

AGRICULTURE PROGRAMS IMPACTING FOOD SECURITY IN TWO HIV/AIDS-
AFFECTED KENYAN AND ZAMBIAN COMMUNITIES

by

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Abstract

HIV/AIDS is one of the most devastating health concerns of the developing world, especially in sub-Saharan Africa (SSA). To address individual food insecurity and malnutrition, numerous small-scale nutrition and agriculture interventions have been implemented. This study compared the *CTC Community Garden Project* in Maai Mahiu, Kenya (n=15) and the *HelpMercy Nutrition and Food Security Project* (seed distribution) in Macha, Zambia (n=64), after one year. Study objectives included assessing food security in Maai Mahiu, determining beneficiaries' perceived usefulness of the interventions, comparing and evaluating the interventions, determining the importance of education in the interventions, and making recommendations for improvement. A survey in Maai Mahiu used a modified FAST tool to determine food security for beneficiaries (n=15) and non-participants (n=50). The majority of respondents were determined food insecure (without hunger), indicating a need for improved access to food/land. To determine outcomes and make comparisons, intervention outcome and beneficiary 'perceived usefulness' were measured using two verbally administered surveys, two focus groups, and two interviews with translation. Qualitative and quantitative results demonstrated differences between beneficiary perceptions of the interventions. No association was observed between perceived usefulness of the two studies (χ^2). A backward elimination logistic regression model of the *HelpMercy* intervention showed that attendance at community-based nutrition and agriculture education sessions (CBES), household size, and number of seed types planted were predictors of perceived usefulness. Households who attended at least one CBES were more likely to perceive the intervention as useful (χ^2 for trend, p=0.007), and there was a linear relationship between number of CBES attended and perceived usefulness (Mann-Whitney, p=0.008). Results may support research that agriculture interventions are more effective when combined with nutrition education. Perceived barriers and benefits differed significantly between the two programs. 60.3% of *HelpMercy* beneficiaries and 40.0% of *CTC* beneficiaries perceived the interventions as useful. Program improvements are possible, and further research is needed to better understand the impact and potential benefits of small-scale nutrition and agriculture interventions for HIV-affected populations in SSA.

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Dedication

For the women and cucus of Maai Mahiu, Kenya, and the people affected by HIV/AIDS in
Macha, Zambia.

CHAPTER 1 - Introduction

HIV/AIDS, coupled with food insecurity and malnutrition, is one of the most devastating public health issues of the developing world today, as more than 33 million people were living with the disease in 2007.^{1,2} At least two-thirds of all people living with HIV/AIDS (PLWHA) reside in sub-Saharan Africa, where poor infrastructure, poverty, food insecurity, and inadequate access to healthcare intensify the disease.¹ PLWHA are particularly susceptible to malnutrition and opportunistic infections because of compromised immune systems, nutrient malabsorption, and side-effects from antiretroviral medication.^{3,4} HIV-affected households and communities also suffer from reduced productivity, development, and food security.⁵ The cycle of malnutrition is exacerbated by HIV/AIDS and vice versa, as the interaction between the two is multidimensional.⁶⁻⁹ This interaction is further complicated by food insecurity.⁹

Agriculture, which is closely tied to food security, is the fundamental economic activity in most sub-Saharan African countries.⁷ In response to the detrimental impacts of HIV/AIDS on sub-Saharan Africa, agriculture intervention programs have been implemented by governmental and non-government organizations to improve nutrition and food security for PLWHA and HIV-affected communities. Some agriculture intervention programs include community gardens, home gardens, seed distributions, agriculture education, and development of new agriculture methods, such as sack gardens and use of home-made organic pesticides, to improve crop yields and dietary intake.¹⁰ Nutrition intervention programs have also been developed to improve dietary intake and health for PLWHA and impoverished communities. Some of these interventions include food distribution, supplements, and nutrition education.¹¹

Both nutrition and agriculture interventions have been shown to improve food security and nutrition status among participants.¹⁰⁻¹⁴ Programs that combine agriculture interventions with nutrition education have been particularly effective in improving nutrition status and health for individuals and PLWHA in sub-Saharan Africa.¹⁵ The *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project* are two new agriculture and nutrition interventions recently developed in sub-Saharan Africa.

This research evaluated two small-scale nutrition and agriculture interventions, the *CTC Community Garden Project* (Maai Mahiu, Kenya) and the *HelpMercy Nutrition and Food*

Security Project (Macha, Zambia). Small-scale interventions are often under-monitored and are not evaluated properly.¹⁶ Monitoring and evaluation are needed to improve efficiency and efficacy of such interventions; better connections between researchers, programmers, and beneficiaries alike can also help achieve informed action.¹⁶ Specific research that monitors and evaluates small-scale agriculture interventions is limited, and no research has evaluated these two interventions or locations specifically. Additionally, current studies of agriculture and nutrition programs have not considered the beneficiaries' 'perceived usefulness' of interventions when assessing their impact. The 'perceived usefulness' of health intervention programs is an important component of consideration as it relates to the Health Belief Model (HBM), a value-expectancy theory of behavior,¹⁷ which uses self-efficacy and perceptions of barriers/benefits to determine/theorize how individuals will respond to an intervention.

To better understand the ways in which agriculture interventions can improve public health in sub-Saharan Africa, comparisons and multidisciplinary studies are needed. Research demonstrates that different areas of Africa, both rural and urban, face diverse health challenges¹⁸ and require distinct strategies for addressing difficult health topics such as HIV/AIDS.¹⁹ Thus, it may be important to design and evaluate intervention programs for specific populations with their cultural, social, environmental, and economic characteristics in mind. Research should seek to explore, understand, and improve health interventions for PLWHA. The purpose of this study was to compare and evaluate two small-scale nutrition and agriculture interventions for HIV-affected populations in sub-Saharan Africa after one year of implementation. We hypothesized that: 1) while the two interventions are very different, important information can be gathered from each to improve future interventions, 2) nutrition education will be significantly related with beneficiary participation and perceived usefulness in the intervention, and 3) these two agriculture interventions have the potential to improve food security for HIV-affected beneficiaries. The objectives of this study were to:

- 1) Assess food security in Maai Mahiu, Kenya, among women participating in the *CTC Community Garden Project* as well as other women in the community not participating in the intervention
- 2) Determine beneficiaries' overall perceived usefulness of the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project*
- 3) Compare and evaluate these two small-scale nutrition and agriculture interventions for HIV-affected populations in sub-Saharan Africa after one year of implementation

- 4) Determine the importance of education as a component of the interventions
- 5) Make recommendations for improving the interventions in the future

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CHAPTER 2 - Review of the Literature

In 2005, the *International Conference on HIV/AIDS and Food and Nutrition Security* held in Durban, South Africa called for more rigorous evaluation and evidence of what constitutes effective program development for isolated, small-scale nutrition and agriculture interventions.¹ Small-scale interventions are generally implemented by nongovernment agencies, but are often under-monitored and fail to be evaluated. To improve efficiency and efficacy of such interventions, better connections are needed between researchers, programmers, and beneficiaries alike, which can help to achieve informed action.¹

The *International Conference on HIV/AIDS and Food and Nutrition Security*¹ highlighted international research covering food security, nutrition, and HIV/AIDS. In a review of the conference, Stuart Gillespie pointed out that while current research has failed to show empirical evidence of solutions per say, and that there is no single solution for the complex HIV problem, there is certainly a need for better understanding of community-driven responses.¹ More importantly, lack of knowledge is not a reason to be stagnate. Instead, the global community should “learn by doing.” According to Gillespie (2005), small-scale interventions and programs are the perfect means to streamline development, but they must be monitored and evaluated appropriately in order to provide relevant evidence to influence policy recommendations. He argued that gaps in knowledge are no excuse for inaction.¹ Understanding the complexities of HIV/AIDS in discrete communities, cultures, and environments will contribute to better construction of interventions and nutrition policies for PLWHA in the future.

The purpose of this literature review is to provide relevant information regarding current international public health trends related to small-scale nutrition and agriculture interventions for diseased populations aiming to improve food security and health. This review presents a broad overview of HIV/AIDS, its impact on in sub-Saharan Africa, agriculture, and details concerning the complex and dynamic relationship between HIV/AIDS, food security, malnutrition, and poverty. Lastly, it discusses the effectiveness of nutrition and agriculture inventions.

The Global HIV/AIDS Pandemic

Definition, Virology, and History

The human immunodeficiency virus (HIV) is a highly infectious retrovirus that infects white blood cells and destroys the immune system, eventually leading to the most advanced stage of the disease termed acquired immune deficiency syndrome (AIDS).² AIDS is the umbrella term used to define an illness with one or more opportunistic infections associated with HIV.² HIV is transmitted via the exchange of body fluids such as blood, vaginal fluid, semen during unprotected sexual intercourse, blood transfusions involving contaminated blood, from mothers to infants during pregnancy, childbirth, or through breast milk, as well as through the shared use of contaminated needles. As infection with HIV advances, the immune system weakens, increasing an individual's susceptibility to opportunistic infections. Progression from HIV to AIDS can take from 10-15 years; however, antiretroviral therapy can slow down this process and improve quality of life for longer durations.³

HIV has been called the deadliest epidemic of the modern age,⁴ and its spread across all continents characterizes the virus as a pandemic. In 1981, a distinct combination of symptoms was observed a group of homosexual men in the United States, notably, the combination of Kaposi sarcoma and pneumonia.⁵ The clustering of these diseases had been observed before, but only in immunosuppressed cancer patients, not young previously healthy people, whose lifestyles invited clinical investigation. Importantly, AIDS cases were soon discovered in other populations including injection drug users (1982), hemophiliacs,⁶ and later blood transfusion patients⁷ and larger populations of adults living in Central Africa. In 1984, Gallo *et al.* determined that AIDS was linked to a HTLV virus, which has led to the current understanding that HIV-1 is the cause of AIDS.⁸ There are at least two known types of HIV, HIV-1 and HIV-2. HIV-1 is the predominant virus found globally, and it is the type generally discussed when the term HIV is used.

Retroviruses store genetic information on RNA. After penetrating a host cell, they create a DNA copy of their genetic information.³ Then the retrovirus becomes integrated into the infected cell's DNA, particularly CD4 cells (or T-cells).³ After becoming infected with HIV, a T-cell becomes an HIV-replicating cell, and it begins to produce new HIV viruses that attack

other immune cells. This process eventually causes the original T-cell to die. As the number of T-cells decreases, the immune system becomes weak and increasingly compromised, which eventually leads to AIDS.³

Four clinical stages of HIV have been defined by the World Health Organization (WHO) leading up to AIDS (stage four).⁹ These stages include the progression of the disease from just a few symptoms (primary HIV infection) to minor skin problems and recurrent upper respiratory infections (stage 2) up until the infected individual experiences significant decreases in bodyweight and chronic diarrhea, fever, and other infections (stage 3). HIV wasting syndrome is experienced along with extreme losses in energy and complications due to various common clinical conditions or opportunistic infections in the final stage, AIDS. When CD4 counts fall below 200 particles per mm³, a person is said to have AIDS.⁹

The Scope of HIV

The HIV pandemic impacts both adults and children as more than 25 million individuals have died due to HIV since its onset, and the disease has caused dramatic demographic changes in the most heavily impacted countries.¹⁰ In 2007, the Joint United Nations Program on HIV/AIDS (UNAIDS) estimated that over 33 million people were living with HIV/AIDS globally,^{10,11} whereas about 2.1 million people (adults and children) died from HIV/AIDS related complications in that same year alone.^{10,12} More than 2.7 million individuals were also newly infected with the virus in 2007.¹⁰ The virus has disproportionately impacted women, as women account for at least half if not more than all individuals living with HIV globally.¹⁰ Social, cultural, biological, and economic factors make women more vulnerable to infection. Women have reduced physiological barriers to the virus compared to men. They also have greater exposed surface area, and young women may have less mature tissue, increasing risk, if they are victims of coercive or forced sex. Violence against women can perpetuate the spread of the disease, lack of control over sex and other gender inequalities such as education can reduce a woman's knowledge of the transmission of HIV.¹³ In 2001 there were about 1.6 million children younger than 15 living with HIV/AIDS.¹⁴ That number increased to 2.0 million in 2007.¹⁰

HIV/AIDS in sub-Saharan Africa

Indisputably, HIV is a major public health concern worldwide, particularly in developing countries where disease burden, coupled with poverty, political instability, food insecurity, and

famine heighten HIV's impact on public health.^{10, 15} Between 850,000-950,000 people were living with HIV/AIDS in the United States as of 2004,¹⁶ demonstrating the importance of HIV prevention and treatment programs internationally, including in the industrialized nations. While HIV/AIDS is destructive worldwide, the pandemic has been particularly detrimental to sub-Saharan Africa.¹⁷ Although only 10% of the world's population inhabits sub-Saharan Africa, more than 60% of all people infected with HIV live there.¹⁷ In fact, as of 2007, the Joint United Nations Program on HIV/AIDS estimated that sub-Saharan Africa accounts for 67% of all people living with HIV/AIDS worldwide and similarly 75% of AIDS related deaths.¹⁰ Correspondingly, almost 90% of children younger than 15 infected with HIV/AIDS also live in sub-Saharan Africa.¹⁰ The incidence and prevalence of HIV/AIDS varies drastically by country.¹⁸ Approximately 1.9 million people in sub-Saharan Africa were infected with HIV in 2007, contributing to a grand total of around 22 million cases.¹⁰ Kenya and Zambia are two countries in sub-Saharan Africa struggling with the consequences of HIV/AIDS.

Zambia, located in the center of sub-Saharan Africa and bordered by Angola, Namibia, Botswana, Zimbabwe, Mozambique, Malawi, and the Democratic Republic of the Congo, has a population of approximately 12 million and has been burdened by health and economic hardships for years, ranking 165th out of 177 countries on the 2007 World Bank Human Development Index.¹⁹ Nationwide, 15% of the population was living with HIV/AIDS as of 2008, 50% of the population was unemployed, and 63% of individuals lived on less than \$1 per day.²⁰ As of 2007, 23% of children under five years old were underweight, 54% were stunted, and 6% were wasted,¹⁷ demonstrating high levels of food insecurity and malnutrition. From 1990 to 2002, the proportion of Zambians living in extreme hunger increased; in the same way, the HIV infection rate increased from 25% to 28%.^{20, 21} Prevalence of HIV/AIDS among adults in Zambia was about 16% in 2005, and women are at a greater risk of infection in the country.²² Life expectancy in Zambia was 37 years and approximately 28% of all children under five years of age are underweight in 2005.²²

Kenya is located to the northeast of Zambia, bordered by Somalia, Ethiopia, Sudan, Uganda, Tanzania, and the Indian Ocean. The population was approximately 34 million in 2005,²³ and while Kenya is more developed than Zambia, it has also been significantly influenced by the HIV/AIDS crisis. Kenya is a low income, food-deficient country with approximately 58% of the population living below the international poverty line in 2005.²³

According to the Kenya Demographic and Health Survey, approximately 7% of Kenyan adults (between the ages of 15 and 49) were infected with HIV in 2003, with rates as high as 9% among women and as low as 5% among men (ages 15-49).²⁴ Residents of urban areas in Kenya are more likely to be infected than residents of rural areas.²⁴ In 2006, the prevalence of HIV among adults older than 15 years of age (per 100,000 people) was 6125,²⁵ and only 27% of individuals with advanced HIV infection in Kenya receive antiretroviral therapy.²⁵ HIV-positive Kenyans are generally not treated for their infections, leading to high morbidity, mortality, and transmission rates.²⁵ Life expectancy in Kenya was only 47 years in 2005.²⁶ Children in Kenya are not exempt from the intensity of HIV/AIDS. Death among children younger than five due to HIV/AIDS is 14.6%, and overall death in the population due to HIV/AIDS per 100,000 people per year is 409 in 2008.²⁵

Global Food Insecurity and HIV/AIDS

Food security is defined by the United States Agency for International Development (USAID) as “when all people at all times have both physical and economic access to sufficient food to meet their dietary needs in order to lead a healthy and productive life.”²⁷ The Food and Agriculture Organization of the United Nations (FAO) defines food security as “the physical and economic access to sufficient, safe, and nutritious foods to meet dietary needs.”²⁸ As early as 1999, global health experts expressed concern over whether or not global food security needs could be met in the face of HIV/AIDS.²⁹ Between 2006 and 2007, the number of people who were food insecure globally rose from 849 million to 982 million. Most of these individuals live in Africa, and consume far less than the nutritional target of 2100 calories per day.³⁰

There are a numerous challenges impacting global food security currently, including climate change, economic crises, as well as food shortages; morbidity and mortality of people because of HIV/AIDS has also impacted global food security.²⁹ Research predicts that developing countries will fare badly with progressive climate changes,³¹ and along with reduced capacity in the labor force, developing countries greatly impacted by HIV/AIDS will suffer significantly. Environmental effects of climate change on developing countries may include droughts, more intense rainfall/longer dry periods, and the promotion of pests.³¹

The consequences of HIV/AIDS on food security within the household are dramatic; adult labor is often removed from the household due to illness or death of family members.³²

With reduced work ability, a household has less capacity to produce or buy adequate food as financial assets are often depleted from medical/funeral costs.³² Along with reduced labor and productivity,³³ the agriculture knowledge base in communities decreases as individuals with knowledge succumb to the disease.³⁴ The International Monetary Fund (IMF) has noted that the impact of AIDS has extended far beyond the community or even the household level. Every part of the public sector and the economy have been weakened by the virus, and development has been subdued.³⁵ Ultimately, HIV/AIDS significantly complicates the problem of world hunger and malnutrition worldwide.^{34, 36}

HIV Affects Socioeconomic and Cultural Factors

AIDS has effectively changed the complete social structure of parts of Africa, impacting work capacity, family structure, and community organization.¹⁵ At the same time, poverty has been shown to increase susceptibility and vulnerability to HIV infection both biologically and behaviorally. Impoverished individuals are at a greater risk of poor nutrition, elevated rates of co-infection, and decreased immune system function. This leads to an increased susceptibility to HIV infection and greater transmissibility if already infected.³⁷

Increased susceptibility to poor health together with food scarcity contributes to the widespread malnutrition in Zambia, disproportionately affecting women, children, and rural populations.²¹ Similar situations have been observed in Kenya.³⁸ The majority of impoverished PLWHA in rural locations in Zambia depend on agriculture as their livelihood base.³⁹ HIV-affected households that depend on agriculture are more at risk of becoming food insecure than similar households unaffected by HIV/AIDS.⁴⁰ This is because HIV-affected households face challenges of increased labor burden and decreased work ability from household member death, loss of energy from malnutrition and opportunistic infections, increased cost of medical care, loss of knowledge and skills if adults die before passing on lessons to their children, and limited access to land for widows.⁴⁰ This in turn puts all household members living in an HIV-affected household at risk of food insecurity because the implications of HIV-infection threaten the household's primary livelihood.

Communities affected by HIV/AIDS are not only inflicted with higher mortality rates among young productive members of society, but they are more susceptible to food insecurity⁴¹ and malnutrition.^{42, 43} Current problems with "AIDS stigma" contribute to food insecurity in

HIV-affected households.^{24,44} For example, according to the 2003 Kenya Demographic and Health Survey, while the majority of Kenyans polled expressed a willingness to care for family members with AIDS, but far fewer stated that they would be willing to buy fresh vegetables from a vendor with AIDS.²⁴ The AIDS stigma may negatively influence economic growth and food security.²⁴

The need to link nutrition support to AIDS treatment has been increasingly recognized as crucial to improve quality of life and care for HIV-positive individuals and households.⁴⁵ The complex relationships between poverty, malnutrition, food insecurity and HIV/AIDS often result in multiple burdens affecting the same household.⁴⁶ Connecting PLWHA to nutritional support can provide households the ability to make more nutritious and safe food choices, reducing the negative effects of HIV/AIDS.⁴⁵ In rural areas, improving a household's main livelihood of agriculture through education and promotion of organic sustainable agriculture techniques such as using organic compost, crop rotation, raised beds, and seed saving, has been found to increase food security, promote income generation, improve nutrition, and improve quality of life for households.^{40,47} Focusing on small-scale sustainable agriculture can improve natural resource conservation, environmental protection, and support future generations and their ability to produce adequate food.⁴⁷

The Need for Nutrition/Agriculture Interventions for People Living with HIV/AIDS

HIV/AIDS in sub-Africa is a multifaceted issue. The HIV/AIDS crisis has been exacerbated by poverty, as economies and infrastructures are already fragile,⁴⁸ and coupled with environmental changes, and reduced agricultural productivity, HIV has contributed to food insecurity in sub-Saharan Africa.⁴ In fact, the overlap between HIV/AIDS and food insecurity is very high.⁴¹ Food insecurity, infectious diseases, HIV, opportunistic infections, and poverty all increase the risk of malnutrition and vice versa.⁴¹ The cyclic nature of this relationship contributes to malnutrition, which is estimated to be the underlying cause of one-third of all child deaths less than five worldwide.⁴⁹ Consequently, the relationship between agriculture and HIV/AIDS is of importance to the global community, since livelihoods in southern Africa are highly dependent on agricultural production,⁵⁰ and agriculture is a key factor in food security. The vast majority of Zambians make a living through agriculture, and AIDS can disrupt planting

and harvesting, significantly reducing the size of the harvest. HIV/AIDS has been credited with contributing significantly to the national emergency food shortages in Zambia in 2002.³³ It is crucial that public health research seek to better understand effective ways to combat food insecurity for communities affected by HIV/AIDS.

Nutrition and agriculture interventions in sub-Saharan African countries, such as Kenya and Zambia, are needed to combat food insecurity and hunger. There is a complex interaction not only between agriculture and food security, but also between nutritional status and HIV/AIDS that is complicated by food insecurity.⁴¹ Proper nutrition and food security are crucial to the health and survival of PLWHA.⁵¹ Food insecurity is detrimental to PLWHA because of the dynamic interaction between malnutrition and infection. HIV infection leads to decreased food intake from anorexia, which results in weight loss, increased energy needs, and excretion of nutrients, susceptibility to opportunistic infections, malabsorption of nutrients, and diarrhea.⁴² Antiretroviral therapy (ART) can improve nutritional status by reducing viral load and improving appetite but often results in dramatic side effects, including nausea, vomiting, and dizziness;⁴² they are more pronounced in malnourished individuals and may affect adherence to treatment as well as perpetuate poor nutritional status.⁴⁵ ART increases resting energy expenditure, which contributes to weight loss.⁵² Poor nutritional status also adversely affects the immune system causing HIV to progress more rapidly in malnourished individuals. It is well documented that PLWHA need to maintain adequate nutritional status and food security, regardless of whether they are receiving ART, because weight loss is a risk factor for morbidity and mortality in affected individuals.^{46, 53, 54} Figure 2-1 depicts the vicious cycle of HIV/AIDS and malnutrition.

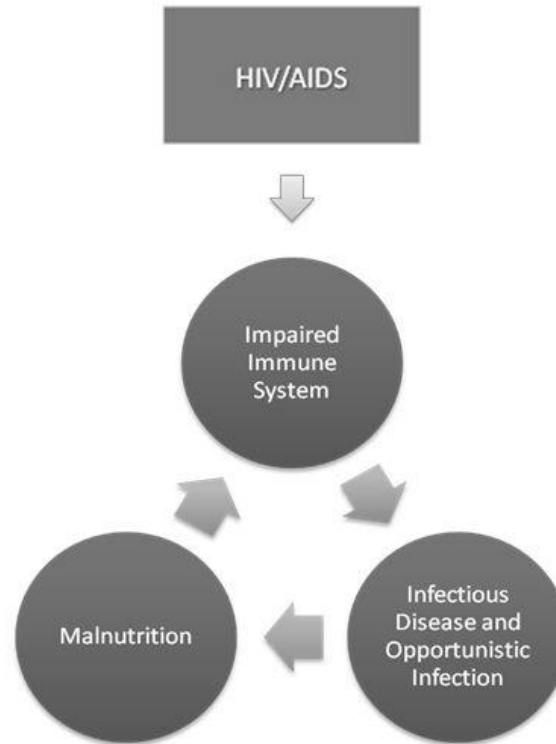


Figure 2-1 The Cycle of Malnutrition and Infection in the Context of HIV/AIDS

(Adapted from Piwoz and Preble, 2000)^{42, 54}

Agriculture and Nutrition Interventions in Africa

Agriculture interventions can help improve global food security by ensuring availability and access to food, especially where households are dependent on agriculture.⁵⁵ In response to the need for improved food security in sub-Saharan Africa, governmental and non-profit organizations have initiated numerous nutrition and agriculture interventions. Some organizations provide food-aid and supplements to vulnerable populations; others have attempted to establish long term and sustainable programs. Many of these programs were developed in direct response to the first Millennium Development Goal of the United Nations, which is to “Eradicate Extreme Poverty and Hunger,”⁵⁶ which specifically includes halving “the proportion of people who suffer from hunger by 2015.”⁵⁷ Nongovernmental and nonprofit organizations, such as *CTC International* in Kenya and *HelpMercy* in Zambia, are also invested in addressing this issue. Unfortunately, efforts to fight poverty and hunger have been slowed or even reversed in recent years because of the global economic and food crises, and most targets will not be met by 2015 according to UN Secretary-General Ban Ki-moon.⁵⁶ Thus, it is imperative that nutrition

and agriculture interventions are efficient and efficacious in addressing food insecurity, particularly for PLWHA.¹ Monitoring and evaluation of such interventions is the best way to assess and improve these interventions.⁵⁸

Current Research

Specific research evaluating the use of agriculture-focused interventions to assist PLWHA and their households is currently limited; more research is needed to understand how interventions are working and how to improve them.⁴⁵ Current research⁵⁹⁻⁶⁶ provides a broad overview of the scope of interventions in sub-Saharan Africa, emphasizing their impact on nutrition outcomes and food security. However, to increase the efficacy of nutrition and agriculture interventions for PLWHA, improved evaluation and monitoring of projects is necessary.^{1, 58}

Community-based agriculture and nutrition interventions are not a new phenomena,⁶⁷ and current food-based interventions include food-distribution projects, community gardens in rural and urban areas, hydroponic gardens, other agriculture interventions such as seed distributions, and various forms of education.⁶⁸ Food distribution projects, community gardens, education programs, and multidimensional projects utilizing these three types of interventions have been studied in sub-Saharan Africa.^{60, 65, 69-71} The objectives of such interventions should be to increase the ability of households to utilize available resources and improve their access and consumption of a variety of safe and quality food to improve and ensure nutritional well-being.⁶⁸ This is particularly important for PLWHA who have increased nutritional needs. Unfortunately, these objectives are not always met. Monitoring and evaluation is crucial for determining the success of agriculture interventions.⁵⁸

Food Distribution Interventions

Food distribution programs for PLWHA, including distribution of ready-to-use-therapeutic foods (RUTFs), have been shown to help improve health outcomes and quality of life.^{42, 69, 72} Specifically, in a report by the International Food Policy Research Institute (IFPRI), Byron et al. (2006) highlighted the benefits and challenges of improving nutrition and food security for PLWHA in Kenya.⁶⁹ Qualitative research showed that patients receiving free antiretroviral treatment while simultaneously enrolled in food programs (food distribution

programs) self-reported greater adherence to their medication and fewer side effects from treatment. They also self-reported a greater ability to satisfy their appetites, weight gain, improvements in physical strength, and the resumption of labor activities. Participation in nutrition programs was seen as a catalyst for increased support from households and the community. The responses from individual participants and community members provided empirical evidence supporting the need for more holistic and comprehensive responses to the problem of HIV/AIDS and food insecurity.⁶⁹ Food distribution programs do not address all of the problems associated with HIV/AIDS and food insecurity. While the findings from this study were positive, the authors noted that post-intervention monitoring and evaluation are needed to allow for future planning.⁶⁹

In general, food-aid as a way to address acute food insecurity and malnutrition, particularly for PLWHA, is extremely useful in situations of crisis and in long-term situations for certain nutrients (such as vitamin A and Iron). However, distribution is not always sustainable and can cause problems in local markets if it is not designed properly.⁷³ It is in the interest of humanitarian organizations and beneficiary communities to push for sustainable interventions that promote changes to agriculture systems and nutrition practices,¹ rather than food-aid alone. Both the *CTC Community Garden Project*⁶⁰ and the *HelpMercy Nutrition and Food Security Project*⁶¹ aimed to create sustainable intervention programs.

