizations of whom will be contacting and sending the letter).

References

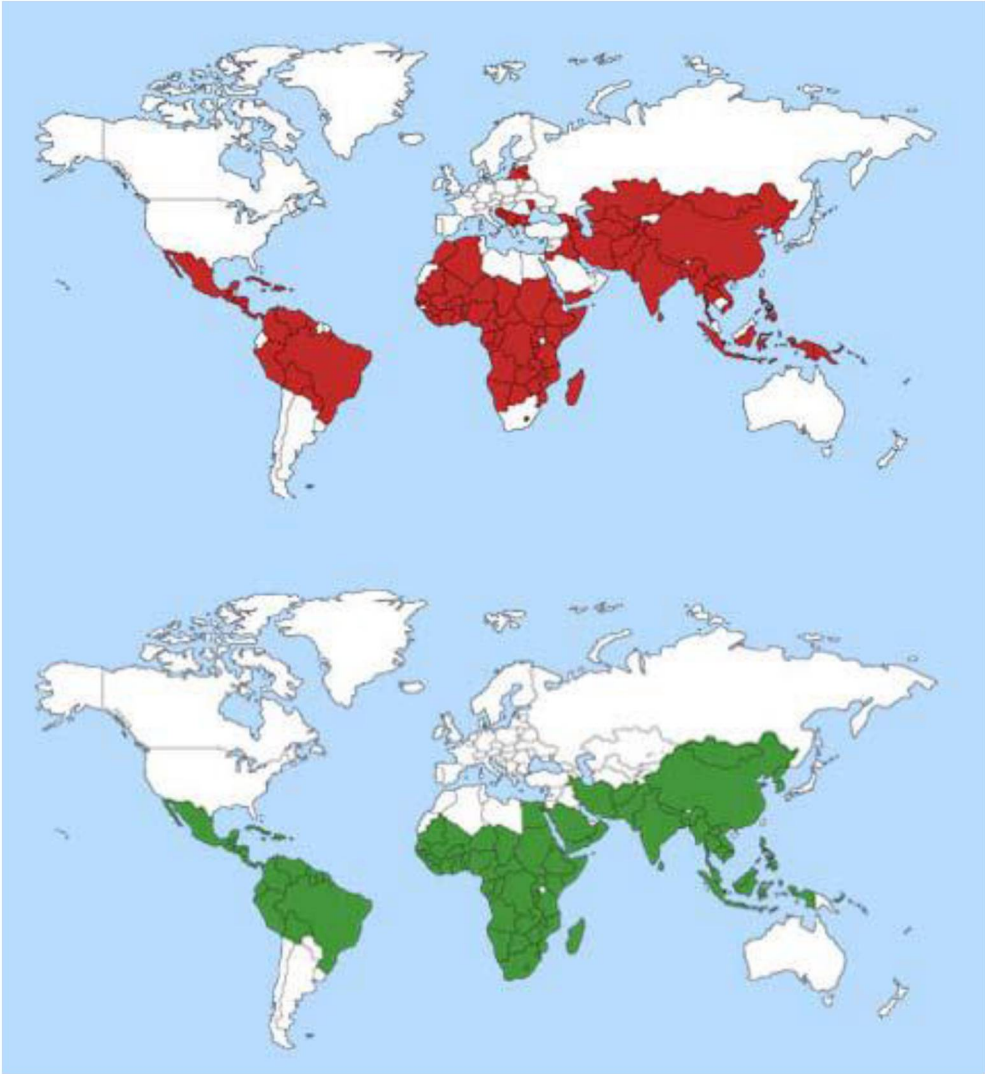
- Agroforestry Database. (2009). Agroforestry Database: a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>)
- Alford, C. (2010). Moringa Oleifera – a miracle for rural communities in developing countries? *Http://www.madcambodia.org/files/Moringa_Oleifera.pdf*. Retrieved June 20, 2012.
- Bornstein, D., & Davis, S. (2010). *Social entrepreneurship: What everyone needs to know*. New York, YK: Oxford University Press.
- Compassion International. (2008). Compassion's holistic child development model. *Compassion International*. Retrieved January 2, 2013, from <http://www.compassionmodel.org/>
- Dolcus Biotech. (2008). *Moringa oleifera*. Retrieved January 23, 2013, from <http://moringamalunggay.com/moringa-fresh-leaf-vs-dried-leaf.pdf>
- Douglas, I., Alam, K., Maghenda, M., Mclean, L., & Campbell, J. (2008). Unjust waters: Climate change, flooding and the urban poor in Africa. *SAGE*, 20(1), 187-205. doi: <http://eau.sagepub.com/content/20/1/187>
- Farm Radio International. (2004, July). Radio scripts: Grow moringa for food and fodder. *Grow Moringa for Food and Fodder // Farm Radio International*. Retrieved October 14, 2012, from http://www.farmradio.org/english/radio-scripts/71-4script_en.asp
- Forbes, B., Luu, D., Oswald, E., & Tutnjevis, T. (n.d.). *A systems approach to child protection: A world vision discussion paper* [Pdf].
- Hart, R. A (1992). *Children's participation: From tokenism to citizenship*. UNICEF International Child Development Centre, Florence, Italy.

