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STAPLES VALUE CHAIN ACTIVITY – *NAFAKA* – BASELINE REPORT

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STAPLES VALUE CHAIN ACTIVITY BASELINE REPORT

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TABLE OF CONTENTS

ACRONYM LIST 1

EXECUTIVE SUMMARY 3
- **SUMMARY** 3
- **MAIN FINDINGS** 4
  - Demographics 4
  - Poverty 4
  - Food Security 5
  - Sources of Income 5
  - Maize and Rice Production 5
  - Production Constraints and Opportunities 5
  - Knowledge and Extension 6
  - Access to Credit, Savings and Information 6
  - Maize & Rice Marketing and Sales 7
  - Household Decision Making 7
  - Institutional Analysis 8

BACKGROUND 9
- **PROGRAM DESCRIPTION** 9
  - Program Context 9
  - Program Goals and Components 10
  - The Value Chain Approach 10
  - Geographic Scope 11
- **RESULTS FRAMEWORK AND INDICATORS** 12

PURPOSE AND EXPECTED USE OF THE BASELINE STUDY 14
- **OBJECTIVES OF THE SURVEY** 14

SURVEY METHODOLOGY AND DATA COLLECTION TECHNIQUES 16
- **HOUSEHOLD DATA SAMPLING STRATEGY** 16
- **FOCUS GROUP DATA** 17
- **ENUMERATION AND DATA ENTRY** 18
  - Enumeration 18
  - Data Entry 18

MAIN FINDINGS 19
- **DEMOGRAPHICS** 19
  - Background 19
  - Literacy Levels 20
  - Population Distribution 20
  - Marriage 21

Training, Experience and Skills 22
HOUSEHOLD POVERTY AND FOOD SECURITY 23
Poverty Analysis 23
Food Security 26
Household Construction and Assets 27
Sources of Income 32
VALUE CHAIN ANALYSIS 33
Background 33
Current Production and determinants 33
Supply function 37
Production Constraints and Investment Opportunities 37
Land, Tillage and Seeding 39
Rainfall and Irrigation 42
Agro-Chemicals 42
Harvesting 45
Labour 45
Post-Harvest Losses and Technologies 48
Knowledge and Extension 49
Access to Credit, Savings and Information 51
Maize/Rice Marketing and Sales 55
Profitability Analysis 60
Maize and Rice Marketed Shares 60
Household Decision-making 64
INSTITUTIONAL ANALYSIS 68
Producer Organizations 68
Input Suppliers 73
Extension Services 75
Farmers' Groups 76
Maize and Rice Traders / Maize and Rice in the Market 83

KEY OBSERVATIONS 84

CHALLENGES 86

CONCLUSIONS 87

ANNEXES .....
NAFAKA RESULTS MODEL & LOGICAL FRAMEWORK .....
GRAMEEN FOUNDATION, PROGRESS OUT OF POVERTY (PPI) TOOL .....
DESCRIPTION OF SAMPLING PROCEDURES .....
SURVEY INSTRUMENTS .....
SURVEY TRAINING MANUAL .....
DISTRICT MAPS .....

ACRONYM LIST

Acronym	Name
ADB	African Development Bank
ASDP	Agricultural Sector Development Programme
CAADP	Comprehensive Africa Agriculture Development Programme
COP	Chief of Party
DCOP	Deputy Chief of Party
EA	Enumeration Area
EAC	East African Community
FAO	Food and Agriculture Organization
FGD	Focus Group Discussions
FtF	Feed the Future
GIS	Graphical Information System
GoT	Government of Tanzania
HH	Household
HR	Human Resources
HSSP	Health Sector Strategic Plan
ICT	Information and Communication Technology
JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
PMP	Performance Management Plan
PPI	Progress out of Poverty Index
PPP	Purchasing Power Parity
RGoZ	Revolutionary Government of Zanzibar
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Growth Corridor of Tanzania

SMS	Short Messaging Service
STD (DEV)	Standard Deviation
TSH(S)	Tanzanian Shillings
USAID	United States Agency for International Development
USD	United States Dollars
VAR	Variance
VC	Value Chain
WFP	World Food Program
WRS	Warehouse Receipt System

EXECUTIVE SUMMARY

Tanzania Staples Value Chain (NAFAKA) is a USAID-funded program that integrates agricultural, gender and nutritional development approaches to improve smallholder farmers' productivity and profitability in maize and rice value chains. ACDI/VOCA is leading a consortium of ten international and local organizations, in implementing the Staples Value Chain Activity. The project is part of USAID's Feed the Future (FtF) initiative, an endeavor to harmonize regional hunger- and poverty-fighting efforts in countries with chronic food insecurity and insufficient production of staple crops.

The overall goal of NAFAKA is to sustainably reduce poverty and hunger by improving the productivity and competitiveness of the rice and maize value chains so as to provide job and income opportunities for rural households. The project is designed to accomplish this goal by improving the competitiveness and productivity of maize and rice value chains; facilitating greater domestic and regional trade; increasing benefits from the growth of the maize and rice subsectors, particularly those to women and youth; and enhancing rural household nutrition via women-focused value chain development and encouraging consumption of a balanced diet.

USAID's FtF initiative places a strong emphasis on monitoring and evaluation and evidence-based program management. Feed the Future's M&E approach is fully results-based, with a detailed logical framework and a comprehensive Indicators Handbook available for implementing partners to ensure full alignment. The baseline survey has the overall purpose of collecting comprehensive, reliable and comparable household-level data that will be used to track the progress of the NAFAKA project and measure its impact in the final evaluation. The information and data contained in this report provides the basis for monitoring changes over the life of the project.

SUMMARY

Data from the baseline survey has confirmed that the project assumptions were largely correct and that the activities planned are in line with the major needs of the targeted areas. The full potential of the maize and rice value chains is far from being fully tapped, and the survey results corroborate this.

The demographic data shows that a large majority of households rely on farming as a major source of income, and despite selling part of their harvests, farmers are usually unable to store them beyond the harvest season. An analysis of poverty indicates that the majority of households in the targeted areas are overwhelmingly poor, and there is very limited use of kitchen gardens. The complete reliance on farmed crops also suggests a situation of high vulnerability to food insecurity. Gender inequalities have emerged throughout the analysis, revealing a context in which men are the final decision-makers, both at the household and farm level. Women's trading capacity is limited, and despite being considered more credit-worthy than their husbands, their access to credit is smaller. NAFAKA's focus on women and youth are appropriate and highly needed because without their involvement, durable improvements will not be achievable.

Households reported that the primary crops they are interested in cultivating are maize and rice, indicating that NAFAKA has focused on the right commodity value chains with the highest demand. Results show that these value chains can be improved in several areas to enhance production and improve the smallholder farmers' competitiveness in the market.

Most stakeholders see smallholder farmers as a risky business partners. They are considered unreliable, difficult to reach, unable to repay loans and ill-equipped to understand the importance of investing in quality inputs (or at least unable to pay for them). They are poorly organized: existing farmers' groups have limited outreach and poor coordination and management capacity. They are deterred from selling on contract because of both their difficulty in meet-

ing required quantities and their lack of contractual power in setting the price. They recognize their difficulties in improving their efficiency and their poor skills.

Lack of quality inputs and limited mechanization emerged as a major cause of low production. One of the objectives of the NAFAKA program is to introduce and encourage the use of new technology and improved inputs for increasing productivity. Extension services in the targeted areas are currently limited, indicating a need to expand NAFAKA extension activities. Households confirmed that irrigation, conservation agriculture, soil fertility management, green manure, pest management and soil conservation for maize and rice are the topics with the highest demand for training services, suggesting that NAFAKA extension services will be well-received by the communities.

The findings on access to credit also support the need for interventions in expanding financial services, as planned in NAFAKA. Close to 20 percent of households interviewed reported having no access to any source of credit – whether informal, semi-formal or formal. More than 30 percent said they had access to only one or two different sources: usually friends/neighbors and family members.

The following provides the main findings of the baseline study.

MAIN FINDINGS

DEMOGRAPHICS

In 2010, the estimated population of Tanzania was just over 43 million, with almost 50 percent of the population under 15 years old. Over 70 percent of the population lives in rural areas, the majority of whom are employed in the agriculture sector as smallholder farmers. Literacy levels among the rural population are low. With over half of the rural labor force between 15-29 years, only about 8.5 percent have post-primary school education or training. Nationally, the formally-educated workforce is small and primarily concentrated in urban areas.

Because of the subsistence farming opportunities available to virtually every rural resident, the unemployment rate is low in rural areas. Still, the extent of underemployment in terms of work hours per week is substantial, and yields and pay are generally low and subject to natural risks.

As the gender of household heads is likely to influence the decision-making autonomy of project beneficiaries, the survey assessed how many respondents are living in male- and female-headed households. The survey found that the majority of households are male-headed (85 percent of cases) and fall within the age range of 42 – 46 years. The average household size is 5.4 people, though it varies across districts, ranging from 4.8 in Kilombero to 5.7 in Kongwa.

POVERTY

The NAFAKA program focuses on agricultural production and the integration of smallholder farmers into the commodity value chain. The underlying reason for these activities is to help support livelihoods and increase the food security of program beneficiary households, aligning with the top goal of the Feed the Future program: to 'Reduce Poverty and Global Hunger.' The challenge lies in how to measure this penultimate goal.

Measuring poverty and changes in poverty can be done in different ways. For example, one common technique is to estimate household expenditures to determine a poverty line (e.g., one dollar a day). An alternative is to benchmark and track some of the material dimensions of poverty, such as levels of nutrition, health status or education. For the NAFAKA baseline, we have chosen to benchmark household well-being using the Grameen Foundation's Progress out of Poverty Index for Tanzania.

The baseline data and calculated poverty index found that households in the project area are overwhelming poor. Eighty percent of households have a poverty index score less than fifty, which indicates that these households are a most likely living below the poverty line, measured at $1.25 a day.

FOOD SECURITY

While closely related, food security and monetary poverty are two different things. Food security relates to the ability of a household to have access at all times to enough food to maintain a healthy, active life. If a household can grow its own food, it can have food security with relatively little money and few assets. The NAFAKA program seeks to increase incomes through the production of commodities, which can lead to improved food security, but it also seeks to improve household food security through other means: one method is by encouraging households to maintain kitchen or community gardens.

From the baseline survey data, it is clear that such gardens are not prevalent among the communities. Just over 10 percent of households have a kitchen garden and less than one percent of households participate in a community garden. The predominant vegetables grown in such gardens are green chilies, okra and tomatoes.

SOURCES OF INCOME

Many vulnerable households, particularly those prone to poverty and food insecurity, tend to earn their income from a variety of sources, as evidenced by the survey. Generating small amounts of income from multiple streams is a coping strategy to insulate families against a collapse in production due to inclement weather, etc. The survey found that over half of respondents reported earning income from owning a farm. Petty trade was the second most common source of income, followed by income earned through casual farm labor. Only about three percent of households interviewed stated that they earned an income from salaried employment.

MAIZE AND RICE PRODUCTION

Tanzania is characterized by a prevalence of maize cultivation, the main staple food for the great majority of farmers and the main expenditure of poor households. Smallholders generally cultivate maize partly for subsistence and partly for the market. Rice is an important cash crop, but smallholders also retain produce for on-farm consumption. Both value chains have significant potential for efficiency improvements in production and in marketing, which directly impact households' incomes and food security.

The survey found that, on average, maize-farming households produce 3,330 Kg of maize per year from an average planted area of 7.7 hectares. Rice farmers produce an average 2,130 Kg per year, but they farm a much smaller area. On average rice farmers cultivate just less than three hectares.

PRODUCTION CONSTRAINTS AND OPPORTUNITIES

The baseline survey assessed the main constraints to increasing production. Twenty percent of maize producers and 22 percent of rice producers reported the following as the main constraints to increasing production: high cost of land preparation and limited numbers of tractors available; limited irrigation works available to ensure adequate water; andhigh cost of improved seed, particularly among maize farmers. Many farmers are still dependent on traditional farming methods, such as hand hoes, and have no access to modern tools. Some farmers acknowledge that they lack basic training in farming and agriculture, which is compounded by a lack of extension services. The high prices of agricultural inputs, including seeds, fertilizers and herbicides, are disproportionate to the low price of produce. This makes it difficult to increase production without access to loans and credit. Moreover, many farmers point to the impact of climate variability – characterized by irregular and inadequate rainfall – as a key constraint to increased production.

One of the objectives of the NAFAKA program is to introduce and encourage the use of new technologies for increasing productivity. One way to do this is through the use of new, improved or hybrid seeds. Currently, there are few farmers taking advantage of hybrid seed. The vast majority, especially maize farmers, use local seeds that have been saved from the previous crop. Indeed, during focus group discussions with farmers for both maize and rice, almost all of the respondents reported that they use local seeds from their stock or that of their neighbors. Hardly any farmers buy their seeds from the marketplace or elsewhere. Most farmers do not seek advice nor receive information

about seeds from anyone. When they do, they are most likely to ask neighbors or friends. A small proportion of farmers reported asking the advice of extension officers.

Given the low rate of fallowing and the declining soil fertility in the project areas, maize and rice yields can be expected to be strongly responsive to pesticides, herbicides and fertilizers, which can greatly increase production. However, the survey found that a low percentage of households use these inputs, especially for maize. Herbicides are the most popular inputamong rice farmers, as 53percent reported using them. Fertilizers were the most common input for maize crops, but onlyabout 19 percent of maize farmers applied inorganic fertilizer.

The lack of storage facilities was also found to be a major factor limiting smallholders' abilities to increase incomes from farm sales, contributing to inefficient markets that are characterized by seasonal price variability. Sixty-eight percent of households reported selling at least part of their maize harvest and just over 80 percent of households reported selling at least some of their rice harvest. Without safe storage infrastructure, households must go straight from the field to the market to sell their produce, even when prices are at their lowest. While the majority of households reported storing their harvests (73 percent of maize was stored and 76 percent of rice was stored), very few reported storing with the aim to sell at a higher price when market demand increased.Instead, households stored the food to consume at a later date.

KNOWLEDGE AND EXTENSION

To meet the goals of increasing smallholder farmer knowledge and facilitating income-generation for vulnerable groups, one of the primary NAFAKA activities is extension training. Only six percent of survey respondents (119 households) reported receiving extension training in the past 12 months. Of the 119 households that had received recent extension training, the majority (89 percent) received only one visit. Less than 10 percent of households that received extension services reported paying for them.

The government and NGOs are the primary service providers. Farmer groups account for about 14 percent of the extension service. Agro-dealers and an unspecified "other" provide a fairly insignificant extension service. Overall, however, it is important to emphasize that extension services are extremely limited with few households reporting access.

The baseline survey asked respondents about their level of knowledge in relation to specific production areas. Most respondents professed limited knowledge. More than 50 percent of respondents indicated little current knowledge regarding irrigation, conservation agriculture, soil fertility management, green manure, pest management and soil conservation. When asked about their desire for training, nearly 100 percent of respondents expressed a desire for training in all aspects of farming.

Without access to extension services, friends, relatives and other farmers serve asthe primary sources of information for smallholder farmers. Radio and SMS currently play an extremely limited role in how farmers gain knowledge on improved farming practices.

ACCESS TO CREDIT, SAVINGS AND INFORMATION

Agricultural productivity and growth for small-scale farmers is hindered by limited access to credit. Without credit, farmers cannot invest in new technologies, such as new seed varieties and irrigation systems, which can help increase and steady production. Farmer focus group discussions in all regions raised the issue of lack of credit, limiting their ability to adopt new technologies and expand production. As previously mentioned, close to 20 percent of households interviewed reported having no access to any source of credit – whether informal, semi-formal or formal. Another 32 percent said they had access to only one or two different sources. Of those households that reported having access to at least one source of credit, the two most common sources were friends/neighbors and family members.

Semi-formal and formal institutions were listed less frequently with 42 percent of households reporting access to micro-credit institutions and only 16 percent reporting a bank as a potential credit source.

Farmers' high default rates, often due to a lack of steady production, may limit their access. The survey found that input suppliers' main hesitations for providing credit is that farmers are not reliable with repayment. This could explain why only 21 percent of households believe that input suppliers are a potential credit source.

MAIZE & RICE MARKETING AND SALES

The baseline survey examined household experiences in marketing maize and rice. Using recall questions, about 70 percent of maize farmers surveyed stated that they had sold product during the recall period, while over 80 percent of rice farmers reporting selling rice. In the sample as a whole, maize farmers reported selling just over 46 percent of their maize produce after harvesting, storing 30 percent, and consuming the rest. On average, just over eight percent of maize is held to repay loans or debts owed to family and friends. With respect to rice, households reported selling just over 42 percent of their harvest, storing about 20 percent and consuming the rest.

In most cases, sales took place through local traders. Secondary and tertiary sales outlets included the local market or neighbors. Very few transactions occurred between the farmers and more formal groups such as producer groups, input suppliers and processing plants. In focus groups, farmers explained that the main reasons for selling to local traders include the ease of access,lack of transport costs to reach buyers and simplicity of the process. Several farmers mentioned that one of the reasons why they choose to sell to local traders is a lack of alternative, as there is no easily accessible market. They reported that markets are inaccessible or inconvenient due tobad road conditions, expensive transport, required middlemen who cut into profit, a complex sales process and a lack of information on prices or unfavorable prices.

The drawback of selling to local traders, however, is that they offer a comparatively lower price and rarely buy in bulk. Rather, at the market it is common to sell in bulk, farmers are assured of cash and there are multiple potential buyers.

HOUSEHOLD DECISION MAKING

USAID, through the FtF initiative, has a central focus on women, seeking to improve their roles and engagement in all program areas. To evaluate the intra-household dynamics, both male and female respondents were asked questions about who in the household makes decisions in two categories – household decisions and farm decisions. The three possible responses were that decisionsare made by a female, decisions are made by a male or decisionsare made jointly. In households where another senior member of the opposite sex was available, the set of questions was asked to both members of the household to compare responses. Collecting data on decision-making will help inform the program and tailor interventions as needed.