Nutrition Education Interventions

Nutrition education programs alone have also been shown to improve nutrition outcomes and health for people in sub-Saharan Africa.^{60, 70} Friedrich (1997) evaluated the Integrated Rural Nutrition Project (IRNP) in Kawambwa, Zambia, that utilized extension nutrition workers to educate community members on breastfeeding, malnutrition, the benefits of increasing production of beans and groundnuts, and improving knowledge, attitudes, and practices to improve nutrition. Study results indicated that nutrition education had a significant, positive effect on the nutritional status of children less than 5 years of age.⁷⁰ Child participants had better weights (for height) than children not involved (by area) after other factors were controlled for such as wealth, access to services (healthcare, water), education level, gender, and age.⁷⁰ Similarly, nutrition education alone was correlated with positive nutrition outcomes in Indonesia and Thailand.⁶⁰ Education distributed via mass-media resulted in beneficial changes in

knowledge, attitude, and dietary practices toward vitamin A.⁶⁰ Conversely, assessment of nutrition education alone in Zambia demonstrated that education, without the addition of agriculture investments or food aid, may not have the ability to impact nutrition/dietary intake significantly, since it does not impact food availability.⁷⁰

Agriculture Interventions Combined with Nutrition and Agriculture Education/Training

Agriculture programs, such as community/home gardens and crop programs, have been shown to improve nutritional outcomes in beneficiaries.^{59, 63, 71, 74} Nutrition education is often combined with agriculture production interventions to ensure that increases in food supply actually translate into increased nutrient intakes/dietary changes by beneficiaries.⁶⁰ When agriculture programs are combined with agriculture training and nutrition education, nutritional outcomes have been found to be even more significant.^{59, 63-65, 71, 74}

Community gardens in Africa have been shown to improve dietary intakes of vegetable crops in participants.^{59, 65} A case study of community gardens in Senegal in 1980 revealed that households with vegetable gardens ate, on average, more than three times the amount of cultivated vegetables as villagers who did not have gardens, although this number was not consistent from year to year.⁶⁵ The primary motivation of the women in the study was the “economic impact” of the activity, suggesting that most of the vegetables were intended for sale since household income was small. However, researchers determined that home vegetable gardens may have alternative beneficial impacts other than dietary intake, even if nutritional impacts are low, such as promoting social change by empowering women when their social status and independence is generally dependent on men.⁶⁵

Hagenimana et al. (1999) compared the differences between interventions that involved agriculture only and those that combined agriculture with nutrition education. The results demonstrated a synergistic effect of the two components that yielded dietary benefits.⁷¹ Laurie and Faber (2008), found that cultivation of beta-carotene rich vegetables in a crop-based nutrition intervention program (Lusikisiki, Eastern Cape, South Africa), combined with nutrition education and community-based growth monitoring, showed favorable effects on child morbidity, nutritional knowledge, and the dietary intake of beta-carotene rich vegetables.⁶³ The agricultural intervention contributed significantly to positive nutrition outcomes, as participants

demonstrated increased knowledge of the importance of vitamin A, foods that are rich in vitamin A, and decreased physiological problems associated with vitamin A deficiency (diarrhea, skin sores, etc).⁶³ This study did not provide quantitative baseline measure for nutritional indicators and could therefore not conclude with certainty that nutritional outcomes were improved.⁶³ However, a crop-based agricultural intervention in Mozambique showed that integrating agriculture with nutrition education had the potential to impact nutritional outcomes in young children.⁷⁴

Faber et al. (2002) determined that a home gardening program integrated with a community-based growth-monitoring system in rural South Africa significantly improved vitamin A status in children ages 2-5 years old.⁶⁴ The program provided economically disadvantaged families with a means to produce yellow and dark-green leafy vegetables at home, increasing families' access to provitamin A-rich foods. Importantly, the program utilized demonstration gardens as training centers and nutrition education (including identification of vitamin A-rich foods, cooking methods, and the importance of a home garden).⁶⁴ A review of literature regarding home gardening in conjunction with promotional and educational interventions demonstrated that combination approaches to agriculture intervention were successful in improving vitamin A nutrition.⁶⁰

Berti, Krasevec, and FitzGerald (2004) reviewed 30 agriculture interventions in an extensive study of the effectiveness of agriculture interventions on improving nutrition outcomes. Overall, the researchers found that the majority of the interventions effectively improved food production and food security, but did not necessarily improve nutrition or health indicators of the participating households.⁵⁹ Nevertheless, interventions that invested in human capital (particularly, nutrition education and consideration of gender issues) along with other types of capital were more likely to positively affect nutritional change. Human capital included agriculture training programs, nutrition education programs, other training programs, and gender considerations. Other types of capital included natural, physical, social, and financial capital. The majority of the home gardening interventions investigated invested in three or more types of capital.⁵⁹ Three programs with home garden projects empowered women by placing them in leadership roles, allowing them to reach out to other women in the community.^{71, 75, 76} Extending nutrition education into the community was particularly effective.

Berti, Krusevec, and FitzGerald (2004) found that peri-urban and rural agriculture projects that considered gender were more likely to have a positive effect on nutritional change.⁵⁹ Gender biases in the agriculture system and agriculture programs exist in Africa, particularly because men are the primary recipients of specialized crop husbandry and market knowledge. While many women gain access to land and productive resources through marriage, broken marriage links or the death of a spouse can deny women access or use of resources, exacerbating poverty. Programs seeking to ensure gender equality in participation and access were shown to have a protective effect for society, empowering women and protecting them from HIV.⁷⁷

Several studies in developing countries have evaluated agriculture interventions after their termination to determine the impact of financial capital on nutrition outcomes.^{59, 71, 76, 78-80} Berti, Krusevec, and FitzGerald (2004) indicated that only about half of agriculture interventions that aimed to provide households with financial gains provided long-term nutritional benefits.⁵⁹ Overall, they concluded that “investing broadly in the target population – and not just in the agriculture intervention- does seem to improve prospects for positively impacting on the health of the people.”⁵⁹ Community gardens and seed distributions can invest in various forms of human capital by empowering community members, particularly women, encouraging community support, and investing in human capital by allowing participants to determine what to do with seeds/crops (sell/plant/keep). It has been documented that as household income rises, impoverished households spend more money on food, although proportionately less than their incomes increase,⁸¹ suggesting that financial gains should be considered when developing interventions.

Nutrition education and agriculture education/training are both important in developing effective programs.⁶⁰ Ayalew WZ, Wolde G, Kassa (1999) introduced new varieties of beta-carotene-rich sweet potatoes to women’s groups in Kenya. One group received nutrition education, food processing lessons, and technical agriculture assistance and education, while the control group received minimal assistance. Results indicated that the intervention group had a statistically significant increase in the frequency of consumption of vitamin A-rich foods compared to the control group.⁷¹ In Ethiopia, home gardening and nutrition education were combined with and built on a previous dairy goat project to improve vitamin A consumption in children to prevent night blindness. The results were positive, indicating an increase in frequency of intake of vitamin-A rich foods.⁸² Both of these studies suggest that success

(improved knowledge, awareness, attitude, and dietary practices) is associated with well-designed programs that include nutrition education in comparison to agriculture interventions that do not include nutrition education.⁶⁰

Proposals for nutrition interventions often suggest combining nutrition and agriculture education with basic intervention strategies. For example, Babu (2000) evaluated the state of vitamin A deficiency in Malawi and proposed a means of agriculture intervention to combat the problem; the development a new crop (an indigenous plant) for the region could provide adequate amounts of provitamin A. Babu proposed adding the Moringa plant to the diet to help prevent vitamin A deficiency and claimed that the most successful integration of a new crop should include technical agricultural messages for farmers along with agricultural training sessions and nutrition education to teach the community about vitamin A, the crop, and proper preparation methods.⁸³

Monitoring and Evaluation of Nutrition and Agriculture Interventions

The research presented above suggests that agriculture and nutrition interventions have been successful in certain situations to improve nutrition and food security outcomes.^{59, 60, 63-65, 71, 74} However, the research also suggests that improved monitoring and evaluation of these interventions is needed, as many lacked sufficient evidence to make strong claims or bold suggestions for future programs or research. Stuart Gillespie (2006) noted that “when it comes to interventions aimed at combating the HIV/AIDS-food insecurity nexus, the evidence base remains weak. Little is known about designing cost-effective solutions, scaling them up, situating them in the larger strategies for obtaining complex development objectives, or monitoring the full multidimensional nature of such interventions.”¹ Innovative strategies for monitoring the performance and success of nutrition and agriculture interventions are vital for improving the impact of interventions. Gillespie suggested that “best practices” are often implemented without proper evaluation or comparison. “Where organizations have launched interventions, they are usually isolated, small scale, with minimal monitoring, and they are rarely well evaluated.”¹

The purpose of monitoring nutrition (and agriculture) interventions is to evaluate and quickly correct any problems observed in a projects implementation.⁵⁸ Conventionally, monitoring should measure impacts by evaluating changes with the specific strategy of the

intervention in mind.⁸¹ These effects can be measured directly or indirectly, depending on what tools are available. Anthropometric measures are suggested for determining agriculture-consumption-nutrition linkages. Other measures can include number and types of food consumed, illness (incidence/duration), and dietary diversity. Monitoring program characteristics that promote consumption of a wide variety of foods and thus suggest better nutrition is useful.⁸¹ Importantly, data collected during monitoring should be utilized locally and quickly to guarantee feedback from project staff regarding benefits of changes efficiently.⁵⁸

How can intervention projects be monitored, evaluated and compared if research is not a primary component of the intervention from the start? As Gillespie noted, many small scale agriculture interventions follow “best practice” approaches without proper evaluation or comparison. After initiation, it is difficult for researchers to evaluate intervention projects using traditional monitoring and evaluation methods.¹ Nevertheless, monitoring and evaluation is still critical for understanding project success, documenting and evaluating potential problems, as well as making suggestions for future improvements.⁸¹

Summary

No studies were found that explicitly compared and evaluated two specific interventions after their pilot year. This study seeks to compare and evaluate two small-scale nutrition and agriculture interventions for HIV-affected populations in sub-Saharan Africa after their first year of implementation: The *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project*. No previous research has evaluated interventions in Maai Mahiu, Kenya or Macha, Zambia simultaneously. In fact, research about programs in Maai Mahiu, Kenya is absent. A detailed comparison of these two nongovernmental interventions demonstrates an innovative way to evaluate agriculture projects in Africa by considering the similarities and differences between two HIV-affected communities and their respective intervention types.

The importance of monitoring and evaluating nutrition and agriculture interventions is evident⁸¹; the dramatic impact of HIV/AIDS worldwide has been detrimental to agricultural production leading to increased food insecurity, hunger, and malnutrition. Because the relationship between HIV/AIDS, food security, and malnutrition is cyclical,⁴² understanding the impact of each factor on the other is important. This study utilizes a ‘perceived usefulness’ measure to help understand the perceptions of beneficiaries in both interventions regarding the

overall program impact on their lives. This measure relates closely with the Health Belief Model (see Methods), suggesting that beneficiaries who perceive a health behavior as beneficial, such as eating nutritious vegetable crops grown in a community or home garden, are more likely to engage fully in a program. Self-efficacy is also important, particularly in regards to participant involvement in agricultural interventions. If beneficiaries believe they are capable of producing, harvesting, and consuming new vegetable crops, they will be more likely to engage fully and benefit from interventions. This study discusses beneficiary responses collected using surveys, focus groups, and interviews to help determine ways to improve both interventions.

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CHAPTER 3 - Methodology

As can be seen from previous research,¹⁻⁷ agricultural interventions have the potential to make valuable contributions to household food security and nutrition by increasing agriculture production, income, food consumption, and access to dietary diversity. However, factors such as health status, environmental conditions, workload, and feeding practices impact whether or not increased food access will benefit nutritional status.⁸ The majority of research available evaluating agriculture and nutrition interventions relies on nutritional assessment as a baseline indicator. Nutrition and agriculture interventions should still be evaluated even if they were not constructed or initiated with research in mind and lack baseline measurements. The *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project* were developed by nonprofit organizations in response to urgent needs in their respective HIV-affected communities, but without monitoring, evaluation, or research in mind.

Background Information on Interventions Evaluated

In order to provide appropriate context for this study, a brief background and synopsis of the two compared interventions is provided below and broken down as follows: project sponsor(s), location, intervention summary, means of intervention, number of beneficiaries, and objectives.

Intervention I- The HelpMercy Nutrition and Food Security Project in Macha, Zambia

Sponsors: The intervention was sponsored financially by two organizations: *HelpMercy International* and the Churches Health Association of Zambia (CHAZ). *HelpMercy International, Incorporated (HelpMercy)* is a 501(c)3 non-profit corporation that was incorporated January 20, 2004 into the Commonwealth of Massachusetts. The organization was founded by Lloyd Williams, a medical student at Tufts University School of Medicine. The mission statement of the organization includes the goal of providing “improved healthcare for underprivileged and underserved populations throughout the world through improving healthcare.”⁹ *HelpMercy* focuses on improving the nutritional status of HIV-positive individuals receiving antiretroviral therapy from the Macha Mission Hospital. CHAZ, previously known as

Churches Medical Association of Zambia (CMAZ), was started in 1970 as an umbrella organization to “represent work done by Church health institutions in Zambia.” The organization “complements government efforts in the delivery of quality healthcare by bringing to the health sector human, material, financial resources, innovation, and more importantly, Christian love and care.”¹⁰ There are around 135 partners that represent 16 different church groups participating in CHAZ, including hospitals, health centers, faith based organizations, and community programs that target rural areas of Zambia.¹⁰

Location: Macha, Zambia. Macha, Zambia is a rural catchment in the Choma district of the Southern province of Zambia. It is home to approximately 5,000 people.¹¹ The nearest town, Choma, is 80 km away by dirt road, and the capital, Lusaka, is nearly 380 km northeast. Macha Mission Hospital is located in Macha, and serves as the home base for *HelpMercy*. Macha is surrounded primarily by open savanna woodlands. The region is tropical, maintaining a rainy season from late October to early April, but a very dry winter. The Macha catchment is home to traditional villages, generally from the Batonga tribe who live on scattered homesteads. Many families remain polygamous. There is no commercial or industrial agriculture in the area, and the chief livelihood of individuals is subsistence farming, primarily of maize. The staple diet consists of ‘nshima,’ a cooked maize meal, which is very similar to ‘ugali’ in Kenya. It is often supplemented with groundnuts, sweet potatoes, and leafy green vegetables.¹¹ A map of Zambia is shown below in Figure 3-1.



Figure 3-1 Map of Zambia

Map Adapted from United States Central Intelligence Agency World Factbook, 2009 ¹²

Intervention Summary: The *HelpMercy Nutrition and Food Security Project* provided vegetable and higher protein seeds (e.g., groundnuts) as well as education regarding sustainable organic agriculture techniques and nutrition to 500 households within the Macha Mission catchment. While the program was funded by both *HelpMercy* and CHAZ, *HelpMercy* further supplemented the seed distribution by providing additional vegetable and high protein seeds to HIV-positive households.

In 2007, 849 households in the Macha Mission Hospital area qualified as CHAZ beneficiaries.^a From this number, community health leaders selected the most vulnerable^b 500 households to enroll in the seed distribution program. Of the 500 households, 181 households had at least one HIV-positive household member receiving antiretroviral therapy at Macha

^a Eligible CHAZ beneficiaries were chosen based on a set of selection criteria including presence of a malnourished child under 5 in the household. Malnourished children were determined using a baseline weight-for-age and middle-upper-arm circumference measurement. In addition, HIV-positive individuals receiving antiretroviral therapy at the Macha Mission Hospital, and compliant with medication, were eligible beneficiaries.

^b Based on malnutrition and HIV status.

Mission Hospital. Once beneficiaries were enrolled in the program, they were invited to attend community-based agriculture and nutrition education sessions (CBES) held at their respective health posts (satellite health clinics providing basic health services) prior to the rainy season. The number of educational meetings held varied from 4 to 12 based on accessibility of the health post. Educational sessions promoted affordable, sustainable agriculture techniques and nutrition education including:

- Organic compost
- Organic pest control (use of chile pepper, intercropping, companion planting)
- Raised beds
- Crop rotation
- Growth of non-traditional vegetables
- Seed saving for planting the following year
- Benefits of high protein food consumption
- Introduction to new crops and their nutritional benefit
- Good nutrition/feeding practices to avoid childhood malnutrition
- The importance of nutrition for PLWHA

In October 2007, prior to the rainy season, beneficiaries were provided with a variety of seeds for vegetable and high protein crops. A total of 15 different varieties of seeds were distributed. Seed varieties included: rape, groundnuts, Chinese cabbage, cabbage, cowpeas, sorghum, green peas, carrot, okra, pumpkin, chile pepper, onion, green bean, cauliflower, and beet root. The number of varieties and the quantity of each variety given to beneficiaries was based on the beneficiaries' need and their apparent motivation to teach others and grow seeds. This was a very subjective process, and seed distribution specifics were determined by the community health workers and the chief agriculture officer at the Macha Mission Hospital. While record keeping of the seeds distributed was not evident or consistent, all of the community health workers and the chief agriculture officer reported that not all of the beneficiaries received the same number of seed varieties or amount of seeds, and not all households received all of the seed varieties available. Distribution varied due to limited supply. Nevertheless, the amount of seed distributed of each variety remained consistent, with the exclusion of groundnuts. Some beneficiaries received extra groundnuts if they were particularly malnourished or ill.

HelpMercy and CHAZ relied on the established community health structure in Macha, including community health workers and health posts for project implementation. Community health workers distributed seeds to the beneficiaries within their health post areas. In addition,

community health workers organized community gardens at 5 of the 10 health posts. The community gardens were also supplied with seeds. Beneficiaries who were too ill to properly cultivate their own seeds were eligible to receive food grown at their respective community garden. Community gardens were supervised by community volunteers and served as models to demonstrate agriculture techniques also presented at the agriculture education sessions and to familiarize beneficiaries with how to grow unfamiliar crop varieties such as cauliflower, cowpeas, sorghum, chile pepper, and beet root.

Means of Intervention: The chief agriculture officer at the Macha Mission Hospital received the following seeds and amounts as purchased by CHAZ and *HelpMercy* International for each health post:

Rape (10x100g), Chinese Cabbage (10x100g), Cabbage (10x100g), Groundnuts MGV4 (8.5x10kg), Groundnuts natal com (5.5x10kg), Cowpeas (33x5kg), Sorghum (10x10kg), Green Pepper (29x5g), Carrot (10x100g), Pumpkin (2x100g), Okra (9x50g), Chile Pepper (98x10g), Onion (10x100g), Green Beans (27x10), Cauliflower (30x5g), Beet root (20x10g)

CHAZ determined the types of seeds to be purchased based on community opinion and local diet. *HelpMercy* funds were used to supplement this purchase.

Community health workers transported seeds from the Macha Mission Hospital via ox-carts or bicycles to the health posts for distribution. There, beneficiaries congregated to collect the seeds after they were notified of their eligibility. There are approximately two volunteer community health workers at each health post.

Number of beneficiaries: 500 total, with 181 HIV+ beneficiaries

Program Objective: The objective of the intervention was to improve the food security and health status of the HIV-affected households sustainably, using a seed distribution and nutrition/agriculture education.

Intervention 2- The CTC Community Garden Project in Maai Mahiu, Kenya

Sponsor: The intervention was sponsored and organized by *Comfort the Children International (CTC)*, a 501(c)3 non-profit organization founded by Zane Wilemon. The mission statement of this organization is to “share in the lives of local communities building mutual understanding and sustainable change.” The organization aims to use “education programs, economic projects,

healthcare, community development and environmental awareness” to create a better tomorrow.¹³ CTC works exclusively in Maai Mahiu, Kenya.

Location: Maai Mahiu, Kenya. Maai Mahiu, Kenya is a periurban community located about 1 hour (80 km) northeast of Nairobi, directly on the main highway that runs from Mombasa to Uganda. This highway is often referred to as the “AIDS highway.” The population of Maai Mahiu is approximately 30,000 and consists of predominantly of people from the Kikuyu tribe with some Masai coming into the town for supplies. The town subsists predominately on small business income, including revenue from tourists that stop in town on their way to the Masai Mara for safaris. While farming is prevalent in Maai Mahiu, unpredictable rain patterns make it difficult. Many of the town’s residents rely on other activities for their primary income. Because of its location along the major trucking route and lack of opportunities for women, prostitution is prevalent. A map of Kenya is shown below in Figure 3-2 with Maai Mahiu shown.



Figure 3-2 Map of Kenya

Map Adapted from United States Central Intelligence Agency World Factbook, 2009¹⁴

Intervention Summary: The *CTC Community Garden Project*, the “CuCu Shamba,”^c involved the development of a community garden for grandmothers over the age of 40 who care for their grandchildren in Maai Mahiu. The plot of land was in a central location and served as a demonstration garden as well as a space for women to contribute and benefit from the agricultural production. The garden plot is 50 ft. by 100 ft. (1/8 of 1 acre). In May of 2008, the land was acquired by *CTC*, and during June 2008, beneficiaries/participants for the community garden project were selected. These beneficiaries participated in the initial preparation work along with the primary *CTC* staff member and a team of Extension volunteers from Kansas State University. The garden began with just three rows and one bucket/drip system. During its first year, the following crops were planted at the community garden: kale, onions, tomatoes, spinach, carrots, green pepper, passion fruit trees, strawberries, mangoes, watermelon, other trees.

Means of Intervention: With the help of Kansas State University, *CTC* worked to set up a demonstration organic garden for the community of Maai Mahiu. The garden was run and managed by 15 (initially 21) grandmothers in the community who met the following criteria:

- 1) Were over 40 years in age
- 2) Had a child or grandchild, living in Maai Mahiu who was disabled or HIV+
- 3) Were unable to supplement the normal diet of their family, due either to lack of funds or lack of a shamba (garden)
- 4) Committed to working 2 hours per week in the garden (they could send a family representative instead)
- 5) Were able to pay a 300 Kenyan shillings (ksh) joining fee. (This was a ‘one time’ amount and was used for equipment and seeds for the garden.)

The *CTC Community Garden Project* was organized with the expectation that participants would work in the garden 1-2 times per week for at least 2 hours. The *CTC* staff provided agriculture education regarding sustainable organic agriculture techniques at the garden including: use of drip irrigation systems, proper planting strategies for vegetable and fruit crops, effective planting and mulching, composting techniques, building at home sack gardens, as well as how to make fertilizer, insecticide, herbicide, and pesticide. Women were encouraged to teach others in the community what they learned at the garden. A large mural with instructions

^c “CuCu,” pronounced “sho-sho,” is the Kikuyu word for grandmother. “Shamba” is the Swahili word for garden.

for building a sack garden for home growing was painted at the garden site to raise community awareness. The women met together once per week to make decisions regarding the garden and distribute produce. The women elected leaders for the group, and distributed produce to group members based on need, pay, and participation. During the first year of implementation, the grandmothers elected a “chairlady” and a “treasurer” for the group. Women were responsible for purchasing produce from the garden to take home, despite working in the garden. Similarly, extra produce was sold at the Maai Mahiu market, or given to *CTC* for use in other community programs. Additionally, very basic nutrition education was provided to grandmothers participating in the community garden; on several occasions, the leader of the group or the *CTC* staff person spoke about the importance of a balanced diet and the consumption of vegetables for health. A specific *CTC* staff person was not in charge of the garden, so some element of oversight and support for the grandmothers was missing throughout the first year of the intervention.

Number of beneficiaries: 21 grandmothers were initially enrolled in the program, but by the end of the first year, 15 women remained as active participants.

Program Objectives: In the “Comfort the Children International Official Project Description for the CuCu Shamba,” (see Appendix A) *CTC* notes the following objectives for the project:

- 1) To supplement the diet of those caring for the disabled or those with HIV/AIDS
- 2) To provide a venue for demonstration for new crops/methods for farming in Maai Mahiu
- 3) To provide a location for other organizations to demonstrate farming/ agricultural environmental techniques
- 4) To recognize and support the grandmothers of the town who carry a disproportionate burden for their families.

Methods for This Study

After receiving approval from the Institutional Review Board at both Kansas State University and Tufts University, as well as from the Biomedical Research Ethics Committee at the University of Zambia, we compared and evaluated two specific agriculture interventions in Maai Mahiu, Kenya and Macha, Zambia. This study used quantitative and qualitative research methods to compare and evaluate two small-scale nutrition interventions: the *HelpMercy Nutrition and Food Security Project* in Macha, Zambia and the *CTC Community Garden Project*

in Maai Mahiu, Kenya. Specifically, we compared beneficiary perceived usefulness of both interventions and also assessed intervention success and potential improvements for each intervention program after one year of implementation. Additionally, our study compared demographics, food security, and basic characteristics of the target populations in order to make recommendations for program continuation. This research involved individual surveys, focus groups, and interviews. Two surveys were completed involving beneficiaries of the two interventions in Macha, Zambia and those in Maai Mahiu, Kenya. A third survey of women attending a free medical clinic in Maai Mahiu, Kenya, was also completed. Several beneficiaries volunteered to participate in focus group discussions regarding both interventions providing additional qualitative data. Key informants were also interviewed in both locations. These three primary components of data collected were distinguished as follows:

- **Kenya Data Set 1:** *Preliminary Survey of Food Security and Maternal and Child Health* in Maai Mahiu, Kenya
- **Zambia Data Set 2:** *HelpMercy Nutrition and Food Security Project*
- **Kenya Data Set 3:** *CTC Community Garden Project*

General Explanation of Population Selection

In collaboration with Tufts University, evaluation of the *HelpMercy Nutrition and Food Security Project* (inauguration year, 2007) was requested by *HelpMercy* and performed in Macha, Zambia. The project and location were ideal for the evaluation of a small-scale agriculture intervention in sub-Saharan Africa because *HelpMercy* is a small organization and the intervention was localized to the Macha catchment. A graduate student from Tufts University served as a co-investigator for the project. Similarly, *CTC*, located in Maai Mahiu, Kenya, signed a memorandum of understanding with Kansas State University in 2008. The organization was receptive and interested in the results of a program evaluation of their new *Community Garden Project* (inauguration year, 2008). A Kansas State University undergraduate assisted with data collection. The two projects were suitable for comparison because their initial implementation occurred one year after the other, and evaluation for this study was completed chronologically. Similarly, both interventions targeted HIV-affected populations.

***Kenya Data Set I: Preliminary Survey of Food Security and Maternal and Child
Health in Maai Mahiu, Kenya***

This survey involved a cross-sectional convenience sample of Kenyan women, predominantly Kikuyu, attending a free health clinic operated by CTC in Maai Mahiu, Kenya in July 2008 and July 2009.

Location

The survey was conducted at the local public health facility in Maai Mahiu, Kenya, during a free medical clinic. This free clinic is organized and conducted annually by volunteer medical professionals from the United States. The clinic is open to the public, and patients are not pre-selected to attend. Instead, posters and word of mouth are used to inform the town that doctors are present and available. The participants, the vast majority whom are women and children, walk to the clinic to register.

Participants and Recruitment

Fifty Kenyan women attending the free medical clinic were surveyed. Women, as opposed to men, were selected to be surveyed because they comprised a similar make-up to the women (only) who participated in the *CTC Community Garden Project*, and they also represented the majority of patients attending the free medical clinic. Women are also a vulnerable population in Kenya and sub-Saharan, Africa; they often experience higher rates of HIV/AIDS,^{15, 16} are more susceptible to malnutrition,¹⁶ and have limited access to land, education,¹⁶ and other resources that may improve food security and health. Criteria for inclusion in the study were as follows. Participants had to be be:

- 1) Greater than 18 years of age
- 2) Female
- 3) Current residents of Maai Mahiu or the surrounding area

*Note: The vast majority of participants were mothers, although this was not requirement of the study.

The following procedures were used to recruit volunteers to participate in the survey:

- Adult women were verbally recruited to participate while waiting in line for the free medical clinic. (As a free health service clinic, not an emergency room, it was not a major inconvenience or stressor for the women waiting in line to take the survey.)

- To assure the women that their participation was completely voluntary, recruitment for the survey took place before the women received treatment,^d but they were given the option to take the survey either while waiting for treatment or after they had seen the doctor/nurse.
- If the women agreed to participate, they were asked to step away from others in the line as far as needed for privacy.

Data Collection Procedure

The survey was translated into Swahili (Kiswahili) prior to our arrival in Kenya and independently back translated into English to ensure translation quality. Participants completed the surveys orally in Kikuyu, Swahili, and/or English with the assistance of a single translator provided by CTC who was trained by the researcher before any surveys were completed. The survey (Appendix B) included questions about current diet, food security, maternal and child health practices, participation in agriculture and access to agricultural resources in Maai Mahiu, and perceptions of agriculture interventions (see Instrument Development Below).

Through the use of a translator and appropriate vocabulary, participants were presented with the terms of the study by means of a formal oral informed consent (example in Appendix C). The informed consent was then signed by the investigators, the participant, and the translator as a witness. After signing the informed consent document, the participant was assigned a participant identification number. This number was not connected to her name or the signed informed consent form, guaranteeing participant privacy. The identification number was only designed to keep survey participants separate, as there was no need to connect survey responses back to individuals. The survey took about 15-45 minutes to complete.

Zambia Data Set 2: The HelpMercy Nutrition and Food Security Project

This study involved a cross-sectional household survey of Zambian beneficiaries who participated in the *HelpMercy Nutrition and Food Security Project* completed from June to July 2008. Focus groups and interviews were also conducted with key informants regarding the success of the intervention.

^d Women were called out from the waiting line for medical care based on their needs, so there was no need for women to worry about losing their space in line. They were reassured that their medical care would not be altered by participating in the survey.

Location

The surveys were conducted at 9 of the 10 community health and at households near health posts in various parts of the Macha catchment in the Southern Province of Zambia.

Participants and Recruitment

Sixty-four beneficiaries/beneficiary households involved in the seed distribution project were recruited to participate in the study. These individuals were approached at their households with the assistance of the Macha Mission Hospital Agriculture Officer, community health workers, and translators. Inclusion for participation in this study was based on the following criteria. Each participant was:

- 1) A direct beneficiary of the 2008 *HelpMercy Nutrition and Food Security Project* (alternatively, the respondent could be an immediate family member^e of the beneficiary)
- 2) Greater than 18 years of age
- 3) Willing to participate in the survey without compensation^f
- 4) A member of a household where at least one household member was known to be HIV-positive^g and known enrolled in treatment offered by the Macha Mission Hospital

The following procedure was used to recruit volunteer participation in the survey:

- A comprehensive list of HIV-positive seed distribution beneficiaries and their households was compiled by the Agriculture Officer at the Macha Mission Hospital.
- An organizational meeting was scheduled between volunteer community health workers, the research team, and the translator, where a map of the Macha catchment was drawn up and a list of potential participants was generated.
- With the help of community health volunteers, who were very familiar with the areas and villages near their respective health posts, beneficiary households were selected at random for the survey based on geographic location (approximately ten households at each health post were selected).
- Beneficiary households were approached on foot by the researchers, a translator, and a community health worker who was well known in their respective communities.

^e If the direct beneficiary was unavailable, ill, or away from the household at the time of the survey, an immediate family member who participated in the Intervention (i.e., helped grow seeds distributed as part of the project) was asked to participate in the survey in place of the direct beneficiary.

^f This was an important component of subject selection because the intervention involved a seed distribution. It was important that survey participants were willing to participate, and understand that participating did not guarantee their involvement in future interventions/seed distributions (or other forms of compensation).

^g HIV-status was provided by the CHAZ, HelpMercy, and the Agriculture Officer at the Macha Mission Hospital.

Beneficiaries were requested verbally to participate. Approximately seven beneficiaries at each health post were surveyed from the ten selected.

- The researchers attempted to survey as many beneficiaries as possible each day, which varied based on the distance of the households from Macha Mission Hospital (starting location).
- Cultural practices within the community were respected including use of appropriate attire (long ‘chitenge’ skirts worn by women) and appropriate greetings (Zambian handshakes) to demonstrate cultural competence and improve respondent acceptance of researchers and the survey tool. This process often lasted for several hours, as researchers sat on small hand-carved Tongan stools or the ground as appropriate.

