CONTRIBUTION OF TISSUE CULTURE BANANAS ON QUALITY OF LIFE OF THE COMMUNITY: A CASE OF ABOGETA EAST DIVISION, IMENTI SOUTH DISTRICT, KENYA

BY

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DECLARATION

I declare that the work contained in this research report is my original work and has not been presented in any other university or institution of higher learning for an award of a degree.

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This project report has been submitted with my approval as University Supervisor.

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DEDICATION

I dedicate this research report to my family, loving husband Gatobu and dear daughters Kagwiria, Nkatha and Kinya.

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ABSTRACT

Tissue culture (TC) bananas are a recent form of biotechnology which aims at providing clean and disease-free planting materials that matures fast, are disease resistant and produce bigger fingers. These were introduced in response to the decline in banana production due to infestation of the traditional banana varieties by pests and diseases in the 1990's. TC bananas are an important horticultural crop in terms of its present and potential contributions.

This study sought to assess the contribution of Tissue Culture Bananas on the Quality of Life of the Community: A case of Abogeta East Division, Imenti South District. Since the division is endowed with natural resources and has a great potential for high quality crops, the study assessed the contribution of food security, health, income and employment on the quality of life of the community.

The study was descriptive survey research and used proportional random sampling technique to get the sample size of the respondents. It targeted nine farmers' groups involved in growing TC bananas in Abogeta East division. A sample size of 50 respondents was selected for the study. Data was collected using questionnaires. It was then analyzed using descriptive statistics such as frequencies and percentages. Data has been presented using frequency tables which have been interpreted.

The study indicated that TC bananas have contributed mainly to increased source of food, improved health, increased family income and source of employment. The farmers had enough to eat, preserve in the store and sell the surplus to gain income. The increased income as a result of sales or employment has led to improvement of other quality of life indicators such as starting other income generating projects, paid fees for their children, improved health and installed piped water. In a smaller extent they have contributed to improved infrastructure and improved security in the community. The groups of people that have benefited most from TC bananas are women (83%), youth (63.8%), men (57.5) and children (27.7%). Thus TC bananas have been a weapon to fight poverty and improve the quality of life of the community.

Finally recommendations have been made to TC banana coordinators, policy makers and areas of further research.

TABLE OF CONTENT

CHAPTER THREE: RESEARCH METHODOLOGY

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

ABBREVIATIONS AND ACRONYMS

ABF	Africa Bio-tech Foundation
ABL	Aberdare Technology Limited
AIDS	Acquired Immune Deficiency Syndrome
AHBFI	Africa Harvest Biotechnology Foundation International
ASALs	Arid and Semi Arid Lands
CBOs	Community Based Organizations
FAO	Food Agricultural Organization
GTL	Genetic Technology Limited
HIV	Human Immunodeficiency Virus
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
IIRR	International Institute of Rural Reconstruction
ISAAA	International Service Acquisition of Agri-biotech Application
ISBRC	Imenti South Banana Resource Centre
JKUAT	Jommo Kenyatta University of Agriculture and Technology
KARI	Kenya Agricultural Research Institute
KSPFS	Kenya Special Program for Food Security
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
NGOs	Non Governmental Organizations
RF	Rockfeller Foundation
TC	Tissue Culture
UN	United Nations
USA	United State of America
USDA	United States Department of Agriculture

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Bananas are grown across the world's Tropical regions. They are grown in a wide range of agro-ecosystems, from sea level up to around 1800 meters and generally in areas of high rainfall (greater than 1000mm per annum). The crop is the worlds' third most important starchy food crop after cassava and sweet potatoes (FAO, 1987). Bananas are a major food crop in developing countries and an important export crop in industrial countries. Its production in the world are 49.63 million tons of which 6.44 million is grown in Africa, 20.3 million in Asia, 13.3 million in South America, 1.5 million in Oceania, 7.66 million in central America and 0.42 million in Europe (NIBAP 1991:Robinson, 1996).

According to Wambugu and Kiome (2001), Africa is a major producer of bananas, contributing 35 percent of world production. Bananas are particularly important in East Africa. For example, East Africa produces over half of Africa's banana crop and it is a staple food and source of income for an estimated 20 million people (Smith, 2007). Uganda produces 10.5 million tons of banana each year, around 450 kilograms per person and the word for bananas '*matooke*' also means food. But the livelihood and food security of farmers who depends on the crop is threatened by declining soil fertility and increase in pests and diseases. The majority of bananas grown worldwide are as a result of farmers' selections rather than breeding programmes. In Uganda TC bananas, an improved variety was disseminated in an effort to improve the incomes of small-scale farmers (Bio-diversity Annual Report, 2008).

In Kenya banana is an important horticultural crop in terms of its present and potential contribution to food security and income enhancement of small landholders. Bananas cover around 1.7 percent of Kenya's arable land, an area equivalent to 80000 hectares. The crop is predominantly grown by small-scale farmers (mainly women) who have an average banana holding of 0.3 hectares. Different local as well as imported varieties are grown, some of which are used exclusively for cooking purposes. Banana is never the

primary crop in Kenya and is usually one of the several livelihood activities that households engage in. It is seen as a security crop that provides a more or less continuous income flow throughout the year, even under low input regimes (Qaim, 1999).

Under optimum conditions, bananas can perform better than other crops in terms of yield per hectare. The continuous availability of harvestable bunches from a banana orchard contributes greatly to year round food and income security (Africa Harvest, 2008).

Table 1.1 shows the area in hectares and crop production in tons in Imenti South District (2007-2009).

Table 1.1 Area and Crop Production Trends in Imenti South District

Crop area (ha.)				**Production(tons)**		
	2007	2008	2009	2007	2008	2009
Tomatoes	102	115	118	1332	1196	1239
Irish potatoes	352	294	342	369.3	319	388.8
Bananas	589	481	636	6823	4862	7123
Sweet potatoes	36.4	34.5	384	476.2	276	499.2
Mangoes	81	292	197	1595	1533	1708
Cabbages	141.7	143.1	150	1310	1431	1650

Source: MOA, 2009

According to Table 1.1 bananas are an important food crop compared to other crops grown in Imenti South district. The production of bananas has been on the increase since 2007.

Table 1.2 shows that banana is a crop grown in all the eight provinces in Kenya.

Table 1.2 Distribution of banana, area and production in tons (2004)

Province	Area (%)	Production (tons)
Central	19	15.8
Coast	8.7	5.2
Eastern	11.7	8.5
Western	14.4	14.1
Nyanza	42.1	51.5
Rift valley	3.5	43
Nairobi	0.1	Less than 0.05
North eastern	0.5	0.6
Total	100	100

Source: Provincial Reports Ministry of Agriculture 2003 /4 (MOA, 2005)

According to the Table 1.2, Nyanza province is the main banana growing province while Eastern Provinces is the third banana growing province in Kenya.

Traditional practices in banana production have been a major cause of declining banana production in the 1980's and 1990's. (KARI) and several Non-Governmental Organizations (NGOs) have been in the forefront promoting adoption of tissue culture bananas since 1997. Tissue culture banana, popularly known as TC banana is the simplest form of bio-technology and consists of using parts of a plant and placing it in sterile nutrient medium where it multiplies. The main aim is to provide clean and disease – free planting materials (Muyanga, 2008). TC bananas improves productivity in the short term while maintaining the productivity of the agricultural resource-base for the future generations. Growing TC bananas entails avoidance of chemical inputs and reliance on locally available organic manure thus protecting nature (Njoroge and Manu, 1999).

Farmers are increasingly taking to banana tending following the introduction of TC bananas a variety that matures fast, is disease resistant and produces bigger fingers. For instance, growing of TC bananas would reduce post harvest loss and increase crop's

resistance to drought. The TC banana project almost doubled the number of new farmers from 3,500 in 2007 to 6000 farmers in 2008 (Africa Harvest, 2009).

According to the Ministry of Agriculture (2005), the area under TC bananas rose to 82,000 hectares in 2006 from 43000 hectares in 1996. The overall adoption of TC bananas by rural communities in 2008 was about 59.8 million hectares.

Providing a better and higher quality of life is the basis upon which all the blue prints of development are built. In an effort to improve the quality of life all the citizens, the Kenya government has been employing various strategies such as developing the Vision 2030, which is the new country's long term development blue print covering the period 2008 to 2030. The Vision aspires to meet the Millennium Development Goals (MDGs) for Kenya by 2015. Agriculture has been identified as one of the key drivers in the Vision 2030. Agricultural growth is critical to Kenya's overall development including the achievement of MDGs of reducing poverty and malnutrition and has become commonly accepted as a framework for measuring progress in development (Government of Kenya, 2008).

Abogeta East division, Imenti South District, is endowed with natural resources and has the potential for high quality crops. The district strives to undertake various programs and projects in an effort to reduce poverty and attain sustainable development, that is, increase rural income through increased food production. It is believed that this would improve the incomes of the farmers particularly the poor. Increased production to provide food for the population will require intensive exploitation of natural resources often times destabilizing the environment. There are private sector agencies (NGOs) and CBOs involved in food production (Meru Central District Development Plan, 2002-2008). For instance, Africa Harvest introduced TC bananas in partnership with TechnoServe in the division. This study was to assess the contribution of TC bananas on the quality of life of the community: A case of Abogeta East Division, Imenti South District, Kenya.

1.2 Statement of the Problem

Recently Tissue culture bananas have been recognized as a priority crop in Kenyan agricultural research. Wambugu *et al* (2000) asserts that bananas have become increasingly costly and no longer serves as a ready supply of highly nutritious food and cash earner for the Kenyan population, particularly women. The introduction of TC bananas was recognized as having the greatest potential to help reverse the situation (Karembu, 2002).

Increasing banana production has the potential to improve the quality of life of the community, while making staple food more affordable for the urban poor. The surplus income created by TC banana farming is likely to lead to increase in demand for other goods and services, exerting positive effect on the whole economy (Wambugu and Kiome, 2001).

The importance of bananas in tackling the problems of food insecurity, malnutrition and poverty in Kenya was recognized by donors ten years ago. The government and private sector agencies (NGOs) have resulted in several initiatives aimed to address the constraints facing banana producers (Africa Harvest, 2009). Indeed TC banana is key food stuff in Abogeta East Division, but little is known of its relationship to the quality of life in terms of food security, health, income and employment.