For many of the household decisions, the answers followed the gender of the respondent. For instance, in answer to the question *who buys clothing*, the female respondents on average indicated that females make that decision. The males responding to the same question answered in the reverse. When looking at agricultural production decision-making, female respondents stated that decisions were more often made jointly, while male respondents perceived that decisions were made by males.

Focus group discussions support the household-level data. The most frequent response – among both women and men – to questions on decision-making regarding agriculture was men. Interestingly, some respondents indicated that women are not usually allowed to do business because buyers fear that they might have stolen the goods they are selling from their husbands. Such responses are indicative of a stigma against women in business.

The FGDs reveal many other reasons why it is very difficult to do business as women. For instance, respondents reported that women face difficulties while trading because there are things that women cannot do, like carrying heavy sacks of rice or maize from one point to another. Another issue challenging women is transportation. Respondents

reported that it is often difficult for women to ride motorcycles or bicycles, and therefore they cannot carry out their businesses efficiently.

INSTITUTIONAL ANALYSIS

The household survey also examined the role of stakeholders including producer/purchaser organizations, input suppliers, farmers and farmer groups and traders at the market. Less than 6 percent of farmers surveyed reporting belonging to a producer group. The main reason given for not joining was that farmers do not perceive the advantages of joining a group nor the benefit of paying annual group fees. The few farmers interviewed who were members of a farmers' group overwhelming stated that their main reason for joining was the hope of accessing credit.

Farmer Groups: Because farmers groups have the potential to allow smallholder farmers to improve their productivity, the survey conducted focus group interviews among 10 farmer groups. The average group size was just over 100 members and the gender breakdown was nearly even.

Increasing their income through increasing crop production was the reason most farmers cited for joined producer groups. Not only did they believe that they would have access to loans, inputs and trainings, but sharing challenges, support from peers and exchanging knowledge with other farmers were important aspects that they thought membership would provide.

Most group members stated that they participate in group sales and marketing. None of the groups sell on contract, but instead conduct direct cash transactions. Although selling on contract is appealing, groups are deterred from using this method of sales because of difficulty in meeting the quantity required. Low production due to the lack of quality inputs is a major problem.

A common theme emerged from the focus groups regarding constraints for increasing membership – the cost-benefit ratio. Almost all groups mentioned that one reason farmers do not join is because of the annual fee. Farmers either cannot afford it or fear that it will cause debt. During an all-female focus group discussion, members said that one of the challenges among women's membership is that their husbands do not want them to join.

Input Suppliers: The baseline interviewed input suppliers to better understand their business experience dealing with smallholders and to identify constraints and possible opportunities to expanding input supply to smallholders. The data collected suggests that over 70 percent of input purchases in the project area are from individual smallholder farmers, with about 15 percent from farmer groups and the rest from local traders and cooperatives. One of the biggest constraints mentioned by input suppliers is farmer's lack of knowledge of the utility of different inputs. They cited the lack of extension services as the main reason for this.

We further examined extension training to better understand how relevant it is in the project area. Over 65 percent of farmers interviewed stated that they had never received agriculture extension visits or training. For those stating that they had received training, the majority stated that training was infrequent.

Maize and Rice Traders: Maize and rice traders were interviewed and asked what factors influence the price of maize and rice in the local markets. They indicated that the top three factors are the cost of transportation, climate variabilitiy and access to middlemen traders.

BACKGROUND

PROGRAM DESCRIPTION

PROGRAM CONTEXT

Over the past decade, the agricultural sector in Tanzania has experienced strong growth. As a key sector for employment, economic growth and export income, the sector has reached a GDP growth rate of 10.6 percent in 2008 (source: ReSAKSS). However, this growth has not proportionally benefited poor households. Over the past decade, rural households have endured stagnant poverty levels of 33 percent and insufficient caloric intake nearing 23 percent.[1] With the recent high growth rates, a favorable climate and 80 percent of the labor force working in the sector, agriculture has the potential to drive economic growth and poverty reduction within the country and the region. Indeed, the Government of Tanzania has placed food security at the top of its development agenda by establishing various initiatives, including the National Strategy for Growth and Poverty Reduction (MKUKUTA), 2006-2015 Agricultural Sector Programme (ASDP), Kilimo Kwanza (Agriculture First) campaign, the Health Sector Strategic Plan III (HSSP 2009-2015), the Roadmap Strategic Plan to Accelerate the Reduction of Maternal and Child Deaths (2009-2015), the draft National Nutrition Strategy (2009-2015), and by joining the Comprehensive Africa Agriculture Development Programme (CAADP) process.

Outside development agencies and donors agree that Tanzania is well-positioned to benefit from significant increases in agricultural assistance aimed to have a positive impact on food security. Such donors include:

- The Southern Africa Growth Corridor of Tanzania (SAGCOT), a public-private partnership which aims to boost agricultural productivity in Tanzania by promoting "clusters" of profitable agricultural farming and services businesses;
- JICA investments in an irrigation scheme and training center for irrigation technicians, and engineering designs for the schemes;
- World Bank investments in a regional center of excellence for rice research and small scale maize fortification;
- Africa Development Bank investments in credit co-guarantees and rural roads;
- FAO investments in capacity building for farmers in irrigation schemes.

Implemented through Feed the Future (FtF), the USAID strategy has been to design programs that complement those of other donors. Integrating agricultural, gender and nutritional development approaches, the Tanzania Staples Value Chain (NAFAKA) focuses on the maize and rice value chains with the aim of improving the productivity and profitability of smallholder farmers.

Despite increasing local production, Tanzania finds itself importing rice to satisfy national consumption. By targeting the rice value chain, NAFAKA aims to help lower costs of production, improve quality and increase competitiveness so as to eliminate barriers that inhibit potential growth in production levels. With rice consumption in Tanzania, the region, and the world growing at a rapid rate, and with a comparative advantage in rice production in the Southern African Development Community (SADC) and East African Community (EAC) region, the additional investment through NAFAKA can assist Tanzania in meeting and benefiting from this growing demand.

Similar to rice, the maize subsector is currently facing production and market restraints. As one of the largest subsectors in Tanzania, maize production is crucial to national food security concerns. NAFAKA investments in maize will

[1]Utz, Robert (ed). Sustaining and Sharing Economic Growth in Tanzania. The World Bank, 2008.

help the country realize its potential for producing over 100% self-sufficiency in the country and will be key to reducing poverty and improving food security.

PROGRAM GOALS AND COMPONENTS

The overall goal of NAFAKA is to sustainably reduce poverty and hunger by improving the productivity and competitiveness of the rice and maize value chains. In doing so, NAFAKA hopes to provide additional job and income opportunities for rural households. The selection of these two commodity chains is in part due to their importance as staple crops in Tanzania. These foods are produced largely by small-scale farmers, providing an ideal entrance point for integrating smallholders into the value chain. While many rice and maize producers grow their crops for both consumption and for sale, in the broader market, rice is seen primarily as a cash crop, while maize is considered primarily a food crop.

The program is designed to accomplish this goal by:

- Improving the competitiveness and productivity of maize and rice value chains;
- Facilitating greater domestic and regional trade;
- Increasing benefits from the growth of the maize and rice subsectors, particularly those to women and youth; and
- Enhancing rural household nutrition via women-focused value chain development and encouraging consumption of a balanced diet.

The activities undertaken are expected to alleviate food insecurity and malnutrition in rural areas. NAFAKA program activities consist of five components:

1. **Value Chain Analysis and Strategy Development**. This component consists of analyzing value chains, developing a five- and ten-year vision and creating an intervention strategy (inclusive of gender, environmental impacts, vulnerable groups and nutritional objectives) for rice and maize.
2. **Improved Competitiveness and Trade** entails creating demonstration plots, generating incentives for buy-in by value chain actors, improving market functions and by minimizing risk for private actor involvement.
3. **Improved Productivity** will result from building producer skills, efficiency and effectiveness via private-sector led extension services focused on use of inputs, water and soil management.
4. **Increased Incomes for Vulnerable Smallholders** will come from the creation of marketing groups and other incentives that will encourage vulnerable individuals to engage with, contribute to and benefit from value chains. Behavior-change ICT solutions will be employed to integrate education on nutrition as well.
5. **Unleashing Innovation and Private-Sector Investment** will occur through the establishment of the NAFAKA Innovation and Investment Fund. The fund will decrease constraints and catalyze investment from the private sector by lowering risk, incentivizing innovation and leveraging existing resources in the maize and rice value chains.

THE VALUE CHAIN APPROACH

The value chain approach consists of linking micro- and small-enterprises into more efficient value chains by developing horizontal and vertical linkages. This process is achieved by creating market incentives to encourage smallholder participation and by equipping small-scale farmers with the necessary tools and information to compete in the larger market.[2]

To develop the necessary environment to bring about change, value chain projects target commodities that have a comparative advantage and focus on:

- Facilitating changes in firm or farmer behavior

[2] http://microlinks.kdid.org/good-practice-center/value-chain-wiki

- Transforming relationships between value chain actors (e.g. input suppliers, farmers, producers, traders, etc.)
- Targeting leverage points
- Empowering the private sector

Under the direction of ACDI/VOCA, local partner MatchMaker Associates conducted a value chain analysis of rice and maize in the target areas in April and May of 2011. The analysis articulated a vision for achieving better performing value chains characterized by continuous upgrading by all players in the system. The following strategy and detailed project activities outlines, temporally, the necessary steps toward realizing this vision.

GEOGRAPHIC SCOPE

The NAFAKA program focuses on the region of Morogoro for rice production and the regions of Dodoma and Manyara for maize production. **.,** on the following page, shows the areas where NAFAKA is being implemented. Additional maps are located in Annex III. These regions were purposfully selected due to their concentrated production in the respective commodities. Indeed, the Morogoro region was targeted for rice because of its location within the Southern Agricultural Growth Corridor (SAGCOT), its current rate of production (it contributes 20 percent of Tanzania's rice), and its close proximity to busy transport corridors and the Dar es Salaam port. Within this region, NAFAKA will focus on the districts of Kilombero and Mvomero due to the high volumes of rice production in these areas.

For maize production, NAFAKA focuses on the districts of Kiteto and Kongwa. These districts were selected due to their strategic locations as catchment areas for one of the largest maize markets in East Africa, the Kibaigwa market. In addition, Kiteto, with an annual surplus of approximately 25,000 tons of maize, is considered the breadbasket for the surrounding food insecure districts in Manyara, Dodoma, and Morogoro. It is hoped that increasing productivity in Kiteto will not only impact the incomes of value chain actors in the district but will also result in lower prices for nearby food insecure regions. The selected districts are large and dynamic. **.** provides some descriptive details about each district.

Table 1: Basic Information on Surveyed Districts

	Mvomero	Kilombero	Kiteto	Kongwa	Total
Total District Area (Km2)	259,347	321,611	152,296	248,656	981,910
Total District Population (2002)	7,325	13,577	16,305	4,041	41,248
Household size (regional average)	4.4	4.4	5.1	4.4	4.575
Cropped Area ('000 ha)	440917	440917	292439	734609	**U/A**
Maize Production (2005) in '000 acres	21.8	14.2	54.6	61.0	22.65
Paddy Production (2005) in '000 acres	11.5	33.7	0	0	11.3

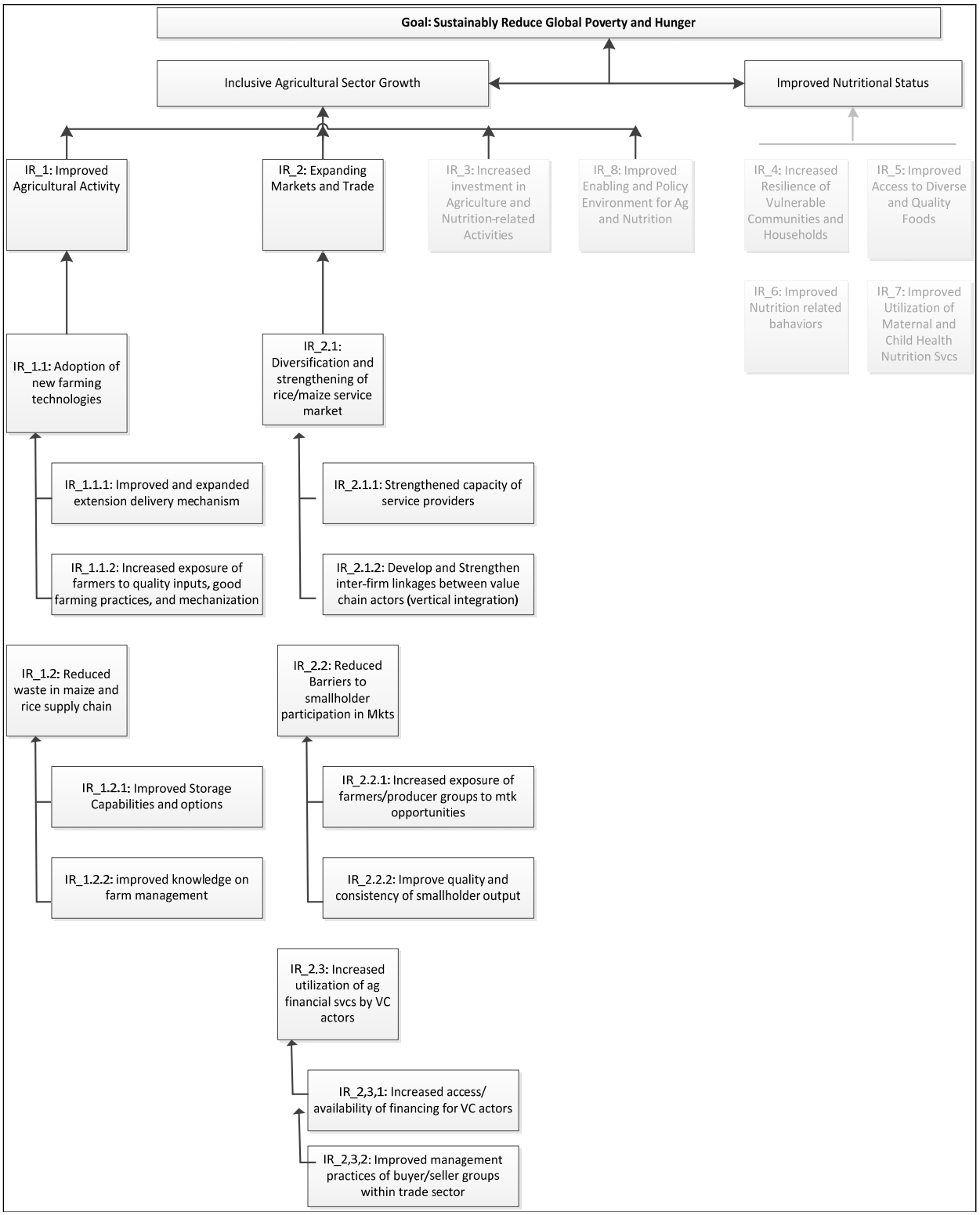
Figure 1: NAFAKA Operational Area

RESULTS FRAMEWORK AND INDICATORS

The results framework serves as the map or guide on how a project will unfold and be measured. It explains the causal argument on how various NAFAKA activities will lead to change. By diagraming out how different results relate to one another, project planners can see the steps they need to take to make tangible impacts. In general, the top level of a results model describes the ultimate intention or goal of project. Mid-level results describe the specific effects or changes that the project intendsto create. The bottom or lowest levels of the diagram describe the specific inputs or activites that the project will introduce to affect change. In order to measure progress, indicators are attached to each result level. The baseline survey activities provide the benchmark values for these indicators. It is from these baseline results that project managers will measure progress through monitoring and impact analysis.

. diagrams NAFAKA's results framework. For a detailed look at the relationship between results and the indicators used to measure these results, see the completed PMP in Annex III. The first two levels of the NAFAKA results framework operate in step with the larger FtF results framework. In this broader framework, the overall goal is to sustainably reduce global poverty and hunger. To achieve this goal, FtF works through two channels: (1) Improving the nutritional status of households and (2) developing an inclusive agricultural sector. It is through this latter channel that the NAFAKA program is situated and will be measured.

Figure 2 NAFAKA Results Framework



PURPOSE AND EXPECTED USE OF THE BASELINE STUDY

USAID's FtF initiative places a strong emphasis on monitoring and evaluation and evidence-based program management. Feed the Future's M&E approach is fully results-based, with a detailed logical framework and a comprehensive Indicators Handbook available for implementing partners to ensure full alignment.

For the NAFAKA Project, ACDI/VOCA has designed a thorough system of real-time data capture, including trends and impact information, using a broad array of tools and methods. The NAFAKA Monitoring, Evaluation and Learning (ME&L) system feeds into both FtF and the Comprehensive Africa Agriculture Development Program (CAADP[3]) and is designed to demonstrate, over the life of the project, the extent to which impacts are broad-based and systemic. The ultimate aim of the ME&L system is to "understand the underlying reasons change is occurring or not occurring in the field and then use that information to both learn and adapt both the actions within the projects (programme response) and the conceptual framework (programme design)". The six areas the ME&L system looks at are: relevance, efficiency, effectiveness, impact, sustainability and external utility.

The baseline survey represents the first step of this process. The survey has the overall purpose of collecting comprehensive, reliable and comparable household-level data that will be used to track the progress of the NAFAKA Project and measure its impact in the final evaluation. Specifically, the NAFAKA baseline survey was designed to collect information in the project area on household farming practices, health behavior and attitudes, household income, and women's asset ownership and land use.

OBJECTIVES OF THE SURVEY

Rather than beginning new research, a baseline survey aims to:

1. Establish the starting points and targets for indicators
2. Inform on the status of a situation (learning process)
3. Assess and guide the kind and intensity of interventions that will be required (adaptation process)

For the performance measurement system to be meaningful, data collection must begin with documented baseline information from which to measure household change. At the end of the project, end-line or impact survey data will be compared to the initial benchmarks to measure the impact on target households. The data for the final evaluation will be collected using the same methodology and tools as the baseline survey, ensuring comparability. The baseline data will also allow the project implementers to set realistic target values for indicators, against which the project advancement is assessed. In fact, the baseline data constitute the basis for the indicators identified in the project's Performance Management Plan (PMP).