Data Collection Procedure

The survey was translated into Tonga prior to our arrival in Zambia by a group of experienced translators hired by Johns Hopkins University.^h Surveys were conducted orally in Tonga (Chitonga) and/or English with the assistance of a single translator hired by *HelpMercy International* and trained by the researchers before surveys were initiated. The survey (Appendix B) included questions about household and beneficiary characteristics, perceptions of the successes and problems with the intervention, as well as perceptions about the usefulness of the intervention (see Instrument Development Below).

Through the use of a translator and appropriate vocabulary, participants were presented with the terms of the study by means of a formal oral informed consent (example in Appendix C). The informed consent was then signed by both researchers, the participant, and the translator as a witness. In cases where the participant was illiterate, the informed consent was signed by the translator after obtaining verbal consent, or the participant signed using a mark rather than a signature. In such cases, the community health worker also signed the consent form as a witness. After signing the informed consent document, the participant was designated a participant identification number. This number was not connected in any way to their name or the signed informed consent form, guaranteeing participant privacy. The identification number was only designed to keep survey participants separate, as there was no need to connect survey responses back to individuals. Surveys took between 45 minutes and 2 hours to complete.

In addition to surveys, one focus group and two individual interviews were completed involving beneficiaries of the *HelpMercy Nutrition and Food Security Project*. The focus group

^h Translators working in Macha, Zambia and hired by Johns Hopkins were employees of the Malaria Institute at Macha (MIAM). They were solicited by and funded by the researchers of this study and *HelpMercy International*.

sessions and interviews with garden overseers were recorded by hand by one researcher, while the other conducted the session. Focus group questions related to only perceptions of and outcomes of the program overall.

Kenya Data Set 3: The CTC Community Garden Project

This study involved a comprehensive survey of beneficiaries of or participants in the *CTC Community Garden Project* after one year of implementation.

Location

The survey was conducted in Maai Mahiu, Kenya, during July, 2009. Surveys were completed in three locations: the *CTC* community garden site, the *CTC* main office building, and in one individual household.

Participants and Recruitment

The *CTC Community Garden Project* targeted grandmothers caring for grandchildren orphaned by HIV/AIDS. The participants in the survey included 100% of the sample population, as all current participants in the *CTC Community Garden Project* were included. In sum, 15 grandmothers were surveyed individually. Twelve of these beneficiaries also participated in a focus group discussion regarding their perceptions of the intervention. The only criterion for inclusion in the study was that the participant was an active participant in the *CTC Community Garden Project* at the time of the survey.ⁱ

Data Collection Procedure

With the help of the assistant director of *CTC*, all participants in (beneficiaries of) the intervention were asked to voluntarily participate in the survey. Several meetings were arranged at the *CTC* main office in Maai Mahiu, Kenya. The researcher, a student assistant, and the translator provided by *CTC* conducted the surveys over the course of several weeks. The following procedures were used to recruit volunteers for participation in the survey:

- Participants in the intervention were contacted by *CTC* and informed about the presence of the research team.
- The research team approached the leader of the women and asked to schedule times for surveys with specific groups of women.

ⁱ Originally, 21 grandmothers were participating in the project. By July 2009, the number of women participating was 15.

- After women volunteered to participate, the surveys were conducted at convenient times after their meetings or midday at central locations, such as the *CTC* office and the community garden.
- One grandmother was surveyed at her house because she was unable to travel by foot to the garden or *CTC* office due to illness.

The survey was translated into Swahili (Kiswahili) prior to the researchers' arrival in Kenya and back translated by someone else into English to ensure translation quality. Surveys were completed orally in Kikuyu, Swahili, and/or English with the assistance of a single translator^j provided by *CTC* who was trained by the researcher before any surveys were completed. The survey included questions about current diet, food security, female participation and access to agricultural resources in the Maai Mahiu area, things learned at the community garden, perceived usefulness of the community garden, and perceived barriers and benefits of the community garden (see: Instrument Development Below).

Through the use of a translator and appropriate vocabulary, participants were presented with the terms of the study by means of a formal oral informed consent (example in Appendix C). This procedure was identical to the consent procedure used in Kenya Data Set 1- *Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu, Kenya* (see above). The survey took about 35-60 minutes to complete.

A focus group was organized involving 12 of the 15 participants. Additionally, an in-interview with the *CTC* staff person in charge of overseeing the intervention was conducted and recorded verbatim by the researcher.^k

Data Collection Instruments

Below is a list of the survey instruments used in this study. Full survey available in Appendix B.

- 1) Kenya Data Set 1: *Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu, Kenya*
Tool: "Preliminary Survey of Food Security and Maternal and Child Health"
- 2) Zambia Data Set 2: The *HelpMercy Nutrition and Food Security Project*
Tool: "HELPMERCY NUTRITION AND FOOD SECURITY PROJECT: Household Survey"
- 3) Kenya Data Set 3: The *CTC Community Garden Project*
Tool: "Evaluation of a nutrition and agriculture intervention in Maai Mahiu Kenya" Survey

^j This was the same translator used for Data Set 1: *Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu, Kenya*

^k This interview was conducted in English and did not need to be translated.

Instrument Development

All three surveys mentioned above were original tools, developed explicitly for this study using similar methods. Specific attention was given to the different design of each intervention assessed, as well as the demographic and cultural differences between the two primary locations. Topics included in the surveys were determined based on the primary goal of understanding and evaluating both interventions after one year of completion (Data Set 2 and 3), as well as collecting general information about the current situation in Maai Mahiu (Data Set 1). To evaluate and compare the two interventions, beneficiaries’ opinions and perceptions were valuable. The variables relevant to this study that were included/recorded in each survey are shown in Table 3-1 below.

Table 3-1 Pertinent Variables Collected in Three Survey Tools

Variables Included	Preliminary Survey of Food Security and Maternal and Child Health	HelpMercy Nutrition and Food Security Project	CTC Community Garden Project
Beneficiary Age	✓	✓	✓
Number of Children	✓	✓	✓
Beneficiary Education Level	✓		✓
Care for sick or ill relatives/children	✓		✓
Household Size		✓	
Gender of Household Head	✓	✓	✓
Perceived Usefulness of Intervention		✓	✓
Food security Level	✓		✓
Problems Experienced With Intervention		✓	✓
Successes Experienced with Intervention		✓	✓
Perception/willingness to participate in potential future Interventions	✓		
Additional Perceptions and Comments about Current Situation	✓	✓	✓

Development of Perceived Usefulness Questions

No previous research was found to have evaluated beneficiary reported ‘perceived usefulness’ of agriculture or nutrition related interventions in sub-Saharan Africa. Through responses to four questions, Zambia Data Sets 2 and Kenya Data Set 3 measured beneficiary ‘perceived usefulness’ of the respective interventions using four, Likert scale, questions pertaining to the perceived usefulness or benefit of each intervention. The questions pertained to four major factors that the interventions may have impacted: food supply, income, dietary diversity, and ability to help friends or relatives in the community. The tool was intended to provide a short but comprehensive picture of overall perceived usefulness. Figure 3-1 below depicts a general template for the ‘perceived usefulness’ questions.

Table 3-2 General Template for Perceived Usefulness Questions

<p>How much did the [Intervention or Intervention Outcome] improve your household’s overall food supply?</p> <p>1. Very Much, 2. Somewhat, 3. A little bit, 4. Not much, 5. Not at all.</p>	<p>How much did the [Intervention or Intervention Outcome] provide your household with additional income?</p> <p>1. Very Much, 2. Somewhat, 3. A little bit, 4. Not much, 5. Not at all.</p>	<p>How much did the [Intervention or Intervention Outcome] help you or your household eat a more diverse diet/different types of food?</p> <p>1. Very Much, 2. Somewhat, 3. A little bit, 4. Not much, 5. Not at all.</p>	<p>How much did the [Intervention or Intervention Outcome] allow you to help friends or relatives in your community?</p> <p>1. Very Much, 2. Somewhat, 3. A little bit, 4. Not much, 5. Not at all.</p>
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The Health Belief Model (HBM)

Health promotion programs require behavior modification, program participation, and/or observance of program guidelines to truly impact health. Programs are also most likely to benefit participants and communities when they are informed by a theory of health behavior, because these theories identify critical points for change and ways to achieve change.¹⁷ Nevertheless, health promotion programs are often formed only on narrowly developed conceptual models focusing on accessibility and effective programming. While these are key components for program execution, they neglect additional influences on health behavior, such as individual perception and belief.¹⁸ Numerous theories regarding methods for developing successful programs have been proposed by psychologists and health professionals,¹⁷ however these models must be implemented carefully because each target population and individual faces a unique set of barriers or challenges to reaching health behavior change^{17, 19} (for example beneficiaries in Maai Mahiu, Kenya and those in Macha, Zambia).

Nutrition and agriculture interventions, like health behavior and health education interventions, rely on participant or beneficiary participation and compliance for success, which is influenced by health belief.^{17, 18} Positive intervention outcomes require beneficiary self-efficacy, and research suggests that when participants are invested in a program, change is more likely to be beneficial.¹⁷ Adherence to program guidelines calling for nutrition and health behavior change is often only partially successful for PLWHA in sub-Saharan Africa because of numerous obstacles. Without a theoretical background, the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project* are in need of program evaluation to inform future program objectives. Collecting data related to health beliefs and community situations allows for future planning of more effective programs¹⁷ and should benefit these interventions. Using the results of health belief data, interventions can be directed to target the specific need of the target population identified by such an assessment.¹⁷

The Health Belief Model (HBM), a value-expectancy theory, remains one of the most widely utilized conceptual frameworks used in health behavior programming and research.²⁰ It seeks to explain health behavior by focusing on the beliefs, attitudes, and perceptions of individuals. In order for any health behavior change to succeed, individuals must change their attitudes. People must (as the original HBM theorizes) also feel threatened by their current behavioral patterns (perceived susceptibility and severity) and believe that change of a specific kind will result in a valued outcome at acceptable cost. They also must feel themselves competent (self-efficacious) to overcome perceived barriers to taking action.¹⁷ Thus, the HBM may be an appropriate theory to investigate and inform the strategies of this study.

History/Background of the HBM

Historically, the HBM has been used as a framework to explain cancer-screening behavior as well as some AIDS-related behaviors.²⁰ The model has been used to intervene at certain points before or during programs to alter behavior and make positive changes addressing public health problems in a variety of multicultural settings, although the framework originated in the United States.

In 1952, the United States Public Health Service offered free tuberculosis screening for adults, but a large number of eligible adults did not participate. Hochbaum (1958) determined that the probability of adult participation in the free tuberculosis screenings was closely tied to

individual belief about personal susceptibility to infection and the belief in the total benefits of early detection.²¹ This demonstrated that the “free screening” itself was not the only factor impacting individual behavior; rather, participant perceptions about the risks and benefits of the program were also key factors.

The HBM assumes that for an individual to change a health behavior, or health related action, he or she must feel that:

- 1) a negative outcome or condition can be avoided (example: HIV/AIDS);
- 2) by following a recommendation, he/she will avoid a negative outcome or condition (for example, behavior can be prevention such as using condoms to prevent HIV); and
- 3) he/she can successfully complete or follow a recommended health action or behavior with confidence (for example, he/she can safely use condoms with confidence).¹⁷

The HBM operates around four primary constructs representing an individual’s perceived threats versus his/her total perceived benefits of a health behavior. These four constructs include: perceived threat (perceived susceptibility, perceived severity), perceived benefits, perceived barriers, and cues to action.²² These elements may explain a person’s readiness to act and engage in behavior change.²⁰ The HBM asserts that for behavior change to succeed “people feel threatened by their current behavioral patterns (perceived susceptibility and severity) and believe that change of a specific kind will result in a valued outcome at acceptable cost. They also must feel themselves competent (self-efficacious) to overcome perceived barriers to taking action.”²³ As mentioned here, an additional component of the model is the concept of self-efficacy, which was developed by Bandura in 1977.²⁴ Self-efficacy is defined as “the conviction that one can successfully execute the behavior required to produce the outcomes.”^{24, 25} Similarly, self-efficacy may “be a strong predictor of many health-related behaviors. Self-efficacy will be a particularly strong predictor of behaviors that require significant skills to perform.”²³

Uses of the HBM

The Health Belief Model (HBM) is one of the most extensively utilized conceptual frameworks in health behavior.²³ In a review of literature published from 1974-1984, Janz and Becker²⁶ noted that the most influential variable for predicting and explaining health related behaviors was perceived barriers, with perceived benefits and perceived severity also demonstrating significant connections. In 1989, Bandura suggested that sustained behavior

change is highly influenced by an individual's perceived ability to successfully carry out a health strategy.²⁷ Thereafter, the HBM has been utilized for a broad range of health behaviors with various populations. The health behaviors evaluated include: 1) preventive health, which includes health promoting and health risk behaviors (i.e., diet, exercise, smoking cessation, vaccination, and contraception), 2) sick role behaviors (compliance to medical regimens), and 3) use of medical clinics (visiting a physician for any reason).²⁸ Nutrition and agriculture interventions often fall under the "preventive health" category when various mechanisms are used to promote positive health behaviors, although the HBM has not been used extensively to inform agriculture interventions.

The HBM has been used as a means to improve nutrition education programs²⁹ and to gain insight regarding attitudes and societal norms that impact diet-related decisions.³⁰ Actual versus perceived dietary quality among adults in the United States has been predicted with this model. The U.S. Department of Agriculture used the "Continuing Survey of Food Intakes by Individuals" and the "Diet and Health Knowledge Survey" to determine that the HBM was useful in predicting perceived quality among respondents. Specifically, the HBM provided a good prediction of nutritious food behavior, but was a weak predictor of dietary quality based on food intake.³¹ Kloebler and Batish (1999) tested elements of the HBM and found perceived benefits to be the best predictors of folate consumption in pregnant women, suggesting that the HBM may offer an effective foundation for development of tailored educational intervention programs for folate consumption in pregnant women.²⁹ Rosenstock (1982)³² posed that there are five axioms of learning that explain dietary habits and support approaches to teaching and education people about healthful eating habits. The axioms include: the influence of prior beliefs and attitudes on interpretation, the fact that learning is incremental, the importance of reinforcement, the fact that behavior is often habitual, and the idea that learning requires cognition and personal skill. Nutrition education plans should aim to modify beliefs using these axioms.³²

A study of perceived barriers and benefits of colon cancer screening in the United States showed that African American adults perceived benefits versus barriers of colonoscopy differently than other groups. In fact, in the African-American church based group expressed perceived benefits unique to the sample, such as taking care of the body being necessary as part of "God's holy temple." The study noted the importance of participant motivation and

adherence to guidelines for effective prevention programs. To increase participation rates, researchers need to understand the barriers and promoters of people's behavior.³³

Research involving the HBM and AIDS indicates that adolescents and adults who report perceiving a high risk of contracting AIDS actually practice safer sexual behaviors than those who perceive a low risk of contracting AIDS.³⁴ This study supports the idea that individuals who do not perceive themselves to be confident in their ability to change a behavior are less likely to change.²² Self-efficacy is a strong component of behavior. Agricultural techniques and skills are required for participation in some agriculture interventions (such as in the *HelpMercy Nutrition and Food Security Project*). If participants do not feel confident growing crops or in their ability to successfully cultivate new crop varieties, perceived self-efficacy and perceived benefits of the intervention will decrease, while perceived barriers will increase. Increasing perceived self-efficacy can be promoted through gaining knowledge and skills necessary to complete the task at hand.

The necessity for beneficiary or participant self-efficacy for health program success has been demonstrated by numerous studies.^{18, 35} Widemann et al. (2009) determined a study on the stage changes predicting fruit and vegetable consumption that self-efficacy was the universal predictor of behavior change.³⁵ Gillis et al. (1995)³⁶ utilized behavioral theory, which is similar to the HBM, to show that behavior is determined by internal antecedents and consequences through an investigation of a modified diet for renal disease in conjunction with dietitian support. The program was very successful, and it involved three key features: self-monitoring and feedback from measures of adherence; modeling, particularly by providing low-protein food products; and dietitian support. The study asked participants to rate the usefulness of the program on 19 components and used a "self-management approach." Dietitians used nutrition intervention strategies to advise and support patients undergoing a specific protein diet regimens (three separate protein levels and diets). The intervention involved patient self-monitoring of health and diet along with biochemical markers to measure success. Self-monitoring and dietitian support were both rated as "very useful" by 88% of the participants.³⁶ This study suggests that participant "perceived usefulness" contributed to the success of the intervention. In fact, the authors noted that participant evaluation of intervention strategies need to be examined so that programs can be responsive to the needs of participants and those implementing an intervention (in this case, dietitians).³⁶

Research involving the HBM in Africa is sparse. Most of it revolves around HIV-prevention and/or cessation of risky behaviors. Tenkorange et al. (2008) reported that perceived risk along with socio-economic and familiar factors impact the timing of first sexual intercourse among males and females in Cape Town, South Africa.³⁷ Similarly, researchers determined that risk perception among adolescents in KwaZulu-Natal, South Africa was a strong predictor for HIV-risk behaviors in addition to environment and self-confidence. Perceived risk may change with an adolescents' environmental background, hence altering preventative behavior.³⁸ These studies indicate that perceived risk or threat is associated with behavior and behavior change in sub-Saharan Africa.

Implications for the Current Study

Consideration of participant perceptions (perceived barriers and perceived benefits or perceived usefulness) of nutrition and agriculture interventions is crucial to better evaluate programs and enhance the development of interventions in sub-Saharan Africa. This is because agriculture and nutrition interventions require some level of behavior change. Also, populations in sub-Saharan Africa are unique from one another, suggesting the need for unique intervention strategies to meet the needs of vulnerable groups. Kenyans and Zambians who participated in either the *CTC Community Garden Project* or the *HelpMercy Nutrition and Food Security Project* may have felt threatened by food insecurity and recognized the damaging effects of malnutrition and HIV/AIDS all around them, influencing their participation in the projects.

The inclusion of a 'perceived usefulness' measure in this study fills a gap in current research. This measure is similar to the perceived benefits measure, which stems from the HBM. To our knowledge, no current studies have evaluated beneficiary 'perceived usefulness' of agriculture intervention programs in sub-Saharan Africa in relationship to food security or nutrition. The perceived benefits of a program, along with participant self-efficacy, are reasonable ways to evaluate and compare agriculture intervention programs. Because there are limitations to the HBM, this study investigates factors in addition to 'perceived usefulness' and elements of self-efficacy. Multiple dimensions of assessment were included in this study to give a broad evaluation and measure of perceived view of the success of *HelpMercy Nutrition and Food Security Project* and the *CTC Community Garden Project*.

Development of Food Security Measure

Both Data Set 1 (*Preliminary Survey of Food Security and Maternal and Child Health*) and Data Set 3 (*CTC Community Garden Project*) utilized a nine question *Food Access Survey Tool (FAST)* adapted from the original *Nine Question Food Access Survey Tool (FAST) for Bangladesh* developed by Coates, Webb, and House (2003).³⁹ The use of this tool was appropriate because the tool exemplifies a validated means to assess food security in developing countries without using strict measures of anthropometry and income, which are typical indicators of food security.³⁹ Anthropometric measures were not feasible in this study due to limited resources. A “FAST” replica tool was created specific for respondents in Maai Mahiu, Kenya, based off of the original tool. Substitutions were made in the survey to make the questionnaire culturally and geographically appropriate. For example, the staple food in Kenya, maize, was substituted for rice, the staple crop/food in Bangladesh. The FAST tool was initially developed using the United States “food security core mode,”⁴⁰ however, the FAST tool expanded on traditional methods for assessing food security by “developing and testing a contextually valid experiential measure of food security in Bangladesh.”³⁹ Initial tests surveyed 600 households in villages in Bangladesh as part of a Food Security Enhancement Initiative, and follow-up methods returned to these households to replicate tests.³⁹ Ultimately, the FAST module was tested for its ability to remain stable and valid against other indicators over time relative to other comparators for food security using several statistical approaches such as bivariate correlations, contingency tables, paired and independent t-tests, two way repeated measures, ANOVA, and multivariate regression.³⁹ Based on comparison with alternative measures and self-replication, the appropriateness of the FAST questions has been assessed in Bangladesh, and a detailed validation for the FAST approach has been accomplished. Research supported by Food and Nutrition Technical Assistance (FANTA) effectively demonstrated that the survey measure previously validated in the United States⁴⁰⁻⁴² is also valid in developing countries.³⁹ In fact, the “the FAST tool serves to address the ‘access’ part of food insecurity that until now was poorly measured using traditional indicators.”³⁹ The FAST tool has been shown to be a valid tool for non-governmental organizations.

The FAST tool requires a final enumerator Food Security Rating (FSR) for each respondent to determine food security level. In this study, FSR were calculated by ranking each response on a scale of 1-3, indicating a level on the Food Security Rating scale. For example,

responses of 1 were left as 1, indicating Food Security. Responses of 2 were changed to 1.5 on a 3 point scale. Complete changes were as follows, with the first number representing the original response and the second number representing the new ranking: 1=1, 2=1.5, 3=2,4=2.5, 5=3. Finally, responses were averaged to give a score between 1 and 3. After evaluating responses, we assigned a FSR to each respondent.

Data Analysis Procedures

Quantitative Methods

Results of the three surveys were analyzed in several ways using SPSS[®] for Windows version 17.0.⁴³ First, descriptive statistics were calculated to determine means, frequencies, and medians among each individual sample population. Second, nonparametric tests were performed for Data Sets 2 and 3. Spearman's Rank Order Correlations were calculated to determine relationships between intervention variables, including the perceived usefulness of the interventions and intervention outcomes. Mann-Whitney U Tests were used to evaluate differences between independent groups along a continuous measure. Chi-Square Tests for independence were also computed to explore the relationship between categorical variables. To determine the impact of several covariates on the perceived usefulness of interventions, Statistical Analysis Software (SAS[®]) Version 9.1.3 was used to develop a logistic regression model (see Logistic Regression below).

Statistical Comparisons of the Three Data Sets

To compare the three data sets, several strategies were implemented. First, side by side comparisons were made using descriptive statistics. Secondly, food security measures between Data Set 1 (*Preliminary Survey of Food Security and Maternal and Child Health*) and Data Set 3 (*The CTC Community Garden Project*) were evaluated using two by two contingency tables. The two primary interventions were compared indirectly using two by two contingency tables (chi square values) and simple linear logistic regression. For the simple linear regression, predictor variables were analyzed in relationship to perceived usefulness and compared individually between the *HelpMercy Nutrition and Food Security Project* and the *CTC Community Garden Project*.

Logistic Regression

Based on the 64 respondents who participated in the household survey, logistic regression was used to develop an estimated model predicting the odds that beneficiaries of the *HelpMercy Nutrition and Food Security Project* perceived the intervention (seed distribution) as useful based on a set of predictive variables. These variables were selected based on their hypothesized relationship with the beneficiaries' perception of the intervention. A backward elimination variable selection procedure, based off of the logistic regression results, was used to find a simpler (reduced) model. Odds and Odds Ratios (OR) were calculated. The procedure for the logistic regression was as follows:

- 1) First, survey responses to the four 'perceived usefulness' of the intervention questions were pooled to create a bivariate variable. Participants were asked to rank the impact of the intervention based on a five point Likert scale, which included the following response options:

- 1=Very Much
- 2=Somewhat
- 3=A little bit
- 4=Not much
- 5=Not at all

Responses from each participant were then averaged to determine an overall 'perceived usefulness' score. Beneficiaries who reported a 'perceived usefulness' average rating of below 'a little bit' (or ≥ 3.1) were determined to perceive the intervention as not useful. Beneficiaries who reported an average rating of greater than 'a little bit' (or ≤ 3.0) were determined to perceive the intervention as useful overall. Responses were then recoded as 'perceived useful YES' and 'perceived useful NO.' In other words, the data was coded as follows: 1-3.0 YES, 3.1-5.0 NO. The outcome variable, 'perceived usefulness' (PUBV) was then set for the model.

- 2) Second, distance to water was also pooled to create a bivariate variable because using the original five part variable demonstrated sparse data in the model. Original responses fell on a scale of 1 to 5 including distances by foot to crop water source (1=inside the house/garden, 2=0-5 min. walk, 3=6-15 min., 4=16-60 min., 5=>60 min.). These distances were pooled and collapsed into two categories: 1= Close to water (1-15 minutes from water) and 2= Far from water (more than 15 minutes from water).

- 3) Third, the following predictive variables were considered for analysis in the original logistic regression analysis: age of beneficiary, number of people living in each household, total number of seed types received, total number of seed types planted, number of community-based training sessions attended, distance to water. All of the continuous variables were mean shifted (indicated by variables ending in ‘S’ below), meaning that the mean was found for each qualitative/continuous variable and subtracted from the value of the variable, i.e. the mean for beneficiary age (BA) was subtracted from BA. This allowed all outcomes of the model to reflect differences from the average, rather than from 0. In other words, when the variable is set to 0, the variable is at its mean. *Note: Additional variables such as household member falling ill and problems with pests were eliminated from the model for two reasons: both variables led to sparse data problems (less than the necessary five responses per category) and responses to ‘illness’ questions may have been skewed due to respondents’ cultural associations between illness and HIV/AIDS, leading to concern regarding stigma.
- 4) The original variables considered for analysis and the original full model considered for analysis were as follows:

$$PUBV = \begin{cases} 1 & \text{if perceived useful} \\ 0 & \text{otherwise} \end{cases}$$

BAS = age of beneficiary with mean shift

HHS = number of people per household with mean shift

TSTRS = total seed types received with mean shift

TSTPS = total seed types planted with mean shift

NCTAS = number of community training sessions attended with mean shift

$$D = \begin{cases} 1 & \text{if less than 15 minutes to planting water} \\ 0 & \text{otherwise} \end{cases}$$

Full Model with Two-way Interactions

$$\begin{aligned}
 PUBV = & \alpha + \beta_1 BAS + \beta_2 HHS + \beta_3 TSTRS + \beta_4 TSTPS + \beta_5 NCTAS + \beta_6 D \\
 & + \beta_7 BAS * HHS + \beta_8 BAS * TSTRS + \beta_9 BAS * TSTPS + \beta_{10} BAS * NCTAS + \beta_{11} BAS * D \\
 & + \beta_{12} HHS * TSTRS + \beta_{13} HHS * TSTPS + \beta_{14} HHS * NCTAS + \beta_{15} HHS * D \\
 & + \beta_{16} TSTRS * TSTPS + \beta_{17} TSTRS * NCTAS + \beta_{18} TSTRS * D \\
 & \beta_{19} TSTPS * NCTAS + \beta_{20} TSTPS * D \\
 & \beta_{21} NCTAS * D
 \end{aligned}$$

- 5) An original goodness of fit test was performed to ensure that the model met all of the criterion for logistic regression.
- 6) The model considered two-way interactions between variables to account for potential interactions that might influence the overall predictive model (i.e., an interaction between beneficiary age and household size might be evident).
- 7) Using a backward elimination process, variables were removed from the model algorithmically based on their overall statistical significance, meaning that during each step in the model selection procedure, one variable was removed based on its p-value. After the least significant variable was removed the model was refit with the remaining variables. This procedure was repeated until only significant variables remained. Backward elimination involved 17 steps. It considered the overall impact of individual variables and two-way variable interactions. During each step, two models were compared, the current model versus itself minus a variable. The Chi-Square statistic represented how well one model represented the data versus the other.
- 8) Ultimately, the reduced model below was calculated.

$$PUBV = \begin{cases} 1 & \text{if perceived useful} \\ 0 & \text{otherwise} \end{cases}$$

HHS = number of people per household with mean shift

TSTPS = total seed types planted with mean shift

NCTAS = number of community training sessions attended with mean shift

Reduced Model

$$PUBV = \alpha^* + \beta_1^* HHS + \beta_2^* TSTPS + \beta_3^* NCTAS + \beta_4^* HHS * TSTPS + \beta_5^* HHS * NCTAS$$

Qualitative Methods

Little research has been published concentrating on perceived benefits, ‘perceived usefulness,’ and overall success of agriculture and nutrition related interventions in sub-Saharan Africa in HIV-affected communities. Few assumptions could be made about the target populations prior to the study. Consequently, open, exploratory research was necessary to understand the perceptions of participants after the first year of program implementation. In addition to quantitative data, qualitative research is needed to lay a foundation for future studies. Basic qualitative analyses were performed to investigate comments given by beneficiary at the end of each survey and to analyze the information collected during focus group sessions and interviews. Interviews are beneficial because they allow researchers to spend more time with participants, and in comparison to other research methods, interviews allow researchers to take a constructionist approach to research topics.⁴⁴ This study emphasized beneficiary perception and hence, valued their experiences.

Qualitative information is useful as a complement to quantitative analyses for determining overall beneficiary perceptions of the two interventions under investigation. These qualitative analyses were conducted using Qualitative Solutions and Research (QSR) NVivo 2.0[®] software and involved the development of a basic coding tree. The following procedure was used to collect, sort, and analyze data qualitatively:

- 1) All comments made by beneficiaries, focus group participants, and interviewees, were transcribed, typed, and checked for errors. Grammatical or English language idioms were not changed or corrected because surveys were transcribed via translation. Beneficiary responses were not altered in order to retain as close to the original meanings as possible. Throughout this process, we were able to identify some general themes and concepts present in the beneficiary comments. Themes included: positive and negative views of education components, barriers and benefits to the interventions, and economic components of the interventions (see Appendix E).
- 2) Data was imported into NVivo[®] as a rich text document, where it was then reformatted as needed.
- 3) Transcribed quotes were sorted categorically based on the primary research objectives and coded by the researcher. The coding categories can be seen in Appendix E.
- 4) Repetition and pattern recognition among participant responses were used to identify themes⁴⁵ and using the coding tree, participant comments were grouped in useful subsets, adding to the overall understanding of the interventions.