- Hofstede, G. H., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind : Intercultural cooperation and its importance for survival*. New York, NY: McGraw-Hill.
- Holy bible: New living translation* (2nd ed.). (2006). Wheaton, IL: Tyndale House.
- Maxwell, D, C Levin, M Amar-Klemesu, M Ruel, S Morris and C Ahiadeke (2000), *Urban Livelihoods and Food and Nutrition Security in Greater Accra, Ghana*, Research Report No 112, International Food Policy Research Institute (IFPRI), Washington DC.
- Miracle Trees. (2005). Moringa water purification. *Moringa Tree*. Retrieved February 2, 2013, from http://miracletrees.org/moringa_water_purification.html
- The Moringa Association of Ghana. (2006). *Growing and processing moringa leaves*. Retrieved March 13, 2013, from <http://www.moringanews.org/documents/moringawebEN.pdf>
- Mission One Million. (2008). The need. *Mission One Million*. Retrieved September 2, 2012, from http://www.mission1m.org/about_the_need.html
- Myers, B. L. (1999). *Walking with the poor: Principles and practices of transformational development*. Maryknoll, NW: Orbis Books.
- Oxford Dictionary. (2013). Holistic. *Definition of in Oxford Dictionaries (US English) (US)*. Retrieved January 16, 2013, from http://oxforddictionaries.com/us/definition/american_english/holistic?q=holistic
- Postnote (2002). Access to water in developing countries. No.178 Internet: www.parliament.uk/post/pn178pdf accessed on 24th October, 2007.
- Richardson, D. (2011). Moringa tree project. *His Heart My Voice*. Retrieved February 18, 2013, from <http://www.hhmv.org/moringa/MOR20120558.html>

- Roloff, A., Stimm, B., Lang, U., & Weisgerber, H. (2009). *Moringa oleifera*. In *Enzyklopädie Der Holzgewächse*. Retrieved January 19, 2013, from http://www.wiley-vch.de/books/sample/3527321411_kap1.pdf
- Save the Children. "Cronic Malnutrtion." *Save the Children*. N.p., 2013. Web. 1 Apr. 2013.
- Trees for Life. (2005). *Moringa: A potential life-saver* [Ebook]. Retrieved June 18, 2012, from http://www.treesforlife.org/sites/default/files/documents/English%20moringa_book_vie.pdf
- Trees for Life. (2011). *Moringa Book. News and Updates*. Retrieved October 10, 2012, from <http://www.treesforlife.org/our-work/our-initiatives/moringa/moringa-book>
- UNICEF. (2013). UNICEF Ethiopia. *Ethiopia*. Retrieved February 19, 2013, from <http://www.unicef.org/ethiopia/>
- United Nations. (1988, March 30). Rapid urbanization poses challenge to health, nutrition. *Rapid Urbanization Poses Challenge to Health, Nutrition*. Retrieved October 13, 2012, from <http://www.unsystem.org/scn/archives/scnnews01/ch2.htm>
- United Nations. (n.d.). Drinking water and sanitation. *UN Water*. Retrieved March 16, 2013, from http://www.unwater.org/statistics_san.html
- White, R. (2006). *Encounter God in the city: Onramps to personal and community transformation*. Downers Grove, IL: IVP Books.