Thus this study sought to assess the contribution of TC culture bananas on the quality of life of the community in order to improve policies aimed at enhancing the growth of tissue culture innovation in banana growing.

1.3 Purpose of the Study

The study intended to assess the contribution of tissue culture bananas on quality of life of the community: The case of Abogeta East Division, Imenti South District, Kenya.

1.4 Research objectives

The study was based on the following objectives:

1. To determine the contribution of food security arising from TC bananas on the quality of life of the community.
2. To assess the contribution of health arising from eating TC bananas on the quality of life of the community.
3. To establish the contribution of income generated by TC bananas on the quality of life of the community.
4. To identify the contribution of employment by TC bananas on the quality of life of the community.

1.5 Research Questions

The research sought to answer the following questions:

1. How does food security arising from TC bananas contribute to quality of life of the community?
2. To what extent does health arising from eating TC bananas contribute to quality of life of the community?
3. To what extent does income from TC bananas contribute to the quality of life of the community?
4. What is the contribution of employment by TC bananas on the quality of life of the community?

1.6 Significance of the Study

The information gathered in the study would be helpful to Africa Harvest, the private organization which initiated TC bananas, in determining whether the project's objective which is to reduce poverty, hunger and malnutrition has been met or not. In addition, the report would be useful in initiating future projects, that is, future projects will be modified or replicated.

The research report will be useful to the Ministry of Planning and National Development (Kenya) in determining future approaches and policies of eradicating food insecurity.

Since not much has been written on TC bananas because it is a recent innovation, the study will also seek to add to the body of knowledge.

1.7 Limitations of the Study

Since the study focused on the government officer, Africa Harvest employees and farmers growing TC bananas their availability limited the study, since they had several workshops and seminars in the area. Therefore the researcher had to visit the respondents several times.

Time and financial constraints were also major limitations experienced by the researcher while conducting the study in Abogeta East Division. Therefore the researcher had to source for extra finances and work for longer hours.

1.8 Delimitations of the Study

There are three divisions involved in the growing of TC bananas in Imenti South District. These include Nkuene division, Igoji division and Abogeta division. The study was limited to Abogeta East Division which is sorrounded by Mitunguu Division, Nkuene Division, Abogeta West Division, Igoji East and Tharaka District.

The study was carried out among the following existing farmers groups: Ntharene, Mwichiune, Koothine, Baranga, Kaira, Bidii, Yururu United, Kanyakine and Nthunguri.

The study looked at the contribution of TC banana on the quality of life of the community between 2004 and 2009.

1.9 Assumptions of the Study

The following were the assumptions of the study:

The government officer and Africa harvest employees were willing to provide the required information.

Since the study focused on the small-scale farmer groups operating in the area of study, data collection was easier.

The growing of tissue culture bananas has contributed to the quality of life of the community.

1.10 Definition of significant terms

Biotechnology It is the latest form of technology that uses locally available raw material to give high production (that is, aims to produce maximum yields) from available land while conserving the environment

Community It refers to people living within Abogeta division, South Imenti District where they share resources; culture (beliefs, customs, and norms) and common language.

Contribution It refers to an action by TC bananas to help to cause or increase the quality of life.

Development This is a process involving community participation in identifying and analyzing their needs and problems, setting goals, making decisions on sustainable use of available resources to improve their quality of life.

Food security This refers to the availability of food and the ability of the people living in Abogeta to access it.

Project It is a temporary endeavor, having a definite beginning and end, usually undertaken to meet unique goals and objectives, usually to bring a beneficial change and added value.

Quality of life of the Community This refers to the ultimate goal of all various processes and strategies that endeavor to meet the needs of the people living together in Abogeta division.

Tissue Culture bananas Pest and disease-free planting material developed in a laboratory under sterile conditions that grow faster and mature (produce fruits) earlier than plants grown from suckers obtained from the mother plant.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The contributions of TC banana technology are to create sustainable rural development. Rural development in Africa is a "chicken and egg affair": farmers won't buy inputs and look after their crops better unless there is a market for extra harvest they produce. By doing so the support services and private companies that can supply inputs will not take shape unless there is a demand for outputs in the community (Africa Harvest, 2006).

Thus, the contribution of the TC bananas on the quality of life of the community will depend on the understanding that rural poor communities are better able to tackle problems and introduce social change if they get development information relevant to their needs and interests. They cannot adopt new ideas in development with confidence and better chance of success. The process of adopting new ideas can be improved through the participation and involvement of the rural poor. People need both technical knowledge and awareness raising or information closely linked to the problems they face in society. The process of internalizing and reflecting on new information and comparing it with that they already know is an empowering experience.

2.2 Theoretical Literature

This study was based on the broad framework of the Psycho-social Approach which was advanced by Paulo Freire (Ayot, ----). This theory considers development to mean a balanced growth in the economic and social fields. It continues to emphasize that development should be seen as the improvement of quality by an individual, community and country at large. Thus development is of the people and the community as a whole.

The community must be geared to set its own goals according to the experience of its people so as to be able to adopt the new skills and techniques to achieve the set goals .Psycho-social Approach is geared to satisfying the economic and social goals to meet human values and material gains. It was poor living conditions in Paulo Freire's community which led him to the discovery of this approach. He developed an ideology

called conscientization. Freire thought that by educating the people through literacy programmes they could be social actors in solving their societal problems. He believed that education was the only means by which people could be made critical of their problems and conscious of the need to look for solutions by themselves. This led to a more sustainable plan of action.

2.2.1 Psycho-social Approach

It is commonly called "problem solving approach". The theory emphasizes the need to involve the community to identify and solve their problems. It creates critical conscietization (self awareness and critical awareness). It helps to liberate the oppressed people from an oppressed mentality.

2.2.2 Principles of the Psychosocial Approach.

There are three principles of the Psychosocial Approach. First, the approach emphasizes on the transformation of the world. Everyone has responsibility to contribute in shaping up the world for human kind. It's a joint effort.

Second, the subject of education should be chosen by the people .People from outside, usually experts in their respective fields, often have different priorities from those of the community. People will only act on those issues about which they themselves have strong feelings. There should be a survey of needs to find the generative themes of community, answering both psychological and sociological needs. The role of the education is to present ideas to the people in a challenging form, the issues they have raised.

Third, there should be a mutual learning process. The problems of development are complex and no expert has all the answers. On the other hand, nobody is totally ignorant. Each person has different perceptions based on their own experience to discover valid solutions. Thus everyone needs to be both a learner and a teacher.

Africa Harvest, a private organization that introduced TC bananas in Kenya, aims to fight hunger, malnutrition and poverty by increasing agricultural yields. To achieve the

greatest impact in the shortest time, it gives priority to delivery of proven bio-technologies to farmers. Africa Harvest's approach which entails community engagement has continued to change the lives of small scale farmers. This has played a critical role in the successful technology transfer. For example, according to research Africa Harvest involvement with the TC banana projects has directly or indirectly made substantial impact to the lives of 500,000 Kenya farmer households (Africa Harvest, 2009).

Africa Harvest acknowledges that to realize their goal, there is need to empower the beneficiaries (the small scale farmers) by giving relevant information through training (capacity building); providing inputs, clean and disease free planting materials and ensuring functioning markets. Knowledge and information are essential for people to respond appropriately to technological changes (Africa Harvest, 2008).

TC banana have helped Kenya farmers recover from declining banana production due to infestation by pests and diseases, a situation that was threatening food security, employment and income is banana growing areas. Tissue culture bananas are likely to bring about considerable contributions to food security, health, income and employment which may affect the being of farmers' household with small pieces of land (Africa harvest, 2006).

Empirical literature

2.3 Contribution of Food Security on Quality of Life

According to UN's Food and Agriculture Organization (FAO) and United States Department of Agriculture (USDA) food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an activity and healthy life.

2.3.1 Food Security in Africa

Issues of food security and poverty in developing countries and especially in Africa have dominated public debate and are issues of global concern (Muyanga, 2008). The small-scale farming families represent about half of the hungry world wide and probably three quarters of the hungry in Africa. Therefore raising the productivity of their crops, vegetables, trees and livestock is a major priority in the fight against hunger (Africa Harvest, 2009).

Millions of African small holder farmers are resource poor and suffer from food insecurity. Their low incomes mean they are unable to make investments and take risks. Despite the tremendous government investments in human and financial resources in agricultural research and extension, the small scale farmers have not greatly benefited. That is the choice of technologies to enhance food security is rife. With over a million people going hungry each day, despite a huge surplus of production, a reorientation towards a more localized, small-scale and sustainable agriculture is needed. For example, Africa has infertile fragile environments and erratic rainfall; vast areas of agricultural land are degraded. In the view of some analysis, these characteristics inhibit possible increase in agricultural production and food security Access to food in a sustainable manner is a fundamental human right. Realizing this Non-Governmental organizations (NGOs), research institutions and governments in Africa have been testing alternative technologies and approaches over a decade now. Such approaches as biotechnology tissue culture bananas are becoming part of the technical packages of international and national research. (IIRR, 1998).

2.3.2 Food Security in Kenya

More than 40 million people live under one US dollar per day and are classified as poor and food insecure. Poverty is more pronounced in rural areas than in urban areas with over 85 percent of Kenya's poor living in rural areas and mainly engaging in farming activities (Ministry of Planning and National Development, 2005).

According to a business daily (2009) "more Kenyan's are in need of emergency food today than they were 20 years ago and the situation may get worse". The International Food Policy Research (IFPRI) says the Kenya's hunger rating has moved from 'serious' to 'alarming'. Kenya is a hunger spot and index shows that it has been failing in food security for the last 20 years compared with other countries.

There is a need for a specific focus on the food insecurity in Kenya which is worsening the poverty level. Kenya's average poverty level exceeds the 50 percent mark. The absolute poor, increased from 10 million to15 million between 1994 and 2000 (Africa harvest, 2006). The number included 3.2 drought affected people in marginal agricultural areas; 150,000 persons displaced by the post election violence; 850,000 school children; 3.5 million urban dwellers and 2.2 million person affected by HIV /AIDS (UN World Food Program Report, 2009).

A significant cause of food insecurity in Kenya arises from lack of preparedness for disasters and appropriate intervention strategies for recovery. For instance, some 2 million Kenyans are more or less permanently on famine relief food and the number rapidly rises over 5 million in the event of drought even if it is for a season (Ministry of Planning and National Development, 2005). The present food imports and food relief projects frequently do not help the country in its development but rather offsets demands only temporarily. In fact this has aggravated environmental neglect of farm land.