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CHAPTER 4 - Results

A total of three surveys were completed as part of this research: 1) *Preliminary Survey of Food Security and Maternal and Child Health* in Maai Mahiu, Kenya, 2) HELPMERCY NUTRITION AND FOOD SECURITY PROJECT: Household Survey, and 3) the Evaluation of a Nutrition and Agriculture Intervention in Maai Mahiu Kenya Survey. Table 4-1 summarizes basic characteristics of the respondents from each survey. Fifty Kenyan women living in or near Maai Mahiu, Kenya were surveyed as a baseline to give an overall picture of the state of food insecurity and demographics in the community (Survey 1). Sixty-four beneficiary households were surveyed as part of the *Zambian HelpMercy Nutrition and Food Security Project* (Survey 2), representing 35.4% of the 181 HIV-positive beneficiary households targeted by the intervention. Additionally, 15 beneficiaries were surveyed from the Kenyan *CTC Community Garden Project* representing 100% of the intervention sample (Survey 3). All variables were not available for all surveys. Unavailable variables were left blank.

Table 4-1 Participant Demographic Information

Variables	Survey 1: Preliminary Survey of Food Security, Maai Mahiu, Kenya	Survey 2: Nutrition and Food Security Project, Zambia	Survey 3: CTC Community Garden Project
N	50	64	15
Gender			
Male	0.0%	29.7%	0.0%
Female	100%	70.3%	100%
Age	31.88 (SD=11.69 Range=18-70)	40.97 (SD=4.42 Range=19-71)	59.90 (SD=10.69 Range=45-81)
Education (Avg. Years of School Completed)	12.84 (SD=5.97 Range=0-23)		8.15 (SD=9.21 Range=0-22)
Number of people living in household (Avg.)		7.95 (SD=4.42 Range=2-26)	
Avg. Number of Children of Beneficiary	3.62 (SD=2.59 Range=1-14)	3.06 (SD=2.24 Range=0-8) ^a	6.07 (SD= 3.86 Range= 1-13)

^a Beneficiaries were asked to report number of children living younger than 18 years of age.

Survey 1: The Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu, Kenya

Fifty participants, representing a random sample of women living in or near Maai Mahiu, reported completing an average of 12.84 years of school (SD=5.97), being pregnant an average of 3.96 times (SD=2.76), and caring for approximately 1.64 sick relatives (SD=0.49) and 1.7 additional children they did not give birth to (SD=0.46) (Table 4-1). Of the respondents, 36% acknowledged being the heads of their households and 55.1% reported working outside of the home. While 82% of the women reported having access to land (predominately owned by others, for rent), only 66% reported participating in agriculture to produce food for herself or her

family. When asked, “If you obtained seeds for various food crops, would you plant them?” 86% of participants said they would plant the seeds. Another 14% said they would rather save, sell, or give away the seeds. After being asked the question, “If YES (would plant seeds), do you think you would be able to grow the seeds and produce crops successfully,” 62% of the women said they would plant the seeds and believed they could produce crops. The women were also asked “If you produced crops from seeds, what would you use the crops for?” Multiple responses were recorded, including: 94% reported that they would use the food to feed family members, 76% planned to sell crops for money, and 50% also planned to share the crops with others (family and/or neighbors). All of the participants believed that being given seeds would improve the amount of food that their family had to eat, whether or not they would plant seeds or sell them.

Survey 3: Evaluation of a Nutrition and Agriculture Intervention in Maai Mahiu Kenya: *The CTC Community Garden Project*

Fifteen participants in the *CTC Community Garden Project* reported completing 8.15 years of school ($SD=9.21$), being pregnant an average of 8.0 times ($SD=4.37$), and caring for approximately 2.27 grandchildren on a regular basis ($SD=1.79$) (Table 4-1). Of the respondents, 86.7% identified as the heads of their households, 53.3% reported working outside of the home, and 80% reported having access to land (predominately owned by others, for rent) to plant food on. The majority of the women (86.7%) reported participating in agriculture to produce food for their families before becoming participants in the community garden. A comparison between women in Maai Mahiu and participants in the CTC Community Garden is shown in Table 4-2.

Table 4-2 Comparison between participants in *CTC Community Garden Project* and non-participants in Maai Mahiu, Kenya

Variables	Survey 1: Preliminary Survey of Food Security, Maai Mahiu, Kenya	Survey 3: CTC Community Garden Project
N	50	15
Age	31.88 (SD=11.69 Range=18-70)	59.90 (SD=10.69 Range=45-81)
Education (Avg. Years of School Completed)	12.84 (SD=5.97 Range=0-23)	8.15 (SD=9.21 Range=0-22)
Avg. number of times pregnant	3.96 (SD=2.76 Range=1-15)	8.0 (SD=4.37 Range=1-17)
Avg. number of children living	3.62 (SD=2.59 Range=1-14)	6.07 (SD= 3.86 Range= 1-13)
Avg. number of children cared for that participant did not give birth to	0.54 (SD=1.01 Range=0-4)	2.27 ^a (SD=1.79 Range=0-5)
Percent participating in agriculture to feed family	66%	86.7 % ^b
Percent employed outside of the home	55.1%	53.3%

^aFor the CTC participants, this question refers to grandchildren and does not include any young adult children that the participant may care for

^bIn this case, agriculture refers to only activities outside of the CTC Community Garden; therefore, for the CTC participants, the survey question asked them if they participated in agriculture at home to grow food for their family

Food Security Measure

Food security for *CTC Community Garden Project* participants, as well as for women in the Maai Mahiu community, was measured using an adaptation of the FAST survey,¹ which evaluates food security over the previous 12 months. The tool contained nine standard questions. Each question was answered by the participants using one of the possible multiple choice answers shown below. Responses between women participating in the CTC Community Garden Project and others differed considerably. A complete list of participant responses to these questions can be found in Appendix D (Table D-1).

Question #1: *How often did the participant eat three 'square meals' (full stomach meals) a day in the past 12 months (year)?*

Question #1 Multiple Choice Answer:

1. Mostly (3 meals each day)
2. Often (3 at least a few times each week)
3. Sometimes (3 per day 7-12 times this year)
4. Rarely (3 per day only 1-6 times this year)
5. Never

Two-thirds (66.7%) of participants in the *CTC Community Garden Project* reported “Never,” while, 58% of women in Maai Mahiu reported “Rarely.”

Question #2- *In the last 12 months, how often did you or any of your family have to eat another food or product although you wanted to eat corn? (Note: Please do not consider times that you or your family members were sick.)*

Question #2 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times this year)
4. Often (a few times each month)
5. Mostly (most days/weeks)

Forty-percent of *CTC* beneficiaries indicated “Often.” Similarly, 52% of women in Maai Mahiu indicated “Often.”

Question #3: *In the last 12 months how often did you yourself skip entire meals due to scarcity of food?*

Question #3 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times this year)
4. Often (a few times each month)
5. Mostly (most days/weeks)

Almost all of CTC beneficiaries (93.3%) could not recall skipping meals due to scarcity of food and indicated, “Never.” Some of women in Maai Mahiu (28 %) recalled that this happened “Mostly,” 28% reported “Often,” and 28% reported “rarely.” Drastic differences in results may have been due to differences in how the question was asked during the first and second year of implementation. During the second year, researchers were aware that food scarcity is not a problem in Maai Mahiu, and that participants may have responded to the question in terms of income and ability to purchase food rather than overall food availability.

Question #4: *In the past 12 months how often did you personally eat less food in a meal due to scarcity of food?*

Question #4 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times this year)
4. Often (a few times each month)
5. Mostly (most days/weeks)

Almost all of CTC beneficiaries (93.3%) reported “Never,” while only 34% of women in Maai Mahiu reported “Never.” Thirty percent of women in Maai Mahiu reported “Often.”

Question #5: *In the past 12 months how often did the food stored in your home run out and there was no money to buy more food?*

Question #5 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times this year)
4. Often (a few times each month)
5. Mostly (most days/weeks)

About half (46.7%) of CTC beneficiaries recalled running out of food in the home with no money to buy more food, “Sometimes,” and a nearly equal amount (48%) of women in Maai Mahiu, stated that this happened “Often.”

Question #6: *In the past 12 months how often did you worry about where food would come from?*

Question #6 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times this year)
4. Often (a few times each month)
5. Mostly (most days/weeks)

The most frequent *CTC* beneficiary response was “Often” (46.7%), and similarly, 46% of the women in Maai Mahiu also reported “Often.”

Question #7: *In the past 12 months, how often did your family purchase corn?*

Question #7 Multiple Choice Answer:

1. Never
2. Rarely (once every few months last year)
3. Sometimes (a few times each month)
4. Often (every week)
5. Mostly (every day)

The majority of *CTC* beneficiaries (73.3%) reported purchasing corn “Often.” Thirty-six percent of women in Maai Mahiu also reported “Often,” and 38% reported “Mostly.”

Question #8: *In the past 12 months how often did your family take food (corn, beans etc) on credit (or loan) from a local shop?*

Question #8 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times a year)
4. Often (a few times each month)
5. Mostly (this happens a lot)

Many *CTC* beneficiaries (46.7%) recalled taking food on credit “Sometimes,” while 40% recalled that this happened “Often.” Women in Maai Mahiu recalled that this happened “Mostly” (42%).

Question #9: *In the past 12 months how often did your family have to borrow food from relatives or neighbors to make a meal?*

Question #9 Multiple Choice Answer:

1. Never
2. Rarely (only 1-6 times this year)
3. Sometimes (7-12 times a year)
4. Often (a few times each month)
5. Mostly (this happens a lot)

Just over half of CTC participants (53.3%) reported that this occurred “Sometimes,” whereas 32% of women in Maai Mahiu reported that it happened “Often.” However, 34% of women surveyed in Maai Mahiu recalled that it happened “Never.”

A Total Enumerator Food Security Rating (FSR) was given to each participant in both surveys based on their answers to the above questions. The ratings were as follows: 1=Food Secure, 2=Food Insecure (without hunger), and 3=Food Insecure with Hunger. All (100%) of participants in the *CTC Community Garden Project* were determined to be Food Insecure Without Hunger (2). Women in Maai Mahiu were more diverse in their responses, as 8% of the women were ranked Food Secure, 54% were ranked Food Insecure without Hunger, and 38% were ranked Food Insecure with Hunger. Figure 4-1 denotes the spread of FSR among women in Maai Mahiu. Because of the lack of diversity in FSR for CTC participants, 2x2 contingency/chi-square tables could not be calculated to compare the two groups.

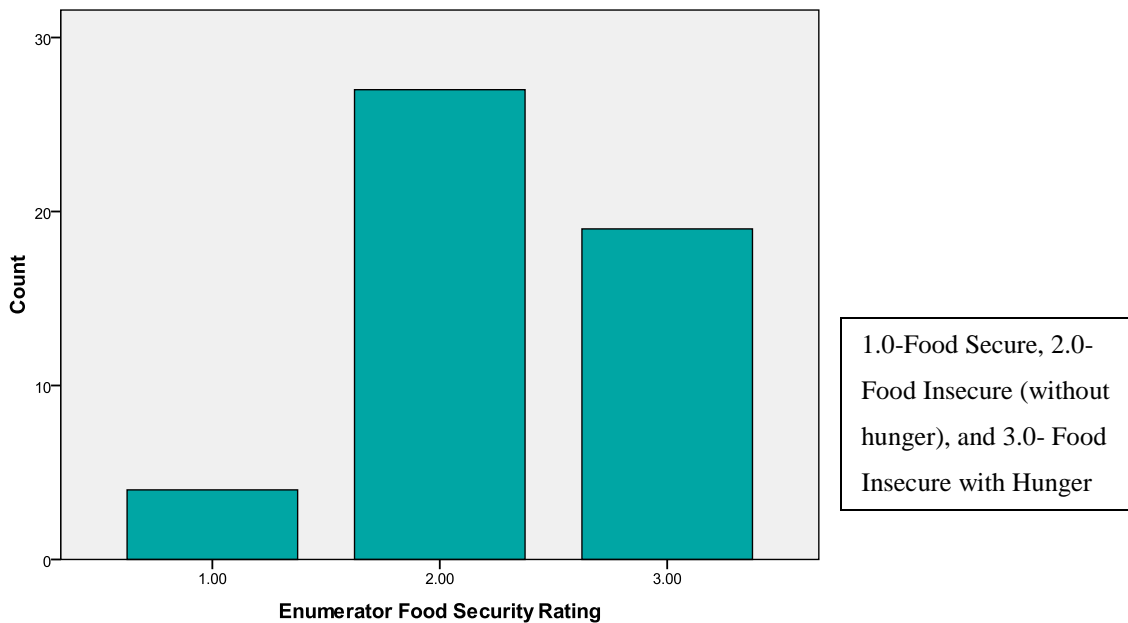


Figure 4-1 Bar graph of Enumerator Food Security Ratings for Women in Maai Mahiu

Perceptions of the CTC Community Garden Project

Participants in the *CTC Community Garden Project* reported mixed feelings about the program. Responses to perceived usefulness questions are shown below and overall perceptions of barriers faced during first year of the project are shown in Table 4-10.

Education

All participants reported learning about nutrition or healthful eating at the community garden. Similarly, 100% of the respondents wanted to learn more about “nutrition and healthy eating,” and reported a willingness to “teach other women about nutrition and agriculture.” In response to the question, “What new techniques did you learn at the community garden?” 93.3% of participants reported learning three or more different agricultural techniques. Techniques mentioned by respondents included: 1. Drip irrigation 2. How to make pesticides 3. How to make compost 4. How to weed 5. Other (data not shown). None of the participants reported being “unsure how to plant or harvest” crops at the community garden (Table 4-10). One participant commented that “*I want to learn more about planting of crops, new methods,*” while another noted that “*If we had more land, we can plant more and different things. More crops to share and sell. Be a school to show others. Demonstration cucus (grandmothers) can be pioneers of the garden to teach younger women later. CTC has given us a lot of knowledge.*”

Perceived Barriers/Problems

Participants in the *CTC Community Garden* commented that there were several problems with the garden, including not receiving enough seeds (86.7%), pests (53.3%), drought (80%), and not having enough land to plant on (86.7%). Although none of the women in the *CTC Community Garden Project* explicitly reported not having enough help (support or physical labor) at the garden with planting, a few comments were made suggesting otherwise: “*CTC staff are in charge, but no one is at the garden. If we did have someone there it would help.*” Another beneficiary stated, it “*would be helpful to have a chair there at the garden for us to rest.*”

One-third of the women in the *CTC Community Garden Project* reported that the project staff was “unhelpful or uncooperative” during the survey, and several women made statements suggesting that they were not pleased with the project staff. One woman stated “*I would like the leaders to change...cucus (we) should elect a leader.*” Another claimed that the “*leaders aren't*

listening to my complaints about my leg. We were told we would get T-shirts, but never did. Some of the cucus left the group because they felt they were being misused or lied to.”

Table 4-10 depicts all of the perceived barriers and problems reported.

Problems with Water

According to statements from beneficiaries and the CTC staff, there was a significant water problem at the community garden, as 80% of the beneficiaries reported problems with drought. The community garden relied on rainwater and water brought by donkey from a borehole across the street; however, only 6.7% of respondents reported that the water source was too far from the garden. Also, 13.3% stated that there were problems with floods. One woman stated that, *“If there was more water, we could plant more.”* In the first year of implementation, there was a major shift in the watering strategy for the garden. Initially donkeys were used to bring in water from across the street, but these donkeys became ill and were removed from the project. Following this development, water was no longer provided to the garden. One participant commented, *“If they could pipe in water, that would make things better. There before, when the donkey was bringing in water, things were good.”*

Perceptions of Purpose of Intervention

Some participants in the community garden reported concerns that the garden did not provide substantial economic benefits. However, the objectives of the program were not economic in nature, highlighting some discrepancies. One woman stated, *“I come from far away, but when we come here, we don’t get anything (money).”* Another stated, *“The shamba (garden) is not bad. If there is water, we can make a lot of money from the crops.”* Another woman stated that, *“Money from selling crops would be used to help everyone.”* Additionally, a woman claimed that *“We want a larger amount of land to plant, more crops for more to sell, increases money.”*

Perceived Usefulness of Intervention

Participants in the CTC Community Garden Project found several components of the intervention to be useful. They were asked how much the intervention benefited them on a scale of 1 to 5 [1=Very Much, 2=Somewhat, 3=A little bit, 4=Not much, 5=Not at all]. Overall, 40% of the participants found that the intervention improved their overall food supply “very much,”

and another 6.7% reported that the garden improved their food supply “a little bit.” Thus, about 46.7% of the beneficiaries reported some benefit (“a little bit” or more) to their overall food supply from the intervention. Almost half of the beneficiaries (46.7%) stated that the intervention helped their household eat a more diverse diet/different types of food “a little bit,” whereas 26.7% reported that the garden helped “very much.” Overall, 73.4% reported some benefit in diet diversity from participation in the garden. Additionally, 53.3% said that the intervention allowed them to help friends or relatives in the community “a little bit.” Only 20% reported seeing any economic benefit (“a little bit”). A summary of responses is given in Table 4-3 below. The summary score reveals that on average, beneficiaries perceived a small benefit from the program (3.32, approximating “A little bit”).

Table 4-3 Perceived Usefulness of the CTC Community Garden Project

	Possible responses [1=Very Much, 2=Somewhat, 3=A little bit, 4=Not much, 5=Not at all]	
Question	Mean Response	Mode Response (Number out of Total Respondents)
How much did the Community Garden or crops grown at the Community Garden improve your overall food supply?	2.87	1 (6/15)
How much did the Community Garden or crops grown at the Community Garden provide your household with additional income?	4.53	5 (11/15)
How much did the Community Garden or crops grown at the Community Garden help you or your household eat a more diverse diet/different types of food?	2.87	3 (7/15)
How much did the Community Garden or crops grown at the Community Garden allow you to help friends or relatives in your community?	3.0	3 (8/15)
Summary Score	3.32	

Survey 2: The HelpMercy Nutrition and Food Security Project

The average number of people living in each household was 7.95 (SD= 4.42). The range in household size was from 2 to 26 household members, explained by multigenerational and polygamous families. Specific household characteristics are shown below (Table 4-4), including household capital. Over two-thirds of respondents were female. All beneficiaries reported that household agriculture production was their main source of food, but 93.8% reported buying some food at a local store or market, 51.5% of the beneficiaries reported receiving food aid sometime in the past, over 75% of the beneficiaries reported receiving food from friends, relatives or neighbors in the past, and only 1.6% of the beneficiaries reported hunting or gathering to obtain food. Many individuals obtained water for planting from a river or stream (39%) if they used a source other than rainwater (20.3% used only rainwater). A third of beneficiaries walked more than 16 minutes to their water source used for planting, but 42.2% walked 0-15 minutes to their planting water source. Eighty-one percent of beneficiaries had access to a borehole or hand pump for clean drinking water.

Table 4-4 Household Characteristics of the HelpMercy Nutrition and Food Security Project

Characteristic	n	Percentage	Mean	+/-SD
Age of survey respondent	64		40.2	13.5
Number of HIV-positive Household Members Reported Per Survey	64		0.98 ¹	
Number of Household Members on ARTs Reported Per Survey			1.03 ^a	
Number of People in Household	64		7.95	4.42
Number of Children ≤18 in household	64		2.6	3.4
Households owning one or more Livestock, Goats, Pigs, or Poultry	64	95.1%		
Number of Cattle per Household	64	81% (52) did not own cattle	2	5.9
Number of Goats per Household	64	36% (23) did not own goats	3.8	5.3
Number of Pigs per Household	64	65.6% (42) did not own pigs	1	1.75
Number of Fowl per Household	64	12.5% did not own fowl (8)	11	11.4
Source of Water used for Planting (dry season) (n=64)				
Well	8	12.5%		
Pond/Lake/Dam	10	15.6%		
Borehole/Hand pump	8	11.5%		
River/Stream	25	39%		
Rainwater Only	13	20.3%		
Distance to water source used for planting (dry season)				
Inside the house/garden (Includes “rainwater only”)	17	26.6%		
0-5 minute walk	15	23.4%		
6-15 minute walk	12	18.8%		
16-60 minute walk	11	17.2%		
>60 minute walk	9	14.1%		

Community-based Agriculture and Nutrition Education Sessions and Participation

In total, 68.75% of households had a member of the household attend at least one community-based agriculture education session (CBES). On average, households attended about three education sessions. Half of the 64 households that received seeds planted 100% of the seed varieties they received; 63% of beneficiaries planted at least 90% of the seed varieties they received. Only five beneficiaries planted less than 50% of their received seed varieties. Of those

¹ Discrepancy between number of HIV-positive individuals reported and number on ARV treatment was due to underreported because of the stigma associated with HIV/AIDS

who received groundnuts (the highest protein crop source distributed), 96.4% planted all seeds. The majority of beneficiaries planted the seeds they were given. A small percentage of beneficiaries still had some unplanted seeds nine months after distribution, did nothing with the seeds, gave away, or ate the seeds. These uses were most common with less familiar seed varieties (e.g., chile pepper, cauliflower, or sorghum). A list of all of the uses of each seed type can be found in Appendix D (Table D-2).

Some perceived benefits of the education sessions were evident in beneficiary responses, as one beneficiary stated, *“The family planted together and used chicken manure. Learned at meetings and helped a lot.”* However, one beneficiary claimed that he and his wife *“do not feel like we have enough knowledge.”* Another beneficiary stated, *“I used fertilizer purchased from the shops. I do not know how to make my own,”* while a different beneficiary claimed *“I do not know how to make fertilizer and did not use it.”* Learning to make compost and fertilizer was a component of the education training sessions. Communication about the CBES was lacking for some. One beneficiary recalled, *“I was not told about the meetings, therefore I did not attend.”* Another noted illness as a reason for not attending, saying *“you saw me, I was sick in bed and did not attend the trainings.”* The seed varieties were a major topic of concern for beneficiaries. Numerous beneficiaries were happy with certain varieties and unhappy with others. Some were content and one beneficiary stated that *“We liked the varieties,”* and another stated that they wanted *“more rape, tomato, cabbage, and onion [seeds].”* One beneficiary stated that the family *“liked cowpeas, cabbage, and carrots and need big onion. Liked rape and bean varieties.”* One beneficiary even claimed that the family had grown and harvested beet root, but *“Family does not know what to do with beet root!”*

Economic Benefits

Of the 64 beneficiaries, over two-thirds sold some of the crops they grew from the seed distribution. About 63% of those able to sell crops spent a part of their earnings on child-related expenses, such as school fees or uniforms. Only 2.4% reported using crop earnings for health care costs, 72% reported spending part of the money on non-food items (such as soap or clothes), and 81% spent part of the money on other food items. Fifteen percent of beneficiaries reported exchanging their crops for non-monetary items. Of those who traded crops, 100% reported exchanging crops for another food item such as maize or groundnuts. Several beneficiaries

reported using the money obtained from selling crops to pay school fees for children. One beneficiary stated, *“I used money for books, uniforms, school fees, chickens,”* and another bought *“soap, salt, and books.”* One beneficiary recalled using the money to buy more seeds, *“bought blankets and 250kg of groundnuts.”*

Perceived Barriers/Problems with the Intervention

After planting, beneficiaries had a difficult time harvesting certain crops. Beneficiaries had the greatest difficulty with sorghum (75% of beneficiaries that planted sorghum did not get a crop), followed by beetroot and cowpeas, three crops less commonly grown in the region. About one (22.6%) in four beneficiaries that planted groundnuts and cabbage did not get a crop from the seeds (Appendix D Table D-2). Overall, 15.6% of the beneficiaries did not believe that they received enough seeds and did not have access to enough land during the program. None of the beneficiaries believed that the project staff was “unhelpful or uncooperative.” However, some beneficiaries reported problems with the intervention including “not enough help planting” (21.9%), pests (84.4%), flooding (64.1%), the water source being too far from the garden (28.1%), and not having access to enough land (15.6%).

Beneficiaries reported that lack of rain as well as flooding was detrimental to their crops. One beneficiary stated, *“I had no problems with knowledge, just too much water then pests, not enough water for all crops”* referring to changes in water availability throughout the year. Another stated, *“[we] can do [plant] vegetables if there are rains, but cannot during dry season. Seeds wasted because no water.”* Rain was reported as particularly damaging to sorghum and groundnut crops, as beneficiaries reported that *“too much rain killed sorghum,”* and *“groundnuts had too much rain.”* Another stated that *“groundnuts [were] destroyed by water, sorghum destroyed by water.”* Pests were also problematic. One beneficiary recalled that *“there were pests on the cowpeas and beans... sorghum was eaten by birds.”* Put simply, one beneficiary said that *“pests were a problem for vegetables,”* and another stated, *“[there were] too many pests for green pepper.”* Distance to water was also an issue for some beneficiary, and one noted that the *“garden is very far from our house by the river”* and another stated, *“water [is] too far from household for watering vegetables.”* Illness was also reported as a possible problem for beneficiaries, but this was often compensated for by family member. One beneficiary stated,

“[my] son planted because I was ill” and another claimed that “I gave seeds to friends and relatives who brought me crops when I was sick.”

Perceived Usefulness

Participants in the *HelpMercy Nutrition and Food Security Project* found several components of the intervention to be beneficial. Beneficiaries were asked their opinion of the intervention benefited them on a scale of 1 to 5 [1=Very Much, 2=Somewhat, 3=A little bit, 4=Not much, 5=Not at all]. The majority of beneficiaries reported that the program was a benefit, as 63.5% rated the intervention as a 1 or 2 on one or more questions. About one-fourth (25.4%) of the beneficiaries reported that the seed intervention helped them eat a more diverse diet “very much,” and more than half reported that the intervention helped “somewhat” (23.8%) or “a little bit” (30.2%). Overall, a large majority of beneficiaries (79.4%) reported some benefit (“a little bit” or more) from the seeds in helping them eat a more diverse diet. Fewer beneficiaries (15.9%) reported that the seeds helped improve their food supply “very much,” but more than half reported “somewhat” (26.9%) or “a little bit” (39.7%) despite the poor harvest season. In sum, 82.5% reported some benefit to their overall food supply. Slightly more than half of the beneficiaries (57.1%) reported economic benefits from the intervention, whereas the influence of the intervention on ability to help friends, relatives, or neighbors in the community was low (34.9% reported “a little bit”). Table 4-4 provides an overview of the mean score response for each question and the overall summary score. The summary score revealed that on average, beneficiaries perceived some benefit from the program (2.95, between “somewhat” and “a little bit”).

Table 4-5 Perceived Usefulness of the *HelpMercy Food Security and Nutrition Project*

Possible responses [1=Very Much, 2=Somewhat, 3=A little bit, 4=Not much, 5=Not at all]

Question	Mean Response	Mode Response (Number of Responses out of Total)
How much did the seeds/crops grown from the seeds improve your overall food supply?	2.68	3 (25/63)*
How much did the seeds/crops grown from the seeds provide your household with additional income?	3.35	5 (23/63)*
How much did the crops grown from the seeds help you or your household eat a more diverse diet/different types of food?	2.63	3 (19/63)*
How much did the seeds/crops grown from the seeds allow you to help friends or relatives in your community?	3.14	3 (22/63)*
Summary Score	2.95	

*One beneficiary household did not answer all the perceived usefulness questions and was excluded from these results

Several significant relationships were found between the perception of usefulness and various aspects of the *Nutrition and Food Security Project*. There was a significant linear relationship between beneficiaries perceiving the intervention to be useful and the total number of CBES households attended (Mann-Whitney, $p=0.008$). Households that attended at least one CBES were more likely to perceive the intervention as useful (χ^2 for trend: $p=0.007$). Beneficiaries who perceived the intervention as useful were significantly more likely to plant more seed types than those who did not perceive the intervention as useful (Mann-Whitney, $p=0.011$). There were no significant differences between beneficiaries' reports of perceived usefulness of the intervention among those that reported a problem with illness within the family or lack of physical energy.

Table 4-6 Bivariate analysis of factors associated with the perceived usefulness of the HelpMercy Nutrition and Food Security Project

Variable	N (N0= Not Useful; N1=Useful)*	χ^2 **	P-value
Attended community-based agriculture education session		7.116	0.002
▪ Total number of CBES attended	N0=26; N1=38		0.008
<u>Seed Use:</u>			
▪ Percent planted of those received	N0=26; N1=38		0.011
▪ Total number of seed types planted	N0=26; N1=38		0.002
▪ Total number of seed types sold			NS
Problem with lack of physical energy			NS
Problem with household member becoming ill			NS

* Mann-Whitney test

** χ^2 test

NS=Not Significant

Table 4-7 Beneficiary characteristics associated with the total percent of seed types planted

Variable	R (R ²)*	P-value
<u>Attended community-based agriculture education sessions:</u>		
Total number of CBES attended	0.260 (6.67)	0.007
<u>Seed Use:</u>		
Total number of seeds types individuals did nothing with	-0.626 (39.19)	<.0001

* Spearman correlation

Logistic Regression Model to Predict the Perceived Usefulness of the HelpMercy Nutrition and Food Security Project

Using a pooled score to calculate a bivariate ‘perceived usefulness’ variable, logistic regression was used to develop an estimated model predicting the odds that beneficiaries

perceived the intervention as useful. Six predictor variables were used in the model: Beneficiary Age (BA), Household Size (HHS), Total Number of Seed Types Received (TSTR), Total Number of Seed Types Planted (TSTP), Number of Community-based Education/Training Sessions Attended (NCTA), Distance to Planting Water (DTPW). The mean for each variable is listed below, excluding DTPW (pooled as a bivariate).

Table 4-7: Mean for predictor variables:

BA	HH	TSTR	TSTP	NCTA
40.9682540	7.7301587	11.2539683	9.4761905	2.8253968

After mean shifting all of the variables, the initial full-model including two-way interactions, was as follows:

$$\begin{aligned}
 PUBV = & 1.0772 + -0.0009BAS + 0.4270HHS + -0.1484TSTRS + 0.1138TSTPS + 0.3335NCTAS + 0.1342D \\
 + & 0.0123BAS * HHS + -0.0213BAS * TSTRS + -0.0063BAS * TSTPS + 0.0297BAS * NCTAS + -0.0125BAS * D \\
 + & -0.0076HHS * TSTRS + -0.1162HHS * TSTPS + 0.2050HHS * NCTAS + -0.0352HHS * D \\
 + & 0.0461TSTRS * TSTPS + -0.0953TSTRS * NCTAS + 0.2775TSTRS * D \\
 & 0.0170TSTPS * NCTAS + 0.3871TSTPS * D \\
 & -0.1541NCTAS * D
 \end{aligned}$$

Seventeen steps were used in a backward elimination process to develop a simplified regression model as follows:

$$PUBV = 0.5864 + 0.1728HHS + 0.3293TSTPS + 0.0242NCTAS + -0.1041HHS * TSTPS + 0.2101HHS * NCTAS$$

From the simplified model, coefficient estimates were calculated (Table 4-8) including confidence intervals. Traditional Wald Confidence Limits were appropriate for this sample because of the size. In the final model, perceived usefulness was predicted by HHS, TSTP, and the NCTA. Two way interactions were also considered between HHS and the NTSP, as well as between HHS and NCTA.