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[3] Through the African Union-sponsored New Partnership for Africa's Development (NEPAD), CAADP aims to facilitate economic growth, eliminate hunger, and reduce poverty in Africa with agriculture-led development. To reach these aims, African governments have agreed to increase public investment in agriculture by a minimum of 10 percent of their national budgets and to increase agricultural productivity by at least six percent. Completely African-led and owned, CAADP represents African leaders' collective vision for the continent's agricultural future. The program is based on four pillars: land and water management; market access; food supply and hunger; and agricultural research. (*Source: USAID website*)

In relation to the second and third objectives, the data collected through the baseline will allow project managers to better understand their districts *vis-à-vis* the program. This will assist in assessing and planning the necessary activities and tracking their progress on continuous basis.

The information included in the NAFAKA baseline survey fulfills these objectives by providing a detailed look at the current situation in NAFAKA's program area as it relates to poverty, hunger and the maize and rice value chains. Also, the questionnaires and indicators of all baseline components are gender sensitive to ensure that the impact of the interventions on both men and women can be captured throughout the programme.

SURVEY METHODOLOGY AND DATA COLLECTION TECHNIQUES

HOUSEHOLD DATA SAMPLING STRATEGY

Rather than utilizing a traditional two-group (treatment/control) sample design, the NAFAKA study is designed to measure the progress of three groups of farmers:

- Maize/rice farmers who did not receive any benefit from the program
- Maize/rice farmers who received indirect benefits from secondary information channels (e.g. radio or SMS)
- Maize/rice farmers who benefited directly from targeted program services (e.g. extension)

Such an approach more effectively measures program impact by examining farmer uptake of new technologies, approaches and project inputs, as well as information penetration and diffusion. The arguments for this methodology are as follows:

- A three-group design more effectively measures program goals.
- Attempting to pre-divide the sample into treatment and control when households self-select is risky. The treatment group may ultimately be very small if the households sampled choose not to participate.
- Since the program area is on a district level and the districts are fairly large, sampling a control group from districts outside the program area is problematic given the high variability of rainfall, soil quality, livelihood characteristics, etc.

The sampling process began with the 2010 census data sent to Kimetrica by the NAFAKA team, reduced down to the project districts. To ensure adequate coverage, it was determined to sample 2,000 households from these districts.

To select the enumeration areas, Kimetrica's GIS specialist first conducted a geo-analysis using available public data – including AfriCover -- to identify the locations where maize and rice are grown within the targeted districts. Using this map, wards (administrative level 4) that do not grow rice and maize were eliminated. In addition, a geo-spatial analysis was conducted of radio and SMS network coverage to ensure that it was adequate to measure the diffusion of NAFAKA information.

To continue the selection process, staff from Kimetrica and ACDI/VOCA visited district and ward offices to speak with local officials, review the pre-generated maps and further eliminate areas where rice and maize are not grown. The officials also identified the locations of each enumeration area (EA) on a map in order to guide the enumeration teams to the appropriate locations to survey. Kimetrica conducted a random sample from the remaining EAs to reach the defined number per district.

The sampling process began with teams traveling to the selected EAs. The GPS coordinates of the center of each EA were provided to the teams. To select households, each enumerator started from this central point, then spun a stick and walked in the direction in which it fell, passing two households and interviewing the third household. Enumerators continued this process for the remaining interviews. To validate that enumerators remained within a given EA, survey managers back-checked the data, ensuring that the 20 households from each EA were clustered around the EA GIS coordinates. .2 displays the sample size in terms of region and district.

Table 2: Household Sample Size by Region and District

Crop	Region	District	HH Interviewed
Maize	Dodoma	Kongwa	600

Maize	Manyara	Kiteto	600
Rice	Morogoro	Kilombero	400
Rice	Morogoro	Mvomero	400

While NAFAKA works predominantly on rice, the enumerators actually interviewed more households in the maize growing areas. The reason for this sampling strategy is due to the dispersed geographic coverage of maize production. While rice is grown in relatively contiguous and distinct areas, maize production is much more widespread and covers larger swaths of land that are not necessarily geographically connected. These large areas may have multiple socio-economic and bio-physical characteristics, which can lead to different yields, irrespective of NAFAKA activities. We therefore were seeking to maximize geographical coverage by more heavily sampling in these areas. Moreover, maize is widely intercropped, which creates a lot of variability in yields. For these reasons, we deemed it prudent to sample more households in maize areas so that we would have enough cases to statistically interpret the results.

FOCUS GROUP DATA

Qualitative data in the form of focus group discussions (FGD) and individual interviews were collected to supplement the quantitative data. FGD and individual interviews were conducted with the following project-related key informants: Farmers, Producer/farmer groups, Input suppliers, Local traders and Purchaser groups. Focus group discussions took place in locations where it was possible to arrange groups of key informants. The key informants were located in or near the sampled EAs. In some cases, the primary market serving a surveyed EA was technically located outside of its boundary. When this occurred, those nearby markets were visited to find the necessary informants.

Where it was not feasible to arrange groups of key informants, individual interviews were conducted instead. The interviews were performed with a mixture of male and female respondents, and the narrative content collected was used to enhance the quantitative data collected at the household level. A breakdown of the type of data collected is displayed in Table 3and Table 3.

Table 3: Breakout of Farmer and Producer Focus Group Discussions and Key Informant Interviews byDistrict

Region	District	Farmers				Producer/Farmer groups				Input suppliers (individual interviews)		
		M	F	Mixed	Total	M	F	Mixed	Total	M	F	Total
Dodoma	Kongwa	2	2	2	6	0	1	1	2	4	1	5
Manyara	Kiteto	2	2	2	6	1	1	1	3	3	2	5
Morogoro	Kilombero	2	2	2	6	0	1	2	3	5	3	8
Morogoro	Mvomero	1	1	1	3	0	0	2	2			4
	Total	7	7	7	21	1	3	6	10			22

Table 4: Number of FGDs and Interviews with Local Traders and Purchaser Groups

Region	District	Local traders							Purchaser groups						
		Focus groups				Individual interviews			Focus groups				Individual Interviews		
		M	F	Mixed	Total	M	F	Total	M	F	Mixed	Total	M	F	Total
Dodoma	Kongwa	0	1	1	2	0	0	0	0	1	1	2	0	0	0
Manyara	Kiteto	0	0	0	0	4	4	8	1	1	1	3	0	0	0
Morogoro	Kilombero	1	1	1	3	0	0	0	0	0	0	0	4	4	8
Morogoro	Mvomero	0	0	0	0	0	0	0	0	0	0	0	6	2	8
	Total	1	2	2	5	4	4	8	1	2	2	5	10	6	16

ENUMERATION AND DATA ENTRY

ENUMERATION

Kimetrica hired 24 enumerators to participate in two weeks of training on interviewing techniques, data quality control procedures, and training on administering the NAFAKA household questionnaire. Enumerators were split into five teams. Each team was led by a team supervisor who received additional training regarding team management and quality assurance. Six focus group discussion experts were hired to conduct the qualitative data collection, and an overall quality control expert was employed for the duration of the field work. Two senior staff from Kimetrica oversaw all operations with assistance from NAFAKA's M&E officer.

Data collection began on November 24, 2011. Five teams were deployed to Mvomero District in Morogoro Region. All teams began in the same area to allow for close supervision over all teams. After the first few days of field work concluded, the team reconvened to discuss and resolve any issues that had been encountered. After completing Mvomero, two teams each went to Kongwa and Kiteto Districts and one team went to Kilombero District. Data collection was completed on December 20, 2011.[4]

DATA ENTRY

After the completion of field work, the questionnaires were shipped to Kimetrica's office in Nairobi, Kenya for digitization. Each questionnaire was entered into the system twice – known as double data entry -- and compared. All discrepancies were reconciled after referring back to the questionnaires. Once captured and reconciled, the data was downloaded and analysed using the statistical analysis program STATA version 11.2 and SPSS.

[4]During field work, local officials notified Kimetrica that Machinga village in Olobot Ward had been demarcated into a different district. Another village was sampled to replace this village. The teams were well-received in most villages. One exception was in Mvomero, where the village was experiencing conflict with the local government about the program implementation. However, after the supervisor discussed the importance of the exercise, the village allowed the enumerators to conduct the work without any problems. Aside from large distances between households, no major challenges were encountered.

MAIN FINDINGS

DEMOGRAPHICS

BACKGROUND

The population of Tanzania has grown from just over 10 million at independence in 1961 to an estimated 43 million in 2010. It is a young population, with almost 50 percent under 15 years of age. The most recent population growth rate, from 2009, is just over 2 percent

Over 70 percent of the population lives in rural areas and are largely employed in agriculture as smallholder subsistence farmers (self-employed) or as unpaid family members. Over half of the labor force is in the 15 – 29 age bracket and only about 8.5 percent have post-primary education or training. Women represent slightly less than half of the labor force. The formally-educated workforce is small in number and is concentrated in urban areas.

Because of the subsistence farming opportunities available to virtually every rural resident, the unemployment rate is low in rural areas. Still, the extent of underemployment in terms of work hours per week is substantial, and yields and pay are generally low and subject to natural risks.[5]

As the gender of household heads is likely to influence the decision-making autonomy of the respondents, the survey assessed how many respondents are living in male- and female-headed households.

Table 5 shows the gender breakdown of household heads. The majority of respondents are male (85 percent of cases), and they fall within the age range of 42 – 46 years. This is in line with figures from the 2002 Census, which show that there were more male-headed households (67.3 percent) compared to female-headed ones (32.7 percent) in Tanzania. When compared with the 1988 census results, the proportion of female-headed households dropped from 33 percent in 1988 to 30 percent in 2002. The same trend has also been observed in both rural and urban areas, where the proportion of female-headed households decreased from 33 percent and 32 percent in 1988 to 31 percent and 29 percent in 2002 respectively. In term of age of the household head, the Census shows that the higher proportion of household headship occurs in the age groups from 25-29 to 40-44 years for both male and female. The peak of the age distribution of household heads occurs in the age group 30-44 for male heads; while for female heads is in age group of 25-29.

From our survey, the average size of the household is 5.4 people, though it varies across districts, ranging from 4.8 in Kilombero to 5.8 in Kongwa. According to the 2002 Census, the average size of households for Tanzania as a whole was 4.7 persons, compared to 5.2 persons in 1988. Differences exist between rural and urban areas: the average household size for Tanzania in rural areas was 4.9 persons while that of the urban areas was 4.2 persons.

Table 5: Characteristics of Household Heads

District	Response Rate	Male (%)	Female (%)	Avg Age of Head	Avg Size of HH	Avg. Age of HH Head	% Literate	
							Male	Female

[5]"CIA - The World Factbook."*Welcome to the CIA Web Site — Central Intelligence Agency*. Web. 09 Feb. 2012.<https://www.cia.gov/library/publications/the-world-factbook>. *Index Mundi - Country Facts*.Web. 09 Feb. 2012. <http://www.indexmundi.com>. *National Website of the United Republic of Tanzania*.Web. 09 Feb. 2012. <http://www.tanzania.go.tz>. Tanzania in Figures 2010 Web. 09 Feb 2012. <http://www.tanzania.go.tz/nbsf.html>, National Bureau of Statistics

Kongwa	592	84.5	15.5	43.8	5.8	22.4	86.6	65.2
Kiteto	594	88.1	12.0	42.4	5.6	22.2	74.6	53.5
Kilombero	400	86.0	14.0	45.0	4.8	25.7	93.0	71.4
Mvomero	397	80.4	19.7	46.2	5.1	26.4	77.4	51.3
Total	1,983	85.0	15.0		5.4		82.4	59.9

LITERACY LEVELS

What is most striking about the data presented in Table 6 is the difference in literacy levels between men and women: 82 percent for men and 60 percent for women. This fits with the historical trend: UNICEF calculates that the adult literacy rate of females as a percent of males for the period 2005-2008 was 84 percent.

Substantial effort has been made to address the literacy gap. This is evident when we expand the analysis to include all household members (including younger members). Literacy levels, as shown in Table 6, are similar for boys and girls in both English and Swahili, and, interestingly, there are slightly more girls still in school than boys.

Table 6: Literacy Levels by Gender - All HH Members

HH member	Male		Female		Total
	#	% (rows)	#	% (rows)	#
Read/write kiswahili	3,453	51.9	3,199	48.1	6,652
Read/write english	645	57.1	485	42.9	1130
Still in school	1,437	49.4	1,471	50.6	2,908

In fact, the great majority of households (93.8 percent) reported having at least one literate member (Table 7).

Table 7: Households with at Least One Literate Member

	# Households (N=1998)	%
At least one literate member	1,874	93.8

Table 8 indicates that 88 percent of children between the ages of 6 and 16 are reported to be in school, with a slight majority of them being girls (51.3 percent).

Table 8: Children Ages 6 to 16 Still in School

School Status	Male (N=1401)		Female (N=1440)	
	#	%	#	%
Still in school	1,217	48.7	1,281	51.3
Not still in school	214	54.0	182	46.0

POPULATION DISTRIBUTION

The total household population is equally distributed between men and women, across districts and age cohorts (Table 9).

Table 9: Household Population by District and Gender

District	Male		Female		Total
	#	%	#	%	#
Kongwa	1,706	49.4	1,745	50.6	3,451
Kiteto	1,658	49.5	1,692	50.5	3,350

Kilombero	962	50.0	964	50.1	1926
Mvomero	1,012	49.5	1,034	50.5	2,046
Total	5,338	49.6	5,435	50.5	10,773

Table 10 shows that the majority of household members are younger than 18 (52 percent). This is in line with national statistics (51.2 percent in 2009, according to UNICEF data).

Table 10: Breakout of Household Population by Age and Gender

Age Cohort	Male		Female		Total
	#	%	#	%	#
0-4	668	49.41	684	50.59	1352
5 to 17	2,115	50.07	2,109	49.93	4,224
18-64	2,374	48.55	2,516	51.45	4,890
65 plus	174	59.18	120	40.82	294
Total	5,331	49.54	5,429	50.46	10,760

Consistent with the distribution of age cohorts, the majority of household members are children (65.8 percent) or grandchildren (5.9 percent) of the household head. As shown in Table 11, extended family members also constitute a relevant share, representing 21.1 percent of the total.

Table 11: Households members in household

Household Member (in relation to head)	HHs with this HH member (N=1999)	
	#	%
Child	1,316	65.8
Extended families	422	21.1
Grandchild	117	5.9
Adopted child	116	5.8
Parent	98	4.9
Brother	72	3.6
Sister	52	2.6
Other relations	41	2.1
Domestic worker	17	0.9
Grandparent	10	0.5

MARRIAGE

Table 12 shows that most of the household members (49.7 percent), excluding children, reported being in a monogamous marriage, while another 40.5 percent have never been married.

Table 12: Marital Status of Household Members

HH member	Male		Female		Total	
	#	% (rows)	#	% (rows)	#	% (cols)
Marital Status						
Married (monogamous)	1,665	49.5	1,697	50.5	3,362	49.7
Never married	1,499	54.8	1,238	45.2	2,737	40.5
Married (polygamous)	92	47.4	102	52.6	194	2.9

Divorced/separated	61	27.2	163	72.8	224	3.3
Widowed	41	16.9	201	83.1	242	3.6
Other (specify)	1	33.3	2	66.7	3	0.0
Total	3,359	49.7	3,403	50.3	6,762	100.0

TRAINING, EXPERIENCE AND SKILLS

Table 13 provides an overview of the primary occupation of head of households. The great majority (95.6 percent) work on their own farm without receiving a formal wage for their work.

Table 13: Primary Occupation of Heads of Households

	Male		Female		Total	
	#	% (rows)	#	% (rows)	#	% (cols)
Labour on own farm (unpaid)	1,612	85.1	282	14.9	1,894	95.6
Trading/business	12	92.3	1	7.7	13	0.7
Livestock rearing (unpaid)	12	92.3	1	7.7	13	0.7
Labour on other farms (paid)	11	64.7	6	35.3	17	0.9
School teacher	9	100.0	0	0.0	9	0.5
Retired/elderly	8	88.9	1	11.1	9	0.5
Other paid work	6	100.0	0	0.0	6	0.3
Civil service/official	5	83.3	1	16.7	6	0.3
Ill/unable to work due to illness	4	100.0	0	0.0	4	0.2
Other unpaid work	3	60.0	2	40.0	5	0.3
Child/student	2	50.0	2	50.0	4	0.2
Casual off-farm labour (paid)	1	100.0	0	0.0	1	0.1
Chief/village elder	1	100.0	0	0.0	1	0.1
Total	1,686	85.1	296	14.9	1,982	100.0

Table 14 further examines characteristics of occupationby breaking them down by age. It is important to note that for all age groups, working on their own farms is by far the most frequently-cited occupation.

Table 14: Household Members' Occupations by Age

Occupation by age	0-4		5-17		18-84		85 and above		Total
	#	%	#	%	#	%	#	%	#
Child/student	1,332	22.9	3,943	67.8	538	9.3	3	0.1	5,816
Labour on own farm (unpaid)	10	0	246	5.4	4,108	89.6	220	4.8	4,584
Housewife/domestic (unpaid)	0	0	2	2.9	54	78.3	13	18.8	69
Retired/elderly	0	0	0	0.0	21	32.8	43	67.2	64
Livestock rearing (unpaid)	2	3.7	19	35.2	33	61.1	0	0.0	54
Labour on other farms (paid)	0	0	4	10.0	36	90.0	0	0.0	40
Ill/unable to work due to illness	0	0	2	6.5	15	48.4	14	45.2	31
Trading/business	0	0	1	3.6	27	96.4	0	0.0	28
Other paid work	0	0	3	17.7	14	82.4	0	0.0	17
School teacher	0	0	0	0.0	13	100.0	0	0.0	13
Civil service/official	0	0	0	0.0	11	91.7	1	8.3	12

Casual off-farm labour (paid)	0	0	0	0.0	11	100.0	0	0.0	11
Childcare/domestic work (paid)	0	0	2	28.6	5	71.4	0	0.0	7
Other unpaid work	0	0	1	14.3	6	85.7	0	0.0	7
Chief/village elder	0	12.5	0	39.3	1	45.5	0	2.7	1

HOUSEHOLD POVERTY AND FOOD SECURITY

POVERTY ANALYSIS

The NAFAKA program focuses on agricultural production and the integration of smallholder farmers into the commodity value chain. The underlying reason for these activities is to help support livelihoods and increase the food security of program beneficiary households, aligning with the top goal of the Feed the Future program, to 'Reduce Poverty and Global Hunger.' The challenge lies in how to measure this penultimate goal.