Appendix A
Moringa and Malnutrition

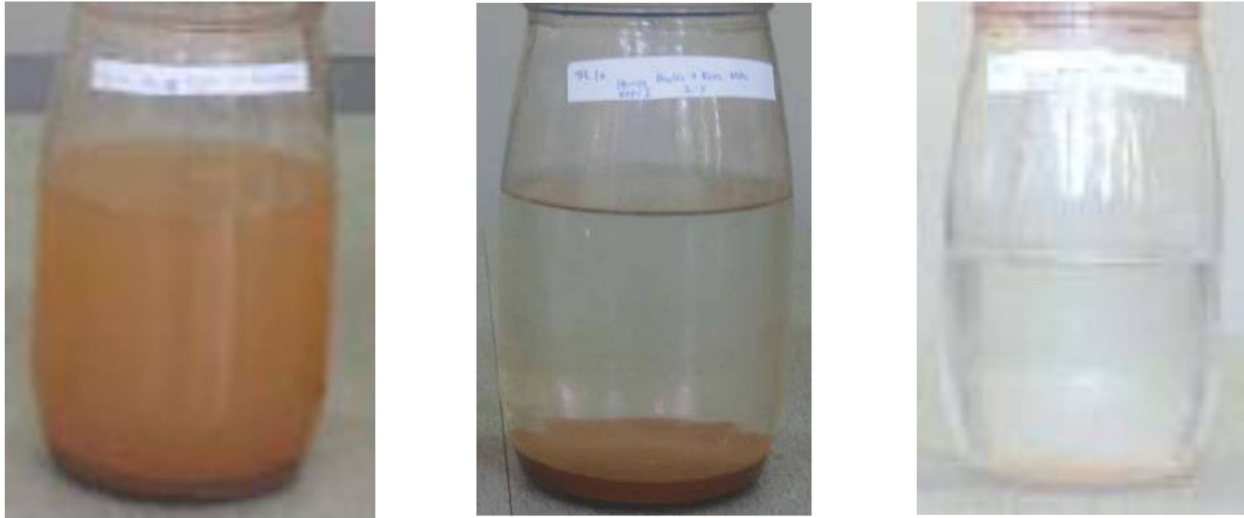
The map on top (in red) shows the countries in which high rates of malnutrition exist. As where the bottom map (in green) shows where Moringa currently grows wild.



(Image from: Trees For Life, 2011).

Appendix B
Moringa for water purification

The three images below show the effects of Moringa on the purification of water (process of 1 hour treatment process from left to right).



(Images from Miracle Trees, 2005)

Appendix C
Letter for orphanages practicing holistic care

Judah Care Foundation
P.O.Box 12233-00100
Nairobi, Kenya

July 1st, 2013

Alyssa Huff
1210 NW Tahoe Lane
Apt. 302
Silverdale, WA, 98383, USA

To Whom it May Concern:

My name is Alyssa Huff and I hold a Masters Degree in International Care and Community Development from Northwest University in Kirkland, Washington in the United States of America. While at Northwest University, I focused my studies on the care of orphans and vulnerable children. I saw on your website that you specialize in holistic care for orphans and wanted to share with you a resource that may enhance the care that you are providing. I would like to encourage you to consider planting, growing, harvesting, and utilizing the Moringa Oleifera (Moringa) tree. Please consider the amazing, beneficial qualities of this tree in the form of a project which will enrich each component of holistic care. I believe in Kenya this tree is referred to as Mronge.

A Moringa project, onsite at an orphanage or children's center, ties very well to the holistic care model. By growing and harvesting Moringa, it would not only provide a new opportunity for learning, but would also enhance each category that is already defined in holistic care. Including children in the process of growing and harvesting Moringa onsite at an orphanage will enrich the children physically, emotionally, and spiritually. From providing for the children physically through the consumption of the leaves, allowing the children to be included in each process of the project, to spiritually knowing that God has given them this amazing gift, a Moringa project would better each aspect of holistic care. Other benefits of a Moringa project are the start-up and maintenance costs of growing Moringa are relatively low. If the tree is not already growing on the property, it can be purchased inexpensively from a local plant nursery.