Table 4-8 Coefficient Estimates for PUBV Logistic Regression Model

Parameter	DF	Estimate	SE	Wald 95% Confidence Limits		Likelihood Ratio 95% Confidence Limits	
Intercept	1	0.5864	0.3384	-0.0768	1.2497	-0.0553	1.2899
HHS	1	0.1728	0.1542	-0.1294	0.4749	-0.0932	0.5301
TSTPS	1	0.3293	0.1090	0.1157	0.5429	0.1339	0.5703
NCTAS	1	0.0242	0.1184	-0.2078	0.2562	-0.2138	0.2671
HHS*TSTPS	1	-0.1041	0.0376	-0.1778	-0.0304	-0.1875	-0.0380
HHS*NCTAS	1	0.2101	0.0819	0.0497	0.3706	0.0731	0.4026

*Estimate=log odds ratio, SE=standard error

Overall, the odds of finding the program useful were $e^{0.5864}$ given that all the variables were at their average value. Therefore, the (predicted) probability of finding the program useful was 1.7915 times higher than the probability of not finding the program useful when household size, number of seed types planted, and number of community training sessions attended equal their sample mean. If total seed types planted increases by one unit (from its mean of 9.4762 to 10.4762) then the predicted odds of finding the program useful is $1.7975 \times 1.3899 = 2.4983$. Therefore, the probability of finding the program useful is 2.4983 times higher than probability of not finding the program useful when total seed types planted increases by one unit its mean. In the same way, the probability of finding the program useful is 2.1365 times higher than probability of not finding the program useful when household size increases by one unit its mean, and the probability of finding the program useful is 1.8415 times higher than probability of not finding the program useful when total number of community training sessions attended increases by unit from its mean.

Odds Ratios (ORs) for the three major predictive variables are shown in Table 4-9 at 1, 2, and 3 unit increases from the mean.

Table 4-9 ORs for the three major predictive variables of “Perceived Usefulness”

Variable	ODDS Ratio		
	1 Unit Increase*	2 Unit Increase*	3 Unit Increase*
HHS	1.19	1.41	1.68
TSTP	1.39	1.93	2.69
NCTA	1.03	1.05	1.08

*Unit Increase from the average value.

The (predicted) odds of finding the program useful change by a multiplicative factor of 1.1886 for a one unit increase in household size, given that the variables total seed types planted, and number of community-based training sessions attended are at their sample means. In other words, if household size increases by one unit from its mean, then the odds of finding the program useful is 1.19 times or 19% higher than than the odds of finding the program useful for the average household size. This value was calculated by holding all variables at their mean, and substituting $HHS + 1$ for HHS in the total logistic regression equation (note: there was no cancellation because the OR: $[(HHS+1) / HHS]$ was calculated). An extra value factors into previous intercept of the model when HHS is increased by 1. Thus, the odds will increase because the entire function (Probability of success/ Probability of failure) increases. For a two unit increase from the average household size, the odds that a beneficiary would perceive the intervention as useful are 1.41 times or 41% higher, and 1.68 or 68% higher for a three unit increase from the mean. As the total number of seed types planted increases from the mean, the odds of perceiving the intervention as useful also increase. In fact, households that plant three more seed types than the average were 2.69 times or 169% more likely to perceive the intervention as useful. The odds of perceiving the intervention as useful increased slightly as the number of community training sessions attending increased by one unit. For a three unit increase in number of sessions attended, the odds of perceiving the intervention as useful were 1.08 or 8% higher than for a beneficiary who attended the average number of training sessions.

Comparisons between the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project*

Perceived Barriers

The two interventions could not be compared directly. However, perceived barriers were compared descriptively (Table 4-10), indicating that the percent of beneficiaries that reported problems with pests, flooding, and water source too far from garden, was greater among participants in the *HelpMercy* intervention. On the other hand, *CTC* intervention participants more frequently reported problems with drought, insufficient land, and not enough seeds received.

Using simple logistic regression, the relationship between perceived usefulness and each single variable at a time was calculated for both interventions. These variables were perceived barriers to the intervention in both interventions: satisfaction with the number of seeds received, problems with flooding, problems with drought, distance to water, and not enough land. Table 4-11 shows the Likelihood Ratio Estimates along with the Odds Ratio (OR) estimates for both interventions. Few of the estimates were significant, based on a 95% confidence interval.

Table 4-10 Perceived Barriers/Problems Reported about Interventions

Perceived Barriers/Problems Reported	Percent of Beneficiaries who Reported Problem	
	Nutrition and Food Security Project, Zambia	CTC Community Garden Project
Did not have enough time to plant/harvest seeds/crops	9.4	0.0
Unsure how to plant or harvest	12.5	0.0
Did not believe they received enough seeds	15.6	86.7
Found Project Staff to be unhelpful and uncooperative	0.0	33.3
Did not enjoy planting or harvesting	1.6	0.0
Experienced family pressure or lack of family support	0.0	6.7
Not enough help planting/with physical labor	21.9 ^a	0.0 ^b
Lack of energy	15.6	13.3
Beneficiary or household member becoming ill	0.0 ^c	13.3 ^c
Beneficiary or household member becoming pregnant	1.6	0.0
Unfamiliar with or did not like seed types/crops	1.6	6.7
Pests	84.4	53.3
Low production	14.1	6.7
Flooding	64.1	13.3
Drought	7.8	80.0
Water source too far from garden	28.1	6.7
Poor soil or not enough soil	9.4	33.3
Not enough land	15.6	86.7

^aIn this case, help planting referred to help from family members or community volunteers.

^bIn this case, help planting referred to help planting at the Community Garden from other participants or program staff. ^cResponses may have been biased due to HIV/AIDS stigma and its association with illness.

Table 4-11 Simple Logistic Regression Values

Intervention Country:	Analysis of Maximum Likelihood Estimates						Odds Ratio Estimates		
	Parameter	D F	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Point Estimate	95% Wald Confidence Limits	
Zambia	Intercept	1	1	0.6109	0.2850	4.5959			
	Satisfaction with Seeds	1	1	-1.4582	0.7466	3.8148	0.233	0.054	1.005
Kenya	Intercept	1	-2.34E-7	1.4142	0.0000	1.0000			
	Satisfaction with Seeds	1	-0.4700	1.5248	0.0950	0.7579	0.625	0.031	12.410
Zambia	Intercept	1	0.6109	0.2850	4.5959	0.0320			
	Access to Land	1	-1.4582	0.7466	3.8148	0.0508	0.233	0.054	1.005
Kenya	Intercept	1	-2.34E-7	1.4142	0.0000	1.0000			
	Access to Land	1	-0.4700	1.5248	0.0950	0.7579	0.625	0.031	12.410
Zambia	Intercept	1	0.3773	0.2650	2.0267	0.1546			
	Drought	1	0.0281	0.9506	0.0009	0.9764	1.029	0.160	6.627
Kenya	Intercept	1	-0.6931	1.2247	0.3203	0.5714			
	Drought	1	0.3567	1.3575	0.0690	0.7928	1.429	0.100	20.437
Zambia	Intercept	1	0.8266	0.4532	3.3271	0.0681			
	Flood	1	-0.6800	0.5508	1.5237	0.2171	0.507	0.172	1.491
Kenya	Intercept	1	-0.4700	0.5701	0.6797	0.4097			
	Flood	1	0.4700	1.5248	0.0950	0.7579	1.600	0.081	31.771
Zambia	Intercept	1	0.4418	0.3021	2.1389	0.1436			
	Distance to Water	1	-0.2187	0.5624	0.1512	0.6974	0.804	0.267	2.419
Kenya	Intercept	1	-0.2877	0.5401	0.2838	0.5943			
	Distance to Water	1	-10.9739	278.9	0.0015	0.9686	<0.001	<0.001	>999.999

*None of the variables were statistically significant based on 95% Wald Confidence Limits because they all crossed 1

Although inferences to the intervention population cannot be made, the strength of OR estimates between perceived barriers and perceived usefulness for the Kenya *CTC Community Garden Project* and the Zambia *HelpMercy Nutrition and Food Security Project* can be compared. Access to land and satisfaction with seed types received was a slightly stronger predictor of perceived usefulness in Kenya than Zambia (OR=0.625 vs. OR=0.233). Flooding was a slightly stronger predictor perceived usefulness in Kenya than in Zambia. Drought was fairly close, and was a weak predictor of perceived usefulness in both interventions (OR= approximately 1). Distance to water was a stronger predictor in Zambia than Kenya (OR=0.8 vs. 0.0001).

Perceived Usefulness

Based on the perceived usefulness bivariate measure, 60.32% of participants in the *HelpMercy* intervention perceived the intervention as useful. Only 40% of the participants in the *CTC Community Garden* felt the same. Overall, there were 9 beneficiaries of the *CTC Community garden Project* who did not perceive the intervention to be useful, 60% of the 15 total beneficiaries. Similarly, 25 beneficiaries of the *HelpMercy Nutrition and Food Security Project* did not perceive the intervention to be useful, 39.7% of the 63 beneficiary households (who answered all the perceived usefulness questions). On the other hand, 6 beneficiaries of the *CTC Community Garden Project* (40%) and 38 beneficiary households of the *HelpMercy Nutrition and Food Security Project* (60.3%) perceived the interventions to be useful. Overall, 56.4% of beneficiaries in both interventions (44 of 78) perceived the nutrition and agriculture interventions to be useful.

Perceived usefulness was also factored into a 2x2 contingency table to investigate whether or not there was a significant difference between beneficiaries' perceived usefulness of the *HelpMercy Nutrition and Food Security Project*, and the *CTC Community Garden project*. In other words, the test was used to see if there was a significant relationship between the intervention and perceived usefulness. A chi-square statistic was used. Table 4-13 shows the results of the Pearson chi-square test and indicates that there is not a statistically significant difference ($p > 0.01$) between beneficiaries' perceived usefulness in the *HelpMercy Nutrition and Food Security Project* versus the *CTC Community Garden Project* ($\chi^2 = 2.034$, $df = 1$, $N = 79$, $p = 0.154$). The 2x2 table included the one beneficiary that did not answer all of the perceived

usefulness questions for the *HelpMercy* intervention, coded as ‘did NOT perceive the intervention as useful.’ See Discussion for further explanation.

Table 4-12 Contingency Table: Perceived Usefulness vs. Intervention

		Intervention Beneficiaries		
		CTC Community Garden Project (N=15)	HelpMercy Nutrition And Food Security Project (N=64)	Total
Perceived Usefulness	Did not Perceive the Intervention as Useful (%)	9 (60.0)	26 (40.63)	35 (44.30)
	Perceived the Intervention as Useful (%)	6 (40.0)	38 (59.38)	44 (55.70)
	Total (100%)	15	64	79

*64 beneficiary responses were included here *HelpMercy Nutrition and Food Security Project* to match logistic regression, as one non-response was coded “Did Not Perceive the Intervention as Useful”—see Discussion.

Table 4-13 Results of Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.859 ^a	1	0.1739
Continuity Correction ^b	1.147	1	0.284
Likelihood Ratio	1.8399	1	0.1750
N of Valid Cases	79 ^c		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.54.

b. Computed only for a 2x2 table

^c 64 beneficiary responses were included here for the *HelpMercy Nutrition and Food Security Project* to match logistic regression, as one non-response was coded “Did Not Perceive the Intervention as Useful”—see Discussion.

Sentiments of Gratitude

Overall, sentiments of gratitude were expressed by beneficiaries, despite some low levels of perceived benefit and problems/barriers experienced. A participant in the CTC Community Garden Project was thankful because “*CTC has given us a lot of knowledge.*” One beneficiary of the *HelpMercy Nutrition and Food Security Project* stated, “[we are] appreciative of seeds to those who are in charge. Helped in the beginning, a lot of food was good.”

References

1. Coates J, Webb P, Houser R. *Measuring Food Insecurity: Going Beyond Indicators of income and Anthropometry*. Washington, D.C.: Food and Nutrition Technical Assistance Project, Academy for Educational Development;2003.

CHAPTER 5 - Discussion

Results from this study provide useful information about differences and similarities between the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project*. These projects are representative of many small nongovernment-run interventions in sub-Saharan Africa, and this study serves as an initial means to monitor and evaluate the two programs. Future program strategies can be informed then addressed by these findings because they are informed by beneficiary perceptions of the intervention after just one year of implementation. Utilizing quantitative and qualitative research methods was useful for this study. Surveys allowed us to measure beneficiary characteristics and intervention outcomes as well as assess comments made by beneficiaries. Focus groups and interviews gave further insight into opinions and experiences of participants.

Nutrition and agriculture interventions should be monitored and evaluated on a variety of levels including outputs, assumptions, outcomes, impacts, and benefits.¹ This study aimed to evaluate these two interventions based on beneficiary reports of outcomes and perceived benefits, suggesting overall usefulness to the beneficiary. Because these interventions were organized independent of a research model and delivered without program monitoring in mind, assessing and evaluating these interventions after one year of implementation through direct communication with beneficiaries seems an appropriate way to observe progress, assess program success, and make apposite recommendations for project continuation. As Health Behavior Theories (HBT) and the Health Belief Model (HBM) assert, participant perception, beliefs, attitudes and self-efficacy are strong determinants of behavior. In this study we quantitatively analyzed perception to determine if beneficiaries with belief in the intervention were more likely to take part in and have success with the interventions. This concept has received limited attention in nutrition and agriculture interventions and previous research. Coupling quantitative survey data with qualitative data, such as focus groups, comments, and interviews, allowed for a more thorough analysis of the interventions and provided insight into health belief influences on behavior change. Understanding and encompassing issues influencing health is essential to promote behavior change as these determinants support individual perception and belief.² Using

both qualitative and quantitative methods, we found that beneficiary perception of these interventions was mixed.

Participants in the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project* had differing opinions of the interventions after the first year. Nevertheless, beneficiaries expressed gratitude for both interventions, and both programs have potential for improvement in the future. While demographic characteristics of participants differed, both populations were affected by HIV/AIDS and are in need of agriculture and nutrition interventions to improve health and food security. Nutrition and agriculture interventions are paramount to improving livelihoods for PLWHA because of the drastic impact of the disease on the body, the mind, and community productivity in general.^{3,4} Both interventions addressed food insecurity and malnutrition using agriculture. By promoting production of various vegetable crops, the interventions aimed to increase the variety of foods in the diet across and within food groups (specifically vegetables and fruits), which is strongly recommended by FAO and WHO to help communities become more self-reliant of dealing with nutritional problems.^{5,6} Low income households, such as those in Maai Mahiu and Macha, tend to have low dietary variety,⁷ experience major financial constraints that prevent them from growing or purchasing fruits and vegetables,⁸ and demonstrate a need for dietary diversification. Community gardens are useful for bringing communities together and promoting long-term food security. The costs to sustain community gardens are very low, and they require little ongoing external support. Entire communities can benefit from the agriculture techniques shown and nutrition education provided there. Children and young adults, as well as prominent community members are allowed to attend sessions, promoting the passing of knowledge from generation to generation.⁹ Community gardens can provide support systems, like familial support, common in African cultures. This is important for HIV-affected populations and PLWHA who need support in farming because of reduced energy.

Objective 1: Assess Food Security in Maai Mahiu, Kenya, Among Women Participating in the *CTC Community Garden Project* as well as Other Women in the Community not Participating in the Intervention

Food security measured in this study for women in the Maai Mahiu community and women who participated in the *CTC Community Garden Project* demonstrated that food

insecurity is a problem in Maai Mahiu, regardless of participation in the *CTC Community Garden* intervention. While men were not selected for participation in this research, the sample was appropriate because of the strong correlation between mothers and household food security, as women in some parts of Africa have primary responsibility for family nutrition.⁵ The modified FAST questionnaire¹⁰ examined household food security probing participants to respond to individual and household level questions.

Food insecurity was found to be a problem in Maai Mahiu for women and is known to be a problem in Kenya, as more than 10 million individuals were food insecure in 2009.¹¹ As a peri-urban area located just off a truck stop, Maai Mahiu depends on commerce for sustenance, and if women do not participate in agriculture and/or do not have jobs outside the home to benefit from commerce, their food security may depend exclusively on financial support from others.

Although there was a slight change in data collection techniques between the initial survey in 2008 (*Preliminary Survey of Food Security and Maternal Child Health in Maai Mahiu, Kenya*) and the survey of the *CTC Community Garden Project* participants in 2009, food security ratings (FSR) were observed for both population samples. After the initial survey, we recognized a discrepancy in question terminology and respondent interpretation. The two questions involving “scarcity of food” were sometimes misinterpreted as “unavailability of food,” predominately because of financial instability. During the second set of surveys, respondents who answered that they were personally forced to “skip meals” or “eat less food at a meal” due to scarcity of food were asked to clarify their answer; “Was the reason for skipping meals or eating less due to unavailability of food in all of Maai Mahiu, or inability to purchase food because of lack of money?” This is not surprising because research has shown that lack of access to food in developing countries is generally not transitory; rather, it is due to chronic lack of access, generally related to low household incomes.¹²

Assigned enumerator FSRs revealed that some participants from Maai Mahiu were food secure (8%), while the majority were food insecure without hunger (54%), or food insecure with hunger (38%). All (100%) of the grandmothers in the *CTC* interventions were deemed food insecure without hunger. Differences in these food security ratings may have been partially due to the change in wording/question clarification, but they might have also been a result of true differences between the two groups including differences in sample size (n=50 versus n=15),

which may have altered the means. For example, the average number of years of education achieved by grandmothers in the *CTC* project was only 8.15 years, whereas the number of education years for women in the community was approximately 12.84 years. Some women in the community may have been more educated, and maternal education (above primary school) has been linked to reduced malnutrition in children¹³ and may be linked to household food security (research unclear).

In both samples, only about half of the women were employed outside of the home, leaving the other half completely dependent on others, predominately their husbands, for financial resources. Similarly, 66% of women in Maai Mahiu and 86.7% of grandmother in the *CTC Community Garden Project* participated in agriculture (at home) to feed their families. These numbers suggest that many women in Maai Mahiu must purchase food at the market, borrow food, or take food on credit to feed their families. Financial dependence on others or lack of financial independence could impact food security and perceptions of the usefulness of the community garden.

Calculating FSR was useful because it allowed us to see slight differences between participants in the *CTC Community Garden Project* and women in the community who did not participate. It provided a clear picture of the need for more nutrition, agriculture, and other community-based interventions to improve food security in Maai Mahiu, Kenya. Food insecurity, coupled with high HIV/AIDS rates in Maai Mahiu reveal a significant public health concern for the area. Future studies can compare pre and post FSR to determine improvements in food security from baseline as a result of the intervention. Additionally, FSR could be calculated for different types of interventions in the same area for comparison. For example, if a seed distribution was completed in Maai Mahiu concurrently with the community garden, it would be possible to determine which type of intervention is more effective in improving food security in Maai Mahiu. FSR for the *HelpMercy Nutrition and Food Security Project* would be useful, particularly with an HIV-positive population.

Objective 2: Determine Beneficiaries' Overall Perceived Usefulness of the CTC Community Garden Project and the HelpMercy Nutrition and Food Security Project

Overall, less than half of beneficiaries of the *CTC Community Garden Project* (40%) perceived the intervention as useful; however, components of the intervention were viewed positively. For example, 53.3% of the beneficiaries recognized that the intervention allowed them to help their friends or relatives in the community “a little bit,” and 40% reported that the community garden improved their overall food supply “very much.” Another 46.7% reported that the crops from the community garden helped their households eat a more diverse diet “a little bit,” while 26.7% of beneficiaries said it helped “very much.” The limiting factor in perceiving the intervention as useful seemed to be economic gain, as 73.3% of the participants reported that the community garden provided their family with additional income “not at all.”

Numerous beneficiary comments were recorded, emphasizing the perception that the garden was an opportunity to earn money; therefore, the inability to earn money through the garden was viewed as problematic. Other factors that may have influenced the perceived usefulness of the intervention included the barriers and/or problems reported by beneficiaries. A majority of the participants were dissatisfied with the number of seeds they were given at the community garden (86.7%) and nearly all (80%) reported problems with drought. Water was a complicated issue for the *CTC Community Garden Project*, as the influence of CTC Staff control over the donkeys purchased to bring water may have influenced ideas about “ownership” of the garden. Women expressed sentiments of distrust in garden organization, including the ways in which group money was spent and control over the donkeys. Similarly, 86.7% of beneficiaries believed that the size of the garden was inadequate. There were also some organizational problems within the group, as six of the initial participants were no longer involved in the garden, and several women expressed distrust and anger with the CTC Staff. The participants in the intervention were grandmothers, caring for grandchildren, mostly because their sons and daughters had died of HIV/AIDS. This added stress may have contributed to their frustrations with the project, as it required them to work in the garden about two hours per week, yet they didn't perceive “economic” benefits from participation. The participants expressed some discontent with the way crops were distributed and group money was handled. Expectations of

economic gain or financial motivation from community gardens have been observed in other interventions,¹⁴ so addressing this misconception is necessary if *CTC* wishes to target improved diet directly from the garden produce.

Considering the lack of infrastructure in both rural Zambia and peri-urban Kenya, water problems in these agriculture interventions were not unexpected. However, a greater percentage of beneficiaries of the *HelpMercy Nutrition and Food Security Project* reported that their water source was too far from the garden compared to *CTC Community Garden* beneficiaries. Distance to water was not the real problem in Kenya, as a borehole with viable garden water is located several blocks from the garden. However, use of donkeys to carry water to the garden was problematic as mentioned in the comments made by the beneficiaries, due to lack of ownership and care for the donkeys.

Based on the same perceived usefulness measurement, 60.32% of beneficiaries of the *HelpMercy Nutrition and Food Security Project* perceived the intervention as useful. This was a majority, demonstrating a noteworthy difference from participants in the *CTC Community Garden* project. Unlike the *CTC* participants, a majority of the Zambian beneficiaries (80%) reported that the seeds helped them to eat a more diverse diet “a little bit” to “very much,” and a little less than half (42%) stated that the seeds helped improve their overall food supply “very much.” Income was not a significant factor, as only about one-third (31.3%) reported improvements in income from the program. These perceived benefits most likely stemmed from the means of the intervention, as fifteen different seed types were distributed to beneficiaries. Following the seed distribution, little participation was required of beneficiaries, although their participation in community education sessions and training activities, as well as attending medical appointment for HIV/AIDS, was encouraged. The seeds were never revoked, and participants could not be asked to leave the project. In the *CTC Community Garden Project*, all of the foods grown were familiar to the beneficiaries and commonly consumed within the community. Zambian diets revolve primarily around maize, so it is not uncommon for a Zambian to state that he/she has “not eaten” until he/she has consumed ‘nshima,’ a maize-meal product. Thus, perceptions of overall food supply in the *HelpMercy Nutrition and Food Security Project* may have been skewed due to cultural beliefs about what constitutes a “food.” With various crops produced, some problems experienced may have been isolated to a single crop and

therefore did not affect the perceived usefulness of the entire intervention for the beneficiary household.

Economic expectations from the *HelpMercy Nutrition and Food Security Project* appeared to be minimal. Macha, Zambia—a rural area—consists primarily of villages and farmers. Unlike Maai Mahiu, Macha is not dependent on commerce for sustenance. Instead, most people grow much of their own food and trade, sell, or buy food at local markets. Beneficiaries seemed to be more concerned with planting seeds for harvest and consumption, rather than selling crops. Even when presented with an opportunity to sell seeds initially, participants planted more than 80% of the seeds received. Other seeds were saved for future planting or given away. Beneficiary comments recorded regarding money or financial aspects of the project were also minimal.

Income-generating activities should not be disregarded, as they have been found to be beneficial for HIV-affected households who often encounter increased financial burdens of health care, food costs, and decreased employment.¹⁵ Income generation may also allow families to purchase foods higher in protein and nutrient content, as they tend to be higher in cost.¹⁶ Nevertheless, the goals and purposes of interventions should be clearly stated at initiation to avoid confusion. In rural areas, access to markets can be a major challenge, and if markets do exist they tend to be saturated with similar products (in Macha, rape, tomatoes, onions, cabbage, carrots and sweet potatoes were the main food items available). Despite Macha being a rural location with very limited access to markets, 67% of beneficiaries reported selling crops grown from seeds they received. This may be a result of the untraditional crop varieties promoting new food items in the market. In areas with limited market access, interventions should promote less traditional crop varieties selected by the community, to increase potential profitability for households. The majority of profits from sale of crops were spent on child school fees or other food items or non-food items such as soap.

Objective 3: Compare and Evaluate these Two Small-Scale Nutrition and Agriculture Interventions for HIV-affected populations in sub-Saharan Africa After One Year of Implementation

Noticeable differences were observed between beneficiary' perceived barriers to the two interventions, including environmental factors (drought, flood, pests, soil quality, and distance to

water source), beneficiary time to participate, knowledge regarding planting, helpfulness or cooperativeness of project staff, and a household member becoming ill. Other perceived barriers did not differ greatly (less than 7% difference reported between the two interventions) between the two interventions including enjoyment of planting, household members becoming pregnant, unfamiliarity or dislike of seed types, and experienced family pressure or lack of support. Pests were reported as a major problem in Zambia by 84.4% of the beneficiaries, whereas only 53.3% of participants in Kenya mentioned pests. This may have been related to the availability of pesticides, the climate, or differences in pest intensity. Flooding was a major problem in Zambia; drought was a major problem in Kenya, exemplifying the large geographic and environmental differences between the two locations.

Because the two populations were selected differently, it was not unexpected that beneficiaries in Zambia may have needed more assistance with planting/physical labor, as all beneficiary household were targeted because they had an HIV-positive household member. Grandmothers in Kenya were all participating in a community garden setting where they were supported by other women working concurrently at the garden thus not needing individual support, and the grandmothers were not identified as being HIV-positive. Nevertheless, Zambian culture is predominately community-based, often polygamous, and very supportive of individuals; household gardens were often cared for by multiple household members, not just the beneficiary, lending support. Problems with project staff were not mentioned in Zambia, but beneficiaries in Kenya identified some issues with the project staff. This discrepancy may have arisen due to the varied nature of the two interventions. In the *HelpMercy Nutrition and Food Security Project*, beneficiary interaction with project volunteers was not required consistently because, after the seed distribution, beneficiaries had the option to work exclusively from home (education sessions were optional). Trusted and well-known volunteer community health workers were utilized to organize the intervention, serving as a bridge between the beneficiaries and the project staff. Conversely, *CTC Community Garden* participants were required to frequently work with others in the program and project staff at the community garden, leaving time for personality clashes and agitation. Similarly, the participants were exclusively female and the *CTC Project Staff* was run by a much younger male, leaving room for potential issues of gender, respect, and/or misinterpretation to arise.

Evaluating the differences and similarities between beneficiary perceptions is useful, as lessons can be learned from the outcomes of both interventions after the first year. Differences in location, culture, program implementation, environmental challenges, and beneficiary perception can help inform future project objectives and strategies. Ultimately, what can *CTC International* learn from *HelpMercy International*, and vice versa? It appears that perceived usefulness from these interventions is a good indicator of the perceived benefits versus barriers that each beneficiary attributes to an intervention, identifying the level of self-efficacy the beneficiaries had in the intervention.

Problems and Successes of Each Intervention

Both interventions succeeding in identifying, targeting, and implementing an agriculture and nutrition intervention project for an HIV-affected population. The use of local volunteers/project staff was a strong point of each intervention, as local leaders strengthened the validity and cultural appropriateness of the project. Below is a list of observed successes for each intervention:

The CTC Community Garden Project

- Successful set-up and crop production: Numerous crops grew in the community garden, and participants utilized techniques such as a drip irrigation system to upkeep the garden. Organic farming techniques were used.
- Active involvement and learning: 15 community grandmothers from Maai Mahiu participated and reported learning numerous agriculture techniques and nutrition information at the community garden.
- Development of a sustainable program: The program was designed in a way that it can continue with active participation. Beneficiaries expressed an interest in improving the garden and using it as a site for agricultural demonstrations in the future.
- Empowerment of women: The *CTC Community Garden Project* was wise to target women as part of the intervention. Research has shown that agricultural projects that focus on gender issues and giving women access to land have a positive impact on nutritional indicators and social empowerment of women.^{17, 18} Targeting grandmothers was important for improving health at the household level because *CTC* participants were grandmothers serving as surrogate mothers/caregivers for grandchildren whose parents had died due to HIV/AIDS. These women have primary responsibility for the care and nutrition of children at home, with a great opportunity to impact and improve health.

The HelpMercy Nutrition and Food Security Project

- Successful set-up and crop production: The project successfully distributed seeds of numerous types, including high protein cowpea and groundnut seeds, to 181 households with at least one HIV-positive household member in the Macha catchment, demonstrating an efficient partnership between *HelpMercy International*, Macha Mission Hospital, Community Health Posts, and CHAZ. Agriculture techniques were useful and some yield was produced despite a difficult year environmentally (rain, drought).
- Successful planting: As farmers by trade, beneficiaries seemed to have few problems planting seeds when they desired to do so. The beneficiaries utilized organic farming techniques.
- Provision of adequate nutrition and agriculture education: Nutrition and agriculture education (numerous sessions) was provided at thorough training sessions by the chief agricultural officer at Macha and volunteer community health workers. This was an effective way to disseminate knowledge to the community, helping to spread the benefits of the intervention overall.
- Perceived as useful: The majority of the beneficiaries perceived the intervention as useful.
- Active involvement and learning: The majority of beneficiaries surveyed actively participated in the intervention by planting seeds that they received, and the majority also attended at least one community-based education/training session (68.75%).