There are many different ways to measure poverty or household well-being. For instance, household expenditures can be estimated to determine a poverty line (e.g. one dollar a day). Alternatively, material dimensions of poverty such as levels of nutrition, health status or education can be benchmarked and tracked. Common development indicators such as literacy rates, incidence of chronic disease, etc. have been shown to be well-correlated with money-based estimates of poverty. Other measures of well-being involve the use of participatory wealth-ranking tools that more closely involve the community in the evaluation process. Indeed, the literature shows that there is no single, agreed-upon way to measure poverty. Each methodology offers distinct advantages and presents unique challenges[6]. As such, for the NAFAKA program, we have chosen to benchmark household well-being using an asset-based composite index. This type of measure combines and weights various proxies of poverty (e.g., household construction, land and cattle ownership, or education levels) into a single measure.

Rather than creating our own unique asset index, we have chosen to use the Grameen Foundation's Progress out of Poverty Index (PPI)[7] as our benchmark for household poverty level. We chose this measure because it is well-established in the industry and its components (indictors) are statistically correlated to monetary poverty using national census data. In addition, it provides a balance between accuracy in measuring poverty and simplicity in implementation, thus reducing measurement error, lowering cost and providing for ease of use. The index uses ten categorical indicators that are easy for field staff to collect and calculate. The complex calculations performed to arrive at the set of indicators and their associated scores (weights) are done in advance by the PPI designers[8]. The ten indicators used vary from country to country, making them geographically and culturally relevant.

For Tanzania, the ten indicators are as follows. A copy of the PPI survey and the points assigned to each answer can be found in the annex section.

1. How many household members are 17-years-old or younger?
2. Do all children ages 6 to 17 attend school?
3. Can the female head/spouse read and write?
4. What is the main building material of the floor of the main dwelling?
5. What is the main building material of the roof of the main dwelling?

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[6]Ravallion, Martin (1996). Issues in Measuring and Modeling Poverty, The Economic Journal, 106, 1328-1343.

[7]For background on the Grameen Foundations work in this area see http://progressoutofpoverty.org/.

[8]For each country, the designers use Logit regression models on national household survey data to determine which indicators correlate most highly with poverty. From this analysis they derive the selection of questions and the points or weights assigned to each question.

6. How many bicycles, mopeds, motorcycles, tractors, or motor vehicles does your household own?
7. Does your household own any radios or radio cassettes?
8. Does your household own any lanterns?
9. Does your household own any irons (charcoal or electric)?
10. How many tables does your household own?

Each question in the scorecard is worth a designated amount of points. For instance, if the household owns at least one lantern they get 6 points; if they do not own any lanterns they get zero points. Each household's PPI score represents the sum of points for all questions and ranges from zero to 100. The lower the score, the more likely a household is to fall below a poverty line and thus to be considered poor.

Table 15 shows the NAFAKA baseline sample breakout of poverty scores by gender of head of household: the majority of the households fall within the 30-49 point range. It is important to note that these scores are only relative units. To understand how these data relate to a given poverty line, the scores are converted into poverty likelihoods or probabilities. The PPI architects, Chen et al. (2008), provide lookup tables by poverty line for the full table with multiple poverty lines). These tables provide a probability (or likelihood) that a household in a given PPI bucket will fall below a given poverty line. In Table 15,we provide the commonly-used United Nations $1.25-a-day likelihoods. For instance, for the 11.1 percent of households that fall into the 30-34 PP bucket, there is 88.5 percent likelihood that household daily expenditures fall below the $1.25-a-day poverty line.

The NAFAKA baseline PPI score results indicate that the communities surveyed are relatively poor. Eighty percent of households have a PPI of less than fifty, indicating that these households are at a minimum 67.4 percent likely to be living below the $1.25-a-day poverty line. The 50.4 percent of households having a PPI of less than 34 points are over 80 percent likely to have daily expenditures falling below $1.25. These figures can serve as a benchmark for poverty and be tracked over time to look for improvements in the beneficiary population.

Table 15: Households Binned by PPI Poverty Score by Gender of HH Head

PPI Bucket	Male		Female		Total		% likelihood household falls below $1.25/day Poverty line
	#	% (rows)	#	% (rows)	#	% (cols)	
0-4	0	0.0	0	0.0	0	0.0	100.0
5-9	11	78.6	3	21.4	14	0.7	91.8
10-14	30	83.3	6	16.7	36	1.8	97.9
15-19	70	86.4	11	13.6	81	4.1	89.7
20-24	121	81.2	28	18.8	149	7.6	95.2
25-29	127	77.4	37	22.6	164	8.3	91.4
30-34	186	85.3	32	14.7	218	11.1	88.5
35-39	195	83.7	38	16.3	233	11.8	81.3
40-44	187	83.9	36	16.1	223	11.3	71.6
45-49	201	87.8	28	12.2	229	11.6	67.4
50-54	161	84.3	30	15.7	191	9.7	57.7

55-59	124	87.9	17	12.1	141	7.2	48.6
60-64	107	93.9	7	6.1	114	5.8	39.7
65-69	60	83.3	12	16.7	72	3.7	20.8
70-74	43	91.5	4	8.5	47	2.4	19.7
75-79	25	89.3	3	10.7	28	1.4	10.2
80-84	20	100.0	0	0.0	20	1.0	15.9
85-89	9	100.0	0	0.0	9	0.5	10.1
90-94	2	100.0	0	0.0	2	0.1	17.3
95-100	0	0.0	0	0.0	0	0.0	0
Total	1,679	85.2	292	14.8	1,971	100.0	100.0

Since poverty and household well-being are subjective ideas, we thought it useful to benchmark a more locally-based definition to see how it tracks with our PPI asset-based composite index. While a detailed community wealth ranking project was outside the scope and budget of this analysis, we did include a subjective poverty question on the household survey.

Respondents were asked to indicate what they believed to be the top three characteristics that describe a poor household. As Table 16 demonstrates, over half of households (56.2 percent) listed chronic hunger and food insecurity as an indicator of a poor household. Other common characteristics of poor households mentioned by respondents included: an inability to purchase basic necessities (47.4 percent); low or variable household incomes (31.5 percent);and poor health of a family member (31 percent). While these responses are not surprising and track with commonly-held notions of poverty, the fact that the leading feature of poverty in the minds of the survey respondents is food insecurity indicates that NAFAKA is correct in targeting smallholder farmers.

Table 16: Community Perceptions of the Features of Poor Households

Poverty Characteristic	# (N=1990)	%
Hungry/food insecurity	1,119	56.2
Not able to purchase basics	945	47.5
Low or variable household income	626	31.5
Poor health of self/family	619	31.1
Poor quality of housing structures	569	28.6
Not enough access to land	454	22.8
No wage earning job	314	15.8
Not able to pay school fees	279	14.0
Not enough livestock	255	12.8
Not well educated/aware	219	11.0
Not enough physical assets	182	9.1
Poor access to sanitation/ water	131	6.6
Inadequate technology	108	5.4
Poor environmental conditions	62	3.1

Inadequate infrastructure	47	2.4
Traditional practices/culture	21	1.1
Other, specify	3	0.2

FOOD SECURITY

While closely related, food security and monetary poverty are two different things. Food security relates to the ability of a household to have access at all times to enough food to maintain a healthy, active life. If a household can grow its own food, it can have food security with relatively little money and few assets. The NAFAKA Project is looking to increase incomes through the production of commodities, which can lead to improved food security; but it is also seeking to improve household food security through other means.

One way to improve food security is by encouraging households to maintain kitchen or community gardens. From the baseline survey data (Table 17), it is clear that such gardens are not prevalent among the communities. Only 10.3 percent of households have a kitchen garden and less than one percent of households participate in a community garden. The predominant vegetables grown in such gardens are green chilies, okra and tomatoes.

Table 17: Household Participation in Kitchen or Community Garden

	#	%
Kitchen Garden	204	10.3
Community Garden	15	0.8
Vegetable		
Green chile	181	38.7
Okra	94	20.1
Tomato	72	15.4
Cauliflower/cabbage	28	6.0
Eggplant	30	6.4
Sweet potatos/yams	23	4.9
Onion	22	4.7
Carrot/Turnip	7	1.5
Other Specify	8	1.7
Korolla	3	0.6

One of FtF's goals in Tanzania is to improve rural household nutrition. NAFAKA is not focusing on the health and nutrition component directly, as such activities are being implemented by another NGO (Africare). However, NAFAKA ensures that indicators and activities are fully complementary.

The number of beneficiaries with access to home or community gardens is one of the indicators being monitored in the NAFAKA PMP. The low level of garden participation and a lack of diversity in and low caloric value of vegetables grown by those that do participate is presented in Table 18, disaggregated by district and age group. This might indicate an issue in consuming a balanced diet.

Table 18: Access to Kitchen Gardens by Gender and Age of HH Head and by District

District	Gender and age category of head	Access to kitchen garden			
		No		Yes	
		#	%	#	%

Kongwa	Male age 18-64	310	0.86	51	0.14
	Male age 65+	32	0.97	1	0.03
	Female age 18-64	72	0.91	7	0.09
	Female age 65+	11	1.00	0	0.00
Kiteto	Male age 18-64	390	0.95	22	0.05
	Male age 65+	27	0.96	1	0.04
	Female age 18-64	61	0.94	4	0.06
	Female age 65+	4	1.00	0	0.00
Kilombero	Male age 18-64	202	0.87	29	0.13
	Male age 65+	25	0.89	3	0.11
	Female age 18-64	44	0.90	5	0.10
	Female age 65+	4	1.00	0	0.00
Mvomero	Male age 18-64	199	0.87	30	0.13
	Male age 65+	26	0.81	6	0.19
	Female age 18-64	50	0.79	13	0.21
	Female age 65+	27	0.93	2	0.07

HOUSEHOLD CONSTRUCTION AND ASSETS

Household Material Construction. Having a household with a floor and roof comprised of earth are two of the Tanzania PPI indicators that correlate highly with poverty. Wealthier households are able to construct their floors with concrete, cement, tiles, etc. and their roofs with iron or tin sheets, or at least with grass and sticks.

Table 19 shows that the floors of most households sampled (72.0 percent) are simply made of mud and/or cow dung, with roughly a quarter of floors constructed with bricks, blocks, and/or cement. Iron sheets comprise approximately half of households' roofs, followed by grass and/or sticks (27.6 percent) and tin and/or iron sheets (20.5 percent). Just over half of households' walls are constructed with bricks, blocks, and cement, while 39.0 percent are constructed with mud and/or cow dung.

Table 19: Household Construction Materials

Construction Material	#	%
Floor Construction		
Mud/Cow Dung	1,432	72.0
Brick/Block/Cement	493	24.8
Stone	35	1.8
Grass/Sticks	19	1.0
Other	9	0.5
Total	1,988	100.0
Wall Construction		
Brick/Block/Cement	1,096	55.1

Mud/Cow Dung	776	39.0
Grass/Sticks	114	5.7
Other	5	0.3
Total	1,991	100.0
Roof Construction		
Iron sheets	953	47.8
Grass/Sticks	549	27.6
Tin/iron sheets	409	20.5
Mud/Cow Dung	60	3.0
Brick/Block/Cement	13	0.7
Other	8	0.4
Total	1,992	100.0

Household Toilet Facilities, Drinking Water, Light, and Cook Fuel Sources. As shown in Table 20, nearly all households (91.8 percent) utilize a pit latrine for their toilet facility. Only 6.5 percent reported that they have no toilet facility or use a pan or bucket. Approximately half of households get their drinking water from a spring, well, water pan, or water dam; roughly ten percent retrieve theirs from a river, lake, or pond. Most households light their homes with paraffin and/or kerosene and cook their food with firewood.

Table 20: Household Toilet Facilities and Drink Water, Light, and Cook Fuel Sources

	#	%
Toilet Facility		
Pit latrine	1,829	91.8
None/Pan/Bucket	129	6.5
Flush	34	1.7
Other	0	0.0
Total	1,992	100.0
Drink Water Source		
Spring/well/water pan/water dam	1,008	50.6
Public tap (paid)/water truck/vendor	449	22.5
Public tap (free)	331	16.6
River/lake/pond	196	9.8
Other	8	0.4
Total	1,992	100.0
Light Source		
Paraffin/Kerosene	1,704	85.6
Candles/flashlight	124	6.2
Solar	66	3.3
Battery	45	2.3
Electricity	28	1.4
Firewood	18	0.9
Other	6	0.3

Total	1,991	100.0
Cook Fuel Source		
Firewood	1,732	87.0
Charcoal	245	12.3
Paraffin/Kerosene	9	0.5
Other	5	0.3
Total	1,991	100.0

Household Asset Ownership. Table 21 presents household ownership of various home and production assets. In terms of production assets, few homes own tools that increase their farming activities, such as ploughs and water pumps. The majority of assets related to farming consist of animals rather than tools.

In terms of household assets, 62 percent of households own mobile phones and over 72 percent own a radio. Since the planned NAFAKA program involves information dissemination via these channels, the community appears well-poised to receive NAFAKA messages.

Table 21: Household Asset Ownership

Asset		Own Asset		Avg. Number		Avg Value	
	Response Rate	#	%	Mean	Std. Dev	Mean	Std. Dev
Production Assets							
Poultry/Chickens	1,997	1,178	59.0	10.9	14.1	69195.1	135375.2
Cattle	1,997	391	19.6	17.0	36.7	11400000.0	103000000.0
Goats	1,997	388	19.4	16.1	38.1	794728.2	1618708.0
Animal plough	1,997	173	8.7	1.7	1.1	173261.9	144347.3
Donkey	1,997	52	2.6	3.3	3.5	473051.4	768955.3
Tractor	1,997	28	1.4	1.3	0.5	19000000.0	19400000.0
Tractor plough	1,997	23	1.4	1.3	0.5	12200000.0	15500000.0
Posho – hammer mill	1,997	17	0.9	1.5	1.3	2009091.0	2386925.0
Shellor	1,997	14	0.7	1.2	0.4	1844000.0	1180690.0
Water pump (powered)	1,997	12	0.6	1.3	0.5	681428.6	599928.6
Water pump (treadle)	1,997	6	0.3	1.6	0.5	7000.0	0.0
Household Assets							
Radio or radio cassette	1,998	1,450	72.6	1.2	0.6	34654.1	62995.6
Bicycle	1,998	1,392	69.7	1.5	1.4	124632.7	166020.7
Tables	1,998	1,373	68.7	1.6	1.0	29270.6	40344.4
Mobile phone	1,998	1,240	62.1	1.4	0.7	61636.5	49584.3
Lantern	1,998	1,162	58.2	1.6	0.9	7872.7	14788.8
Irons box (charcoal or electric)	1,998	454	22.7	1.1	0.6	10338.7	17201.7
Motorcycle/scooter	1,997	189	9.5	1.0	0.2	2028940.0	4229758.0
Television	1,997	83	4.2	1.1	0.2	299027.0	363514.3
Automobile	1,997	27	1.4	1.2	0.5	12300000.0	13600000.0

The NAFAKA PMP uses the indicator value of household assets to measure its goal to sustainably reduce poverty and hunger in its target districts. Table 22 presents the indicator's baseline value disaggregated by district and by gender of the household head.

Table 22: Mean Value of HH Assets by Gender of HH Head and by District

District	Sex of head	Mean value of household assets		
		#	Avg	StdDev
Kongwa	Male	481	2228592.0	6644919.0
	Female	90	354538.9	763635.1
Kiteto	Male	488	6863293	91000000.00
	Female	68	242710.3	600107.8
Kilombero	Male	331	423923.9	740602.3
	Female	56	151502.7	246225.2
Mvomero	Male	300	4177100	15800000.00
	Female	71	1288827	4230278

Household Asset Sale. . (following page) shows the sale of key assets over the past twelve months. The most commonly sold assets were animals: poultry, goats and cattle. Of key interest is the reason for the sales. Overall, the most common reason for selling off assets was to feed the family (60.2 percent of all sales). While this can be an indicator of food insecurity, it is not clear from these results whether the sales data is normal (e.g. selling chickens is a regular enterprise activity for the households) or indicative of some type of problem.

Table 23: Sale of Assets

Asset	Sold Asset		Reasons for Sale of Asset							
	#	%	Replaced with new (%)	No longer needed (%)	Feed family (%)	Pay school fees(%)	Pay medical fees(%)	Buy land (%)	Other (%)	N/A (%)
Production Assets										
Poultry/Chickens	371	18.7	3.5	1.1	77.6	2.4	8.1	0.3	4.3	2.7
Cattle	150	7.6	9.3	2.7	49.3	10.7	10.7	11.3	4.0	2.0
Goats	146	7.4	5.5	1.4	58.9	11.0	12.3	4.8	3.4	2.7
Donkey	6	0.3	16.7	16.7	33.3	0.0	0.0	16.7	0.0	16.7
Animal plough	4	0.2	25.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0
Water pump (treadle)	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Tractor	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Tractor plough	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Shellor	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Water pump (powered)	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Posho – hammer mill	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Household Assets										
Bicycle	34	1.7	50.0	11.8	11.8	2.9	14.7	2.9	2.9	2.9
Mobile phone	23	1.2	52.2	13.0	21.7	0.0	4.4	0.0	4.4	4.4
Radio or radio cassette	11	0.6	27.3	27.3	9.1	0.0	18.2	0.0	0.0	18.2
Motorcycle/scooter	6	0.3	33.3	50.0	0.0	0.0	0.0	0.0	0.0	16.7
Irons box (charcoal or electric)	3	0.2	0.0	0.0	66.7	0.0	0.0	0.0	0.0	33.3
Automobile	2	0.1	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0
Tables	2	0.1	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0
Television	3	0.2	0.0	66.7	0.0	0.0	0.0	0.0	0.0	33.3
Lantern	2	0.1	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0
Total	769	1.9	9.49	3.38	60.21	5.59	9.49	3.51	3.77	4.55

SOURCES OF INCOME

Many vulnerable households, particularly those prone to poverty and food insecurity, tend to earn their income from a variety of sources. Generating small amounts of income from multiple streams is a coping strategy to insulate families against a collapse in production due to inclement weather, etc. Table 24 shows that just over half of respondents (55.4 percent) reported earning income from owning a farm.[9]Petty trade was the second most common source of income, with 46.7 percent of households earning their income this way. The third most common source of income (37.8 percent) was from casual labor on a farm. Only 3.2 percent of households earn income from salaried employment.