2.3.3 Contribution of Tissue Culture Bananas on Food Security

According to Professor Esther Kahangi of JKUAT (who is largely credited with TC bananas), the high yielding TC bananas has lifted the livelihoods of Kenyans living in

rural areas in close to 14 districts. Increasing banana production has the potential to improve the standards of living of many small-scale farmers, while making staple food more affordable for the urban poor. The surplus created by TC banana farming is likely to lead to increase in demand for other goods and services exerting a positive impact to the whole economy (Daily Nation, 2008).

The growing of TC bananas has also helped to reduce the losses due to pests and diseases. Since TC bananas grow faster and mature earlier than the traditional varieties, farmers benefit from increased productivity per unit area. The surplus production provides a reliable source of income thus contributing to household food security. Once the crop is established, harvesting is essentially continuous throughout the year. (Qaim, 1999).

About 25 percent of all bananas are consumed in the same household in which they are produced. It has emerged as a popular food and a good source of carbohydrates, vitamins and minerals. The growing of TC bananas is likely to provide food security. At the family level, a TC banana plantation is an important asset, since it provides food security. Some families reported that after, growing of TC bananas increase in banana production at the family has increased food security. Research indicates that they did not need to accept food aid for the first time in their lives when there was a drought in their area (Africa Harvest, 2009).

According to research on impact of TC bananas in Kenya, the results of the banana project (Chura community TC banana project), demonstrated that the project was appropriate for and can be managed by small scale farmers. The availability of large quantities of planting materials has enabled participating farmers to reclaim their old banana orchards and reduce loses due to pests and diseases. In addition, because TC bananas grow faster and mature earlier than traditional varieties, farmers can benefit from increased productivity per unit of time (Africa Harvest, 2008).

According to research growing of TC banana technology has the potential to improve banana production and income among small scale farmers. According to MOA (1994) on average small-scale farmers harvested bananas with a bunch weight of more than 40 kilograms compared to usual average of 15 – 30 kilograms. Tissue culture technology in Africa has increased productivity from 20 to 45 tons per hectare (ABF Africa, 2002-2009).

According to research in Kirinyaga, a small-scale farmer pointed out that clean plantlets were sold at an affordable price of sh.80 and incase of famine farmers growing TC bananas did not go hungry. A report of a research carried out in Thika indicated that, if more small scale farmers planted TC bananas, there would be enough food to eat and attract a huge market. This would also triple cash flow and hence breaks the poverty cycle. Another research carried out in Imenti North District, pointed out that the TC bananas were very tasty when mashed with boiled legumes and vegetables (Africa Harvest, 2009).

2.4 Contribution of Health on Quality of Life of the Community

About 20-25 percent of the East African population is undernourished due to poor energy and protein intake. Further, about 40 percent of women of child bearing age have anaemia while almost an equal percent of under five year old children do not consume enough nutrients to maintain normal health (IFRI, 2001). The growing of TC bananas is likely to contribute to improved health of the community. That is, malnutrition is likely to decrease and the farmer's livelihood may improve.

TC bananas can either be cooked or can be consumed as a fruit. Bananas can also be processed into value-added products such as powder, starch, juice, jam, beer and dried banana crisps or chips (Africa Harvest, 2009).

The fruit is nutritious and a ripe banana contains 16 percent of dietary fibre, 15 percent of the vitamin C, 11 percent of potassium and 20 percent of the vitamin B6 recommended

each day. Along with other fruits and vegetables consumption of bananas are associated with a reduced risk of breast cancer in women (http://www.wikipedia.org/wiki/banana).

Taking a banana each day could prevent deficiency of potassium which helps to counter stress and thus influence the risk of stroke. Potassium is also an essential mineral needed to regulate water balance, acidity level and blood pressure. For example bananas have a natural anti-acid effect in the body and therefore help to relieve heartburn (http://www.higlighthealth.com/diet-and-nutrition).

Ripe bananas also contain sugars and are therefore a good source of energy. Although the protein content of banana is low, it contains lysine, an essential amino-acid that is lacking in maize. Banana is therefore an excellent complement to maize-based diets. Compared to an apple, a banana is reported to contain four times the protein, twice as much carbohydrate, three times the phosphorus and five times as much vitamin A and iron (Africa Harvest, 2008).

Therefore adoption of TC banana has contributed to household welfare especially of women and children. Malnutrition among members of the household has reduced owing to the additional income. In addition, home consumption of TC banana fruit by farmers and their families reduced malnutrition. Also to the nutritional value of eating the bananas, the family's diets have become more diverse, since the income from selling bananas can be used to buy other types of food (Africa Harvest, 2009).

There is a theoretical danger that the increased value of bananas as a cash crop could encourage small holders to sell all their bananas, thereby having an adverse effect on household nutrition. However, the strategy adopted by Africa Harvest that teaches farmers to sell by grade always results in some bananas not being purchased thus the lower grade bananas are more likely to be kept for home consumption. Indeed, the project staff estimates that banana growing families are now eating even more bananas. Thus banana has improved the nutrition value of household diets and thereby improved general health and productivity of the households and this includes women and girls.

2.5 Contribution of Income on Quality of Life of the Community

The contribution of additional income from banana to the quality of life includes increased access to food for small scale farmers' families. This has considerably helped in improving food security, nutritional levels and economic status of the rural poor. For example in Chura village in Wangige, about 20km from Nairobi, TC bananas have transformed the lives of previously poor farmers with small land holdings. Increased family income has led to improvements in other quality of life indicators, including ability to pay secondary school fees, improved housing, healthcare and diversification of farm enterprises (Africa Harvest, 2009).

Acharya and Mackey (2007) have estimated the direct income contribution of TC bananas. The table below shows the returns from alternative crops in Kenya, which may partly explain the potential net return per acre in one year.

Table 2.1 Returns from alternative crops in Kenya

Crop	**Net Income (Ksh /acre /year**
Cabbages	150,200
Tomatoes	80,240
Irish potatoes	8,040
Beans	3,200
Maize	-
TC bananas	305,610

Source: Mbogo *et al* 2004

Taking the area under TC bananas as 4288 hectares (5.22 percent of the total area under banana) and the different in net income between TC and non-TC banana (Ksh 224,526 per hectare), the additional income that accrued to TC banana growers was around 963million. Adding this to the indirect contribution of Ksh 5508 million it results in a total income contribution of Ksh 6471 million (Africa Harvest, 2008).

Increased production of banana has also helped poor urban and other consumers to keep the retail price at an affordable level. Further banana has provided cash income security to the poor farmer because it provides almost continuous inflow throughout the year, even under low input regimes. Banana suckers and leaves are used as animal feeds especially during the dry seasons when no other source of folder is available (Africa Harvest, 2009).

Recent studies about impacts of TC banana technology indicate that on average adopting farmers benefit from income increase through reduced pests control costs and high effective yields (Ismael et al, 2001; Traxler, 2004). An independent socio-economic study demonstrated that average per hectare incomes for small, medium and large scale farm could rise by 156, 145 and 106 percent respectively (Qaim, 1999).

According to a study carried out in Murang'a, the 150 smallholder farmers interviewed said that a TC banana bunch was sold at sh.500 unlike the traditional banana types that went for shs.150. They also confessed that they had enough to eat and plenty to sell (Africa Harvest, 2008).

2.6 Contribution of Employment on the Quality of Life of the Community

According to Ndunge (2008), most African countries are experiencing a profound problem of unemployment. The high rate of population growth, relative to the growth of economies, presents many challenges which include; health, education services and high rate of unemployment. Therefore this has affected the quality of life of the people.

Technology and innovation have been identified as most important in achieving sustained economic growth of the country. For instance poorly developed markets and marketing infrastructure contributes to unemployment. Rural area where agriculture takes place are poorly linked to urban area due to poor road networks, post-harvest handling and processing results in high wastage of perishable produce before delivery to markets. This greatly discourages production and leads to loss of opportunities for self – employment and income generation within the rural areas. Lack of investments in the rural area has

led to many youths migrating to urban areas in search for employment. The high poverty level often results in youth with 'potential brains' for leading technological development dropping out of school or if they receive education, owing to lack of jobs, migrate to developed countries - brain drain (http://www.atpsnet.org).

Unemployment in Kenya is an old phenomenon since 1990s. The government has been struggling to bring the crisis to an end but with little achievement. The government that took office after the year 2002 promised to champion for jobs creation and especially for the youth. Since the rural population depends on agriculture for livelihood, TC bananas can be used as a weapon to fight poverty and improve the quality of life in rural communities. For instance TC banana cultivation and trade provides a major source of employment in many rural areas in Kenya. The NGOs and CBOs could invite the unemployed youth and women to run the village nurseries for regional supply as a means of employment and generate income to support income to support themselves and the HIV/AIDS orphans (http://sgp.undp.org/web/projects/6874). They can create employment for the local community in the banana processing industries, that is, in the processing of starch, juice and chips. TC banana growing may create employment for transporters, those who collect the bananas and transports them to urban areas; the people in the market involved in grading and pricing of the bananas. Finally, more farmers are likely to engage in banana production because there a market for their products (Maleli, 2009).

Scientific research plays a key roletin more appropriate techniques of production. This in turn provides employment and creates wealth. The adoption of TC bananas and revival of the banana economy has had a multiplier effect on the rest of Kenya's economy by providing employment, economic or business opportunities to village assemblies, wholesalers, urban retailers, transporters, laborers in wholesale markets, manufacturers of packaging materials and agricultural labor households (Africa Harvest, 2008).

2.7 Gender

As the TC technology spreads and banana moves from being subsistence to a commercial crop, it is important to consider the gender dimensions of the impact. Banana is traditionally an important source of income for women. For example, in Maragua, women control the income from bananas in 89 percent at households. For this reason, improved banana production is contributing to household welfare especially of women and children. The projected additional income to the family after adopting of TC banana cultivation reflects an increase in disposable income for the family. A substantial production of income from sale of bananas goes towards purchase of other food items by women. At the same time, the banana income has helped to promote more equality in family decision making (Africa Harvest, 2009).