One of the main reasons I want to encourage you to consider a Moringa project would be the nutritional value the leaves of the Moringa have when consumed. Various parts from the Moringa tree, from the leaves to the seeds, contain numerous important vitamins such as Vitamin A, B1, B2, B3, C, Calcium, Chromium, Copper, Iron, Magnesium, Manganese, Phosphorus,

Potassium, Zinc, and all of the essential amino acids (Trees for Life, 2011). DolCas Biotech, a development and research organization described that, “Many of the listed vitamins, minerals and amino acids [found in Moringa] are very important for a healthy diet. An individual needs sufficient levels of certain vitamins, minerals, proteins and other nutrients for his physical development and well-being” (p.2).

There are two main ways of consuming Moringa. First, the leaves can be picked by hand and consumed fresh after using clean water to clean any dirt that may be on the leaves. Second, the leaves can be harvested, washed, and laid to dry. Once the leaves are dry they can be ground into a fine powder, which can then be added to food. This will give the food a higher nutritional value. Physically, through the consumption of the Moringa leaves, children will acquire valuable nutrients and vitamins which otherwise they may not have access.

The organization, Save the Children (2013) found malnutrition can cause children to have greater risk of heart disease, diabetes, kidney damage, and cause children to be “far less able to withstand infection” in comparison to those who receive proper nutrition. This can then affect the physical capacity and energy for work that a child has, directly negatively influencing their chances to succeed in school. Save the Children (2013) also found malnutrition can also cause “long-term impacts on brain and nerve development and function... reflected in lower IQs and performance at school.” However, through the consumption of Moringa and the increased consumption of important vitamins, many of these problems can be prevented. By eating these leaves, children will be able to fight against the ailments brought on by malnutrition and the consumption of the same foods daily. It will also help children to be able to better focus and succeed in school.

Almost every aspect of the Moringa tree is harvestable and edible. The actual harvesting of various components of the tree is not difficult, and something children can regularly take part in. It may even help the children to learn how to work together for a common goal, along with acquire life skills such as responsibility and cooperation. However, as found by the Moringa Association of Ghana (2006), it is important to note that the branches of the Moringa tree are very brittle and unsuitable for both adults and children to climb. In order to prevent the need for people to climb the tree to harvest it, the tree must be trimmed to a height that makes it convenient to harvest without being forced to climb branches. Ideally, the tree should be trimmed to the height of tall bushes to make it easily harvestable. Trimming the tree in this way will also increase maximum growth and production.

I know in an urban setting like Nairobi it may seem strange to purpose the consideration of an agricultural project, however, usage of the Moringa tree is not limited to facilities in rural settings due to its resilient nature. Rather, it is also a viable option for orphan care in urban locations. The Moringa tree is able to withstand harsh climates, making it an ideal agricultural product in an urban location. Having deep tuberous roots, the tree is also able to withstand harsh droughts that may occur.

Finally, I believe that the Moringa tree is truly a gift and resource provided from God. In the Bible God has made it clear that He calls those on earth to care for the orphaned. In Psalm 82:3 God gives specific instruction to, “Defend the weak and the fatherless; [and] uphold the cause of the poor and the oppressed” (New Living Translation Bible). However, He does not leave us stranded and left independently to care for these children. Rather, He has provided us with a tool to use to help make sure this commandment is fulfilled. The Moringa tree grows in the exact locations which those who typically do not have access to valuable vitamins and nutrients.

Echoing the same map as those lacking resources, it appears as though the Moringa tree has been strategically placed, as a gift, resource, and tool provided by God. If God has provided a way for every person on earth to be well nourished, we need to access this provision. I want to encourage you to use this amazing tool that God has provided. By not doing so, we are not respecting this amazing gift.

I would love to answer any questions that you may have or help in any way possible. Please feel free to contact through email at: alyssa.wyss11@northwestu.edu

May God Bless you abundantly in the work that you are doing to care for these children.

Sincerely,

Alyssa Huff

Appendix D
Organization I will be sending the above letter to.

- Ah-Gah-Pay Mercy Children's Center
- Judah Care International
- Every Orphan's Hope
- Compassion International
- World Vision International
- Back2Back Ministries
- Orphan Relief & Rescue
- Africa Renewal Ministries
- Agape Children's Ministry
- Fulaa Lifeline International
- God's Kids
- KIDMIA
- Orphan's Promise
- WATOTO
- Life in Abundance International
- Orphan Justice Mission