Table 24: Sources of Income

Source of income	Receiving income from source			Rating of Importance (%)*			
	Response Rate	#	%	Response Rate	Very	Somewhat	Not Very
Own farm	1,985	1,099	55.4	1,093.0	46.8	43.2	10.1
Petty trade	1,988	928	46.7	924.0	64.6	33.2	2.2
Casual labor - farm	1,986	750	37.8	747.0	49.9	44.6	5.5
Casual labor - non-farm	1,985	527	26.6	526.0	55.7	40.9	3.4
Remittances	1,982	211	10.7	210.0	36.7	55.7	7.6
Rental income	1,983	145	7.3	144.0	71.5	21.5	6.9
Salaried employment	1,983	63	3.2	63.0	69.8	25.4	4.8
Fishing	1,983	38	1.9	38.0	57.9	31.6	10.5
Other	1,904	35	1.8	33.0	93.9	6.1	0.0
Interest	1,983	18	0.9	17.0	76.5	17.7	5.9
Pension	1,983	10	0.5	9.0	44.4	55.6	0.0
Total	21,745	3,824	18	3,804	54.4	39.8	5.9

*as a percentage of those receiving income from source

The NAFAKA PMP uses the indicator percent change in rural household revenue from sale of commodities to measure IR 1: "Improved Agricultural activity." Table 25 shows the baseline value of the revenue, disaggregated by districts and by crop.

Table 25: Mean HH Revenue from Sale of Commodity (Maize and Rice)

District	Crop	Mean revenue of commodities		
		#	Avg	StdDev
Kongwa	Maize	459	546,079.9	800166.5
	Rice	92	471,706.5	523540.6
Kiteto	Maize	464	1,610,946.0	4228419.0

[9]Interestingly, the production (see section 6.3.2) indicates that nearly 80 percent of respondents indicated owning their own farm and of those 82 percent of rice farmers and 68 percent of maize farmers are selling their crops. This shows that the responses to this question are quiteliteral.

	Rice	3	210,000.0	121243.6
Kilombero	Maize	109	297,472	421916.20
	Rice	332	832,821.1	1449448
Mvomero	Maize	345	2180167	1.37E+07
	Rice	48	408895.8	423786.8

VALUE CHAIN ANALYSIS

BACKGROUND

Mainland Tanzania is characterized by a prevalence of maize cultivation, the main staple food for the great majority of farmers and the main expenditure of poor households. Smallholders generally cultivate maize partly for subsistence and partly for the market. Rice is an important cash crop, but smallholders also retain produce for on-farm consumption.

Both value chains have significant potential for efficiency improvements in production and in marketing, which directly impact on households' incomes and food security.

CURRENT PRODUCTION AND DETERMINANTS

This section presents the current production estimates for maize and rice for the sampled farmers. It also shows the determinants of yields (e.g. household characteristics) and how price and input-responsive is production, through the estimation of the production function.

Table 26 shows the current average production per farm, planted area per farm and yield per hectare.

Table 26: Production Estimates for Maize and Rice

	Maize			Rice		
	#	Mean	Std. Dev.	#	Mean	Std. Dev.
Average production per farm (kg)	1725	3440.6	9750.9	628	2130.7	3926.4
Average area planted (ha)	1729	4.2	6.2	634	1.8	3.2
Yield per hectare (kg)	949.9	1073.8	664	1494.4	1388.6	949.9

The average production per farm was 3,440 Kilograms for maize and 2,130 Kilograms for rice. There was a high variation in this indicator for both maize and rice. The average area planted in hectares was lower for rice than for maize with the average area for maize being 4.2 hectares and the average area for rice found at 1.8 hectares. The yields per hectare for maize were found to be 949.9 Kilograms per hectare; rice is at 1,494.4 Kilograms per hectare. From the household survey we can estimate the baseline value of the PMP indicator "Average cost of production", by summing the average reported costs incurred by smallholder farmers. The results are presented in the table below.

However, it should be noted that those figures do not include transport cost nor consider the value of labour from the household (it only includes the cost of hired labour).

Table 27: Average production cost (Tsh)[10]

District	Crop	Average production cost		
		#	Avg	StdDev
Kongwa	Maize	624	240531.0	709371.1
	Rice	0	0.0	0.0
Kiteto	Maize	483	393365.5	805340.4
	Rice	0	0.0	0.0
Kilombero	Maize	157	85882.17	163611.3
	Rice	354	360837.8	2221993
Mvomero	Maize	207	265265.8	545812.1
	Rice	166	415524.1	1079574

Farms' yields are produced with the use of many different combinations of inputs, such as land, labor, capital, fertilizers, etc. The farm's output, thus, is a function of the inputs used. The relationship that exists between physical inputs and output is the production function.

With the data collected, we tried to estimate the production function for the NAFAKA farmers, to establish how efficiently inputs are used by smallholders in relation to the yield per acre of cultivated land.

The function considers the following inputs: household size, labor (expressed as total person-days spent in preparing, weeding and harvesting the field), altitude (to control for quality of the soil; no data on rain), seeds (kg of improved seeds per acre), fertilizers (kg of fertilizers per acre), education level and age of the household head, livestock owned by the farm, proportion on women in the household, credit, extension training, access to and use of means of communication and access to and use of means of transportation.

The acres of land cultivated were not included in the function, as their direct correlation (coefficient was approximately 1, as the more land cultivated the higher the production) with the total production was interfering with the results.

It is interesting to note that when we first estimated the production function for the total production (not in terms of yield per acre) and included the acres of land cultivated to crop (in per capita terms) among the variables, the household size was very positively significant for both crops. This could be explained by the fact that bigger households tend to have bigger plots and therefore they produce more in absolute terms.

[10] Calculated as the sum of the cost hired labor for land preparation, rental equipment for land preparation, money spent on seeds, cost of hired labor for crop management, cost of pesticides, herbicides and fertilizers, hired labor for harvesting, rental equipment for harvesting

Table 28: Production function - Log of Kg of maize per acre

	Maize	Rice
	coef/se	coef/se
Total person-days spent in preparing, weeding and harvesting the field	0.079***	0.060*
Meters of altitude	0.343*	0.972***
Kg of improved seeds used per acre	0.186***	0.207***
Kg of fertilisers used per acre	0.021	0.066***
Household size	-0.134***	-0.357***
Maximum level of education achieved by the household head	0.028	0.112**
Number of livestock owned by the household	0.060***	0.081**
Proportion of hh members who are women	-0.153*	0.075
Extension training or service	0.106	-0.013
Loan during the last crop season	-0.081	0.096
Belongs to a producer organisation / farmer group	0.142	-0.001
Household owns at least 1 radio or 1 mobile phone or 1 television	0.262***	-0.006
Household owns at least 1 bicycle or 1 motorcycle or 1 automobile	0.075	0.054
note: *** p<0.01, ** p<0.05, * p<0.1		
	Maize	Rice
Number of observations	1,573	564
R2	0.229	0.153
Adjusted R2	0.221	0.130

When we re-estimated the function without the land variable and using as dependent variable, the yield per acre instead of the total production, the results changed. For maize, the household size is significantly negative – in other words, larger household sizes have lower productivity in maize. We are unsure as to why this is the case.

Labour is positively correlated to production, but the coefficients are almost insignificant: the reason is that smallholder farmers tend to have a surplus of labour availability from the household, whose all members are somehow employed in different tasks.

As shown in the table, production is also directly correlated to the use of improved seeds, especially for rice. The use of improved seeds as a variable as opposed to seeds in general is due to the fact that a fixed quantity of seeds is generally used per acre. On the contrary, improved seeds are not very common among smallholder farmers, and therefore, it is interesting to see how improved seeds are used and adopted. This means that a

higher use of improved seeds leads to a better yield: this finding is very relevant for NAFAKA, which aims at increasing the use of improved seeds to increase productivity in the region.

To a smaller extent, but still significantly, the same is true for fertilizers, i.e. those farmers that use fertilizers tend to produce more. However, this is only true for rice producers, as fertilizers are generally not used for maize. It should be noted as well that fertilizers are used differently according to different types of soil (lower productivity soils will require more fertilizers) and therefore the analysis on fertilizers would need more information on soil characteristics to be significant.

The altitude is also significantly and strongly correlated to production. This is because higher altitutdes in general have higher rainfall, lower temperatures and lower rates of evaporation.

With respect to livestock there is a strong correlation with production, because livestock are used in the tillage and therefore having liveltock can increase the planted area. It does not appear to influence yields, most likely due to the low use of fertilizers.

Interestingly, the proportion of women in the household is negatively correlated to production for maize and insignificant for rice. Traditionally, women in rural Tanzania are responsible for almost all livestock activities of dairy husbandry (feeding, milking, milk processing, marketing, etc.) and are responsible for food preparation, fetching water and gathering firewood[11]. This suggests that women are not primarily focused on those two value chains, maybe because they are focusing more on other tasks or in the cultivation of less labor-intensive value chains.

The education level of the household head is highly significant for rice, while this is not true for maize. The main explanation is that rice cultivation requires higher skills and needs the use of more sophisticated technologies, where education and training can play a big role.

However, training appeared to be insignificant for the production in the rice value chain. However, it was positively significant for maize. This can be due to the fact that either current training on rice is very scarce and therefore does not influence the actual skills of farmers, or that the current extension courses on rice are not well received by farmers. On the other hand, training on maize has a positive impact on production. In all cases, this is an important finding for NAFAKA, which should make sure that the training planned as part of its activities are designed in way that is well received by farmers and that are focused on relevant aspects of production.

The role of means of communication is very relevant for maize, while the same is not true for rice. Means of communication considered here are the radio, the mobile phone and the television. It could be interesting to see how these can be used to strengthen the training courses and share best practices among farmers.

Credit was not a significant factor for production, and this can probably be explained by the very limited offer of credit services to smallholder farmers in those districts.

Means of transport also provided insignificant results, suggesting that inputs are generally found in the farm or nearby (not purchased in the market), and therefore the cost of transport is an irrelevant variable for production.

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[11] Source: Analysis of Benefits Accrued by Women and Factors Influencing Participation in a Mogabiri Extension Project, Mary Ahungo (FAO)

Finally, participation to farmers' groups and organizations has a positive impact on maize production, suggesting that NAFAKA is going in the right direction in promoting and strengthening the work of groups and cooperatives in its target districts.

SUPPLY FUNCTION

As part of the analysis, we also tried to estimate the supply function. The supply function estimates the relationship between supply and those factors that affect the willingness and ability of a supplier to offer inputs for sale and therefore the availability of those inputs in the market.

We considered as supply factors the price of rice and maize (outputs), the price of seeds, the median wage paid for land preparation, weeding and harvesting, the land per capita, the household size, altitude, education level of the household head, livestock owned by the farm, proportion on women in the household.

However, we could not identify significant parameters. The main explanation is that markets in rural Tanzania are not integrated and commodities are not distributed across different districts nor are competitive one with the other. The great majority of farmers relies solely on household labor and does not purchase any input in the market, therefore making the cost of inputs an insignificant parameter.

As a result, whenever there is a surplus in a specific area, its market will be swamped with that commodity lowering its price but this will not necessarily affect neighboring markets or the price of other commodities.

The main conclusion from those results is that efforts are needed to integrate markets and ensure farmers are capable to store and conserve their harvests beyond harvest season to improve distribution both geographically and in time.

PRODUCTION CONSTRAINTS AND INVESTMENT OPPORTUNITIES

This section provides an overview of the main perceived constraints to increasing maize and rice production based on focus group discussions. The following sections consider specific farm inputs and production technologies in more detail. The main constraints are shown in Table 29. Twenty percent of maize producers and 22 percent of rice producers reported problems in facing the high cost of plowing due to the small number of tractors available. Insufficient irrigation facilities also limit the capacity to increase production of maize in 8.5 percent of cases and the production of rice in 17 percent. The high cost of improved seed is also an inhibitor in the case of maize (11 percent). Many farmers are still dependent on traditional farming tools, such as hand hoes, and have no access to modern tools. Without tractors, farmers are not able to significantly increase crop production.

Some farmers acknowledged that they lack basic training in farming and agriculture, which is compounded by a lack of extension services. The high prices of agricultural inputs, including seeds, fertilizers and herbicides, are disproportionate to the low price of produce. This makes it difficult to increase production without access to loans and credit. Moreover, many farmers pointed to the effect of climate change on irregular and inadequate rainfall, which disrupts irrigation systems and results in floods and prolonged drought periods. Other challenges mentioned include a lack of land, poor quality of seeds, lack of efficient irrigation systems, pests and weeds and land disputes between farmers and Maasai herders, from whom land is rented.

Table 29: Main Constraints to Increased Production

	#	Maize (%)	#	Rice (%)
High cost of plowing. Not enough tractors at planting season	12	20.34	5	21.74
Lack of irrigation facilities	5	8.47	4	17.39

High cost of improved seed	6	10.17	0	0.0
Other (specify) – this was not specified by the enumerators	5	8.47	2	8.69
Not enough extension visits	5	8.47	1	4.35
Other input bottleneck	7	11.86	2	8.69
Existing varieties don't yield well	3	5.08	2	8.69
Not enough direct training on crop production	3	5.08	1	4.35
High cost or limited supplies of inorganic fertilizer	3	5.08	1	4.35
Too few input suppliers / too far a part	3	5.08	2	8.69
Land disputes/insecure title discourage investment in land	3	5.08	0	0.0
Shortage / high cost of basic farm implements	2	3.39	1	4.35
Inadequate information on farming from media sources	0	0	0	0.0
Migrant crop pests not controlled	1	1.69	1	4.35
Soil erosion and land degradation	0	0	1	4.35
High cost / limited availability of farm labor	1	1.69	0	0.0

In order to address these problems, farmers think that the government should ensure that a tractor is available in each village, adequate irrigation systems are established, crucial input supplies are subsidized and extension services are offered to farmers. It is also suggested that the Farmers Cooperative Union (VyanmaVyaWakulima) should be reinstated. Farmers feel strongly that they should be given greater access to credit and loan facilities.

Table 30 shows that, according to 19 percent of maize farmers and 13 percent of rice farmers, investments in support to plowing/land preparation are critical to increasing production. For maize, 18 percent of farmers' groups also suggested investments in free or subsidized improved seed. Other important investments include increased farm extension services and other methods of input support (both with 13 percent of responses for rice).

Table 30: Preferred Investments to Increase Production

	#	Maize (%)	#	Rice (%)
Free or subsidized improved seed	11	17.7	1	4.4
Support to plowing/land preparation	12	19.4	3	13.0
Increased farm extension visits	6	9.7	3	13.0
Other input support	5	8.1	3	13.0
Free or subsidized inorganic fertilizer	4	6.5	2	8.7
Direct training on crop production	3	4.8	1	4.3
Development of better crop varieties	4	6.5	2	8.7
Provision of irrigation services / equipment	4	6.5	2	8.7
Improved public services for land rights and cadastre	4	6.5	0	0.0
Other	3	4.8	2	8.7
Free or subsidized pesticide	1	1.6	1	4.4
Encourage increase in input supply networks	2	3.2	2	8.7
Improve quality and coverage of public extension program	1	1.6	0	0.0
Free/subsidized provision of hand tools	1	1.6	1	4
Spraying/treatment for pest/disease control	1	1.6	0	0.0

Total		100		100

Currently, farmers using improved technologies - defined as drip irrigation, tiller or tractor for land preparation, improved seed varieties, and sheller, thresher or combined method of harvesting – are a very small share of the sample. The values indicated in Table 31 constitute the baseline for the indicator "Farmers use improved technologies" under the Intermediate Result 1.1.2.

Table 31: Farmers Using Improved Technologies*

District	Crop	Improved technologies			
		No		Yes	
		#	%	#	%
Kongwa	Maize	410	0.70	178	0.30
	Rice	0	0.00	0	0.00
Kiteto	Maize	267	0.45	323	0.55
	Rice	0	0.00	0	0.00
Kilombero	Maize	85	0.85	15	0.15
	Rice	136	0.46	162	0.54
Mvomero	Maize	85	0.45	104	0.55
	Rice	71	0.37	120	0.63

*Improved technologies are defined as drip irrigation, tiller or tractor for land preparation, improved seed varieties, and sheller, thresher or combined method of harvesting.

LAND, TILLAGE AND SEEDING

The most common type of land ownership for both maize and rice plots is land that is owned and used by the household with 80.4 percent and 83.4 percent of plots falling into this category, respectively (Table 32). The second most common type of land ownership is rented-in land or land that is not owned by the household but is used for a payment. Seventeen percent of maize plots and 11.7 percent of rice plots are rented-in by the household. Questions related to land ownership fall under IR 2.1.

Table 32: Type of Land Ownership

	Maize		Rice	
	#	%	#	%
Owned and used by household	1390	80.4	529	83.4
Not owned by HH but used by HH for a payment	293	17.0	74	11.7
Owned by HH but used by different HH, for a payment	27	1.6	19	3.0
Not owned by HH but used by HH for no payment	15	0.9	8	1.3
Owned by HH but used by different HH, no payment	2	0.1	3	0.5
Communal land	1	0.1	1	0.2
Others	1	0.1	0	0
Total	**1729**	**100**	**634**	**100**

Table 33: Number of Hectares Under Contracted Service

Number of hectares under contracted services (hired labor)			
Commodity	**Observations**	**Mean**	**Standard Deviation**
Maize	944	10.47643	14.62088

Rice	398	3.427764	5.419926

*Contracted service is defined aswhere hired labour is in charge of tillage, weeding, spraying, etc.