Some problems were evident after the first year of implementation for each project. Below is a list of some of the problems we observed during the first year of each intervention:

The CTC Community Garden Project

- Ineffective goal communication: The project staff failed to effectively set goals with and convey the objectives of the community garden to the participants. There was a significant amount of dissatisfaction reported by beneficiaries regarding the lack of economic gains or benefits from the community garden as a whole. If the purpose of the community garden was to improve intake of nutritious vegetable crops, improve nutrition and agriculture knowledge, improve food security, and empower surrogate caregivers in the Maai Mahiu community, this message needed to be directed clearly to the participants.
- Production difficulties: There were several problems reported in crop production, including lack of water, pests, and inadequate land access. The water access situation was particularly unsuccessful, as water unavailability and misuse of funds for water led to poor trust between beneficiaries and program staff.

- Distribution problems: Produce from the garden may not have reached the beneficiaries and their households as needed. Respondents noted that they sometimes had to buy crops from the garden, and the produce was not distributed evenly.
- Perceived usefulness: The majority of the beneficiaries did not perceive the intervention as useful.

The HelpMercy Nutrition and Food Security Project

- Sustainability: While a seed intervention is very beneficial in theory, not all of the seeds distributed can be harvested and grown again without additional seed. Seed distributions alone, like simple food aid, are not sustainable in changing food security long-term.¹⁹ The intervention staff, volunteers, and supports did not mention sustainability as a goal of the project, nor did beneficiaries note being able to grow crops in the following year without seed.
- Production problems: Problems with flooding, drought, pests, and other crop damage yielded low amounts of produce from the seeds. While many of these issues were unavoidable due to environmental stresses that are seasonably variable (yearly), additional education and encouragement regarding home-made pesticides, herbicides, and compost was needed to improve yields.
- Subjective seed distribution: The intervention was initiated under a vague set of guidelines, which may have resulted in favoritism toward certain beneficiaries. Similarly, seeds were not distributed according to household size or HIV-status severity, which seems necessary for a variable seed distribution.

Objective 4: Determine the Importance of Education as a Component of the Interventions

Based on the logistic regression model for the *HelpMercy Nutrition and Food Security Project*, several variables were significant predictors of whether or not beneficiaries of the intervention perceived it as useful. Specifically, beneficiary household size, the number of seed types planted, and the number of community-based trainings attended (education sessions) were significant. Distance to planting water (near vs. far) was not a significant predictor of perceived usefulness in the final reduced model. This may have been because rural Zambia are used to walking long distances to collect water for gardens. Similarly, because of household structure, when HIV-positive beneficiaries were too sick or weak to walk long distances to collect water, other household members, such as children or spouses, were available and supportive to compensate and collect water. Hand water-pumps or boreholes were also recently installed in the Macha catchment by NGOs, reducing the water burden. Bias may have been introduced in the

sample, as researchers surveyed some households that were easier to access (e.g., better road conditions), which tend to be closer to water sources.

Household size was related to perceived usefulness, as households with more people were more likely to perceive the intervention as useful. The predicted odds of finding the intervention useful was 2.1365 for every one person increase in household size. Macha is a very collective community, and we expected that larger households might perceive greater usefulness from the intervention, as there were more hands to assist in agriculture work, and more mouths to feed in the household/benefit from the produce.

The average number of education sessions attended was about three, and attendance at community-based nutrition and agriculture education sessions was a significant predictor of perceived usefulness of the intervention. The predicted probability of finding the *HelpMercy Nutrition and Food Security Project* useful increased as the number of education sessions increased. A beneficiary was 1.8415 times more likely to perceive the intervention as useful than not useful if they attended one additional training session from the mean, as long as household size and number of seed types were not altered. This was not surprising, as research has indicated that nutrition education in combination with agriculture programs has been shown to improve diet,^{20, 21} micronutrient intake,^{21, 22} nutrition knowledge and physiological indicators,²¹ and food security.¹⁷ Agriculture education is also beneficial, as it works directly to help farmers adopt more productive and advanced technologies for crop-management techniques to obtain higher returns from the land.^{23, 24} This consequently improves diet and food security. As literature suggests, the intervention seemed more useful to participants who attended meetings. The combination of nutrition and agriculture education with agriculture production may have resulted in stronger nutritional outcomes for beneficiary and beneficiary households who attended nutrition and agriculture education sessions than those who did not, but this was not measured. The majority (68.75%) of participants attended at least one education session. However, access to community-based education sessions may have been unequal because of limited formal communication systems to announce the sessions, and because some health posts held up to 12 education sessions, while others held only four. Similarly, there was no curriculum in place for the education sessions. Therefore, it was difficult to determine the impact that each additional session may have had. The odds of perceiving the intervention as useful did not change significantly as the number of training sessions increased. The odds of finding the intervention

useful only increased by 1.08 times or 8% for a three unit increase in the number of community training sessions attended. This may indicate that attendance at training sessions beyond the average (about three sessions) was not a significant factor in perceiving the intervention as useful. Because *HelpMercy* did not establish a curriculum, there is no way of knowing if similar material (agriculture techniques and nutrition education) was covered at each session or not.

The strongest predictor of perceived usefulness was the total number of seed types planted (NSTP). The more seed types planted, the more likely beneficiaries were to find the intervention useful. A total of 15 possible seed types were distributed, and the predicted probability perceiving the intervention as useful was 2.4983 for a one unit increase from the mean, whereas the predictive odds for a three unit increase from the mean was even greater, at 4.8353. As an agricultural based society, rural Machans were likely to plant many of the seeds. In fact, half of the beneficiary households planted 100% of the seed varieties received, and 63% of the households planted at least 90% of the seed types received. While some seeds were saved to be planted later, it appeared that planting more types of the seed varieties received was a positive predictor of perceived usefulness. Planting the seeds was a clear demonstration of beneficiary participation in the intervention; beneficiaries who participated more readily in the intervention found the intervention more useful, which is what we expected in accordance with the HBM. Beneficiaries who planted more seed types were likely self-efficacious in planting and perceived fewer barriers to producing crops initially.

The results of the logistic regression were supported by a significant linear relationship calculated between the total number of community-based education trainings attended and beneficiaries perceiving the intervention as useful (Mann-Whitney, $p=0.08$). If beneficiaries attended at least one training, they were more likely to perceive the intervention as useful (χ^2 for trend: $p=0.007$). Similarly, beneficiaries that perceived the intervention as useful were more likely to plant more seed types than those who did not. No relationships were observed between reported problems with illness and perceived usefulness. This may have been due to persistent stigmas associated with HIV/AIDS and illness. Maltreatment of PLWHA is still prevalent in both Zambia and Kenya.²⁵ It was not surprising that participants did not report illness, tiredness, or death of household members due to HIV/AIDS to the researchers.

We discovered one minor data discrepancy in the *HelpMercy Nutrition and Food Security* data during analysis that could not be rectified during this study. One particular

beneficiary household failed to respond to the four ‘perceived usefulness’ questions because the respondent was a parent of the seed beneficiary (answering for the beneficiary) and did not feel comfortable answering the questions. While the respondent did not answer the specific perceived usefulness questions, the respondent did give several indications that they did not perceive the intervention as useful for their daughter. Thus, in running calculations for the perceived usefulness logistic regression, the simple logistic regression values, and 2x2 contingency table (see below), this particular respondent was inadvertently coded as ‘did not perceive useful,’ when the proper coding should have been “N/A,” as other missing data sets were discarded. This may have slightly altered the results, however, it would not inflate the perceived usefulness responses, as the respondent was coded 0=NO (did not perceive the intervention as useful). In all other data calculations, this respondent was discarded.

Although use of a logistic regression model to determine factors that impact the perceived usefulness of the *CTC Community Garden Project* was not possible because of the small sample size (n=15), a similar model would be possible if the population size were bigger. Similarities between the two interventions, such as an agricultural focus, an HIV-affected population, and the need for improved food security suggest that some similar variables in the *CTC Community Garden Project* might be useful predictors for beneficiaries perceiving the intervention as useful. Importantly, education was also a crucial component of the *CTC Community Garden Project*; participants did value and recognize educational benefits of the program. Although the education component was predominately agricultural, women recalled learning about nutrition and healthful eating at the garden. They were also able recall and list numerous new agricultural techniques and strategies they learned for growing food. Many of the women commented that the community garden could be an effective tool as a “demonstration” garden, and all expressed a desire to learn more and willingness to teach others what they learned. The women viewed the community garden as a good space to hold lessons and education sessions about nutrition and agriculture. Unlike the *HelpMercy Nutrition and Food Security Project*, participants in the *CTC Community Garden Project* experienced “community” benefits of being part of the group working at the garden. They also noted a desire to more readily share the education and knowledge they had learned. FAO, along with Faber and Wenhold (2007), noted that availability of “nutritious foods at the community and household level can be increased through mixed cropping; the introduction of new crops; the promotion of

underexploited traditional food crops; and home gardens.”^{26, 27} Education provided in both of these intervention projects was aimed to increase home gardening through the introduction of new crops and increased agricultural knowledge. We observed a clear desire to learn and grow diverse crops among both groups of beneficiaries.

Simple logistic regression calculations showed some differences between perceived barriers and perceived usefulness in the two interventions (Table 4-11). Although the 95% Walk Confidence Limits for many of the data sets cross 1, and it is possible that the measurements are due to random error, the Odds Ratio Estimates (point estimate) can be considered, as we were not aiming to extrapolate these data to beneficiaries not included in this study or to the greater population. It would be inaccurate to make inferences about the greater population due to the lack of replication of these interventions and the study evaluation methods. Satisfaction with seed/crop types and access to land were much stronger predictors of perceived usefulness in the *CTC Community Garden Project* than in the *HelpMercy Nutrition and Food Security Project*. Conversely, distance to water was reported as a stronger predictor of perceived usefulness in Zambia than in Kenya (probably because of variation in distance versus a localized source for the community garden), and flood was stronger predictor in Kenya. The two groups were approximately equal in terms of the impact of drought on perceived usefulness, most likely due to generalized severe weather conditions in both countries.

Overall, no association between perceived usefulness of the two interventions could be determined ($\chi^2=1.8487$, $p=0.1739$) (Tables 4-12 and 4-13, chi-squared contingency table); however, this result was not unexpected due to the great diversity between the two interventions and study populations. The null hypothesis (perceived usefulness is independent of the intervention; there is no association between the variables) could not be rejected. Although no major statistical associations could be calculated, significant differences in intervention type, implementation, and population may have contributed to some variation in observed reports of perceived usefulness.

Summary

Despite their differences, these two interventions were compared and evaluated effectively. From the results of this study, we determined that both interventions were influential projects after their first year of implementation. Based on the nature of their intervention types

and the significant differences in populations, we did not expect to make direct comparisons between the two interventions, but rather envisioned learning valuable information about both in order to improve each intervention in the future.

Strengths of Study

This study retroactively evaluated two small-scale agriculture interventions after their first year of implementation. The study carefully examined the differences and similarities between the two interventions as a means of comparison, and the research was completed in collaboration with the non-government organizations that administered the projects. A modification of the FAST food security tool was used, and as a validated measurement, the FAST tool provided a good way to measure food security among two groups in peri-urban Kenya. Similarly, this study utilized ‘perceived usefulness’ as a way to determine beneficiary perceived benefit of the two interventions. The tool used was identical in both surveys. The surveys were administered using trained translators and back translated into English to ensure translation quality. To supplement quantitative measurements, beneficiary comments were recorded and coded qualitatively. The use of local translators allowed our study to ask personal questions in culturally appropriate ways. This provided a more realistic picture of people, perceptions, and experiences involved in these interventions.

Limitations of Study

This study was limited in its design and implementation. The study involved development of an evaluation method after the intervention was implemented. Ideally, future projects should include evaluation as a basic component. Similarly, the research involved surveys completed via translation, which may limit the reliability of the results. Respondent opinions and feelings may have been misconstrued in translation. Similarly, because these interventions were implemented in resource-limited settings, beneficiaries may have felt unable to express true feelings regarding the interventions for fear of losing access to the programs. Additionally, interviewer bias or error could have altered respondent answers, skewing the results. Stigma surrounding HIV/AIDS made it difficult to discuss the impact of illness, tiredness, or health on the beneficiaries’ experiences with the programs.

The surveys used were not validated instruments. However, they were developed exclusively for the reference populations and interventions under study. For the *CTC Community Garden Project*, 100% of the active participants were surveyed, but six initial participants who dropped out of the program could not be contacted for the survey. While both interventions were similar in objectives, it was difficult to make direct statistical comparisons due to the limited sample size of the *CTC Community Garden Project* (n=15) and the nature of the interventions (seed distribution vs. community garden). The number of participants in the *CTC Community Garden Project* (n=15) significantly limited the number of statistical tests that could be used to analyze these data.

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CHAPTER 6 - Conclusions

The results of this study suggest that there are numerous factors that impact the perceived usefulness of agriculture interventions for Kenyan and Zambian communities. The *CTC Community Garden Project* used a community garden and group education/group work approach to provide grandmothers (surrogate mothers) of children affected by HIV/AIDS in Maai Mahiu with more nutritious food (vegetables), experience with improved agricultural techniques, and agriculture and nutrition knowledge. The *HelpMercy Nutrition and Food Security Project* targeted individual households through a seed distribution combined with community-based nutrition and agriculture training sessions. The findings of this study provide direction for future research regarding beneficiaries' perceived usefulness of nutrition and agriculture interventions in sub-Saharan Africa. Importantly, they also suggest that nutrition education in combination with agriculture programs may be an effective means to improve food security and health among communities affected by HIV/AIDS.

Based on our findings, we can make several recommendations for future small-scale agriculture interventions as well as for the *CTC Community Garden Project* and the *HelpMercy Nutrition and Food Security Project*.

Objective 5: Make Recommendations for Improving the Interventions in the Future

General Recommendations

- All small-scale nutrition interventions should supplement agriculture production and training with nutrition education to improve food security and nutrition outcomes.
- Future nutrition and agriculture interventions in sub-Saharan Africa should continue to consider gender as the *CTC Community Garden Project* has done, rather than selecting participants without regard to gender. For example, technologies reducing the amount of time women must spend on agricultural activities will give women more time to spend on household responsibilities, including nutrition for family members.¹
- Interventions should aim for sustainability. Because food insecurity in sub-Saharan African is a complex issue correlated with poverty and HIV/AIDS, programs cannot be efficacious if they provide a “one-time” impact. Agriculture programs have the potential

to be sustainable, particularly if agriculture education is included and organic techniques are utilized.

Specific Recommendations for the CTC Community Garden Project

CTC International should address the water issues, economic misconceptions, and lack of participant-staff trust, as well as aim to include more education at the community garden. While these issues are largely related to *personnel* and attitude, efforts can be made to clarify the objectives of the intervention and help the beneficiaries take “ownership” of the community garden.

- *CTC* and the participants should clearly outline the objectives of the community garden before the next growing season. If the community garden is intended to be a major production site with yields for profit, this should be clarified. If it intended to be exclusively a demonstration and educational site, this should be stated. Economic misconceptions about the purpose of the garden should be dispelled.
- Based on the demographics of the beneficiaries, we suggest that *CTC* hire a staff member to oversee the garden and be present to support the grandmothers (physically, emotionally, and directionally) at the garden at all times. All other *CTC* programs are overseen by a particular *CTC* staff person, but the community garden lacked direct leadership from *CTC*. We believe *CTC* should consider hiring or investing in a program manager specifically for the community garden as many of the grandmothers expressed a desire for the garden to succeed, but there was a need for more support and instruction directly at the garden.
- Water is necessary at the community garden. Either the beneficiaries or *CTC* need to take control of obtaining water, not both. With proper oversight, water is available for the garden by purchase even if it does not rain and should not be a major issue.
- *CTC* should encourage increased use of organic pesticides, herbicides, and crop rotation to help improve yields in future seasons.
- The economic needs of the garden should be outlined and plainly differentiated from the financial needs of individuals. A plan for the financing of the garden needs to be implemented with input from the participants to avoid distrust or confusion.
- *CTC* should also include a more rigorous and organized nutrition and agriculture education program into the community garden. Participants expressed an openness and willingness to learn more, which would be beneficial. Education should be intentionally incorporated by trained nutrition and agriculture educators (or trained *CTC* staff) solicited regularly to teach the participants.

- *CTC* should consider allocating sections of the garden for different purposes, such as a community area and individual plots for the grandmothers. This may address some issues of “ownership,” putting responsibility for certain portions of land solely on the women, who would then directly benefit from the crops grown on their plots.
- Monitoring, evaluation, and feedback should occur before, during, and after the intervention to measure the impact of these changes.

Recommendations for the HelpMercy Nutrition and Food Security Project

HelpMercy International can make changes to their seed distribution intervention to improve the program in the future. While many of the problems reported by beneficiaries were beyond the scope of the intervention (such as flooding and drought), they are important to consider because they reflect reality. *HelpMercy* should focus on increasing and reorganizing the nutrition and agriculture education component of the program with an emphasis on benefits for HIV-positive individuals, promote use of sustainable farming methods, use community gardens more frequently, and aim for sustainability.

- The seed distribution and program implementation should be standardized. Instead of a subjective approach, *HelpMercy* should employ distribution criteria based on household size, poverty level, and health/HIV-status when deciding the quantity households should receive. Using set criteria and increasing the tracking of seeds distributed and the quantity of total number of seeds and seed varieties a household receives can also help determine the cost effectiveness of the program.
- *HelpMercy* should strengthen/increase the number, consistency, and availability of agriculture and nutrition interventions. Access to training sessions, as well as promotion of the sessions within the community, was difficult in rural Zambia without formal communication systems, but this can be improved with more planning ahead and communication with community volunteers. Beneficiaries may not have had access to all proposed components of an education-based intervention, as observed with some health posts holding 12 sessions and others only four. Education has been shown improve agricultural success and nutritional knowledge. We suggest that education sessions become a requirement for receiving seeds as part of the intervention. If the beneficiary is too ill, an adult household member should be required to attend a specified number of education sessions.
- *HelpMercy* needs to improve knowledge and use of sustainable organic farming techniques. This may improve yields.
- Monitoring and evaluation should occur before, during, and after the intervention to measure the impact of these changes.

- As an intervention targeted at individual beneficiary households, the project should consider implementing more community involvement via gardens. Community gardens can serve as demonstration sites, education locations, and as means to promote community support. In this way, the intervention is more likely to benefit more people in Macha, outside of just seed recipients.
- *HelpMercy* should consider ways to make the intervention more sustainable, such as using community gardens as demonstration sites, utilizing sustainable agriculture techniques, and teaching crop/seed saving techniques, while also distributing seeds that can be saved from crops for planting the following year.

Future Research

Based on the results of this study, more research is needed to fully understand the usefulness, impact, and potential benefits of small-scale agriculture interventions for communities affected by HIV/AIDS in sub-Saharan Africa. This study compared two interventions in just two countries and was only able to review them retrospectively. Future studies should therefore carefully monitor and evaluate project outcomes, considering pre-post differences in project objectives and control areas. Mid-project evaluation should also be conducted to understand how impacts have been achieved.² In order to do so, baseline measurements are required. Nutrition indicators, such as anthropometric measurements, should be considered in addition to changes in food security, nutrition knowledge, and beneficiary perceptions of the intervention. Beneficiaries and their households should be considered and involved in future studies and program development. Research should explore quantitative and qualitative methods further and evaluate motivations that drive individual health behavior. This will provide a better understanding of the impact of studies on individuals and communities, as well as the usefulness of the HBM in nutrition and agriculture interventions/research.

Replication is needed to determine validity and eliminate the possibility of random or systematic error in study results. Implementing and evaluating multiple community gardens and seed distributions in the same communities and other communities would be beneficial. To replicate studies, an established nutrition curriculum could be used in all settings uniformly, even if the agriculture component varies. Also, future studies should continue to recognize the similarities and differences between different populations in Africa. As past research asserts, the responsibilities and privileges of men and women vary along socio-cultural and socioeconomic lines. Therefore, researchers should not view rural women (or any group) as a homogenous social classification, and gender relationships in households should not be generalized. Policies

and services for women, including agriculture projects, should capture the diversity across communities. Agricultural extension services need to be adapted to local conditions.^{1,3} Logistic regression models and other statistical analyses should factor in variations in culture, health, resources, environment, and socioeconomic status that may influence the impact and perceived benefit of future interventions.

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**Appendix A - Comfort the Children International Official Project
Description for the CuCu Shamba**

CuCu Shamba, Project Description: CTC International

Project Sheet- Demonstration Garden

Project Title: Shosho's Shamba

Project Category: Environment/Health

Submitted by: Alison Costain

Date: May 2008

Approved by: Alison Costain

Date: May 18th, 2008

Project Overview/Summary

To set up a demonstration organic garden for the community of MM. It will be run and managed by 20 grandmothers in the community who will fulfill the following criteria:

- 6) Be over 40 years in age
- 7) Have a child or grandchild, living in MM who is disabled or HIV+
- 8) Unable to supplement the normal diet of their family, due either to lack of funds or lack of shamba
- 9) Commit to working 2 hours per week in the garden (They can send a family representative instead)
- 10) Be able to pay a 300 ksh joining fee. (This is a 'one off' amount and will be equipment and seeds for the garden.)

Objectives:

- 5) To supplement the diet of those caring for the disabled or those with HIV/AIDS
- 6) To provide a venue for demonstration for new crops/methods for farming in MM
- 7) To provide a location for other organizations to demonstrate farming/ agricultural environmental techniques
- 8) To recognize and support the grandmothers of the town who carry a disproportionate burden for their families.

Time line:

1. May 2008- Land ploughed and fenced
2. May 2008- grandmothers approached and selected. Committee formed- chairlady, treasurer, and secretary.
3. Collection of joining fees.
4. Opening of bank account.
5. June 2008- Composting and irrigation techniques demonstrated by K-State team, seed beds prepared, and plan for garden proposed.
6. June 2008- donkey cart and 3 drums purchased by CTC.
7. Equipment and seeds bought by SS.
8. Donkey driver hired by SS.
9. June 2008- organization and rota of tasks assigned by committee.
10. July 2008- Shamba operation under the leadership of Rocky Murray.

Rationale/ Assessment of Current Situation:

There is a need for both nutritional and environmental education in MM. Both also the opportunity to put into practice the techniques learned. Grandmothers have the most influence in the community and generally are the most trustworthy group.

CTC needs a central location to showcase its environmental, agricultural initiatives. This should lead to partnerships with other environmental/agricultural/organic farming groups.

Sustainability Assessment: (Include predicted timelines to sustainability)

After initial input from K-State and CTC, this project will be self-sustaining immediately. (See above timeline.)

Strategies:

1. Initial set up of garden- assisted by Mayers, Rocky, CTC, and K-State
2. Marketing of project to: Care of Creation, CCS, Institute of Organic Farmers, Local Flower Farmers. (Advice and supplies).

Implementation: (who does what, when, why and how, exit strategy, specific time line, and deadlines)

- 1) May- KND and talk to John Mayers (Alison)
- 2) May- Rocky to oversee ploughing and fencing of land
- 3) May- Jane gathers the grandmothers, outlines project and forms a committee
- 4) Inform chief, DO and the area agricultural officer of project. (Alison)
- 5) May- Grandmothers, Rocky, and Alison to meet to clarify objectives of project
- 6) June- Visit of K-State team, demonstration of irrigation and composting techniques/ health and nutrition workshops (Alison)
- 7) June- Purchase of donkey, car, and drums (Rocky)
- 8) June- Laying of seed beds (Shoshos)
- 9) June and onward- Promotion of project to care of creation, Institute of organic farmers tec. (Rocky)
- 10) June onwards- Fundraising for greenhouse, guttering, and water tank (Alison)

Methods of evaluation:

- 1) Monthly meetings with Committee
- 2) Rocky to oversee project
- 3) Assessment Criteria:
 - a. Are the crops growing?
 - b. Are other stakeholders getting involved?
 - c. Is the sale of crops/or consumption helping improve nutrition in each family represented?
 - d. Are the techniques being used being copied in the wider community?
 - e. Are we getting interest from other NGO's?

Notes and additional Comments:

List your updates, notes, where you are on the peoject, last update for the team etc. A summary of what you are doing weekly, monthly, etc.

Item	Cost in KSH
Ploughing of land	2,000
Fencing of Land and Gate	25,000
Donkey	5,000
3 Drums	3,000
Cart	8,000

Appendix B - Food Security and Intervention Surveys

Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu Kenya

Part I: Participant Identification **Maelezo ya mshiriki**

Number	Question (Swali)	Answer (Jibu)
1	Date of Interview (Month/Day/Year) (Tarehe)	
2	Participant ID Number: (Nambari ya kutambulisha)	
3	Interviewer (Mtoa swali)	
4	Translator (Mkalimani)	

Part II: Participant characteristics **(Kuhusu mwenye kujibu / Kawaida ya mshiriki)**

Number	Question (Swali)	Response (Circle response where applicable) (Weka mviringo kwa jibu)
1	What is your age? (Note: Survey participant must be at least 18 years old) Una umri ngapi?	
2	Are you the head of your household? Je, wewe ndiye mkubwa wa nyumba/familia?	1=YES 2=NO 1=NDIO 2=LA
2a	If NO, is the head of your household male? Kama la, ni nani? mzee yuko?	1=YES 2=NO 1=NDIO 2=LA
3	How many children do you have living? Watoto wako wangapi wanaishi?	
3a	How many times have you been pregnant? Umebeba mimba mara ngapi?	
4	What are the ages of your children? Taja umri ya watoto wako?	(list ages in chronological order from youngest to oldest)
5	Do you take care of children that you did not give birth to (are not your own)? Una watoto wengineo wasio wako /watoto yatima unalinda?	1=YES 2=NO 1=NDIO 2=LA
5a	If YES, how many additional children (other than your own) do you care for on a regular basis? Kama ndio, ni wangapi wasio wako?	
6	Do you take care of relatives that are sick or ill on a regular basis? Je, wnalinda jamaa yako wagonjwa?	1=YES 2=NO 1=NDIO 2=LA
7	Do <u>you yourself</u> have employment outside the home? Una kazi?	1=YES 2=NO 1=NDIO 2=LA
7a	If YES, where/ how do you earn money? Kama ndio, una pata aje pesa?	1. Agriculture work (Kazi la Shamba) 2. Textiles/art (Kushona) 3. Tourism (Utalii) 4. Other, please explain: (Zingine zozote) 5. Business (Biashara)

Part III: Current Diet (Chakula)-		
Number	Question	Response (<i>circle all that apply, list where requested</i>)
1	<p>On average, what are the most common foods that <u>you</u> eat? What do you eat daily?</p> <p>Ni vyakula gani unavyokula kila siku?</p>	<p>1 corn (ugali)- ugali/ Mahindi</p> <p>2 beans -maharagwe</p> <p>3 lentils - dengu, njugu</p> <p>4 wheat flour (such as chapatti)- Unga ngano</p> <p>5 vegetables: please list- mboga, taja zinginezo</p> <p>_____</p> <p>6 fruit: please list- matunda _____</p> <p>_____</p> <p>7 nuts and seeds: please list- mbegu _____</p> <p>_____</p> <p>8 rice- mchele/wali</p> <p>9 Tea- chai</p> <p>10 milk- maziwa</p> <p>11 meat (chicken, beef, pork): please list - nyama</p> <p>_____</p> <p>12 eggs- mayayi</p> <p>13 other: please list- (Zingine)</p> <p>_____</p>
2	<p>On average, what are the most common foods that <u>your children</u> eat? (Note: Consider only children >2 years old who eat solid food.)</p> <p>Watoto wako wa rika chini ya miaka miwili unawalisha nini?</p>	<p>1 corn (ugali)- ugali</p> <p>2 beans -maharagwe</p> <p>3 lentils - dengu, njugu</p> <p>4 wheat flour (such as chapatti)-Unga ngano</p> <p>5 vegetables: please list- mboga , taja zinginezo</p> <p>_____</p> <p>6 fruit: please list- matunda _____</p> <p>_____</p> <p>7 nuts and seeds: please list- mbegu _____</p> <p>_____</p> <p>8 rice- mchele</p> <p>9 Tea- chai</p> <p>10 milk- maziwa</p> <p>11 meat (chicken, beef, pork): please list - nyama</p> <p>_____</p> <p>12 eggs- mayaya</p> <p>13 other: please list (Zinginezo- taja)</p> <p>_____</p>

Part IV: Food Security (Usalama wa vyakula)			
Note: Survey questions adapted from the “Food Access Survey Tool (FAST)” developed for Bangladesh			
Number	Question	Response	Response Options
1	How often did you eat three ‘square’ meals (full stomach meals) a day in the past 12 months (year)? Je, ni mara ngapi ulikula mara tatu kwa siku mwaka moja uliyopita?		<ol style="list-style-type: none"> 1. Mostly (3 meals each day) (mara tatu kila siku) 2. Often (3 at least a few times each week) (Mara tatu mara chache kila wiki) 3. Sometimes (3 per day, 7-12 times this year) (Mara tatu kwa siku, Mara 7-12 mwaka huu) 4. Rarely (3 per day only 1-6 times this year) (Mara tatu kwa siku, Mara 1-6 mwaka huu) 5. Never (Hapana/ La)
2	In the last 12 months, how often did you or any of your family have to eat another food or product although you wanted to eat corn? (Note: Please do not consider times that you or your family members were sick.) Mara ngapi wewe au familia yako mumelazimishwa kula chakula kingine tu yenye haujazoea ?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
3	In the last 12 months how often did <i>you yourself</i> skip entire meals due to scarcity of food? kwa miezi kumi na miwili iliyopita, ni mara ngapi umelala na njaa kwa sababu ya upungufu wa chakula?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
4	In the past 12 months how often did <i>you</i> personally eat less food in a meal due to scarcity of food? Kwa miezi kumi na miwili iliyopita, ni mara ngapi ume kula kidogo tu kwa sababu ya upunguju?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
5	In the past 12 months how often did the food stored in your home run out and there was no money to buy more food? Kwa miezi kumi na miwili iliyopita, ni mara ngapi muliishiwa na chakula katika ghala bila kuwa na pesa ya kununua chakula?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
6	In the past 12 months how often did you worry about where food would come from? Mara ngapi kwa mwaka umekuwa na wasiwasi kuhusu utakapopata chakula?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
7	In the past 12 months, how often did your family purchase corn? Mumenunua mhindi ya kusaga mara ngapi kwa miezi kumi na miwili iliyopita?		<ol style="list-style-type: none"> 1. Never (Hakuna siku) 2. Rarely (once every few months last year) (Kama mara moja kila miezi michache) 3. Sometimes (a few times each month) (mara kadhaa kila mwezi) 4. Often (every week) (Kila wiki) 5. Mostly (every day) (Kila siku)
8	In the past 12 months how often did your family take food (corn, beans etc) on credit (or loan) from a local shop? Je katikamiezi kumi na miwili zilizopita mume kopa chakula mara ngapi ?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (this happens a lot) (mara kadhaa)
9	In the past 12 months how often did your family have to borrow food from relatives or neighbors to make a meal? Mara ngapi mumetegemea jamaa au jirani kwa vyakula?		<ol style="list-style-type: none"> 1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (this happens a lot) (mara kadhaa)
10 Score	<i>Based on answers from the above questions, in the enumerator’s opinion, this household should be classified as: (Kulingana na mjibu ya sehemu hii, familia hii inweza tajwa hivi..)</i>	118	<ol style="list-style-type: none"> 1. Food secure(wana chakula cha kutosha) 2. Food insecure without hunger(Hawana chakutosha lakini hawana njaa) 3. Food insecure with hunger(Hawana chakutosha na wana njaa)