Many households have been able to raise school fees from the sales of bananas increasing the possibility of educating the girl-child. Families have been able to construct good houses from the income of bananas sales. Often given the control women have over banana incomes, home improvements will start with a modern kitchen benefiting the entire family. Families have acquired assets from sale of bananas for example mobile phones, bicycles and consumer durables for the family. This further improves the quality of the life for the women, children and the entire family (Acharya and Mackey, 2008).

Reports indicate that in some instances, where marketing is done through the group even though the women are the member of the group, the man has approached the treasurer for the money from the sale of bananas. Because men and women often have different priorities for income, erosion of women's income may have a negative impact on the family's health and living standards. Opportunities for farmer-to-farmer exchange and training are more often taken up by men. In the Rockfeller –funded Africa Harvest led project only four of the 26 farmer's trained as farmer trainers were women, while farmer-to-farmer exchange set up for the Kandara farmers attracted no women at all (Africa Harvest, 2009).

2.8 Conceptual Framework

Figure 2.1 is a conceptual framework that shows how the independent variables relate with dependent variable.

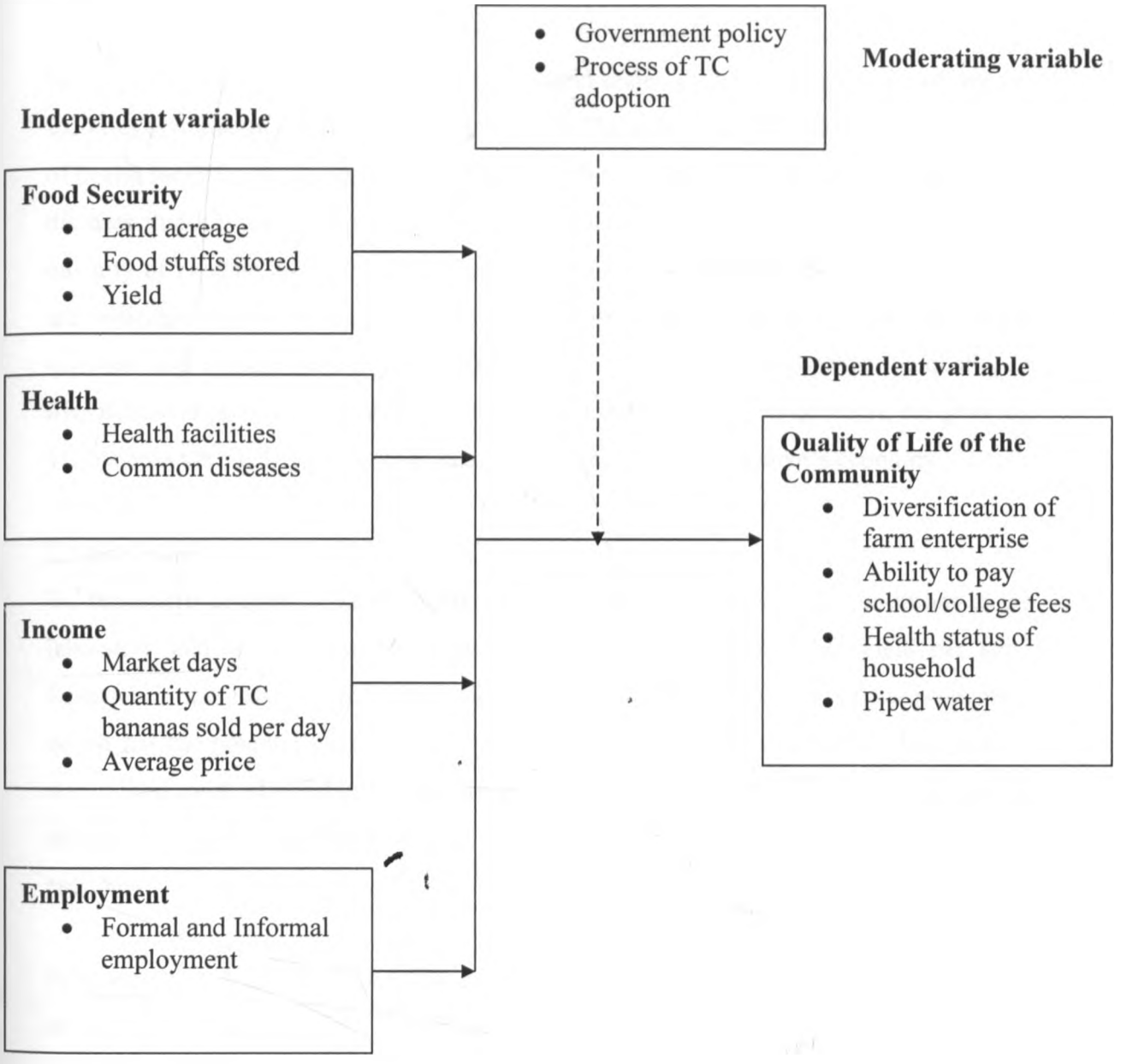

Figure 2.1 Conceptual Framework

The independent variables are the contributions of Tissue Culture bananas and the dependent variable is the quality of life of the community. The framework points out that TC banana contributes to food security, health, income and employment among the people in the community.

Food security depends on total land acreage, land under TC bananas, presence of storage facilities and quantity of TC bananas produced. The indicators of health include the type of health facilities available in the division, number of times the farmers fall sick and the diseases that kill most people. Income is dependent on the number of market days and quantity of bananas sold per market day. The indicators of employment by TC bananas are indicated by the people involved in the formal and informal income generating activities and income earned per day. These have the potential to improve the quality of life of banana producers, consumers and the entire community. In addition, the growing TC bananas are likely to contribute positively to the rest of the Kenya's economy.

2.9 Summary

TC bananas is a superior banana variety that is developed under sterile conditions in the laboratory and has enhanced pest and disease resistance and higher yield per acre. Research in the past revealed that growing TC bananas has increased banana production which has the potential to improve the quality of life of the community, while making staple food more affordable for the urban poor. The surplus created is likely to lead to increased demand for other goods and service thus contributing positively to the whole economy.

Previous research also indicated that growing TC bananas contributed to improved health of the family members of the household in that, the consumption of TC bananas at home consumption reduced malnutrition.

The additional income from the sales of bananas was used to buy other types of food. Thus the lives of previously poor farmers with smallholding of land were transformed as

a result of increased income. That is, increased family income enabled them to pay school fees, improve housing, health care and diversify farm enterprise.

Finally growing of TC bananas became a source of employment for the local community in the laboratories where TC bananas are developed; village nurseries and demonstration fields; processing industries; loading and transportation of bananas and also in marketing of bananas.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with research design, target population, sampling techniques, research instruments, validity and reliability of instruments, data collection procedure and data analysis procedure.

3.2 Research Design

A research design is a plan showing how the problem under investigation will be solved. It is a process of selection of methods to be used to answer the researcher questions and solved the research problem (Ngechu, 2006). Descriptive design was used for this study. This is because it attempts to describe the state of affairs of the problem under investigation. Therefore in using descriptive design, the researcher sought to assess the contributions of TC bananas on the quality of life of the community: the case of Abogeta East Division, Imenti South District.

3.3 Target Population

The target population was 485 respondents and consisted of 482 small-scale farmers growing TC bananas in Abogeta East Division and three key informants. The study was based on the following farmers groups which grow TC banana: Ntharene, Mwichiune, Koothine, Baranga, Kaira, Bidii, Yururu United, Kanyakine and Nthunguri. The Table 3.1 shows the number of members in each of the farmer's group;

Table 3.1 Target Population

Name of group	Number of members
Ntharene	94
Mwichiune	41
Koothine	32
Baranga	67
Kaira	60
Yururu United	72
Kanyakine	51
Nthunguri	24
Bidii	41
Key Informants	3
Total	485

3.4 Sampling Technique

According to Orodho (2004) a sample design is a definite plan determined before any data is collected by obtaining a sample size from a given population. For this study, purposive sampling technique and proportional random sampling technique were used. Proportional random sampling was used to obtain the sample of the nine groups of study. Purposive sampling was used to select the District Agricultural Officer and Project Coordinators Africa Harvest.

Table 3.2 Sample Size

Name of group	No of members	Sample Size (10 %)	Percentage of sample out of 50
Ntharene	94	9	18
Mwichiune	41	4	8
Kothine	32	3	6
Baranga	67	7	14
Kaira	60	6	12
Bidii	41	4	8
Yururu united	72	7	14
Kanyakine	51	5	10
Nthunguri	24	2	4
Key informants	3	3	6
Total	485	50	100

3.5 Data collection and techniques

In data collection, questionnaires and observation were used in order to obtain information. Content analysis of reports was also be used.

The questionnaires comprised of both closed and open ended questions in order to encourage the respondents to give in-depth information. The researcher prepared two sets of questionnaire, one for the District Agricultural Officer and Coordinators Africa Harvest. The other questionnaires were administered on the farmer's group coordinators and the farmers growing TC bananas to collect information on the contribution of TC bananas on the quality of life of the community.

3.5.1 Instruments Validity

Validity is the accuracy and meaningfulness of the inferences. It is the degree to which results obtained in the study represents the variables of the study measure (Mugenda and Mugenda, 1999).

To enhance the validity of the instruments used in the research, the researcher carried out a pilot study by administering the questionnaire to the farmers in one group to assess the ability of the respondents to interpret and answer the questions asked correctly. An analysis of the findings was done and some ambiguous questions were amended.

3.5.2 Reliability of the Instrument

According to Orodho (2004) reliability of instrument concerns the degree to which a particular measuring procedure gives similar results over a repeated trial. To test reliability of instrument the researcher used test-retest technique in which the questionnaires were administered on the same group twice, that is, the first time was during the pilot and also during the study. This was to ensure that the required data was obtained.

3.6 Data Collection Procedure

The researcher obtained an official letter of introduction from the University of Nairobi. The researcher was then introduced by the manager Ntharene buying centre to the coordinators of farmer's groups.

Before visiting the field, telephone call was made to book an appointment. During the visits questionnaires for the coordinators and farmers were administered. Only 47 questionnaires out of the 50 issued were collected.

3.7 Data Analysis and Presentation

Data analysis means categorizing, ordering, manipulating and summarizing of data to obtain answers to research questions.

After data was collected, the researcher scrutinized the questionnaires to ascertain completeness, accuracy and uniformity. The data was coded so as to facilitate classification of the answers to the questions into meaningful categories and bring out their essential pattern.