Table 34 presents the area under maize cultivation, which averaged 7.7 acres per plot for maize compared to 2.8 acres per plot for rice.

Table 34: Planting Details

	Maize			Rice		
	#	Avg	StdDev	#	Avg	StdDev
Total area under cultivation(acres)	1729	7.7	11.6	634	2.8	4.4

Households were asked if plots that were normally planted in maize or rice had been cultivated in the previous season, and if not, the reason for not cultivating. According to Table 35, very few plots were left partially or fully uncultivated (17.9 percent). Of those that were not fully cultivated, the two main reasons were due to a lack of equipment or tools or not having labor. The low rate of fallowing is notable.

Table 35: Reason for Not Cultivating

Degree of Cultivation	#	%
Amount of Plot Cultivated		
Completely cultivated	2,025	82.3
Partially cultivated	391	15.9
Not cultivated	44	1.8
Total	2,460	100.0
Reason for Not Cultivating		
No equipment/tools	135	39.8
No labour	103	30.4
Others	59	17.4
Poor weather	22	6.5
Fallow	11	3.2
Poor soil	7	2.1
No seeds	2	0.6
Total	339	100.0

Table 36 presents the methods farmers use to prepare their land for farming. The majority of rice plots were prepared using a tractor (52.5 percent) whereas the most common method of preparing maize fields was by using hand tools (46.8 percent). This may be a cause of the high average returns on rice cultivation.The ox plough was also used for preparing both maize and rice fields.

Table 36: Method of Land Preparation

	Maize		Rice	
	#	%	#	%
Hand tools	803	46.8	249	39.8
Tractor	648	37.8	328	52.5
Ox plough	253	14.8	47	7.5

Donkey or Horse plough	5	0.3	0	0.0
others	4	0.2	1	0.2
Tiller	1	0.1	0	0.0
Total	**1,714**	100.0	**625**	100.0

Those who spent money on land preparation spent an average of 229,316 TSH for maize plots and 116,353 TSH for rice plots (Table 37). This reflects the smaller average plot sizes for rice.

Table 37: Tillage and Seeds Used

	Maize			Rice		
	#	Avg	Std. Dev.	#	Avg	Std. Dev.
Amount spent for tillage/plowing	915	229,316.1	515,594.6	404	116,353	157543.3
Amount of Seed Used (kg)	1725	2.4	0.8	632	2.6	1.0
Amount Spent on Seed (TSH)	1711	90.8	1210.6	631	79.5	98.2

One of the objectives of NAFAKA is to introduce and encourage the use of new technologies for increasing productivity. One way to do this is through the use of new, improved or hybrid seeds. Currently, there are few plots that take advantage of this type of seed. The vast majority, especially maize fields, use local seeds that have been saved from the previous crop. Table 38 displays the types of seeds used by surveyed households.

Table 38: Type of Seed Used

	Maize		Rice	
	#	%	#	%
Local seeds -saved from previous crop	1,382	80.3	420	66.6
Local seeds-bought	164	9.5	100	15.9
Improved/ hybrid- bought	98	5.7	41	6.5
Improved/ hybrid- saved from previous crop	72	4.2	69	10.9
others	5	0.3	1	0.2
Total	**1,721**	**100**	**631**	**100**

The average amount of seed used per plot was 2.36kgs of maize seeds and 2.58kgs of rice seeds. Those who purchased seeds (excluding seeds that were used from previous harvest), paid an average of 90.81 TSH per kilogram for maize seeds. Rice seeds were slightly less expensive at 79.45 TSH per kilogram.

During the focus group discussions with farmers, for both maize and rice, almost all of the respondents reported that they use local seeds from their stock, or that of their neighbors. Hardly any farmers buy their seeds from the marketplace or elsewhere. Most farmers do not seek advice nor receive information about the seeds from anyone. When they do, they are most likely to ask neighbors or friends. A small proportion of farmers reported asking the advice of extension officers. There was no difference in response between maize and rice seeds.

Inter-cropping is the practice of growing multiple non-competing crops within the same area (i.e. deep-rooted crops with shallow-rooted crops). This takes advantage of resources that would not otherwise be used when

planting a single crop. As shown in Table 39, 44.5 percent of maize plots in this study used this technique. As expected, far fewer (upland) rice plots are intercropped: only 4.1 percent.

Table 39: Planting Details

	Maize		Rice	
	#	%	#	%
Crop intercropped	769	44.5	26	4.1

RAINFALL AND IRRIGATION

One of the main obstacles that farmers face is inconsistent rains. Flooding and drought can wipe out entire harvests, leaving households without food or a source of income. One way to mitigate this problem is through irrigation systems. However, currently, effectively all of the surveyed households (99.77 percent of maize plots and 96.99 percent of rice plots) depend on the rains as the main method for watering crops (Table 40).

Table 40: Method of Watering Crop

	Maize		Rice	
	#	%	#	%
Rain fed only	1720	99.8	612	97.0
Water hose	2	0.1	7	1.1
Flooding	1	0.1	0	0
Bucket/watering can	1	0.1	0	0
Others	0	0	7	1.1
Tank or roof catchment	0	0	5	0.8
Sprinkler	0	0	0	0
Drip irrigation	0	0	0	0
Total	**1,724**	**100**	**631**	**100**

AGRO-CHEMICALS

Given the low rates of fallowing and declining soil fertility in the sample areas, maize and rice yields can be expected to be strongly responsive to fertilizer application. Pesticides, herbicides and fertilizers are inputs that can greatly increase production. However, as shown in Table 41, a low percentage of households use these inputs, especially for maize. Herbicides are the most popular form among rice farmers with 53.11 percent. Fertilizers were the most common out of the three for maize crops, but only 18.89 percent of maize farmers applied inorganic fertilizer.

Table 41: Use of Pesticides, Herbicides and Fertilizers

	Maize		Rice	
	#	%	#	%
Use pesticides	76	34.2	146	65.8
Use herbicides	52	13.8	324	86.2
Use fertilizer	321	65.9	166	21.1

The type of fertilizer used most frequently differed drastically by crop type (Table 42). Almost 70 percent of maize plots that used fertilizer used manure, while urea was the fertilizer of choice for approximately 80 percent of the rice plots on which fertilizer was applied.

Table 42: Type of Fertilizer Used

	Maize		Rice	
	#	%	#	%
Di-ammonium Phosphate(DAP)	8	6.4	3	2.9
Urea	26	20.6	82	79.6
Triple super phosphate	0	0	0	0
Calcium Ammonium nitrate	1	0.8	0	0
Sulfate of Ammonium	1	0.8	3	2.9
Rock phosphate	1	0.8	0	0
Nitrogen phosphate	0	0	0	0
Manure	88	69.8	6	5.8
Compost	1	0.8	1	1.0
others	0	0	8	7.8
Total	**126**	**100**	**103**	**100**

For households that used any of the chemical inputs, the average amount of pesticides and herbicides used was very similar, though slightly more was used on rice than maize. The amount of fertilizer used was much higher for maize than rice. This can be attributed to the fact that manure is the most commonly-used fertilizer for maize and is heavier than urea, which is typically used for fertilizing rice. Of the three inputs, households spent the most on fertilizer, with an average of 22,554.84 TSH for maize and 53,658.49 TSH for rice crops. The difference in cost is also related to the type of fertilizer used: manure generally comes from the household and is therefore free, while households must purchase urea. Overall, more was spent on chemicals for rice crops than for maize crops.

Significantly more farmers use herbicide for rice than for maize. While hardly any farmers reported using herbicide on their maize crops, the majority of farmers growing rice mentioned using herbicide on their rice crops. The preferred herbicide is 2,4-Dichlorophenoxyaceticacid *(*2,4-D*)*, which farmers obtain from input suppliers in town. Input suppliers are also the main source of information on uses and types of herbicides.

In most cases, no pesticides are used for either rice or maize except during times of emergency when farmers are instructed to use them by government. One of the main reasons quoted for the low utilization of pesticides is cost, which is deemed to be expensive. With that said, a slightly higher proportion of farmers use pesticides on rice crops than on maize crops, and the type of pesticide most often used is Gramaxon which is sold in town by input suppliers.

Table 43 presents the amounts and costs of pesticides, herbicides and fertilizers used by smallholders.

Table 43: Amount Used and Spent on Pesticides, Herbicides and Fertilizers

	Maize			Rice		
	#	Avg	StdDev	#	Avg	StdDev
Amt of pesticides used	56	2.4	2.6	104	3.0	8.4
Amt spent on pesticides (Tsh)	51	16847.1	21510.0	101	27938.6	83314.3
Amt of herbicides used	25	2.0	2.2	288	3.8	13.3
Amt spent on herbicides (Tsh)	24	17925	16310	286	37209	69170
Amt of fertilizer used	108	285.8	397.3	105	91.5	141.7

Amt spent on fertilizer (Tsh)	56	49942.9	49896.7	101	56374.3	66532.1

Most seeds come from the farmers' own stocks, although it is also common for smallholders to purchase seeds from other farmers or to borrow them from friends, family, and neighbors. Roughly thirty percent of households receive their seeds from a local NGO or the government, whether as a donation or as a purchase.

In terms of agro-chemicals, fertilizer is most commonly borrowed from friends, family or neighbors or from the household's own stock (Table 44). This likely reflects the use of manure as a fertilizer for maize. When used, herbicides and pesticides are most often purchased from the local market. Fertilizer and pesticides are also received from NGOs and the government on occasion.

Table 44: Main Sources of Inputs for Maize/Rice Cultivation

	Seeds (%)	Fertilizer (%)	Herbicide (%)	Pesticide (%)
From own stock	75.8	11.8	0	0
Purchase from other farmers	38.6	2	5.9	0
Borrow from friends, family or neighbors	35.4	12.7	0	0
Donations from local NGO, Government	18.1	5.1	0	5.9
Purchase from local NGO, Government	12.7	5.6	0	5.9
From farmer group	6.4	0	0	0
Other, specify	5.9	5.9	0	0
Purchase from the local market	5.4	8.8	16.9	15.4
Purchase from maize/rice seed multiplication sites	2	0	0	0
Not applicable – don't use	0	11.8	29.4	23.5
Cooperatives	0	0	0	0

In the focus groups, farmers reported that their main reason for not using any fertilizer is the inherent fertility of the land. The FGDs confirm that when fertilizer is used, most farmers use manure, although a small percent use urea.

Seeds, as discussed, are primarily open-pollinated varieties from farmers' own stocks. Organic fertilizer is often borrowed from friends or neighbors. Agro-chemicals are purchased on the open market: there was no evidence of acquisition from farmer groups in the sample.

In terms of input quality, the majority of farmers interviewed stated that they are unhappy with the maize and rice seeds they are using. As they often use seeds from the previous season, the seeds' characteristics are unpredictable; some take a short time to mature while others take much longer. Many farmers complained of bad crop yields with those particular seeds, yet they were not sure whether the poor yields were due to bad seeds or bad rainfall. Some farmers have had bad experiences with commercial suppliers in that they were conned into buying fake seeds that never germinated.

Where applicable, farmers had good experiences with all of the fertilizers, pesticides and herbicides used. The only negative comment made concerned the price of pesticide, which is considered to be expensive and not entirely effective.

Table 45 and Table 46 present the farmers' levels of satisfaction with availability and quality of inputs, respectively.

Table 45: Farmers' Average Satisfaction with Availability ofQuality Inputs (Maize/Rice)

	1: Very	%	2: Somewhat	%	3: Not	%	Response Rate
Seeds	6	28.6	7	33.3	8	38.1	21
Fertilizer	5	29.4	1	5.9	11	64.7	17
Herbicide	1	6.3	2	12.5	13	81.2	16
Pesticide	1	6.3	2	12.5	13	81.2	16

Key: 1 = very satisfied; 2 = somewhat satisfied; 3 = not satisfied

Table 46: Satisfaction Level with Quality of Inputs

	1: Very	%	2: Somewhat	%	3: Not	%	Response Rate
Seeds	6	33.3	7	38.9	5	27.8	18
Fertilizer	6	42.3	2	14.3	6	42.8	14
Herbicide	3	23.1	3	23.1	7	53.8	13
Pesticide	2	167	2	16.7	8	66.6	12

Key: 1 = very satisfied; 2 = somewhat satisfied; 3 = not satisfied

HARVESTING

Few households use technology when harvesting crops. As summarized in Table 47, nearly 95 percent of maize was harvested by hand. The majority of rice was harvested using a kitchen knife (close to 60 percent); this was followed by harvesting by hand at 36.6 percent.

Table 47: Harvesting Methods

	Maize		Rice	
	#	%	#	%
Hand	1,580	94.2	219	36.6
Kitchen knife	95	5.7	363	60.6
Shelter	2	0.1	2	0.3
Thresher	1	0.1	7	1.2
Combined harvester	0	0	8	1.3
Total	1,678	100	599	100

Despite the high prevalence of harvesting by hand and kitchen knife, fourteen percent of maize farmers and twenty-four percent of rice farmers did pay for equipment and/or fuel for harvesting (Table 48).

Table 48: Households Paying for Equipment and Fuel for Harvesting

	Maize		Rice	
	#	%	#	%
Paid for equipment and fuel for harvesting	242	14.24	146	23.93

LABOUR

Households were asked about human resources used during all periods of the harvest season – both household and hired labor. The results are summarized in Table 49. The mean amount of person hours spent was highest during crop management for both maize and rice crops. Crop management includes activities such as

weeding, applying pesticides and irrigation. The mean hours spent on preparation and planting was the lowest and was evenly split between household and hired labor. For crop management and harvesting and threshing, the mean person-hours were greater for hired labor than for household labor. In general, more person-hours were used in all stages for rice than for maize, and a slightly higher percent of households used hired labor for rice compared with maize.

Table 49: Human Resources Used during Harvest

	Maize			Rice		
	#	Avg	StdDev	#	Avg	StdDev
Preparation and Seeding						
Mean person hours of household labor	1698	18.19	28.91	600	30.8	36.38
Mean person hours of hired labour	755	18.73	40.36	292	34.79	88.51
Mean spent on hired labour (Tsh)	667	66389.81	129691.5	286	109017.5	247305.3
Crop Management						
Mean person hours of household labor	1588	258.37	3245	578	375.86	373.04
Mean person hours of hired labour	746	423.23	836.46	312	718.63	2168.58
Mean spent on hired labour (Tsh)	733	160799	349925.2	309	133351.4	247602.7
Harvesting and threshing						
Mean person hours of household labor	1691	28.7	40.5	606	37.5	36.9
Mean person hours of hired labour	618	96.1	339.2	336	75.0	285.3
Mean spent on hired labour (Tsh)	589	126765.0	273290.6	330	243642.7	1933372.0
Mean spent on equipment and fuel (Tsh)	242	76517.36	172758.5	146	71973.97	339455.2

Table 50 shows the plots that used hired labor for maize and rice out of only the plots that grew maize and rice as their main crop. Roughly half of household's surveyed used hired labor for preparation and seeding and for crop management for both maize and rice (Table 50).

Table 50: Percent of Households Who Hired Labor

	Maize		Rice	
	#	%	#	%
Used hired labor for preparation and seeding	755	43.6	292	46.1
Used hired labor for crop management	746	43.9	312	51.1
Used hired labor for harvesting and threshing	618	64.6	338	35.4

Table 51 shows the breakdown of household labor in crop production by age and gender. There are minimal differences in the amount labor provided by men and women, suggesting that women's efforts are equivalent to those of the male family members. Weeding and harvesting are indicated as the activities that require more days of work, followed by land preparation. Child labor appears to be limited, but the table shows some children involvement in all land production activities.

Table 51: Household Labor Use in Crop Production and Marketing (Days)

	Female						Male						Total					
	Adult			Child			Adult			Child			Adult			Child		
Production Component	Response Rate	Avg	Std	Response Rate	Avg	Std	Response Rate	Avg	Std	Response Rate	Avg	Std	Response Rate	Avg	Std	Response Rate	Avg	Std
Land prep.	1986	7.2	12.8	1925	0.5	3.1	1979	6.9	13.4	1933	0.8	3.8	3965	7.1	13.1	3858	0.7	3.5
Planting	1986	5.2	11.5	1926	0.5	2.8	1979	5.2	14.0	1932	0.7	4.6	3965	5.2	12.8	3858	0.6	3.8
Water collection	1924	0.1	1.6	1909	0.0	0.0	1920	0.1	1.3	1910	0.0	0.0	3844	0.1	1.4	3819	0.0	0.0
Weeding	1981	18.7	21.2	1924	1.6	7.5	1975	18.1	22.9	1927	2.4	9.0	3956	18.4	22.1	3851	2.0	8.3
Harvesting	1983	15.8	18.3	1926	1.5	7.9	1978	15.7	19.6	1931	2.0	7.9	3961	15.8	19.0	3857	1.8	7.9
Market/sales	1949	0.5	2.8	1910	0.0	0.1	1955	1.0	2.6	1912	0.0	0.3	3904	0.8	2.7	3822	0.0	0.2

POST-HARVEST LOSSES AND TECHNOLOGIES

The lack of efficient storage facilities contributes to inefficient markets that are characterized by seasonal price variability. Without safe storage infrastructure, households must go straight from the field to the market to sell their produce, even when prices are at their lowest. Sixty-seven percent of households reported selling at least part of their maize harvest and 82.1 percent of households reported selling at least some of their rice harvest (Table 52). While the majority of households reported storing their harvests (73.6 percent of maize farmers and 76.4 percent of rice-producing households), very few reported storing their harvest to sell at a higher price (Table 55).Instead, households stored the food to consume at a later date.

Table 52: Commodity Storage, Sale, and Spoilage

	Maize			Rice		
	Response Rate	#	%	Response Rate	#	%
HH reporting storage	1,648	1,212	73.5	598	455	76.1
HH selling commodity	1,650	1,105	67.0	597	490	82.1
HH reporting spoilage	1,650	123	7.5	598	58	9.7

To address this issue, the program is aiming to improve the warehouse receipt system (WRS). Under WRS, warehouse receipts are issued by warehouse operators as evidence that commodities of stated quantity and quality have been deposited. The warehouse operator is liable to make good on any value lost through theft or damage. There are many benefits for small farmers that utilize a WRS; for example, it reduces the post-harvest losses that can be characteristically high in the region. Of the households surveyed, eight percent (Table 53) reported experiencing postharvest losses with either their maize and/or rice harvest. This constitutes the baseline value for the PMP indicator "Amount lost after harvest as percent of total harvested", which aims at measuring the reduction of waste in both value chains (IR_1.2).