Part V: Maternal and Child Health (Maisha ya mama na mtoto)

Note: If Participant does not have children, N/A should be marked for child feeding questions

Number	Question	Response	Response Options
1	What is the age of your youngest living child? Mtoto mdogo ana umri gani?		
2	Was your youngest child breastfed? Ulimnyonyesha mtoto wako mdogo?		1=YES 2=NO 1=NDIO 2=LA
2a	If YES, how long did you breastfeed your baby before you began to supplement with solid food? How long did you feed your child with <u>only</u> breastmilk? Kama ndio, ulimnyonyesha kwa muda gani kabla ya kumpa mtoto chakula? Ulimnyonyesha mtoto kwa mda gani?		1. 0-1 month (chini ya mwezi moja) 2. 1-3 months (Mwezi moja hadi tatu) 3. 3-6 months (Miezi tatu hadi sita) 4. 6-9 months (Miezi sita hadi tisa) 5. Longer than 9 months (please list duration _____) (Miezi nyingi kuliko tisa- tafadhali taja kipindi)
2b	If NO, which of the following do you/did you use? Kama la, ulitumia maziwa ipi?		1. Dry formula and water (Maziwa ya unga na maji) 2. Dry formula mixed with cow or goat milk (maziwa ya unga pamoja na ya n'gombe au mbuzi) 3. Cow or goat milk alone (Maziwa ya n'gombe au mbuzi pekee) 4. Premixed formula (Mchanganyiko iliyotayarishwa) 5. Other: Please list _____ (Zinginezo- taja)
2c	If NO, what was the reason? Kama la, sababu gani hukumnyonyesha mtoto?		1. You thought breastfeeding would be too difficult (Ulidhani kunyonyesha ni ngumu sana) 2. You did not have time to breastfeed (Hukuwa na wa wakati wa kunyonyesha) 3. You were sick and did not want to make the baby sick (Ulikuwa mgonjwa na hukutaka kumpa mtoto ugonjwa) 4. You were influenced by family members and encouraged not to breastfeed (Familia walikuambia usinyonyeshe) 5. You did not want to breastfeed (Hukutaka kunyonyesha) 6. Other: Please list _____ (Zinginezo- taja)
3	At what age did you begin to feed your youngest child solid food (weaning foods)? Ulianzipa mtoto chakula kwa umri ngapi?		1. Less than 4 months old (chini ya miezi minne) 2. 4-6 months old (miezi minne hadi sita) 3. 6-7 months (miezi sita hadi saba) 4. 8 months or older (miezi minane au zaidi) 5. I have not yet begun to feed my youngest child solid food (Sijaaanza kumpatia chakula)
4	How old was your youngest child when you stopped breastfeeding completely? Uliacha kunyonyesha mtoto wako mdogo akiwa na umri gani?		
5	What was the reason that you stopped breastfeeding your youngest child? Kwa nini uliacha kunyonyesha?		1. The child was old enough to eat solid food (mtoto alikuwa mkubwa kutosha) 2. Difficulty breastfeeding (ugumu wa kunyonyesha) 2. Not enough milk produced (maziwa kidogo) 3. Not enough food for you, the mother (sikuwa na chakula tosha) 4. Other: Please list _____ (zinginezo- taja tafadhali)
6	Did you breastfeed all of your other children? Je, uliwanyonyesha watoto wako wote?		1=YES 1=NDIO 2=NO 2=LA
6a	If NO, what was the reason that you did not breastfeed (any or all of your children)? Kama la, kwa nini hukuwanyonyesha wote?		1. You thought breastfeeding would be too difficult (Ulidhani kunyonyesha ni ngumu sana) 2. You did not have time to breastfeed (Hukuwa na wa wakati wa kunyonyesha) 3. You were sick and did not want to make the baby sick (Ulikuwa mgonjwa na hukutaka kumpa mtoto ugonjwa) 4. You were influenced by family members and encouraged not to breastfeed (Familia walikuambia usinyonyeshe) 5. You did not want to breastfeed (Hukutaka kunyonyesha) 6. Other: Please list _____ (Zinginezo- taja)
7	Do you believe that breastfeeding is healthy for infants? Je, unaamini kuwa kunyonyesha mtoto ni mzuri kwa afya yake?		1=YES (NDIO) 2=NO (LA) 3=YES, but not always (Ndio lakini si kila wakati- inalingana)
8	How did you first learn about breastfeeding? Ulijifunza aje/wapi kuhusu kunyonyesha?		1. Family Member (familia) 2. Health Worker (Nasi/ Daktari) 3. Friend (Rafiki) 4. Health Class (Kliniki/ zahanati) 5. Other: Please list _____ (zinginezo-taja)
9	If you could change the length of time (duration) that you breastfed your youngest, would you? Je, ungeweza kubadili muda wa kunyonyesha mtoto wako mdogo ungefanya nini?		1. YES, I would have breastfed longer- Ndio, ningengeza mda wa kunyonyesha 2. YES, I would have breastfed for a shorter time- Ndio, ningefupisha muda. 3. NO, I would not change how long I breastfed La, singe badili muda.

Part VI: Potential Interventions			
Number	Question	Response	Response Options
1	Do you participate in agriculture to grow your own food for you and/or your family? Una kuza chakula?		1=YES- 1=NDIO 2=NO- 2=LA
2a	If YES, what crops did you grow during the last growing season? Kama ndio, ulikuza mimea ipi msimu uliopita ?		Please list: Tafadhali taja:
2b	If YES, does anyone help you grow food? (Circle the appropriate response) Kama ndio, Je kuna mtu anakusaidia kwa shamba?		1. husband Mume 2. companion Mwenzi wako 3. children watoto 4. parents or grandparents Wazazi , Babu/ Bibi 5. other relatives Jamaa 6. friends Marafiki 7. government or community workers Serikali au wafanyikazi ya jumuia 8. no one helps me Hakuna
3	Do you personally have access to land where you can/could grow food? Je, kuna shamba ambapo unaweza kukuza mimea au vyakula vingine?		1=YES- 1=NDIO 2=NO- 2=LA
3a	If NO, does someone else in your family (such as your husband, son, brother-in-law, sister etc.) have access to land that could be used for farming? Kama la, kuna jamaa yako yeyote mwenye shamba unaloweza kutumia?		1=YES- 1=NDIO 2=NO- 2=LA
4	Do you have access to water that could be used to grow food or do you think there is enough rain? Je, unafikiri kuna maji ya kutosha kukuza mimea au vyakula?		1=YES- 1=NDIO 2=NO- 2=LA
4a	If YES is it difficult to obtain this water (is it located far from your house or difficult to transport)? Kama ndio, kuna ugumu kupata maji (unapata maji karibu au mbali na nyumbani?)		1=YES- 1=NDIO 2=NO- 2=LA
5	If you obtained seeds for various food crops, would you plant them? Ukipata mbegu za mimiea tofauti, utazipanda?		1=YES - 1=NDIO 2=NO- 2=LA
5a	If YES, do you think you would be able to grow the seeds and produce crops successfully? Kama ndio, unafikiri utaweza kupanda na kuvuna mumea ipasavyo?		1=YES- 1=NDIO 2=NO- 2=LA 3=UNSURE Sijui
5b	If NO, would you prefer to sell the seeds for money?		1=YES- 1=NDIO 2=NO- 2=LA

	Kama la, ni heri kuuza mbegu ili kupata pesa?		3=UNSURE Sijui
7	Do you think that having seeds would improve the amount of food your family would have to eat? Ungekuwa na mbegu, ingeweza kuongeza kiasi cha vyakula katika familia?		1=YES - 1=NDIO 2=NO- 2=LA 3=UNSURE Sijui

Part VII: Other Comments		
Number	Question	Response
1	Do you have any other information about your diet, your access to food or land, or child feeding that you would like to share? Je, kuna ya kuongezea juu ya namna unavyopata vyakula, kiasi ya vyakula, utumizi wa ardhí, na vyajula unavyompa mtoto watoto?	

Evaluation of a nutrition and agriculture intervention in Maai Mahiu Kenya

Part I: Participant Identification **Maelezo ya mshiriki**

Number	Question (Swali)	Answer (Jibu)
1	Date of Interview (Month/Day/Year) (Tarehe)	
2	Participant ID Number: (Nambari ya kutambulisha)	
3	Interviewer (Mtoa swali)	
4	Translator (Mkalimani)	

Part II: Participant characteristics

Number	Question (Swali)	Response (Circle response where applicable) (Weka mviringo kwa jibu)
1	What is your age? (Note: Survey participant must be at least 18 years old) Una umri ngapi?	
2	Are you the head of your household? Je, wewe ndiye mkubwa wa nyumba/familia?	1=YES 2=NO 1=NDIO 2=LA
2a	If NO, is the head of your household male? Kama la, ni nani? mzee yuko?	1=YES 2=NO 1=NDIO 2=LA
3	How many children do you have living? Watoto wako wangapi wanaishi?	
3a	How many times have you been pregnant? Umebeba mimba mara ngapi?	
4	What are the ages of your children? Taja umri ya watoto wako?	(list ages in chronological order from youngest to oldest)
4a	How many of your children have died due to HIV/AIDS? Watoto wangapi wako wamefariki kwa sababu ya virusi vya ukimwi?	
5	Do you take care of your grandchildren? Una wajukuu wanaokutegemea kwa mahitaji yao ya kila siku?	1=YES 2=NO 1=NDIO 2=LA
5a	Do you take care of any children that you did not give birth to (are not your own)? (orphans, nieces, nephews etc) Una watoto yatima wanaokutegemea?	1=YES 2=NO 1=NDIO 2=LA
5b	If YES, how many additional children (other than your own) do you care for on a regular basis? Kama ndio, ni wangapi wasio wako?	
6	Do you take care of relatives that are sick or ill on a regular basis? Una watu wa familia yako wagojwa wanaokutegemea wakati mwingi?	1=YES 2=NO
6a	If YES, how many relatives do you take care of on a regular basis. Kama ndiyo, ni watu wangapi wa familia yako wagojwa wanaokutegemea?	
7	Do <u>you yourself</u> have employment outside the home? Una kazi?	1=YES 2=NO 1=NDIO 2=LA
7a	If YES, where/ how do you earn money? Kama ndio, una pata aje pesa?	1. Casual Labor (e.g., agriculture work) mfanya kazi wa kibarua 2. Textiles/art nguo au usanii 3. Tourism utalii 4. Retail Work (e.g., Hair Plaiting Business) biashara ya kawaida 4. Other, please explain: zingine

8	How many years of school did <u>you</u> or have you completed? Ulienda shule? Mpaka darasa ipi?	
9	Are you part of a women's group or a community group that promotes education and/or provides resources for women and mothers? Je, umejiunga na kikundi cha maendeleo ya wanawake?	1=YES 2=NO 1=NDIO 2=LA

Part III: Current Diet (Chakula)

Number	Question	Response (circle all that apply, list where requested)
1	What are the most common foods that <u>you</u> eat? What do you eat daily? Ni vyakula gani unavyokula kila siku?	1 maize (ugali))- ugali/ Mahindi 2 beans maharagwe 3 lentils /green grams dengu, njugu 4 wheat flour (such as chapatti)- Unga ngano 5 vegetables: please list- mboga, taja zinginezo _____ 6 fruit: please list- matunda _____ _____ 7 nuts and seeds: please list- mbegu _____ _____ 8 rice- mchele/wali 9 Tea- chai 10 milk- maziwa 11 meat (chicken, beef, pork): please list - nyama _____ 12 eggs- mayayi 13 other: please list- (Zingine) _____
2	What are the most common foods that <u>your children</u> eat? (Note: Consider only children >2 years old who eat solid food.) Watoto wako wa rika chini ya miaka miwili unawalisha nini? CIRCLE HERE IF DIET IS APPROXIMATELY THE SAME	1 maize (ugali))- ugali/ Mahindi 2 beans maharagwe 3 lentils /green grams dengu, njugu 4 wheat flour (such as chapatti)- Unga ngano 5 vegetables: please list- mboga, taja zinginezo _____ 6 fruit: please list- matunda _____ _____ 7 nuts and seeds: please list- mbegu _____ _____ 8 rice- mchele/wali 9 Tea- chai 10 milk- maziwa 11 meat (chicken, beef, pork): please list - nyama _____ 12 eggs- mayayi 13 other: please list- (Zingine) _____

Part IV: Food Security

Note: Survey questions adapted from the "Food Access Survey Tool (FAST)" developed for Bangladesh¹

Number	Question	Response	Response Options
1	How often did you eat three 'square' meals (full stomach meals) a day in the past 12 months (year)? Je, ni mara ngapi ulikula mara tatu kwa siku mwaka moja uliyopita?		6. Mostly (3 meals each day) (mara tatu kila siku) 7. Often (3 at least a few times each week) (Mara tatu mara chache kila wiki) 8. Sometimes (3 per day, 7-12 times this year) (Mara tatu kwa siku, Mara 7-12 mwaka huu) 9. Rarely (3 per day only 1-6 times this year) (Mara tatu kwa siku, Mara 1-6 mwaka huu)

			10. Never (Hapana/ La)
2	In the last 12 months, how often did you or any of your family have to eat another food or product although you wanted to eat corn? (Note: Please do not consider times that you or your family members were sick.) Mara ngapi wewe au familia yako mumelazimishwa kula chakula kingine tu yenye haujazoea ?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
3	In the last 12 months how often did <i>you yourself</i> skip <u>entire meals</u> due to scarcity of food? kwa miezi kumi na miwili iliyopita, ni mara ngapi umelala na njaa kwa sababu ya upungufu wa chakula?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
4	In the past 12 months how often did <i>you</i> personally eat less food in a meal due to scarcity of food? Kwa miezi kumi na miwili iliyopita, ni mara ngapi ume kula kidogo tu kwa sababu ya upunguju?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
5	In the past 12 months how often did the food stored in your home run out and there was no money to buy more food? Kwa miezi kumi na miwili iliyopita, ni mara ngapi mulishiwa na chakula katika ghala bila kuwa na pesa ya kununua chakula?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
6	In the past 12 months how often did you worry about where food would come from? Mara ngapi kwa mwaka umekuwa na wasiwasi kuhusu utakapopata chakula?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (most days/weeks) (mara kadhaa)
7	In the past 12 months, how often did your family purchase corn? Mumenunua mhindi ya kusaga mara ngapi kwa miezi kumi na miwili iliyopita?		1. Never (Hakuna siku) 2. Rarely (once every few months last year) (Kama mara moja kila miezi michache) 3. Sometimes (a few times each month) (mara kadhaa kila mwezi) 4. Often (every week) (Kila wiki) 5. Mostly (every day) (Kila siku)
8	In the past 12 months how often did your family take food (corn, beans etc) on credit (or loan) from a local shop? Je katikamiezi kumi na miwili zilizopita mume kopa chakula mara ngapi ?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka) 4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (this happens a lot) (mara kadhaa)
9	In the past 12 months how often did your family have to borrow food from relatives or neighbors to make a meal? Mara ngapi mumetegemea jamaa au jirani kwa vyakula?		1. Never (Bado) 2. Rarely (only 1-6 times this year) (Kati ya mara 1-6 mwaka huu) 3. Sometimes (7-12 times this year) (Mara 7-12 kwa mwaka)

			4. Often (a few times each month) (mara chache kila mwezi) 5. Mostly (this happens a lot) (mara kadhaa)
10 Score	Based on answers from the above questions, in the enumerator's opinion, this household should be classified as: (Kulingana na mjibu ya sehemu hii, familia hii inweza tajwa hivi..)		1. Food secure(wana chakula cha kutosha) 2. Food insecure without hunger(Hawana chakutosha lakini hawana njaa) 3. Food insecure with hunger(Hawana chakutosha na wana njaa)

Part V: Potential Interventions

Number	Question	Response	Response Options
1	Did you participate in agriculture to grow your own food for you and your family before the community garden was started? Ulihusika na ukulima kukuza chakula chako na familia kabla ya kuanzishwa kwa shamba la jamii/jumuia?		1=YES Ndiyo 2=NO La
2a	If YES, what crops did you grow? Kama ndiyo, Ni mimea gani ulikuza?		Please list:
2b	If YES, did anyone help you grow food? (Circle the appropriate response) Kama ndiyo, Kuna mtu aliyekusaidia kukuza chakula? Weka mviringo kwenye jawabu sahihi.		1. husband- bwana 2. companion- jamaa 3. children- watoto 4. parents or grandparents- wazazi au nyanya au babu 5. other relatives- jamii 6. friends- rafiki 7. government or community workers- wafanya kazi wa serikari au jamuia 8. no one helps me- hakuna aliyenisaidis
3	Do you personally have access to land where you can/could grow food other than at the community garden? Una shamba ambalo unaweza kukuza chakula bali na bustani/shamba la jamii/jumuia?		1=YES Ndiyo 2=NO La
3a	If YES, what type of land do you/did you have access to? Kam ndiyo? Una/ulikua na aina gani ya shamba?		1= Rented land – Shamba la kukodi 2= Borrowed land – Shamba la kuazima 3=Family owned land (owned by male) – Shamba la jamii linalomilikiwa na mwanaume 4= Family owned land (owned by female)- Shamba la jamii linalomilikiwa na mwanamke 5= Shared land – Shamba la jumua 6= Personally owned land – Shamba langu
3a	If NO, does someone else in your family (such as your husband, son, brother-in-law, sister etc.) have access to land that they use for farming? Kama la, kuna mtu katika familia yako(kama bwana, mtoto wako, ndugu au dada) aliye na shamba ya kulima?		1=YES - Ndiyo 2=NO – La
4	What was the primary source of water for the community garden? Mlitegemea maji kutoka wapi kwa ukulima wa shamba lenu?		1. Rain water – Maji ya mvua 2. Water brought from the pump across the street – Maji ya mbomba 3. water brought by women from their homes (waste water) – Maji yaliyoletwa na wanawake

			kutoka manyumbani mwao (Maji machafu) 4. other - Mengine
4a	Is it difficult to obtain this water? (Is it located far from the garden or difficult to transport)? Ni ngumu kupata haya maji? (Yako mbali na shamba au ngumu kusafirisha)?		1=YES - Ndiyo 2=NO - La 3=N/A (no labor required) – Sihitaji kufanya kazi yeyote
	Is there enough water available to grow crops for part of the year? Je kuna maji ya kutosha ya kukuza mimea kwa wakati fulani kwa mwaka?		
4b	Is there enough water at the community garden to grow crops year round? Je kuna maji ya kutosha katika shamba la jumua ya kukuza mimea mwaka mzima?		1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika
4c	Did the drip irrigation system help with watering the crops? Je maji ya kudondoka/kumwagilia mimea ilisaidia kunyunyizia mimea?		1=YES Ndiyo 2=NO La
5	If you personally obtained new or different seed types that you had not planted before, would you plant them at the community garden? Je wewe mwenyewe ukipata mbegu mpya au tofauti ambazo hujawahi kukuza, unaweza kupanda katika shamba la jamii/jumuia?		1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika
5a	Would you also try to plant these new seed types at home? Je unaweza pia kujaribu kukuza hizi mbegu mpya nyumbani?		1=YES Ndiyo 2=NO La 3= UNSURE Sina Uhakika
5b	If YES, do you think you would be able to grow the seeds and produce crops successfully at home? Kama Ndiyo, unafikiri unaweza kukuza hizi mbegu na kupata mazao nyumbani?		1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika
5c	Would you prefer to sell the seeds for money? Je ungependelea kuuza mbegu hizi kwa nia ya kupata pesa?		1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika
6	Do you use a sack garden at your home? Je unatumia shamba la gunia nyumbani kwako?		1=YES Ndiyo 2=NO La
6a	If NO, would you want to use a sack garden at your home in addition to the community garden? Kama la, ungependelea kutumia shamba la gunia nyumbani hata kama bado ungali unalima kwa shamba la jumua/Jamii?		1=YES Ndiyo 2=NO La 3=UNSURE Sina uhakika
7	Did you learn new techniques for growing food at the community garden? Ulisoma ujuzi mpya wa kukuza mimea katika shamba la jumua/jamii.		1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika
7a	If YES: What techniques did you learn at the community garden? Kama ndiyo, ni ujuzi upi huu?		Drip Irrigation - Maji Ya kundondoka How to make pesticides – Jinsi ya kutengeza dawa za kuua wadudu How to make compost – Jinsi ya kutengeneza mbolea How to weed – Jinsi ya kukabiliana na kwekwe Other: List – Ujuzi mwingine (Andika)

7b	<p>Have you in the past or do you currently teach others about agriculture? Umekuwa hapo mbeleni au kwa sasa ukiwafunza wezako mambo ya kilimo?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika</p>
7c	<p>Would you like to help teach more women about how to grow their own food? Ungependa kufunza kina mama wengine kuhusu ukukuza chakula chao wenyewe?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika</p>
8	<p>Did you learn about nutrition or healthful eating at the community garden? Ulisomo mambo ya chakula chenye afya au kula kiafya katika shamba la jumua?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina uhakika</p>
8a	<p>Would you like to learn (more) about nutrition? Ungependa kusoma zaidi mambo ya chakula chenye afya?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina uhakika</p>
8b	<p>Do you think that the community garden is a good place to learn about nutrition if there were nutrition education or training sessions held there? Unafikiri shamba la jumua ni pahala panzuri pa kusoma mabo ya chakula chenye afya, kama kungekua na walimu na masomo ya haya?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika</p>
9	<p>Do you have any other comments about what you learned or would like to learn at the community garden? Una jambo lakuongezea kuhusu uliosoma au yale ungepende kusoma katika shamba la jumua?</p>		<p>1=YES Ndiyo 2=NO La 3=UNSURE Sina Uhakika Comments: Maoni</p>

Part VI: Garden Success			
<u>Kufaulu kwa bustani</u>			
Number Nambari	Question Swali	Response (circle all that apply, list where requested) Jawabu (Weka mviringo au uandike)	
1	<p>What seeds did you planted at the community garden in the past year? (June 2008- June 2009)</p> <p>Ni mbegu zipi ulipanda mwaka jana katika shamba la jumuaia? (Kuanzia Juni 2008 hadi Juni 2009)</p>	<p>1 corn (ugali) - Mahindi</p> <p>2 beans - Maharagwe</p> <p>3 lentils - Ndengu</p> <p>4 wheat flour (such as chapatti) - Ngano</p> <p>5 vegetables: please list - Mboga (Andika aina ya mboga)</p> <p>_____</p> <p>6 fruit: please list – Matunda (Andika aina ya matunda)_____</p> <p>_____</p> <p>7 nuts and seeds: please list Njugu na mbegu (Aina)_____</p> <p>8 rice – Mpunga</p>	
2	<p>What crops did you successfully harvest in the past year? (June 2008-June 2009)</p> <p>Ni mimea ipi ulivuna vizuri sana mwaka jana?(Kuanzia Juni 2008 hadi Juni 2009)</p>	<p>1 corn (ugali) – Mahindi</p> <p>2 beans – Maharagwe</p> <p>3 lentils – Ndengu</p> <p>4 wheat flour (such as chapatti) – Ngano</p> <p>5 vegetables: please list - Mboga (Andika aina ya mboga)</p> <p>_____</p> <p>6 fruit: please list – Matunda (Andika aina ya matunda)_____</p> <p>_____</p> <p>7 nuts and seeds: please list Njugu na mbegu (Aina)_____</p> <p>8 rice – Mpunga</p>	
3	<p>What crops would you like to grow at the community garden in the future?</p> <p>Ni mimea ipi ungependa kupanda katika shamba la jumuaia katika siku za usoni/zinazokuja?</p>	Please List: - Andika aina	
4	<p>What crop grew the best in the community garden?</p> <p>Mimea ipi ilimea vizuri sana katika shamba la jumuaia?</p>	Please List:	
4a	<p>Why do you think this crop (from 4 above) grew the best?</p> <p>Ni kwani mimea hi ilikua vizuri?</p>	Please List:	
5b	<p>Did you feed your family any of the food that you grew at the community garden?</p> <p>Uilisha familia yako na chakula chochote ulichokuza katika shamba la jumuaia?</p>		<p>1=YES Ndiyo</p> <p>2=NO La</p> <p>3=UNSURE Sina Uhakika</p>
5b	<p>Did you sell any of the crops grown at the community garden?</p> <p>Uliuza mavuno yoyote kutoka kwa shamba la jumuaia?</p>		<p>1=YES Ndiyo</p> <p>2=NO La</p> <p>3=UNSURE Sina Uhakika</p>
5c	<p>Did you share any of the crops grown at the community garden with your friends or neighbors?</p> <p>Uligawia marafiki wako chakula chochote ulichovuna katika shamba la jumuaia?</p>		<p>1=YES Ndiyo</p> <p>2=NO La</p> <p>3=UNSURE Sina Uhakika</p>

Part VII: Impact of and/or Perceived Benefit of the Community Garden
Umuhimu au manufaa va shamba la jumuaia

1) How much did the community garden/crops grown at the community garden improve your household's overall food supply? (*Circle Response*)

Kwa kiwango kipi shamba la jumuaia/ mimea katika shamba hili ilinufaisha familia yako kichakula? Weka duara/zingila jibu lako.

Sana sana	kidogo sana	sana	kidogo	hata kidogo
Very much	Somewhat	A little bit	Not much	Not at all
1	2	3	4	5

2.) How much did the community garden/crops grown at the community garden provide your household with additional income? (*Circle Response*)

Kwa kiwango kipi shamba la jumuaia/ mimea katika shamba hili ilinufaisha familia yako kifedha? Weka duara/zingila jibu lako

Sana sana	kidogo sana	sana	kidogo	hata kidogo
Very much	Somewhat	A little bit	Not much	Not at all
1	2	3	4	5

3.) How much did the community garden/crops grown at the community garden help you or your household eat a more diverse diet/different types of food? (*Circle Response*)

Kwa kiwango kipi shamba la jumuaia/ mimea katika shamba hili ilinufaisha familia yako kupata chakula tofauti au aina mbalimbali? Weka duara/zingila jibu lako

Sana sana	kidogo sana	sana	kidogo	hata kidogo
Very much	Somewhat	A little bit	Not much	Not at all
1	2	3	4	5

1.) How much did the community garden/crops grown at the community garden allow you to help friends or relative in your community? (*Circle Response*)

Kwa kiwango kipi shamba la jumuaia/ mimea katika shamba hili ilinufaisha marafiki, jamii au jumuaia yako? Weka duara/zingila jibu lako

Sana sana	kidogo sana	sana	kidogo	hata kidogo
Very much	Somewhat	A little bit	Not much	Not at all
1	2	3	4	5

Part VIII: Problems experienced with community garden:
Shida zilizoshuhudiwa shamba/bustani la jumuaia

PROBLEM Shida	EXPERIENCED Zilizoshuhudiwa YES or NO ndiyo au la
Did not have enough time to plant seeds <i>Hakukuwa na wakati wa kutosha wa kupanda</i>	
Unsure how to plant and harvest (<i>circle which one</i>) <i>Kutokuwa na uhakika jinsi ya kupanda au kuvuna</i>	
Not enough seeds were received <i>Mbegu za kutosha hazikupokelewa</i>	
Project staff was not cooperative or helpful <i>Wafanya kazi wa mradi hawakusaidia</i>	
Did not have enough help in planting or physical labor at the garden <i>Hakukuwa na usaidizi wa kutosha wa kupanda au kufanya kazi katika</i>	

bustani/shamba	
Other (please specify): _____ Zingine (fafanua)	

Household Problems with seeds or crops:
Shida za familia kuhusu mbegu na mimea:

PROBLEM Shida	EXPERIENCED Zilizoshuhudiwa YES or NO YES or NO Ndiyo au La
Do not enjoy planting, harvesting or selling (<i>circle which one</i>) <i>Sifurahii upanda, kuvuna au kuuza (zingira moja)</i>	
Family Pressures (ex: family members not supportive, planting not allowed, other work, etc.) <i>Shida za familia (familia kutokuunga mko, kupanda)</i>	
Lack of energy (e.g. too tired) <i>Kutokuwa na nguvu (kama kuchoka)</i>	
You or household member becoming ill <i>Mtu wa familia yako kugonjeka</i>	
You or household member becoming pregnant <i>Wewe au mtu wa familia yako kupata mimba</i>	
Unfamiliar with or dislike of seeds or crops, if so which ones? <i>Mbegu ngeni au kutozipenda, kama kweli zipi?</i> _____ _____	
Other (please specify): _____ Zingine (fafanua)	

Environmental Problems with seeds or crops:

PROBLEM Shida	EXPERIENCED Zilizoshuhudiwa YES or NO Ndiyo au La
Plant disease, pests or animal damage <i>Magojwa ya mimea, wadudu, au wanyama kuhalibu</i>	
Low Production <i>Mavuno nduni</i>	
Flooding or drought <i>Mafuriko au kiangazi</i>	
Drought <i>Kiangazi</i>	
Poor or not enough soil <i>Mchanga mbaya</i>	
No access to or not enough land <i>Kutokuwa na shamba</i>	
Seeds competing with other crops <i>Mbegu kushida na mimea ingine</i>	
Water source too far from garden <i>Chanzo cha maji kuwa mbali na bustani</i>	
Other (please specify): _____ Zingine (fafanua)	

Part IX: Additional Comments regarding experiences with the community garden:

Jambo la kungezea kuhusu hari va shamba la jumua

Do you have any other information about your diet, your access to food or land, or child feeding that you would like to share?