The researcher used the computer software Statistical Package for Social Sciences (SPSS) to give the frequency tables and percentages of the distributions. The level of analysis was descriptive since it describes the general trends and examines one variable at a time. Descriptive statistics was used to determine the frequencies and percentages. The findings were presented in the form of tables and charts.

3.8 Summary

Descriptive design was used for this study. The target population was 485 people. The study used proportional sampling technique and purposive sampling to obtain the cases that had the required information. The total sample was 50 respondents. In data collection questionnaires, observation and content analysis of reports were used. The researcher used test-retest technique to test the reliability of instruments used. The researcher obtained an official introduction letter from the University of Nairobi to the Coordinators Africa Harvest. During the visit questionnaires were administered to the project coordinators, District Agricultural Officer and tissue culture banana farmers. Finally the researcher used SPSS to give frequency distributions and descriptive statistics to find the percentages.

3.3 Operationalization Table.

Objective /Research questions	Type of variable	Indicator	Measure	Data collection	Level of scale	Approach of analysis	Level of analysis
1) How does food security arising from TC bananas contribute to quality of life of the community?	Independent variable	-Acreage of TC banana Plantation -meals per day. -presence of store -Variety of food eaten by family members. -Yield of TC bananas	-Area under TC bananas -Number of meals per day Amount of food in the store -Amount of yield in kilograms	-questionnaire –observation -Interviews	-Nominal -ordinal	Quantitative and qualitative	Descriptive
	Dependent: Quality of life of the community.	-Ability to pay school/college fees -Health status of the household. -Diversification of farm enterprise -Piped water	- Category of educational institutions attended (private or public). - Number of times one falls sick. - Type of money generating projects stated - Availability of clean water	-Questionnaire -Interview -Observation -Content analysis	-Nominal -ordinal -Ratio	Quantitative and qualitative	Descriptive
To what extent does health arising from	Independent	-Nutrition level -Type of health facilities available	Diversity of food eaten. -Number of meals per day. -Number of health clinics in the	-Questionnaire -Interview -Observation	-Ordinal -Nominal	Quantitative and qualitative	Descriptive

Objective /Research questions	Type of variable	Indicator	Measure	Data collection	Level of scale	Approach of analysis	Level of analysis
eating TC bananas contribute to quality of life of the community?		-Attendance to health clinics -Prevalence of diseases	area -Accessibility to health centers				
3) To what extent does income from TC bananas contribute to quality of life of the community?	Independent	-Types of schools attended by children -Payment of school fees -Quality of housing -Meals per day and diversity -Daily earnings	Category of schools -Number of student sent to school Type of building materials used Availability of modern structures -Number of meals per day -Cash from sales	Questionnaire Interview Observation	-Nominal -Ordinal	Qualitative and Quantitative	Descriptive
What is the contribution of employment by TC bananas on the quality of life?	Independent	-People involved in formal and informal income generating activities -Wage /income per day	-Number of people in both formal and informal employment activities -Amount of earnings	-Questionnaire -Interview -Content analysis	Nominal	Quantitative and Qualitative	Descriptive

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

The data analyzed regards the contribution of tissue culture bananas on the quality of life of the community: A case of Abogeta East division, Imenti South District .The method of representation of the data collected include frequency tables and charts.

Data has been analyzed regarding the general information of the respondents (including gender, age, educational background and number of children); contribution of food security, health, income and employment on quality of life of the community.

Out of the 50 questionnaires distributed for the study, 47 respondents filled and returned them, making a response rate of 94%.

4.2 General Information

General information refers to the information on the characteristics of the respondents which includes gender, age, highest education level of the respondents, number of children and training in management of TC bananas.

4.2.1 Gender

Table 4.1 shows the gender of respondents interviewed during the study.

Table 4.1 Gender of Respondents

Gender	Frequency	Percentage
Male	28	59.6
Female	19	40.4
Total	**47**	**100**

The respondents comprised of 59.6% males and 40.4% females. This indicates that both men and women grow tissue culture bananas but there are more men than women.

4.2.2 Age

Table 4.2 gives the frequency and percentage of ages of farmers growing TC bananas in Abogeta East Division.

Table 4.2 Ages of Respondents

Age in years	Frequency	Percentage
Less than 25	4	8.5
25-40	9	19.2
40-50	18	38.3
More than 50	16	34.0
Total	**47**	**100**

Table 4.2 shows majority (38.3%) of the respondents were aged between 40-50, 34% were 50 years and above, 19.2% were aged between 25-40 years and 8.5% were below 25 years. This is an indication that most of the people growing TC bananas were aged 40 years and above.

4.2.3 Highest Level of Education

Table 4.3 indicates the various levels of education attained by the farmers growing TC bananas in the division.

Table 4.3 Highest Level of Education

Education Level	Frequency	Percentage
Adult	5	10.6
Primary	13	27.7
Secondary	21	44.7
College	8	17.0
University	-	-
Total	**47**	**100**

According to Table 4.3 majority (44.7%) of the respondents attained secondary level education, 27.7% attained primary education, 17% attended college and none had university as their highest level of education.

4.2.4 Number of Children

Table 4.4 indicates the number of children in the families of the respondents.

Table 4.4 Respondents Number of Children

Age in Years	Frequency	Percentage
0-2	11	23.4
3-4	13	27.7
5-6	17	36.1
More than 7 years	6	12.8
Total	**47**	**100**

Table 4.4 shows that 36.1% of the families had 5-6 children while only 12.8% had more than 7 children. Majority (76.6%) of the respondents had more than two children while 23.4% had less than two children.

4.2.5 Training in Management of Tissue Culture Bananas

Training in management of TC bananas is an empowerment of farmers so as to be able to apply appropriate technology correctly. Table 4.5 shows the percentages of farmers trained/not trained in the past one year.

Table 4.5 Respondents Trained in Management of TC Bananas in the past one year

Training	Frequency	Percentage
Yes	15	31.9
No	32	68.1
Total	**47**	**100**

According to Table 4.5, 31.9% of the respondents had been trained in management of TC bananas in the past one year while 68.1% were not trained.

4.3 Food Security

Food security refers to the ability of people to produce enough food to eat, store some or even sell the surplus to gain income.

4.3.1 Size of Land

Availability of land and its size is crucial in ensuring food security. Table 4.6 shows the respondents' entire land sizes in acres.

Table 4.6 Respondents Size of Land

Land Size in Acres	Frequency	Percentage
Less than 1	3	6.4
1-2	24	51.1
3-5	5	10.6
6-10	11	23.4
Above 10	4	8.5
Total	**47**	**100**

The study revealed that all of the respondents owned land of varying sizes. Majority (51.1%) of the respondents owned land between 1-2 acres, 23.4% owed land between 6-10 acres, 10.6% had land between 3-5 acres, 8.5% had land above 10 acres and 6% owned less than one acre of land.

4.3.2 Size of Land under TC Bananas

TC bananas were introduced so as to benefit farmers with both small and large parcels of land. Table 4.7 shows the sizes of land under TC bananas in acres.

Table 4.7 Respondent Size of Land under TC Bananas

Size of land in acres	frequency	percentage
Less than 1	27	57.5
1-2	16	34.0
3-4	3	6.4
More than 5	1	2.1
Total	**47**	**100**

Table 4.7 shows that out of the total land owned by respondents, TC bananas are mainly grown on less than one acre of land (57.5%), while 2.1% were grown on more than 5 acres of land. The study indicated that majority (91.5%) of the respondents were growing TC bananas on less than 2 acres of land.

4.3.3 Food Store

A store helps to keep food and protects it from weather conditions which are likely to destroy food stuff which are ready for consumption. Therefore the availability of storage facilities ensures food security. Table 4.8 shows the percentages of farmers having a food store.

Table 4.8 Respondents having Food Store

Food store	Frequency	Percentage
Yes	27	61.4
No	17	38.6
Total	**44**	**100**

According to Table 4.8, 61.4% of the respondents had a store for storing food while 38.6% did not have one.

4.3.4 Storage of Food Stuffs

Table 4.9 shows the percentage of respondents storing various kinds of food stuffs. These include: bananas, beans, maize, French beans, peas, yams, mangoes and avocados.

Table 4.9 Food Stuffs Stored by Respondents

Type of food stuff	frequency	percentage of responses
Bananas	22	46.8
Beans	23	48.9
Maize	27	57.4
Potatoes	9	19.1
Millet	5	10.6
Peas	4	8.5
Sorghum	2	4.3
Soya beans	2	4.3
Wheat	2	4.3
Yams	1	2.1
French beans	1	2.1
Avocados	1	2.1
Mangoes	1	2.1

N=47

Table 4.9 shows that the main food stuffs which are stored by the respondents are maize (57.4%), beans (48.9%) and bananas (46.8%). The food stuffs with the least percentage (2%) include; yams, French beans, avocados and mangoes. Thus TC bananas form part of other food stuffs grown in the area and contributes to food security in Abogeta East division.

4.3.5 Number of Meals

The number of meals one eats in a day indicates whether he/she is food secure or not. Table 4.10 indicates the number of meals the respondents take in a day.

Table 4.10 Respondents Number of Meals

Number of meals per day	Frequency	Percentage
1	2	4.3
2	11	23.4
3	32	68.0
4	2	4.3
Total	**47**	**100**

According to Table 4.10, 68% of the respondents eat three meals, 23.4% take two meals while 4.3% take one or four meals in a day. This indicates that 72.3% of the respondents eat three to four meals in a day while only 4.3% eat one meal in a day.

4.3.6 Reasons for eating specific Number of Meals

The number of meals one eats in a day depends on several reasons. Table 4.11 indicates the reasons given by the respondents for eating the specific number of meals in a day.

Table 4.11 Reasons for eating specific Number of Meals per day

Reasons	Frequency	Percentage
Food is enough	6	12.8
Food is not enough	6	12.8
There is no enough money	11	23.4
To preserve some food for another day	26	55.3
To preserve some food for selling in the market	32	68.1

N=47

According to the study, 68.1% of the respondents pointed out that they ate a specific number of meals in a day so as to preserve some food for selling in the market while 55.3% did so as to preserve food for another day. Only 12.8% indicated that food was enough and 23.4% indicated that there was no enough money to buy food.

4.4 Health

TC bananas are nutritious when consumed as fruits or cooked. Thus they may help to reduce malnutrition in children and prevents various diseases resulting from low body immunity.