Table 53: Amount Lost After Harvest as Percent of Total Harvested

Crop	Post-harvest losses		
	#	Mean (%)	StdDev
Maize	113	10.7	0.102
Rice	56	8.9	0.132

The most common reason for losses of maize and rice crops were insects and pests (Table 54).

Table 54: Reason for Crop Spoilage

	Maize		Rice	
	#	%	#	%
Insects	45	36.6	14	24.1
Pests	42	34.2	33	56.9
Rotting	13	10.6	3	5.2
Other, specify	16	13.0	6	10.3
Theft	7	5.7	2	3.5
Total	123	100.0	58	100.0

Warehouse Receipts Systems can increase the trust between a producer and a buyer because quality and quantity of the crop is assured with a receipt, thus minimizing the potential for getting cheated on weights and

quality. The issue of being cheated at the market was noted by several farmers as a major problem, particularly for women.

The majority of households (roughly 75 percent) reported that they currently store some of their harvest for later use (Table 52). However, over 90 percent use sacks or polythene bags as the storage type (Table 55). Extremely few farmers store their grains in a warehouse. This method could be explained by the reason for storage: 71.9 percent of maize and 41.6 percent of rice was stored for later consumption by the household. Another 42.5 percent of stored rice was kept for use as seeds. Only 17.1 percent of maize and 14.6 percent of rice was stored to be sold later at a higher price.

Table 55: Storage Details

	Maize		Rice	
	#	%	#	%
Reason for Storing crop				
Food for household	870	71.8	190	41.8
Sell at a higher price	206	17.0	66	14.5
Seeds	121	10.0	193	42.4
Other, specify	15	1.2	6	1.3
Total	1,212	100.0	455	100.0
Type of Storage Facility Used				
Sacks	661	53.4	248	54.6
Polythene bags	504	40.7	188	41.4
Dried and stored in granary	48	3.9	7	1.5
Pits covered with leaves	11	0.9	2	0.4
Other specify	6	0.5	0	0
Pits covered with soil	5	0.4	2	0.4
Warehouse	3	0.2	7	1.5
Total	1,238	100.0	454	100.0

KNOWLEDGE AND EXTENSION

To meet the goals of increasing smallholder farmer knowledge and facilitating income-generation for vulnerable groups, one of the primary NAFAKA activities is extension training. The baseline survey collected data on knowledge and extension training.

Only six percent of survey respondents (121 households) reported receiving extension training in the past 12 months. Of those, the majority (89.2 percent) received only one visit. Less than ten percent of households paid for extension services.

Table 56 provides additional details on extension services. The government and NGOs are the primary service providers. Farmer groups account for about 14 percent of the extension service. Overall, it is important to emphasize that extension services are extremely limited with few households reporting access.

Table 56: Extension Services

Extension Description	#	%
Type of Extension Agent		
Government	61	44.9

Local NGO	44	32.4
Farmer group	20	14.7
Agro company/dealers	7	5.2
Other {specify)	4	2.9
Total*	136	100.0
Primary Product of Interest		
Maize	48	35.0
Rice	36	26.3
Production Techniques	22	16.1
Other, specify	18	13.1
Marketing	13	9.5
Total	137	100.0
Training Method Received		
Workshops/Seminars	66	48.9
Demonstration plots	52	38.5
Field day	7	5.2
Pamphlets/Brochures	4	3.0
Group visits by extension officer	3	2.2
Household visits by extension officer	3	2.2
Total	135	100.0

*121 households received extension, but some received more than visit, so this number can total to more

The baseline survey asked respondents about their level of knowledge in relation to specific production areas. Most respondents professed limited knowledge (Table 57). More than 50 percent of respondents profess little current knowledge regarding irrigation, conservation agriculture, soil fertility management, green manure, pest management and soil conservation. When asked about their desire for training, nearly 100 percent of respondents expressed a desire for training in all aspects of farming.

Table 57: Knowledge Areas

	Desire training			Rating of current knowledge			
Knowledge Area	Response Rate	#	%	Response Rate	Very (%)	Somewhat (%)	Little (%)
Current prices	1,991	1,978	99.4	1,995	13.9	58.4	27.7
Land mgmt.	1,996	1,982	99.3	1,997	13.0	60.9	26.1
Seed varieties	1,995	1,983	99.4	1,997	11.8	62.4	25.7
Crop marketing	1,993	1,981	99.4	1,995	11.0	57.6	31.4
Weed mgmt.	1,995	1,983	99.4	1,996	9.4	46.7	43.8
Post-harvest loss/storage	1,996	1,988	99.6	1,997	7.4	47.7	44.9
Green manure	1,995	1,984	99.5	1,996	5.8	34.1	60.1
Pest mgmt.	1,995	1,987	99.6	1,997	4.5	39.0	56.5
Irrigation	1,995	1,976	99.1	1,997	4.5	16.7	78.8
Conservation ag.	1,995	1,983	99.4	1,996	4.2	33.6	62.2
Soil conservation	1,995	1,985	99.5	1,996	4.1	41.9	54.0
Soil fertility mgmt.	1,994	1,986	99.6	1,997	4.0	34.0	62.0

Total	23,935	23,796	99.4	23,956	7.8	44.4	47.8

Friends, relatives and other farmers are the primary sources that smallholders use to gain information (Table 58). Radio and SMS currently play an extremely limited role in how farmers gain knowledge on improved farming practices.

Table 58: Sources of Knowledge

Knowledge Area	Resp. Rate	Source of Knowledge (%)											
		Friend or relative	Another farmer	Commercial supplier	Gov't Ag ext officer	Radio	NARS researcher	NGO	Farmer group	Newspaper	TV	Via SMS (Mobile phone)	Total
Seed varieties	1,530	45.8	36.7	1.2	10.3	3.1	0.6	1.3	0.9	0.1	0.0	0.0	100.0
Soil conservation	951	34.8	49.8	0.1	9.7	2.5	0.6	1.5	1.0	0.0	0.0	0.0	100.0
Soil fertility mgmt.	794	33.1	46.4	0.5	13.2	2.6	0.8	1.9	1.3	0.1	0.1	0.0	100.0
Land mgmt.	1,515	38.4	48.2	0.3	9.0	2.0	0.4	1.0	0.7	0.1	0.0	0.0	100.0
Irrigation	450	28.0	51.3	0.7	11.1	3.3	0.7	3.1	1.1	0.7	0.0	0.0	100.0
Weed mgmt.	1,150	36.5	47.0	1.1	10.0	2.5	0.5	1.4	0.8	0.1	0.0	0.0	100.0
Green manure	830	37.5	45.3	0.2	9.3	3.9	0.8	1.7	1.1	0.1	0.1	0.0	100.0
Conservation ag.	776	32.9	50.5	0.4	9.8	3.1	0.8	1.4	0.9	0.1	0.1	0.0	100.0
Pest mgmt.	894	28.2	48.2	1.9	13.7	3.9	0.3	1.6	2.1	0.0	0.0	0.1	100.0
Post-harvest loss/storage	1,132	40.2	46.8	1.4	6.3	2.4	0.4	1.0	1.3	0.1	0.0	0.1	100.0
Crop marketing	1,418	28.6	39.9	25.1	2.1	1.6	0.2	0.6	0.9	0.1	0.0	0.9	100.0
Current prices	1,490	21.2	41.1	30.1	1.7	2.0	0.1	0.8	0.7	0.1	0.1	2.2	100.0
Total	12,930	34.2	45.0	6.9	8.2	2.6	0.5	1.3	1.0	0.1	0.0	0.4	100.0

ACCESS TO CREDIT, SAVINGS AND INFORMATION

Agricultural productivity and growth for small-scale farmers is hindered by limited access to credit. Without credit, farmers cannot invest in new technologies, such as new seed varieties and irrigation systems, which can help increase and steady production. Farmer focus group discussions in all regions raised the issue of lack of credit, limiting their ability to adopt new technologies and expand production. Household-level data also emphasized this constraint. Close to 20 percent of households interviewed reported having no access to any source of credit – whether informal, semi-formal or formal. Another 32.4 percent said they had access to only one or two different sources. Table 59 provides the breakdown of the perceived number of credit sources the households have access to, according to the household survey.

Table 59: Households Reporting Number of Credit Sources

# of sources of credit	#	%	Cumulative %
None	371	18.56	18.56
1-2	651	32.57	51.13
3-5	489	24.46	75.59
6-8	334	16.71	92.3

9-11	154	7.7	100
Total	7,131	100.0	

As shown in Table 60, of those households that reported having access to at least one source of credit, the two most common sources were friends/neighbors and family members at 72.2 percent and 67.6 percent, respectively. Semi-formal and formal institutions were listed less frequently with 43.2 percent of households reporting access to micro-credit institutions and only 17.0 percent reporting a bank as a potential credit source.

Farmers' high default rates, often due to a lack of steady production, may limit their access. One of the input suppliers' main hesitations for providing credit, according to interviews with them, is that farmers are not reliable with repayment. This could explain why only 21.8 percent of households believe that input suppliers are a potential source of credit.

Table 60: Households Reporting that They Have Access to Credit Sources

Sources of credit	# (N=1996)	%
Friend/Neighbor	1,441	72.2
Family member	1,350	67.6
Microcredit	862	43.2
Savings group	582	29.2
Local trader	532	26.7
Money Lender	462	23.1
Input supplier	435	21.8
NGO	423	21.2
Bank	339	17.0
Religious Institution	326	16.3
Other	7	0.4

In addition to the hypothetical questions on credit, households were asked if they had actual loans. Table 61 shows the total number of households that reported accessing credit from any source. It is disaggregated by district, gender and age group of the household head. These figures can be used as baseline values for part of the indicator "Percent of beneficiaries receiving credit and the value of the credit", under IR_2.3.1 (Increased access and availability of financing for value chain actors).

Table 61: Number of HHs Who Took Credit by District, Gender and AgeGroup

District	Gender and age category of head	Number of households who took credit			
		No		Yes	
		#	%	#	%
Kongwa	Male age 18-64	385	0.83	78	0.17
	Male age 65+	30	0.86	5	0.14
	Female age 18-64	69	0.85	12	0.15
	Female age 65+	11	1.00	0	0.00
Kiteto	Male age 18-64	450	0.91	42	0.09
	Male age 65+	30	0.97	1	0.03

	Female age 18-64	56	0.86	9	0.14
	Female age 65+	4	1.00	0	0.00
Kilombero	Male age 18-64	230	0.75	77	0.25
	Male age 65+	31	0.89	4	0.11
	Female age 18-64	42	0.82	9	0.18
	Female age 65+	4	1.00	0	0.00
Mvomero	Male age 18-64	235	0.84	44	0.16
	Male age 65+	29	0.78	8	0.22
	Female age 18-64	54	0.82	12	0.18
	Female age 65+	27	1.00	0	0.00

Households who had taken loans were also asked the purpose of the loan, the source of the loan and how they expected to pay the loan off. Table 62 provides the breakdown. Less than 16 percent of households reported taking out a loan in the past 12 months, of which the average number of loans received (not applied for) per household was 1.3 (Table 63). Most of the loans taken are for agricultural purposes – either inputs (51.9 percent) or extension services (18.1 percent) (Table 62). Other reasons for borrowing included: to feed the family (9.9 percent), pay school fees (9.2 percent) and pay medical fees (7.5 percent).

Reflective of their perceived access to credit sources, very few households borrowed from semi-formal or formal sources; rather, they tended to borrow from neighbors/friends (42.7 percent). Micro-finance institutions and producer groups were the next most common, but only 16.0 percent and 10.9 percent of loans were taken from these two sources, respectively.

Table 62: Loan Details

Loan Details	#	%
Purpose of loan		
Production (agricultural) inputs	152	51.9
Access to extension services	53	18.1
Feed family	29	9.9
Pay School fees	27	9.2
Pay Medical Fees	22	7.5
Other, specify	10	3.4
Total	293	100.0
Source of Loan		
Neighbor/friends	125	42.7
Microfinance institution	47	16.0
Farmer Group	32	10.9
Grocery/local trader	24	8.2
Family member	17	5.8
NGO	15	5.1
Commercial bank	14	4.8
Other(specify)	10	3.4
Money lender	9	3.1
Total	293	100.0

How will repay		
Cash	193	81.1
In production at price of the day	22	9.2
In production at pre-set value	17	7.1
Other	6	2.5
Total	238	100.0

The average value of loans taken was 622,866 TSH, approximately US$370 at the exchange rate in December 2011. At the time of the interview, the average amount that had been repaid by the households was approximately 75% of the amount received (Table 63). The most popular form of repayment reported was in the form of cash compared to production – either at a pre-set price or the price at the day of payment (Table 62).

Table 63: Number of Loans Received and Value

	Response Rate	Avg.	StdDev
Total number of loans	298	1.3	0.7
Total value of all loans (TSH)	302	622866.6	2744215
Total amount paid back to date (TSH)	300	457966.9	2127938

The same figures are represented in Table 64 disaggregated by district, gender and age group of the household head, representing the second part of the baseline value of the indicator "Percent of beneficiaries receiving credit and the value of the credit", under IR_2.3.1 (Increased access and availability of financing for value chain actors).

Table 64: Mean Value of Loans Received by District, Gender and Age Group

District	Gender and age category of head	Mean Value of loans taken		
		#	Avg	StdDev
Kongwa	Male age 18-64	78	1246887.0	5219757.0
	Male age 65+	5	204400.0	176342.8
	Female age 18-64	12	161833.3	169810.0
	Female age 65+	0	0.0	0.0
Kiteto	Male age 18-64	42	807404.8	1360813.0
	Male age 65+	1	100000.0	0.0
	Female age 18-64	9	639444.4	963705.2
	Female age 65+	0	0.0	0.0
Kilombero	Male age 18-64	77	252090.9	328021.70
	Male age 65+	4	362500	433464.70

	Female age 18-64	9	141944.4	182789.90
	Female age 65+	0	0	0
Mvomero	Male age 18-64	44	401954.5	545958.7
	Male age 65+	8	671750	1145217
	Female age 18-64	12	226666.7	349000.7
	Female age 65+	0	0	0

Households were also asked questions about savings, including participation in a savings group, a small group of men and women who save money and then borrow from each other. This is different from microcredit because it is based on savings rather than debt. As shown in Table 65, only 251 households reported belonging to a savings group (12.61 percent) and even fewer owned shares in a savings group (195 households or 9.87 percent). The average value of the shares was 146,580 Tanzanian shillings, or a little over US$175. More households had personal savings accounts, but still less than 25 percent of households interviewed. The average amount households had in savings was 306,746 Tanzanian shillings or approximately US$180.

Table 65: Savings

	Participation			Amt (TSH)		
	Response Rate	#	%	Response Rate	Avg.	Stddev
Belong to savings group	1,999	251	12.6	-	-	-
Own shares in savings group	1,992	195	9.8	196	146580.2	224860.8
Have personal savings account	1,995	461	23.1	444	306746.7	723733.5

MAIZE/RICE MARKETING AND SALES

Of the sampled maize-producing households, about 70 percent sold produce during the recall period; the remaining 30 percent consume all their own produce (Table 66). Of the sampled rice producers, 83 percent reported selling rice.

Table 66: Households Selling Commodities

	Maize			Rice		
	Response Rate	#	%	Response Rate	#	%
HH selling commodity	1,650	1,105	67.0	597	490	82.1

As shown in

Table **67**, in the sample as a whole, maize farmers reported selling 46.4 percent of their maize produce after harvesting, storing 30.2 percent, and consuming 15.7 percent (plus another 8.5 percent which is used to settle loans or debts, is given or lent out to friends or spoilt). In the case of rice, the households reported selling 42.6 percent of their harvest as whole product, storing 20.6 percent, and consuming 17.8 percent.

Table 67: Household Maize and Rice Utilization Details

Utilization Details (kg)	Maize				Rice			
	N	Avg (kg)	StdDev	Avg % of Qty Harvested	N	Avg (kg)	StdDev	Avg % of Qty Harvested
Quantity Harvested	1657	3580.3	10140.1	100.0	606	2119.4	3962.0	100.0
Sold whole	1655	1652.2	8116.2	46.1	606	900.8	1468.5	42.5
Retained in store	1647	1080.0	3351.0	30.2	601	437.5	1180.1	20.6
Consumed as food	1655	560.2	761.0	15.6	603	376.3	466.0	17.8
Used to settle loans/debts	1649	155.3	879.9	4.3	601	97.5	406.8	4.6
Sold Processed	1633	48.9	488.6	1.4	593	90.3	1145.2	4.3
Given out (relative/neighbor)	1650	73.0	365.6	2.0	599	70.8	638.8	3.3
Lent out (relative/neighbor)	1651	28.0	215.3	0.8	596	16.1	180.9	0.8
Spoilt or lost post harvest	1650	20.2	227.3	0.6	599	11.3	62.9	0.5

Only a small proportion of product was sold after being processed. **Error! Reference source not found.** shows the mean volume in kgs of processed maize and rice by district. Those values represent the baseline for part of the indicator "Value and volume of processed products (e.g., maize meal and processed rice)" under IR_1 – Improved Agricultural activity.

Table 68 Mean Volume of Processed Commodities Sold (KGs)

District	Crop	Volume of processed products sold		
		#	Avg (KGs)	StdDev
Kongwa	Maize	598	115.4	784.1
	Rice	0	0.0	0.0
Kiteto	Maize	585	3.5	51.1
	Rice	0	0.0	0.0
Kilombero	Maize	176	5.795455	58.68
	Rice	340	125	1490.108
Mvomero	Maize	274	28.32117	243.7033
	Rice	253	43.73518	300.3153

The figures show large differences from one district to another. On one hand, Kongwa farmers reported selling an average of 115kg of processed maize and no processed rice. On the other hand, Kilombero farmers reported selling 125kg of processed rice and only about 6 kg of processed maize. In Kiteto, famers seem not

to sell processed products (average of 3.5kg of maize and no rice) while in Mvomero they sell an average of 28kg of processed maize and 44kg of processed rice.