Una jambo lingine la kuelezu kuhusu vile unapata chakula, chakula chenye afya, au kunyonyesha mtoto?

HELPMERCY NUTRITION AND FOOD SECURITY PROJECT

Household Survey

SECTION ONE: HOUSEHOLD IDENTIFICATION

- 1a.) Date of Interview (Day/Month/Year): _____
- 1b.) Name of District: _____
- 1c.) Name of Health Post: _____
- 1d.) Household ID Number (from informed consent): _____
- 1e.) Respondent ID Number(s) (from Section 2A): _____
- 1f.) Interviewer: _____
- 1g.) Translator: _____
- 1h.) Record Number from SPSS or SAS: _____

SECTION TWO: HOUSEHOLD CHARACTERISTICS

INSTRUCTIONS—For the following questions, only include individuals usually living in the household. Current household members are all individuals living in the household during the last month and eating from the same pot.

2a.) Who are current household members, star and list beneficiary(ies) first?

ID	What is the HH members relationship to the head of the household? Household Head=1 Spouse=2 Son/daughter=3 Father/mother=4 Sister/brother=5 Son/Daughter-in-law=6 Grandchild=7 Brother/sister-in-law=8 Other relative=9 Non-relative=10	What is the HH members marital status? Unmarried=1 Married=2 Separated=4 Divorced=4 Widow/Widower=5	Is male or female? Male=1 Female=2	Age	
				Year(s)	Month(s)
01					
02					
03					
04					
05					

2b.) If there are children <5 years of age in the household, were any ever breastfed? (No=0; Yes=1) - _____

2c.) If yes, please tell me what the youngest child was fed during weaning: _____

2d.) Does the household own any animals/livestock or poultry? (Yes=1, No=0) _____

2e.) What livestock or poultry does the household currently own and how many?

Livestock	Total Number Owned
Cattle	
Goat/Sheep	
Pigs	
Donkey/Horses	
Poultry (ex: Chicken, ducks)	
Rabbit	

2f.) Before this growing season, did you or your household plant and/or grow any crops? (Yes=1, No=0)

2g.) If yes, where did you plant the crops?

- Land that was leased Community Garden
- Land owned by the household Other: _____

2h.) If you watered your crops during the growing seasons, where did you get your water from?

- Well Borehole Rain water
- Pond/lake/dam River/spring/stream Supply/Piped Water
- Other (specify): _____

2i.) How far a walk is the water source from your household?

- Inside the house
- 0-5 minute walk from house
- 6-15 minutes walk from house
- 16-60 minutes walk from house
- >60 minutes walk from house

Comments: _____

SECTION 3: BENEFICIARY CHARACTERISTICS

3a.) If known, how many household members (including beneficy(ies)) are HIV positive?: _____

3b.) Are any of the household members currently taking ARVs? (No=0, Yes=1) _____

3c.) If yes, how many household members are currently taking ARVs? _____

SECTION 4: QUESTIONS FOR THE RESPONDENT

INSTRUCTIONS—The beneficiary (person(s) who received the seeds in the household) should respond to the remaining questions unless they are under the age of 18. If this is the case, the person responsible for the seeds should respond to the remaining questions.

ID number (from 2a) of respondent: _____

4a.) Did you or anyone in the household attend/go to any of the group meetings that taught about how and when to plant the seeds? (No=0, Yes=1): _____

4b.) If yes, where were the group meetings attended? (1=Health Post Community Garden, 2=Macha Hospital Health Post, 3=Other): _____

4c.) How many group meetings were attended? _____

Report in table below:

4d.) Which of these seeds did the beneficiary receive?

4e.) Once the seeds were received, what was done with them?

Seed Type	Seeds Received? <i>No=0</i> <i>Yes=1</i>	Use of seeds (can have >1 use) <i>Planted seeds=1</i> <i>Ate seeds=2</i> <i>Sold or traded seeds=3</i> <i>Gave seeds away=4</i> <i>Fed seeds to livestock/poultry=5</i> <i>Did nothing with seeds=6</i>
Rape		
Chinese cabbage		
Cabbage		
Groundnuts MG4		
Groundnuts Natal Com		
Cowpeas		
Sorghum		
Green Pepper		
Carrot		
Pumpkin		
Okra		
Chilli Pepper		
Onion		
Green Beans		
Cauliflower		
Beet Root		

Comments: _____

INSTRUCTIONS—Based on response to 4e.), go to the corresponding section. If more than one use was reported, go to ALL appropriate sections.

If respondent reported:

- *Planted, go to SECTION 5*
- *Ate the seeds, go to SECTION 6*
- *Sold or traded seeds, go to SECTION 7*
- *Gave them away, go to SECTION 8*
- *Fed crops to livestock/poultry or Did nothing with seeds, go to PART B: Section SECTION 5: PLANTED SEEDS*

INSTRUCTIONS—Skip this section if respondent did not report planting seeds
Report answers in table below:

- 5a.) If planted, which seeds were planted and which were harvested?
- 5b.) If the crops produced harvest, how were the crops used?

Seed Type	Planted <i>No=0 Yes=1 *From previous page*</i>	Harvested <i>No=0 Yes=1</i>	Use of Crops (can be >1 use) <i>Ate crops=1 Dried or preserved crops=2 Sold or traded crops=3 Gave crops away=4 Fed crops to livestock/poultry=5 Did nothing with crops=6</i>
Rape			
Chinese cabbage			
Cabbage			
Groundnuts MG4			
Goundnuts Natal Com			
Cowpeas			
Sorghum			
Green Pepper			
Carrot			
Pumpkin			
Okra			
Chilli Pepper			
Onion			
Green Beans			
Cauliflower			
Beet Root			

Comments: _____

INSTRUCTIONS—Based on response to 5b.), go to the corresponding section. If more than one use was reported, go to ALL appropriate sections.

If respondent reported:

- *Ate the seeds, go to SECTION 6*
- *Sold or traded seeds, go to SECTION 7*
- *Gave them away, go to SECTION 8*
- *Fed crops to animals or Did nothing with crops, go to PART B: Section 9*

SECTION 6: SEEDS OR CROPS CONSUMED

INSTRUCTIONS—Skip section if beneficiary did not report eating seeds or crops

6a.) Who were the seeds or harvested crops eaten by?

Consumed by	<i>No=0 Yes=1</i>
Beneficiary	
Head of Household	
Children under 5 in household	
Children 5-18 in household	
Other women in household	

Other men in household	
Relative who does not live in household	
Friends or neighbors who do not live in household	

6c.) Besides your own production, what are the other sources of food for your household?

Food Source	No=0 Yes=1
Purchase food at a market	
Food Aid	
For Children under 2: Breastmilk	
For Children under 2: Formula	
Gift from family and/or relatives	
Hunting and gathering wild food	
Grain Bank	
Other (specify): _____	

Comments: _____

If completed all sections reported:

➤ Go to PART B: Section 9

SECTION 7: SALE OF SEEDS OR CROPS

INSTRUCTIONS--Skip this section if beneficiary did not report selling seeds or crops

7a.) If sold, what was the money used for?

Uses of money	No=0 Yes=1
Health Care costs (e.g. medications, hospital visits)	
Child-related costs not health care related (e.g. school supplies, special foods)	
Travel costs (e.g. to hospital, market, school)	
Non-Food Purchases	
Food items	
Housing costs	
Given away or used to buy gifts	
To Pay back debt	
Other (specify) _____	

7b.) If traded, what were the seeds or crops exchanged for?

Exchanged For	No=0, Yes=1
Health Care costs (e.g. medications, hospital visits)	
Child-related costs (e.g. school supplies, special foods)	
Travel costs (e.g. to hospital, market, school)	
Non-Food Purchases	

Environmental Problems with seeds or crops:

PROBLEM	EXPERIENCED (No=0, Yes=1)
Plant disease, pests or animal damage	
Low Production	
Flooding or drought (<i>circle which one</i>)	
Water source too far from household	
Poor or not enough soil	
No access to or not enough land	
Seeds competing with other crops	
Other (please specify): _____	

Comments: _____

Appendix C - Example of Oral Informed Consent

**Preliminary Survey of Food Security and Maternal and Child Health in Maai Mahiu
Kenya**

Detailed Narrative of the Oral Informed Consent
Maelezo kamili kuhusu makubaliano na mshiriki

Hamujambo! Jina langu ni Valerie. Mimi ni mwanafunzi Katika Chuo Kikuu cha Kitaifa cha Kansas State University inchini marekani, ambapo ninakisomea masomo ya kiafya yaani public health.

Nyote mnakaribishwa kushiriki katika uchunguzi inayohusu vyakula unavyokula, mbinu au njia za kilimo, na vile unavyowalisha watoto wako. Ningependa kukuuliza maswali kuhusu vyakula vyenu, unavyowalisha watoto wako, ikiwa unazo ardhi au eneo ya kukuza mimea, na kadhalika sitakuuliza maswali yoyote kuhusu sababu ya kuja kuona daktari au muuguzi leo.

Greetings! My name is Valerie and I am a graduate student studying public health and nutrition at Kansas State University in the United States. You are invited to participate in a research study about the food that you eat, your agricultural practices, and the way that you feed your children. I would like to ask you questions about your diet, what you feed your children, if you have land available to you where you could grow food, and other related questions. I will not ask you any questions about why you are here to see the doctor or nurse today.

Nitakuuliza maswali au kukupa makaratasi zilizochapishwa ili uweze kujaza kabla ya kuona daktari au baada ya kunuwona. Maswali haya yatachukua kama dakika kumi na tano au ishirini pekee kumaliza. Maswali haya yataulizwa pasipo na wengine ili kuhifadhi siri zako. Kushiriki kwako katika uchunguzi huu ni kwa hiari na unaweza kujiondoa wakati wowote, unaweza pia kuamua kutojibu swali. Ikiwa hutajiskia kujibu tafadhali unapashwa kufahamu kwamba kushiriki kwako katika uchunguzi huu haitabadilisha huduma utakayopata katika zahanati hii ya Tree Maai Mahiu. Ushiriki au ushiriki, bado utapewa haduma ya afya bila malip yoyote.

I will give you the survey now (either here in line or after you finish your meeting with the doctor). If you agree to participate, the survey should only take about 15-20 minutes to complete. It will involve me asking you a series of simple questions and you giving responses based on your experiences. We will move away from other patients, if possible, to protect your privacy. Your participation in this survey is voluntary and you may choose to withdraw your consent or stop participating in the survey at any time. You may also choose not to answer any question if you feel uncomfortable. Please know that your participation in the survey will not impact your health care here at the Free Maai Mahiu Clinic. Whether or not you participate in this survey, you will still receive free health care.

Uhifadhi wa Siri

Ukikubali kushiriki katika uchunguzi huu, lolote utakalosema au majibu yote utakayatoa yatahifadhiwa na hayatatolewa kwa mtu yeyote. Majina zenu hayatambatanishwa na majibu muliyotoa katika uchunguzi huu. Mkubwa wangu hapa na yule aliye katika chuo cha Kansas State University ndio watakaoviona makaratasi haya baada ya kuvikamilisha.

Confidentiality

If you agree to take part in this research study, your personal information will not be given to anyone. I will keep your information private and your name will not be attached to the answers that you give for the survey. Only the investigator and my advisor at Kansas State University will have access to these documents after

Malipo

Ninakushukuru sana kwa wakati wako uliutumia kujibu maswali haya. Hakuna malipo yoyote utapat katika kashiriki.

Payment

I appreciate your time to take the survey, but you will not be paid for your participation in the study.

Namna au mbinu nyinjine

Kwa vile kushiriki ni kwa hiari, unaweza pia kuamua kutoshiriki katika uchunguzi huu.

Alternative

Since participation in this study is optional, an alternative is not to participate in this study.

Manufaa

Hakuna manuufaa utapata moja kwa moja kutokana na kushiriki katika somo hili. Tutakayojifunza hapa itatunika katika kuimarisha afya ya watoto na wakiuamama na hali ya kujitashleza na chakula na utumiaji wa ardui katika eueo ya Maai Mahiu.

Benefits

There is no direct benefit to you or your household for participating in the study. The information will be used to improve general knowledge about maternal and child health, food security, and access to land in Maai Mahiu.

Hasara

Kwa vile kuna uwezekano wa kusikizwa kwa yale unayosema au majibu yako na watu wengine, siri yako inaweza kujulikana na wengine.

Risks

There is a potential risk of loss of confidentiality for you if you participate in the survey because someone may overhear your responses to the questions.

Anwani

Nitakupa anwani yaugu ili ukiwa na swali unaweza kuwasiliana nami kuhusu uchunguzi huu. Asante Kwa Kushiriki!

Contact

I will provide you with my contact information so that you may contact me if you have any questions about this study.

Thank you for participating!

Toa karatasi lingine lenye anwani kwa washirik, liwe na anwani na pia yafuatayo.

Hand out a separate contact sheet to subjects, which includes the following contact information:

Habari ikiwa uuayo maswali kuhusu uchunguzi huu:

Information if you have questions about the study:

Maswali Malalmishi

Ukiwa na swali lolote, malalmishi, au pendekezo kuhusu uchunguzi huu, mbinu yake, hatari na manufaa, au mbiuu uyingiue ya matibabu, unaweza kuwasiliana na mchuujuzi mshiriki (Valerie Stull) inchini Kenya. Unaweza pia kuwasiliana naye inchini Marekani Kupitia nambari ya simu +1-303-579-8389 au kupitia barua pepe vjstull@ksu.edu.

- Questions, Concerns, or Complaints:
 - If you have any questions, concerns or complaints about this **research study**, its procedures, risks and benefits, or alternative courses of treatment, you should ask the Co-Investigator (Valerie Stull) in Kenya. You may also contact her in the United States at +1-303-579-8389 or by e-mail at vjstull@ksu.edu

Ikiwa hautaweza kumfikia kupitia kwa anwani iliyo hapo juu, tafadhali jaribu kupitia Mrs. Sandy Procter kupitia nambaria ya simu +1-785-532-1675.

- Alternate Contact:
 - If you cannot reach the Co-Investigator, please contact Sandy Procter at +1-785-532-1675.

Uhuru wa kikundi cha uchunguzi:

Ikiwa haujatoshelezwa na mbiuu ya uchunguzi huu, au ikiwa unayo maswali, malalamishi, pendekezo, au swali lolote kwa jumla kuhusu haki yako kama mshiriki, tafadhali wasiliana na Kansas State University IRB:

- Independent of the Research Team Contact:
 - If you are not satisfied with the manner in which this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a research study subject, please contact the Kansas State University IRB:
 - **Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.**
 - **Jerry Jaax, Associate Vice Provost for Research Compliance and University Veterinarian, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.**

Appendix D - Results Tables

Table D-1 Food Security (FAST) Tool and Responses

Question*		1. How often did the participant eat three 'square meals' (full stomach meals) a day in the past 12 months (year)?	2. In the last 12 months, how often did you or any of your family have to eat another food or product although you wanted to eat corn? ^a	3. In the last 12 months how often did you yourself skip entire meals due to scarcity of food?	4. In the past 12 months how often did you personally eat less food in a meal due to scarcity of food?	5. In the past 12 months how often did the food stored in your home run out and there was no money to buy more food?	6. In the past 12 months how often did you worry about where food would come from?	7. In the past 12 months, how often did you family purchase corn?	8. In the past 12 months how often did your family take food ^b on credit (or loan) from a local shop?	9. In the past 12 months how often did your family have to borrow food ^c to make a meal?
Response Options (RO)		1. Mostly (3 meals each day) 2. Often (3 at least a few times each week) 3. Sometimes (3 per day 7-12 times this year) 4. Rarely (3 per day only 1-6 times this year) 5. Never	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times this year) 4. Often (a few times each month) 5. Mostly (most days/weeks)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times this year) 4. Often (a few times each month) 5. Mostly (most days/weeks)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times this year) 4. Often (a few times each month) 5. Mostly (most days/weeks)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times this year) 4. Often (a few times each month) 5. Mostly (most days/weeks)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times this year) 4. Often (a few times each month) 5. Mostly (most days/weeks)	1. Never 2. Rarely (once every few months last year) 3. Sometimes (a few times each month) 4. Often (every week) 5. Mostly (every day)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times a year) 4. Often (a few times each month) 5. Mostly (this happens a lot)	1. Never 2. Rarely (only 1-6 times this year) 3. Sometimes (7-12 times a year) 4. Often (a few times each month) 5. Mostly (this happens a lot)
CTC COMMUNITY GARDEN PROJECT										
Mean Response		4.27	3.80	1.07	1.07	4.20	4.53	3.87	4.13	3.53
Percent of Participants who selected each Response Option (RO)	RO1	6.7	6.7	93.3	93.3	6.7	0.0	0.0	6.7	20.0
	RO2	6.7	20.0	6.7	6.7	6.7	0.0	0.0	6.7	6.7
	RO3	6.7	33.3	0.0	0.0	46.7	0.0	20.0	46.7	53.3
	RO4	13.3	40.0	0.0	0.0	40.0	46.7	73.3	40.0	20.0
	RO5	66.7	6.7	0.0	0.0	6.7	53.3	6.7	6.7	20.0

PRELIMINARY SURVEY OF FOOD SECURITY IN MAAI MAHIU, KENYA

Mean Response		3.61	3.72	3.14	3.02	3.34	3.88	3.98	3.66	2.96
Percent of Participants who selected each Response Option (RO)	RO1	18.0	12.0	28.0	34.0	20.0	12.0	4.0	22.0	34.0
	RO2	20.0	4.0	10.0	8.0	2.0	2.0	6.0	2.0	4.0
	RO3	2.0	8.0	8.0	4.0	16.0	6.0	16.0	6.0	12.0
	RO4	58.0	52.0	28.0	30.0	48.0	46.0	36.0	28.0	32.0
	RO5	18.0	24.0	28.0	24.0	14.0	34.0	38.0	42.0	18.0

^aNote: Participants were asked not to consider times when they personally or a family members was sick.

^b Corn Beans, Etc.

^cBorrow food from relatives or neighbors

*Coates, J., P. Webb, and R. Houser. (2003). Measuring Food Insecurity: Going Beyond Indicators of Anthropometry. Washington, D.C., Food and Nutrition Technical Assistance Project, Academy for Educational Development

Table D-2 HelpMercy Nutrition and Food Security Project: Uses of Seeds Distributed

Seed/Crop Type (N= number of beneficiaries who received seeds)	Seed Uses: Percent who Planted	Percent who ate	Percent who did nothing with/still have seeds	Percent who gave away	Percent who saved some and planted some	Harvest: Percent who <i>did not</i> get a crop but planted seeds
Rape (57)	84.2	0	0	1.8	14	8.9
Ground Nuts (55)	96.4	1.8	0	0	1.8	22.6
Chinese Cabbage (56)	82.1	0	3.6	1.8	12.5	3.8
Cabbage (52)	84.6	0	5.8	1.9	7.7	25.5
Cowpea (52)	94.2	1.8	0	0	3.8	35.4
Sorghum (53)	84.9	0	9.4	3.8	1.9	75.6
Green Pea (38)	71.1	0	28.9	0	0	24
Carrot (54)	81.5	0	9.3	0	9.3	10
Pumpkin (11)	90.9	0	9.1	0	0	20
Okra (38)	92.7	0	7.3	0	0	1.6
Chile Pepper (48)	66.7	0	25	0	8.3	15.6
Onion (56)	83.9	0	7.1	1.8	7.1	9.8
Green Bean (53)	84.9	0	11.3	0	3.8	19.6
Cauliflower (35)	65.7	0	34.3	0	0	30.4
Beet Root (30)	45.3	0	18.8	0	1.6	44.3
<i>AVERAGE</i>	<i>80.6</i>	<i>0.24</i>	<i>11.3</i>	<i>0.74</i>	<i>4.8</i>	<i>23.1</i>

Appendix E - Qualitative Data Codebook

**Coding Tree Developed for Qualitative Analyses of Beneficiary Responses, Focus
Groups, and Interviews**

Parent and Child Nodes Established:

Intervention (location)

- Zambia
- Kenya

Gender [of Respondent]

- Male
- Female

[Perception of] Education

- Positive
- Negative

[Perceptions of] Barriers

- Water
- Financial
- Pests
- Resources
- Project Staff
- Lack of trust
- Distance/Location
- Illness

[Perceptions of] Benefits

- Education
- Health
- Diet
- Community
- Financial
- Water

Node/Code Label/Definition/Search Results

(1) /Location	(1)	11/12/2009								
(1 1) /Location/Zambia	(1 1)									
No	26647	192	1	2	0	0	0	0	0	0
(1 1 1) /Location/Zambia/Focus Group										
No	606	31	1	1	0	0	0	0	0	0
(1 1 2) /Location/Zambia/Survey Responses	(1 1 2)									
No	25278	137	1	1	0	0	0	0	0	0
(1 1 3) /Location/Zambia/CG Interview	(1 1 3)									
No	763	25	1	1	0	0	0	0	0	0
(1 2) /Location/Kenya	(1 2)	11/12/2009								
No	15679	128	1	1	0	0	0	0	0	0
(1 2 1) /Location/Kenya/Survey Responses										
No	6353	35	1	1	0	0	0	0	0	0
(1 2 2) /Location/Kenya/Rocky Interview	(1 2 2)									
No	7545	58	1	1	0	0	0	0	0	0
(1 2 3) /Location/Kenya/Focus Group	(1 2 3)									
No	1744	29	1	1	0	0	0	0	0	0
(2) /Beneficiary Gender	(2)									
No	0	0	0	0	0	0	0	0	0	0
(2 1) /Beneficiary Gender/Female	(2 1)	11/								
No	25405	185	1	28	0	0	0	0	0	0
(2 2) /Beneficiary Gender/Male	(2 2)									
No	16624	119	1	24	0	0	0	0	0	1
(3) /Perception of Education	(3)									
No	0	0	0	0	0	0	0	0	0	0
(3 1) /Perception of Education/Positive Learning	(3 1)									
No	5039	42	1	26	0	0	0	0	0	1
(3 10) /Perception of Education/Negative or Lack of Education	(3 10)									
No	3021	20	1	21	0	0	0	0	0	0
(4) /Perceived Barriers	(4)									

No	0	0	0	0	0	0	0	0	0
(4 1) /Perceived Barriers/Water				(4 1)					
No	6915	41	1	39	0	0	0	0	0
(4 2) /Perceived Barriers/Financial				(4 2)					
No	1897	11	1	14	0	0	0	0	0
(4 3) /Perceived Barriers/Pests				(4 3)					
No	5252	45	1	32	0	0	0	0	1
(4 4) /Perceived Barriers/Resources				(4 4)					
No	1776	14	1	13	0	0	0	0	0
(4 5) /Perceived Barriers/Project Staff				(4 5)					
No	731	4	1	5	0	0	0	0	0
(4 6) /Perceived Barriers/Distance~Location				(4 6)					
No	1628	8	1	8	0	0	0	0	0
(4 7) /Perceived Barriers/Crop Distribution				(4 7)					
No	584	5	1	5	0	0	0	0	0
(4 8) /Perceived Barriers/Lack of Trust				(4 8)					
No	1082	3	1	5	0	0	0	0	0
(4 9) /Perceived Barriers/Illness				(4 9)					
No	794	7	1	8	0	0	0	0	1
(5) /Perceived Benefits				(5)					
No	0	0	0	0	0	0	0	0	0
(5 1) /Perceived Benefits/Education				(5 1)					
No	1007	7	1	7	0	0	0	0	0
(5 2) /Perceived Benefits/Health				(5 2)					
No	783	2	1	2	0	0	0	0	0
(5 3) /Perceived Benefits/Diet(5 3)									
No	777	3	1	3	0	0	0	0	0
(5 4) /Perceived Benefits/Community				(5 4)					
No	1248	11	1	12	0	0	0	0	0
(5 5) /Perceived Benefits/Financial				(5 5)					
No	2387	38	1	37	0	0	0	0	0

(5 6) /Perceived Benefits/Crop Distribution	(5 6)									
No	0	0	0	0	0	0	0	0	0	0
(6) /Seed Types or Seeds	(6)									
No	6207	30	1	30	0	0	0	0	0	0
(7) /Search Results	(7)									
No	0	0	0	0	0	0	0	0	0	0
(7 1) /Search Results/Intersection	(7 1)									
No	0	0	0	0	0	0	0	0	0	0
(7 1 1) /Search Results/Intersection/WaterKSurvey	(7 1 1)									
No	799	6	1	7	0	0	0	0	0	0
(7 1 2) /Search Results/Intersection/KSurvey	(7 1 2)									
No	0	0	0	0	0	0	0	0	0	0
(7 1 2 1) /Search Results/Intersection/KSurvey/Water	(7 1 2 1)									
No	799	6	1	7	0	0	0	0	0	0
(7 1 2 2) /Search Results/Intersection/KSurvey/financial	(7 1 2 2)									
No	1413	5	1	11	0	0	0	0	0	0
(7 1 2 3) /Search Results/Intersection/KSurvey/Resources	(7 1 2 3)									
No	459	4	1	4	0	0	0	0	0	0
(7 1 2 4) /Search Results/Intersection/KSurvey/distance	(7 1 2 4)									
No	313	3	1	3	0	0	0	0	0	0
(7 1 2 5) /Search Results/Intersection/KSurvey/projectstaffandlackoftrust	(7 1 2 5)									
No	166	1	1	1	0	0	0	0	0	0
(7 1 2 6) /Search Results/Intersection/KSurvey/prb	(7 1 2 6)									
No	0	0	0	0	0	0	0	0	0	0
(7 1 2 6 1) /Search Results/Intersection/KSurvey/prb/projstaff	(7 1 2 6 1)									
No	348	2	1	3	0	0	0	0	0	0
(7 1 2 7) /Search Results/Intersection/KSurvey/pbarrier	(7 1 2 7)									
No	0	0	0	0	0	0	0	0	0	0
(7 1 2 7 1) /Search Results/Intersection/KSurvey/pbarrier/trust	(7 1 2 7 1)									
No	1082	3	1	5	0	0	0	0	0	0
(7 1 3) /Search Results/Intersection/kfocus	(7 1 3)									

No	0	0	0	0	0	0	0	0	0	
(7 1 3 1) /Search Results/Intersection/kfocus/financial							(7 1 3 1)			
No	222	4	1	2	0	0	0	0	0	
(7 1 4) /Search Results/Intersection/ksurvresources							(7 1 4) 11/14/2009			
No	459	4	1	4	0	0	0	0	0	
(7 1 5) /Search Results/Intersection/kfgpbarresources							(7 1 5)			
No	254	2	1	2	0	0	0	0	0	
(7 1 6) /Search Results/Intersection/fgbeneducation							(7 1 6)			
No	60	1	1	1	0	0	0	0	0	
(7 1 7) /Search Results/Intersection/kfgcommunity							(7 1 7)			
No	223	3	1	3	0	0	0	0	0	
(7 1 8) /Search Results/Intersection/ksurveyeducation							(7 1 8)			
No	94	2	1	2	0	0	0	0	0	
(7 1 9) /Search Results/Intersection/ksruveycommunity							(7 1 9)			
No	208	2	1	3	0	0	0	0	0	
(7 1 10) /Search Results/Intersection/surveykposlearning							(7 1 10)			
No	1361	18	1	4	0	0	0	0	0	
(7 1 11) /Search Results/Intersection/kfgposlearning							(7 1 11)			
No	315	5	1	4	0	0	0	0	0	
(7 1 12) /Search Results/Intersection/zambposeducation							(7 1 12)			
No	2711	15	1	15	0	0	0	0	0	
(7 1 13) /Search Results/Intersection/zambiasurveynegedu							(7 1 13)			
No	2456	18	1	19	0	0	0	0	0	
(7 1 14) /Search Results/Intersection/zamwater							(7 1 14)			
No	4208	29	1	29	0	0	0	0	0	
(7 1 15) /Search Results/Intersection/zambpests							(7 1 15)			
No	4948	31	1	31	0	0	0	0	0	
(7 1 16) /Search Results/Intersection/zampests							(7 1 16)			
No	4948	31	1	31	0	0	0	0	0	
(7 1 17) /Search Results/Intersection/zamresources							(7 1 17)			
No	692	6	1	6	0	0	0	0	0	

(7 1 18) /Search Results/Intersection/zamillness	(7 1 18)								
No	794	7	1	8	0	0	0	0	0
(7 1 19) /Search Results/Intersection/zamdistance	(7 1 19)								
No	1217	4	1	4	0	0	0	0	0
(7 1 20) /Search Results/Intersection/zamcropdis	(7 1 20)								
No	49	1	1	1	0	0	0	0	0
(7 1 21) /Search Results/Intersection/zamprojectstaff	(7 1 21)								
No	383	2	1	2	0	0	0	0	0
(7 1 22) /Search Results/Intersection/zambeneduc	(7 1 22)							11/14/2009	
No	853	4	1	4	0	0	0	0	0
(7 1 23) /Search Results/Intersection/zamhealth	(7 1 23)								
No	783	2	1	2	0	0	0	0	0
(7 1 24) /Search Results/Intersection/zamdiet	(7 1 24)								
No	777	3	1	3	0	0	0	0	0
(7 1 25) /Search Results/Intersection/zamcommunity	(7 1 25)								
No	817	6	1	6	0	0	0	0	0
(7 1 26) /Search Results/Intersection/zambenfinancial	(7 1 26)								
No	2312	36	1	36	0	0	0	0	0
(7 2) /Search Results/Intersection 2									