4.4.1 Number of Times the Respondents fall Sick

Table 4.12 shows the number of times the respondents fall sick per month.

Table 4.12 Number of Times the Respondents fall Sick per month

Number of Times per month	Frequency	Percentage
None	26	55.3
Once	12	25.5
Two times	6	12.8
Three times	3	6.4
More than four times	-	-
Total	**47**	**100**

Table 4.12 shows that 55.3% of the respondents never fell sick in the previous month before the study. Only 25.5% of the respondents fell sick once, 12.8% fell sick two times, 6.4% fell sick three times and nobody fell sick more than four times a month. The study also revealed that only 80.8% of the respondents fell sick once or none times in a month. This is an indication that the respondents enjoy good health.

4.4.2 Common Diseases

Table 4.13 indicates some of the most common diseases among family members of the respondents.

Table 4.13 Common Diseases among Respondents' Family Members

Disease	Frequency	Percentage
Common cold and cough	32	68.1
Malaria	37	78.7
Amoeba	6	12.8
Typhoid	17	36.2
Pneumonia	-	-

N=47

The study indicates that majority (78.7%) of the respondents family members suffered from Malaria and 68.1% suffered from common cold and cough. It also revealed that none of the respondents' family members suffered from pneumonia. This shows that the farmers households improved nutrition has improved their general health.

4.4.3 Disease Prevalence

Table 4.14 shows the extent to which respondents strongly agree, disagree and strongly disagree with the kind of diseases that kill most people in Abogeta East division.

Table 4.14 Diseases that kill most people in Abogeta East division

Diseases	Responses				
	Strongly disagree %	Disagree %	Agree %	Strongly agree %	**Total**
Common cold and pneumonia	10.6	23.4	38.3	27.7	100
Malaria	4.3	6.4	34.0	55.3	100
Amoeba	23.4	34.0	34.0	8.5	100
Typhoid	2.1	8.5	51.1	38.3	100
Cancer	2.1	14.9	36.2	46.8	100
Tuberculosis	6.4	6.4	40.4	46.8	100
HIV/AIDS	-	-	14.9	85.1	100

N=47

The diseases that kill most people in the area include HIV/AIDS (100%), malaria (89.3%), typhoid (89.4%), tuberculosis (87.2%) and cancer (83%). Common cold and pneumonia cause deaths to small extent (66%) as compared to the other diseases. This is an indication that the respondents are healthy and are more likely to be productive. Therefore deaths do not occur due to diseases resulting from food deficiency but other infections such as HIV/AIDS, malaria and typhoid.

4.4.4 Health Clinics

The types of health clinics found in an area are an indication of whether the people fall sick often or not. Table 4.15 shows the type of health clinic found in Abogeta East Division or in its neighborhood.

Table 4.15 Type of Health Clinics

Health Clinic	Frequency	Percentage
District hospital	10	21.3
Health centre/dispensary	14	29.8
Private hospital	12	25.5
Private clinic	11	23.4
Total	**47**	**100**

The study revealed that 51.1% government health clinics and 48.9% private owned health clinics are found nearby or in the area. This indicated that health was not a major problem in the area thus people were living quality life.

4.4.5 Health Clinics Attended by Respondents

The type of health clinic attended by the people is an indication of their economic well being. Table 4.16 shows the health clinics attended by respondents in Abogeta East division.

Table 4.16 Health Clinics Attended

Health Clinic Attended	Frequency	Percentage
District hospital	5	10.6
Health centre/dispensary	13	27.7
Private hospital	15	31.9
Private clinic	14	29.8
Total	**47**	**100**

The study revealed that majority 61.7% of the respondents attended private owned health clinics while 38.3% attended government health clinics .This is an indication that the respondents high level of income from TC bananas has helped them enjoy quality life.

4.5 Income

TC bananas provide a continuous cash inflow from the sales because of the availability of a ready market. The level of income determines the quality of life of the farmers' household (that is, their ability to send their children school/higher institutions).

4.5.1 Market Days

There are two market days per week in the area. The main market day is on Monday at Ntharene open air market. Thursday was the other market day at Imenti South Banana Resource Centre (ISBRC) but the bananas were bought on order. Table 4.17 shows the number of market days attended by the respondents per week.

Table 4.17 Number of Market Days attended per Week

Number of market days	Frequency	Percentage
1	24	51.1
2	23	48.9
Total	**47**	**100**

According to table 4.17, 51.1% of the respondents pointed out that they attended one market day per week while 48.9% indicated that they attended two market days per week.

4.5.2 Marketing Channels for TC Bananas

Figure 4.1 shows the marketing channels of TC bananas in Abogeta East division.

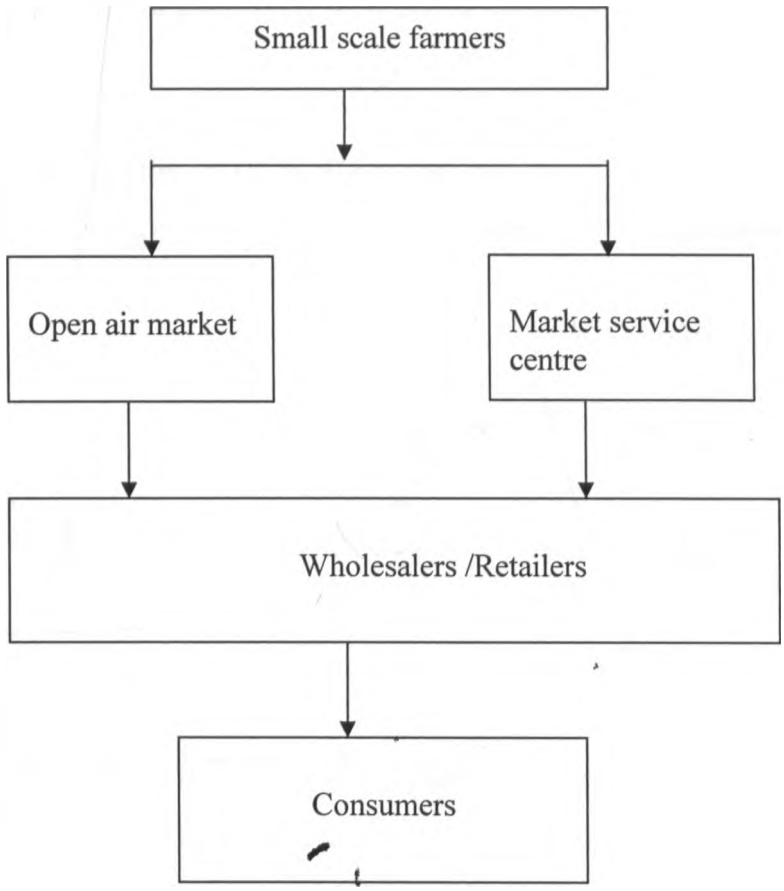

Figure 4.1 Marketing Channels for TC Bananas

TC bananas are transported to the market to be sold. These are either sold at the Open air market or the Market service centre at Ntharene. At the open air market the bananas fetch higher prices than at the market service centre. The pricing of TC bananas depends on the grade while at the Market service centre it depends on the weight. The market service centre is a project initiated by private organization known as Technoserve which helps TC bananas farmers to market their produce.

The research revealed that the wholesalers/retailers come from different parts of the country namely: Nairobi, Nakuru, Meru greens limited, Isiolo, Mombasa, Nanyuki, Kajiado and Tharaka.

4.5.3 Quantity of TC Bananas sold per Day

The quantity of TC bananas per kilogram is an indication of whether the farmers' incomes are high or low. Table 4.18 shows the quantity of TC bananas sold by a farmer per day.

Table 4.18 Quantity of TC Bananas sold per Day

Quantity in Kilograms	Frequency	Percentage
10-20	1	2.1
20-40	5	10.6
40-80	17	36.2
80-200	16	34.1
200-400	8	17.0
Total	**47**	**100**

Table 4.18 shows that majority (87.3%) of the respondents sell more than 40 kilograms of TC bananas per day while 12.7% sold 40 kilograms and below. The study indicated that about 300 tonnes of TC bananas were sold on the main market day while 2-5 tonnes were sold at Imenti South Banana Resource Centre on Thursdays.

4.5.4 Average Price of Tissue Culture Bananas

Table 4.19 shows the price of tissue culture bananas per kilogram in 2000.

Table 4.19 Price of TC Bananas per Kilogram

Price in Ksh	Frequency	Percentage
10-20	24	51.1
20-40	23	48.9
Total	**47**	**100**

Table 4.19 indicates that 51.1% of the farmers sold TC bananas at a price between Ksh 10-20 while 48.9% sold theirs between Ksh 20-40. The study indicated that the average price of TC bananas per kilogram was Ksh 15.

4.5.5 Category of Schools Attended by Respondents Children

Education is very important in improving the quality of life of the community and table 4.20 shows the number of children at different levels of education.

Table 4.20 Category of Schools Attended by Children

Institution	Number of children				Public	Private
	1 %	2 %	3 %	4 %	%	%
Nursery	21.3	-	-	-	12.7	8.5
Primary	23.4	17.0	12.8	4.3	34.0	17.0
Secondary	21.3	17.0	2.1	-	40.4	-
College	10.6	-	-	-	4.3	6.4
University	21.3	-	-	-	21.3	-

N=47

Majority (40.4%) of the respondents children are in public secondary schools, 12.7% of children are in public nursery schools and 25.6% of children are in public colleges and universities. The research indicates that 77.9% of the respondents educated their children in public institutions while 22.1% sent their children to private institutions.

4.5.6 Utilization of Income from TC bananas

Table 4.21 indicates ways in which the farmers growing TC Bananas were able to utilize their income.

Table 4.21 Utilization of Income by Respondents

Utilization	Frequency	Percentage
Bought a mobile phone	10	21.3
Paid school fees for the children	33	70.2
Started other money generating projects	39	83.0
Installed piped water	10	21.3
Installed electricity	1	2.1
Bought television set	1	2.1

N=47

The study indicated that majority (83%) of the farmers used their income from TC bananas to start other money generating projects. The second way in which farmers utilized their income was to pay school fees for their school going children. This is likely to improve quality of life of the community. This has clearly evident in table 4.21, which shows that farmers have the ability to educate their children private schools and colleges.

4.6 Employment

Employment contributes to the quality of life of the people in that growing TC bananas creates opportunities for self employment and income generation.

4.5.1 Contribution of growing TC Bananas

The farmers' responses on the contribution of growing TC Bananas are shown in Table 4.22

Table 4.22 Contribution of TC Bananas

Contribution	Frequency	Percentage
Increased family income	47	100
Improved health	47	100
Increased source of food	47	100
Source of employment	47	100
Improved infrastructure (Roads, health facilities and schools)	17	36.2
Improved security in the community	12	25.5

N=-47

The study revealed that 100% of the farmers stated that the contribution of TC bananas include the following: increased family income, improved health increased source of food and source of employment .Other contributions indicated were improved infrastructure (36.2%) and improved security in the community (25.5%).

4.6.2 Employment in the Community

Table 4.23 indicates responses on whether TC bananas have contributed to employment or not.

Table 4.23 Creation of Employment by TC Bananas

Creation of Employment	Frequency	Percentage
Yes	47	100
No	0	0
Total	**47**	**100**

Table 4.23 shows that all the farmers accepted that TC banana farming had created employment in the community. This indicates that quality of life of people in Abogeta East division, Imenti South district is likely to improve.

4.6.3 Contribution of TC Bananas on Employment

Table 4.24 shows ways in which TC banana farming has created employment.

Table 4.24 Ways in which TC Bananas have created Employment

Contributions	Frequency	Percentage
Self employment	47	100
Employment for no- tissue culture Bananas growers	11	23.4
Creation of formal employment	12	25.5
Employment of youths	20	42.6

N=47

This indicated that the major contribution of TC banana growing is self employment (100%). Secondly, it has contributed to employment of youths (42.6%). Finally it has contributed to a small extent to creation of formal employment (25.5%) and employment of non- tissue culture banana growers (23.4%). In addition, the study also revealed that there are 3609 farmers growing TC bananas in Abogeta East division.

4.6.4 Benefits of TC Bananas to various Groups of People

The various groups of people in the community that have benefited most from the growing of TC bananas are as shown in Table 4.25

Table 4.25 Benefits of TC Bananas to various Groups of People

Group of People	Frequency	Percentage
Youth	30	63.8
Women	39	83.0
Men	27	57.5
Children	13	27.7

N=47

This indicated that women (83%) benefited most from the growing of TC bananas followed by the youths (63.8%).

4.7 Summary

This chapter discussed the findings on general characteristics of the respondents, food security, health, income and employment. These were presented using frequency tables and charts. The frequency tables were then interpreted.

CHAPTER FIVE
SUMMARY OF THE FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives the summary of the findings, discussions and conclusion based on the research objectives. Recommendations on the contribution of TC bananas on the quality of life in Abogeta East division, Imenti South District have been stated.

5.2 Summary of Findings

Summary of the findings gives information on the characteristics of the respondents which includes gender, age and educational background. The study indicated that the farmers growing TC bananas comprised of males (59.6%) and females (40.4%). About 72.3% of the farmers interviewed were above 40 years while 27.7% were less than 40 years. This implied that the TC bananas were grown mainly by the older people since they own the factors of production such as land and capital.

Majority of the farmers have attained secondary education (44.7%) and primary education (27.7%). Thus they had no professional qualifications to get formal employment except being self employed by TC banana farming.

The summary of findings is also given as per the research objectives and research questions. The research objectives of this study were: to determine the contribution of food security arising from TC bananas on the quality of life of the community, to assess the contribution of health arising from eating TC bananas on the quality of life of the community, to establish the contribution of income generated by TC bananas on the quality of life of the community and to identify the contribution of employment by TC bananas on the quality of life of the community.

The study revealed that TC bananas have contributed to increased source of food. This is supported by the fact that majority (61.4%) of the farmers had a food store where they kept food stuffs such as maize (57.4%), beans (48.9%), bananas (46.8%), potatoes (19.1%), millet (10.6%),peas (8.5%) and sorghum among others. The availability of a

variety of food stuffs coupled by the fact 72.3% of the farmers ate three to four meals in a day and only 4.3% ate one meal in a day is an indication that TC bananas have helped to ensure food security hence improved quality of life.

TC bananas contributed to improved health This is supported by the fact that 55.3% of the farmers' household did not fall sick for a month while 25.5% fell sick only once. It was only a small percentage (19.2%) of the farmers who fell sick three or more times in a month. The study also indicated that majority (78.7%) of the farmers suffered from malaria and none suffered from pneumonia. This implied that the most of the farmers were healthy and living quality lives.

The study also indicated that TC bananas have contributed to increased family income. The farmers educated their children in both private (22.1%) and public (77.9%) institutions. For instance 21.3% of the farmers' children were in public universities. Also 6.4% of their children attended private colleges while 4.3% attended public colleges. In addition m 40.4% of their children were in public secondary schools and 17 % were in private primary schools. This is an indication that the farmers increased income has enabled them pay school/college fees and are thus leading quality lives.

All of the farmers pointed out that TC banana farming is a source of employment. It has created self employment (100%), employment of non- tissue culture banana growers (23.4%), formal employment (25.5%) and employment of youth (42.6%). Also 83% women and 57.5% men have benefited from the growing of TC bananas. Thus the income gained from their wages or sales of TC bananas has helped improve their quality of life

5.3 Discussion of Findings

This section discusses the findings of the study based on the objectives.

5.3.1 Contribution of Food Security on Quality of Life of the Community

The study indicated that the farmers had enough food to eat, preserve in the store and sell to gain income. The fact that 72.3% of the farmers ate three to four meals in a day is an indication that increased production of TC bananas has improved the quality of life of the people in the division .These findings supports the fact that, TC bananas have benefited farmers because of their increased productivity per unit area. The surplus production provides a reliable source of income thus contributing to household food security (Qaim, 1999). Also Africa Harvest (2009) indicated that about 25 percent of all the bananas were consumed in the households where they were produced.

The study revealed that all the farmers owned land of varying sizes that is from less than 1 acre to more than 10 acres. Majority (57.5%) of the farmers grew TC bananas on less than 1 acre of land while 34% grew them on land between 1-2 acres. Thus the findings supports the research carried out in Thika which indicated that growing TC bananas provided the small scale farmers with enough food to eat and attract a huge market. This had a triple cash flow and hence broke the poverty cycle (Africa Harvest, 2009).

5.3.2 Contribution of Health on the Quality of Life of the Community.

The study indicated that 80.8% of the farmers growing TC bananas did not fall sick often. It was apparent that the three diseases that killed most people in Abogeta East division were HIV/AIDS (100%), malaria (89.3%) and typhoid (89.4%). In addition, the study revealed that there were 51.1% government health clinics and 48.9% private owned clinics in the Abogeta East division. Therefore the presence of more government hospitals than private hospitals is an indication that majority of the people in the division were healthy and did not fall sick often.

This supports the report by Africa Harvest (2009) that, TC bananas are nutritious when consumed since they maintain good health. Thus the growing of TC bananas has contributed to household welfare especially women and children. Also home

consumption of TC banana fruit by farmers and their families reduced malnutrition. Malnutrition among members of the households reduced since additional income from TC bananas was used to buy other types of food.

5.3.3 Contribution of Income on the Quality of Life of the Community

The study indicated that majority (51.1%) of the TC banana farmers attended one market day per week while 48.9% attended two market days per week. In addition 87.3% of the farmers sold between 40kg-400kg of TC bananas per market day. The average price of TC bananas per kilogram is Ksh.15. This implied that the farmers' daily income was high. For example 51.1% of the farmers earned an income between Ksh 1200 - Ksh 6000 per week from the sales of bananas.

The increased income has led to improvement in health care. For instance the study revealed that majority (61.7%) of the farmers attended private owned health clinics for treatment while 38.3% attended public health clinics. This implied that they had high level of income since they are willing to pay for the services offered in private hospitals which were more costly. The farmers growing TC bananas, mainly used their income in starting other money generating projects (83%) and paid school fees for their children (70.2%).This implied that the income from the sale of bananas has helped improve their quality on life.

This supports a study by Africa Harvest (2009) in Chura village in Wangige which indicated that TC bananas had transformed the lives of previously poor farmers with small land holdings. The increased family income had led to improvements in other quality of life indicators including ability to pay school fees, improved housing, health care and diversification of farm enterprise.

5.3.4 Contribution of Employment on the Quality of Life of the Community.

TC bananas is a recent technology which has established marketing channels where the farmers produce is marketed by Technoserve, a private organization working with the farmers in Abogeta East division. The study indicated that growing TC bananas created both formal and non formal employment. TC bananas have created employment for

women (83%), youth (63.8%) and men (57.5%). They have also created employment for non tissue culture banana growers (23.4%) such as transporters, wholesalers/retailers, people involved in grading and pricing. Thus TC banana growing has provided employment and created wealth to the farmers thus improving their quality of life.

These findings support the report (http://www.atpsnet.org) that technology and innovation have been identified as the most important in achieving sustained economic growth in the country. It indicated that poorly developed markets and marketing infrastructure contributes to unemployment since this discourages production and leads to loss of opportunities for self employment and income generation in rural areas. Another report (http://sgp.undp.org/web/projects/6874) indicated that TC banana cultivation and trade provided a major source of employment in rural areas in Kenya.

5.4 Conclusions

Based on the findings of the study, TC bananas have contributed to increased source of food, improved health, increased family income and source of employment. First, food security has contributed to the quality of life of the farmers growing TC bananas in Abogeta East division. For example the results of the study indicated that the farmers have enough food to eat, preserve in the store and even sell the surplus to gain income. For example 61.4% of farmers had a store for storing food crops such as maize (57.4%), beans (48.9%) and bananas (46.8%) among others. The fact that 72.3% of the farmer ate three to four meals in a day is an indication that TC bananas have contributed to food security in Abogeta East division, Imenti South district.

Second, health has contributed to quality of life of the people in the division since when TC bananas are consumed as a fruit or cooked, they help reduce diseases resulting from low body immunity. This is supported by the fact that in a month 55.3% the farmers' family members fell sick none times, 25.5% fell sick once, 12.8% fell sick two times, 6.4% fell sick three times and nobody fell sick more than four times. Majority (78.7%) of the farmers suffered from malaria and none suffered from pneumonia. Moreover, the diseases that killed most people in the area were mainly HIV/AIDS (100%), malaria (89.3%), typhoid (89.4%), tuberculosis (87.2%) and cancer (83%). Common cold and

pneumonia caused death in a smaller extent (66%) compared to the other diseases. This is an indication that the farmers were healthy and more likely to be productive.

Third, income has contributed to improvement of quality of life the farmers. This is supported by the fact that the farmers growing TC bananas used their income in starting other money generating projects (83%), paid school fees for their children (70.2%), installed piped water (21.3%) and improved health.

Finally, growing TC bananas has increased employment opportunities and generated income in Abogeta East division. For example TC bananas have mainly created self employment for women 83% and youth 63.8%. They have also created employment for non-tissue banana growers (23.4%) such as the transporters, wholesalers/retailers and the people involved in grading and pricing. In a small extent TC bananas have created formal employment (25.5%). Men (57.5%) and children (27.7%) have also benefited from the growing of TC bananas. Thus TC bananas have been a weapon to fight poverty and improve the quality of life of the community.

5.5 Recommendations

From the research findings the given the following recommendations to the policy makers and the TC banana project coordinators are proposed:

1. Increase training of farmers on management of TC banana so as to empower them and lead to increased production.
2. Intensification of campaigns to fight diseases causing death such as HIV/AIDS, malaria and typhoid through the local media. This would improve the quality of life of the people since they may not spend money in paying hospital bills or purchasing drugs.

5.6 Suggestions for Further Research

Research in the following areas is suggested:

1. Factors influencing the sustainability of TC banana project.
2. Investigation of the challenges encountered by TC banana farmers.

5.7 Summary

The summary of the findings, discussions and conclusions were based on the research objectives and research questions. Recommendations have been made to TC banana coordinators and policy makers. Areas of further research have also been suggested.

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APPENDIX A

INTRODUCTION LETTER TO MANAGEMENT

Mercy Gatwiri
Kaaga Girls High School
P.O BOX 1275 60200
Meru

The Management

.....

.....

Dear Sir/Madam,

RE: CONTRIBUTION OF TISSUE CULTURE BANANA ON QUALITY OF LIFE OF THE COMMUNITY

I am a Postgraduate student in the University of Nairobi, pursuing a Masters degree in Project Planning and Management. I am conducting a research on the contribution of tissue culture bananas on the quality of life of the Community in Abogeta East Division, Imenti South District. Therefore I request you to allow me to interview you and /or your employees who have been working with you for at least the last three years.

The information being sought is meant for research Purposes. Your responses will be confidential and the names of the individuals or organizations shall not be disclosed. Thank you in advance.

Yours sincerely

Mercy Gatwiri.

APPENDIX B

QUESTIONNAIRE TO BE FILLED BY MEMBERS OF FARMERS GROUPS

Contribution of Tissue Culture Bananas on Quality of Life of the Community

Introduction

Dear Sir / Madam

I am a post graduate student of the University of Nairobi. I am undertaking a research on the contribution of Tissue Culture bananas on the quality of life of the community.

You are kindly requested to provide the information asked for as genuinely as possible. The information provided will be treated in confidence and will only be used for this study. Therefore do not write your name on the questionnaire. Please read the instructions given and put a tick in the appropriate brackets or answers in the spaces provided.

Section A: Respondents Profile

(Please Tick Where Appropriate)

1. What is your sex?

   a) Male ( ) (b) Female ( )

2. What is your age bracket?

   a) Below 25 years ( )

   b) 25 – 40 years ( )

   c) 40 – 50 years ( )

   d) Over 50 years ( )

3. What is your marital status?

   a) Married ( )

   b) Separated / divorced ( )

   c) Widowed ( )

   d) Never married ( )

4. How many children do you have?

a) 2 and less ( )

b) 3 – 4 ( )

c) 5 – 6 ( )

d) More than 7 ( )

5. What is your highest level of education attained?

a) Primary ( )

b) Secondary ( )

c) College ( )

d) University ( )

e) Others (Please specify) .....

6. Have you received any training or course in management of tissue culture bananas in the past one year?

a)Yes ( ) b) No ( )

Section B: Food Security

(Please tick where appropriate)

7. How many acres of land do you have?

a) 1 – 2 acres ( )

b) 3 – 5 acres ( )

c) 6 – 10 acres ( )

d) Above 10 acres ( )

e) Others (Please specify) .....

8. Which year did you start growing the tissue culture bananas? .....

9. How many acres of land have you planted tissue culture bananas?

a) Less than 1 acre ( )

b) 1 - 2 acres ( )

c) 3 – 4 acres ( )

d) More than 5 acres ( )

10. Do you have a store for storing food?

a) Yes ( ) b) No ( )

If yes, what Kind of foodstuffs do you keep in your store? Please tick where appropriate

a) Bananas ( )

b) Beans ( )

c) Maize ( )

d) Potatoes ( )

e) Others (Please specify) .....

11. How many meals do you eat in a day?

a) One meal ( )

b) Two meals ( )

c) Three meals ( )

d) Four Meals ( )

e) None ( )

12. In reference to question (11) above, why do you chose to eat the number of meals you have selected in a day.

a) Food is not enough ( )

b) There is no enough money to buy food ( )

c) To preserve some food for another day ( )

d) To reserve some food for selling in the market ( )

e) Others (Please specify) .....

Section C: Health

(Please tick where appropriate)

13. During the past one month, how many times have you fallen sick?

a) Once ( )

b) Two times ( )

c) Three times ( )

d) More than four times (Please specify) .....

14. Which is the most common illness among your family members?

a) Common cold and cough ( )

b) Malaria ( )

c) Amoeba ( )

d) Typhoid ( )

e) Pneumonia ( )

f) Others (Please specify) .....

15. Besides each of the statements given, please indicate whether you:

1) Strongly disagree 2) Disagree 3) Agree 4) strongly agree.

In my home area, the disease that kills most people is:

Diseases	1	2	3	4
Common cold and pneumonia				
Malaria				
Amoeba				
Typhoid				
Cancer				
Tuberculosis (TB)				
HIV / AIDS				

16. What type of health clinics are found in your community, nearby where you live?

a) District hospital ( )

b) Health centre / dispensary ( )

c) Private hospital ( )

d) Private clinic ( )

17. Of the health clinics in your home area, which one do you attend for medical treatment?

a) District hospital ( )

b) Health centre ( )

c) Private hospital ( )

d) Private clinic ( )

e) Others (Please specify) .....

Section D: Income

(Please Tick where Appropriate)

18. How many market days do you attend in a week?

a) 1 ( )

b) 2 ( )

c) 3 ( )

d) 4 ( )

e) More than 4 ( )

19. How many kilograms of bananas do you sell in one day?

a) 10 – 20 kg ( )

b) 20 – 40 kg ( )

c) 40 – 80 kg ( )

d) 80 -200 kg ( )

e) More than 200 kg (Please specify) .....

20. During the past one year, what was the average price of Tissue Culture bananas per Kilogram?

a) Ksh 10 – 20 ( )

b) Ksh 20 – 40 ( )

c) Ksh 40 – 60 ( )

d) Ksh 60 – 80 ( )

e) Above Ksh 80 (Please specify) .....

21. Indicate the number of your children attending each category of schools and circle the appropriate number in the table shown below. Tick also the appropriate school category that they are in.

School	Number of children	Public school	Private school
Nursery	1 2 3 4 5		
Primary	1 2 3 4 5		
Secondary	1 2 3 4 5		
College	1 2 3 4 5		
University	1 2 3 4 5		

22. Since you started growing the tissue culture bananas, which of the following things have you been able to do? Please tick where appropriate.

a) Bought a mobile phone ( )
b) Paid school fees for the children ( )
c) Started other money generating projects ( )
d) Installed piped water ( )
e) Installed electricity ( )
f) Others (e.g bought television set, car) .....

Section D: Employment

(Please Tick where Appropriate)

23. In your opinion which of the following is not one of the contributions of growing Tissue Culture bananas:

a) Increased family income ( )
b) Improved health ( )
c) Increased source of food ( )
d) Source of employment ( )
e) Improved infrastructure (roads, health facilities and schools) ( )
f) Improved security in the community ( )

24. In your opinion has Tissue Culture banana farming created employment in your community? (Please tick where appropriate.

a) Yes ( ) b) No ( )

If your answer is yes, in what ways has Tissue Culture banana farming created employment (Please tick where appropriate):

a) Self employment ( )

b) Employment for non Tissue Culture banana growers ( )

c) Creation of formal employment (eg staff from the government and Non-Governmental Organizations ( )

d) Employment of youths ( )

25. Which group of people in your community has benefited most from the growing of Tissue Culture bananas?

a) Youth ( )

b) Women ( )

c) Men ( )

d) Children ( )

Thank you.

APPENDIX C

KEY INFORMANTS QUESTIONNAIRE

SECTION A

Please put a tick in the appropriate brackets or answer as required in the spaces provided.

1. What is your gender?

a) Male ( ) (b) Female ( )

2. What is your highest academic qualification?

(i) Masters Degree ( )
(ii) Degree ( )
(iii) Diploma ( )
(iv) 'A' level (Form 6) ( )
(v) 'O' level (Form 4) ( )
(vi) Others (please specify).....

3. How many years have you worked with the community?

(i) 0-2 years ( )
(ii) 3-4 years ( )
(iii) 5-6 years ( )
(iv) Over 7 years ( )

SECTION B

4. When did tissue culture banana farming start in Abogeta Division .....

5. How many farmers did you start with? .....

6. What was the source of tissue culture banana planting materials/seedlings when the Project was initiated? .....

7. How many farmers grow tissue culture bananas in Abogeta Division? .....

8. What has been the trend in tissue banana adoption in terms of?

Particulars	Quantity
a) Acreage under tissue culture bananas b) Quantity of tissue culture banana sold per market day c) Number of market centers d) Price of tissue culture bananas per kilogram e) Number of seedling nurseries in the area f) Number of employees from the community	

9. How tissue culture bananas get to the market (marketing channels)?

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10. Who are your main customers? .....

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11. In your opinion, has the adoption of tissue culture bananas contributed to the quality of life of the community?

a) Yes ( ) (b) No ( )

If your answer is yes in question (11) above, please indicate some of the ways in which the growing of tissue culture bananas has benefited the community members?

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12. What are some of the challenges encountered by tissue culture banana farmers?

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Thank you.