The average quantity per sale for maize was 3.5 tons compared to 1.7 tons for rice. However, given the higher unit price of rice, the average value per sale for maize was only roughly 30 percent more than that for rice.

As shown in Table 69, very few households sold their commodities on contract (2.3 percent for maize and 0.2 percent for rice). Most transactions were conducted by individuals; only very few transactions were through farmer groups (4 for maize and 2 for rice). There were too few group sales for a statistically meaningful comparison of sales prices for group sales compared to individual sales.

Table 69: Maize/Rice Sales

Commodity	# of Reported Sales			% Sold on Contract	Avg. QTY Sold (KG)	Avg Price per KG	Avg. Value (TSH)
	Individual	Group	Total				
Maize	1,336	4	1,340	2.3	3395.2	407.6	815381.5
Rice	585	2	587	0.2	1092.7	718.0	648148.9

As Table 70 shows, in most cases, sales took place through local traders (74.3 percent of cases for maize, and 83.6 percent for rice). Secondary and tertiary sales outlets included the local market (15.5 percent for maize and 8.5 percent for rice) or neighbors (8.7 percent for maize and 7.5 percent for rice). Very few transactions occurred between the farmers and more formal groups such as producer groups, input suppliers, and processing plants. As one of the goals of the NAFAKA Project is to build relationships among value chain actors, we expect the number of sales with these formal groups to increase over the life of the program.

In focus groups, farmers explained that the main reasons for selling to local traders include the ease of access, lack of transport costs to reach buyers and simplicity of the process. Several farmers mentioned that one of the reasons why they choose to sell to local traders is a lack of alternative, as there is no easily accessible market. They reported that markets are inaccessible or inconvenient due to bad road conditions, expensive transport, required middlemen who cut into profit, a complex sales process and a lack of information on prices or unfavorable prices.

The drawback of selling to local traders, however, is that they offer a comparatively lower price and rarely buy in bulk. Rather, at the market it is common to sell in bulk, farmers are assured of cash and there are multiple potential buyers.

All farmers, whether they sell to local traders or directly at the market, express dissatisfaction with their current buyers. This is largely because farmers recognize that they are price followers with no power to control the price of their produce. Since there is a lack of a price regulation mechanism, farmers thus feel that they often sell their produce for less than they should. The other common grievance concerns the lack of standardized measuring units, which vary from trader to trader depending on the instrument used to measure. This means that price fluctuations are high and farmers are easily undercompensated for their produce.

According to the household survey, and as presented in Table 70, transport to the point of sale was mainly though vehicles (trucks, cars, or minivans) for both commodities (74.8 percent for maize and 86.8 for rice).

Table 70: Sales Outlet and Transportation

	Maize		Rice	
	#	%	#	%

Sales Outlet				
Local traders	986	74.3	490	83.6
Local Market	206	15.5	50	8.5
Neighbor	115	8.7	44	7.5
Producer group	14	1.1	1	0.2
Input supplier	2	0.2	0	0.0
Processing plant	2	0.2	1	0.2
Other, specify	3	0.2	0	1.0
Total	1,328	100.0	586	100.0
Transport Type				
Picked up by customer	995	74.8	504	86.8
Vehicle	120	9.0	22	3.8
Cart	100	7.5	5	0.9
Bicycle/motorcycle	69	5.2	45	7.8
Tractor	36	2.7	36	2.7
Head loading	8	0.6	3	0.5
Other, specify	2	0.2	1	0.2
Total	1,330	100.0	581	100.0

The primary reason for low sales relates to inadequate production beyond household subsistence needs. More than half of the households who did not sell any of their production indicated it was due to a lack of surplus (57.4 percent for maize and 66.4 percent for rice). Two other common reasons were low production due to climate (14.5 percent of maize farmers who did not sell) and low market prices (9.4 percent of rice farmers who did not sell). This suggests that in times of poor harvests, households prioritize their own consumption. The majority of farmers would sell if they produced a sufficient quantity. Less than 15 percent of households reported producing maize or rice exclusively for household consumption. Note that from Table 71 post-harvest losses are lower than expected in rural Tanzania. The implication is that households consume a significant amount of their produce that is not of sufficient quality for the market.

Roughly 10 percent did not their produce due to low market prices. NAFAKA aims to decrease the number of households not selling for many of these reasons through its extension training.

Table 71: Reasons for Not Selling

	Maize		Rice	
	#	%	#	%
No surplus	313	57.4	71	66.4
Low production - climate	79	14.5	4	3.7
HH consumption only	74	13.6	12	11.2
Low market prices	56	10.3	10	9.4
Low production - disease	10	1.8	4	3.7
Other (Specify)	6	1.1	3	2.8
Low production - economy	5	0.9	2	1.9
High spoilage rates	2	0.4	1	0.9
Total	545	100.0	107	100.0

Focus groups reported on the main constraints to increasing the total volumes they market. Their responses are summarized in Table 72. The most common constraints for maize, in order of prevalence, are poor roads, poor open market trading facilities, unfavorable prices, lack of information on prices and transportation expenses. For rice, the top primary constraints, in order, are unfavorable prices, poor roads, transportation expenses and lack of information on prices.

Table 72: Main Marketing Constraints

	#	Maize (%)	#	Rice (%)
Poor roads	11	19.3	5	18.52
Poor open market trading facilities	9	15.8	2	7.41
Prices are not favourable	9	15.8	6	22.22
Not enough information on prices	8	14.0	3	11.11
Transport to market too expensive	7	12.3	4	14.81
Not enough surplus produced	3	5.3	2	7.41
Taxes and transport levies	4	7.0	2	7.41
Too few commercial traders	1	1.75	0	0
Too few collectives / farmer groups	1	1.75	0	0
Scared of being cheated	1	1.75	1	3.7
Farmers lack knowledge of trading practices	1	1.75	1	3.7
Others	2	3.5	1	3.7

The three suggestions mentioned most frequently by farmers regarding the steps necessary to improve the marketing of their crops were, first, the construction more markets, second, improvement of roads and bridges to ease the transport of produce and third, the establishment of a regulatory body to set prices. Other common suggestions included the creation of a farmer's union, the removal of agricultural taxes and increased access for farmers to loans and credit schemes.

Table 73: Marketing Investments

	#	Maize (%)	#	Rice (%)
Build more market places / improve public market facilities	14	24.6	4	14.8
Build better roads	12	21.1	4	14.8
Regulate prices	10	17.5	3	11.1
Price info services for traders and farmers	4	7.0	4	14.8
Lower taxes	4	7.0	2	7.4
Invest in farm production	2	3.5	3	11.1
Establish more collectives/ farmer groups	3	5.3	2	7.4
Reduce taxes on fuel	3	5.3	2	7.4
Reduce roadblocks and bribes	0	0	0	0
Encourage new traders	1	1.75	0	0.0
Better security on roads	1	1.75	0	0
More government purchases	0	0	0	0
Better security at markets	0	0.0	0	0.0
Peace-building	0	0.0	0	0.0

Marketing training for farmers	2	3.5	1	3.7
Market training for traders	0	0.0	0	0.0
Better contract enforcement in courts	0	0.0	0	0.0
More credit for traders	0	0.0	1	3.7
Improved public storage facilities	0	0.0	0	0.0
Investment in on-farm storage facilities and practices	0	0.0	0	0.0
Other	1	1.75	1	3.7

PROFITABILITY ANALYSIS

This section will assess the profitability of maize and rice production.

Table 74: Production Costs and Margins for Rice and Maize

	Maize			Rice		
	#	Mean	Std. Dev.	#	Mean	Std. Dev.
Total production cost per kg in TSH	1076	168.3	540.1	523	166.6	280.3
Average sales price per kg TSH	1078	415.6	1708.1	503	700.0	884.6
Gross margin as percent of production cost	1078	9.7	92.1	443	15.5	146.0
Gross margin per hectare under cultivation in TSH	1072	273648	378774	497	509663	561419

The total production cost per kilogram was found to be TSH 168.30 per kilogram for maize, and 166.60 for rice. The average sales price per kilogram was found to be at TSH 415.60 while the average sales price per kilogram for rice was TSH 700.00. In both crops, the variability was high suggesting a lack of market intergration and hence the high variability in the sales price between different farmers. Gross margins per crop as a percent of production cost were also calculated; the gross margin as percent of production cost for maize was 9.7% while that of rice was 15.5%. Both have a very high variability as well. The gross margins per hectare were also calculated and these were found to be TSH 273,648 per hectare for maize and TSH 509,663 for rice.

MAIZE AND RICE MARKETED SHARES

This section assesses the determinants of marketed shares of both rice and maize, the probability of market participation and the share of sold harvest

Table 75 Maize and Rice market participation

	Regression coefficients	
Determinants	Maize	Rice
Price of maize or rice	-0.155**	-0.046
Number of livestock owned	-0.100***	0.070
Altitude	0.032	N/A
Age of household head	-0.676***	-0.866***
Proportion of female HH members	-0.663***	-0.284
Household Head maximum level of education	0.034	-0.152
Household size	0.398***	0.330**

Land per capita	0.025	0.391***
Loan acquired	0.609***	-0.010
Amount of fertilisers used per acre	-0.001	0.106*
Amount in kg of improved seeds used	0.090	0.186*
Received extension training or service	-0.145	-0.037
Access to communication assets	0.078	0.399**
Quantity of transport means owned by the hh	-0.064	-0.084
Additional sources of income	-0.105	0.026
Belong to a producer organisation	0.364**	-0.007
Constant	3.363*	3.540***

note: *** p<0.01, ** p<0.05, * p<0.1

From the table above we can see that a decrease in the price of maize and a decrease in livestock holdings increase market participation. A plausible explanation could be that many of the farmers utilize maize stocks as part of the feed for livestock. The larger the household size and the older the household head, the more likely the market participation of that household for maize; this could be due to that particular household wanting to raise money to cover household expenses like school fees and medical care. Belonging to a producer organization / farmer group also increases a household's likelihood of market participation. The higher the proportion of female household members the less the likelihood of a household participating in the maize market; the plausible explanation could be that majority of the stock would be used to feed the household. Acquiring a loan by a household also increases the likelihood that a household will participate in the maize market. Belonging to a producer organization also increases the likelihood of market participation as producer organizations provide direct access to markets by reducing the transaction costs and supporting small-scale producers to associate, collaborate, and coordinate to achieve economies of scale in their transactions with input suppliers and buyers.

For the rice market, the age of the household head is negatively related to the likelihood of market participation. Household size is however positively related to market participation; the plausible explanation could be similar to that of maize where the larger the household size the more likely they will sell rice in order to raise funds to cover ever increasing household expenses. Land per capita is also positively related to market participation since larger farms will tend to sell most of their products as compared to smallholder farms. Amount of fertilizer used per acre and amount of improved seeds used also increases the likelihood of market participation as these increase yield leading to surplus product that can then be sold. Access to communication assets increases market participation by providing channels of information (e.g. about product specifications, market prices) and other business services accessible to these farmers.

Table 76 Marginal effects: change in probability

	Coefficients	
Determinants	**Maize**	**Rice**
Price of maize or rice	-0.05385*	0.019268
Number of livestock owned	-0.0348*	0.02027
Altitude	0.011145	N/A
Age of household head	-0.23492*	0.05443*
Proportion of female HH members	-0.23041*	0.07219
Household Head maximum level of education	0.01197	0.02234

Household size	0.138401*	0.03823
Land per capita	0.21177	0.02754*
Loan acquired	0.008793	0.00339
Amount of fertilisers used per acre	-0.00026	0.01385
Amount in kg of improved seeds used	0.031241	0.02480
Received extension training or service	-0.05057	0.07529
Access to communication assets	0.027251	0.04296*
Quantity of transport means owned by the hh	-0.0221	0.03865
Additional sources of income	-0.03658	0.03618
Belong to a producer organisation	0.126398*	0.07216

Note:* p-value < 0.05

Even when we look at the change in probability of market participation as in the next table, we can draw some similar inferences for the maize market as when were looking at market participation; the price of maize, number of livestock held, age of household head, proportion of female members in the household reduce the probability of a household's market participation. Household size and belonging to a producer organization increases this probability

For the rice market however we see a slightly different picture from the maize market; the age of the household head has a positive effect on increasing the probability of that household participating in the market. Other factors that increase this probability are land per capita and an access to communication assets.

Table 77 Maize and rice marketed supply

	Coefficients	
Determinants	**Maize**	**Rice**
Price of maize or rice	-0.122**	-0.153*
Number of livestock owned	-0.002	0.020
Altitude	0.948***	0.734**
Age of household head	-0.481***	-0.023
Proportion of female HH members	-0.336*	0.273
Household Head maximum level of education	0.048	0.156
Household size	0.965***	0.616***
Land per capita	1.090***	0.770***
Loan acquired	-0.071	0.115
Amount of fertilisers used per acre	0.020	0.051
Amount in kg of improved seeds used	0.212***	0.066
Received extension training or service	0.197	-0.045
Access to communication assets	0.309***	0.008
Quantity of transport means owned by the hh	0.235***	0.242***
Additional sources of income	0.009	-0.049
Sctsold	2.135**	-4.590
Constant	0.425	3.645*

note: *** p<0.01, ** p<0.05, * p<0.1

From the table above we can see that there is a negative relation between the price of maize and the marketed supply; even though normally we would expect a positive relationship, this could be due to the fact that majority of the farmers are smallholders, and not commercial farmers. The altitude has a positive effect on the amount of maize marketed as it is a determinant of the quality of soil. The age of the household head has a negative effect on the marketed supply of maize. The larger the household size the larger the marketed supply of maize this could be due to the fact that larger households need to raise money to cover household expenses. Land per capita has a strong positive effect on marketed supply of maize since the since larger farms will tend to sell most of their products as compared to smallholder farms. The amount of seeds also has a positive effect as it directly increase as the yield and hence the surplus produce that can be marketed. Access to communication assets helps farmers to obtain market information and thus has a positive effect on marketed supplies of maize. The quantity of transport means owned by a household head also has a positive effect on the marketed supply of maize as farmers with greater access to means of transport can supply more of their produce to points of sale.

For the rice market, the price has a negative effect on the marketed supply of the product. Altitude has a positive effect as it directly affects the quality of soil and hence yields. Household size has a positive effect on the marketed supply plausibly due to the increased need to provide for household expenses, but it could also be due to the increase in household labour which could be used to produce surplus produce for sale. Land per capita also has a positive effect on marketed quantity for rice as the more the land per capita; the higher the amounts of rice produced the greater there is surplus produce to market. The quantity of the transport means owned also has a positive effect on the marketed supply of rice as farmers with greater access to means of transport can supply more of their produce to points of sale.

Table 78 Share of rice and maize sold

	Coefficients	
Determinants	**Maize**	**Rice**
Price of maize or rice	-0.015	-0.073**
Number of livestock owned	-0.030***	-0.000
Altitude	0.211*	-0.033
Age of household head	-0.122**	-0.206
Proportion of female HH members	-0.275**	-0.015
Household Head maximum level of education	0.031**	0.012
Household size	0.013	-0.071*
Land per capita	0.086***	0.008
Loan acquired	-0.009	0.099
Amount of fertilisers used per acre	-0.005	0.015
Amount in kg of improved seeds used	0.029*	-0.197
Received extension training or service	-0.003	-0.092
Access to communication assets	0.059**	-0.056
Quantity of transport means owned by the hh	-0.031	0.029
Additional sources of income	-0.029	0.052
Share of product sold	0.604**	0.881

Constant	-0.559	2.326*

note: *** p<0.01, ** p<0.05, * p<0.1

For the maize market, the share of product sold negatively affects the share of grain sold. The plausible explanation could be that these farmers use maize stocks for livestock feed. Altitude has a positive effect on the share of maize actually sold; altitude has a direct effect on soil quality and hence influences yield. The age of the household head and the proportion of female household members in the household has a negative effect on the share sold. This could be because majority of the produce is used to feed the household members. Land per capita and amount of improved seeds used has a positive effect as it directly affects yield. Access to communication assets also positively influences shares sold as it assists farmers with market information.

For the rice market, price has a negative effect on the quantities sold, and so does household size. Plausible explanations for this could be that the larger the household the more mouths to feed; this means that not as much product can be sold off before feeding the family.

HOUSEHOLD DECISION-MAKING

It is generally acknowledged that women play an important role in improving household health and nutrition. Increa ingly, researchers and practitioners are looking at the role of women in agricultural production. Research suggests that increasing resources controlled by women could promote increased agricultural productivity.[12] USAID, through the FtF Initiative, has a central focus on women, which seeks to improve their roles and engagement in all program areas. To evaluate the intra-household dynamics, both male and female respondents were asked questions about who in the household makes decisions in two different areas – household decisions and farm decisions. The three possible responses were that the decisions are made by a female, the decisions are made by a male or the decisions are made jointly. In households in which another senior member of the opposite sex was available, the set of questions was asked to both members of the household to compare responses. Collecting data on decision-making will help inform the program and tailor interventions as needed.

For many of the household decisions, the answers followed the gender of the respondent (Table 79). For instance, in answer to the question of 'who buys clothing,' the female respondents, on average, indicated that females make that decision (40.5 percent) vs. males (31.1 percent). The males responding to the same question answered in the reverse. Only 13.2 percent of male respondents indicated that females make this decision. Interestingly, male respondents overwhelming indicate that decisions about large or important expenses are made by males or jointly.

[12]Quisumbing, A. R. 1996, Male-female differences in agricultural productivity: Methodological issues and empirical evidence. World Development 24 (10): 1579–1595).

Table 79: Household Decisions

	Response Rate*	Female Respondents (%)			Male Respondents (%)			Total (%)		
		Female	Male	Joint	Female	Male	Joint	Female	Male	Joint
Buying small food items	2,411	53.2	26.7	20.2	35.0	42.4	22.6	44.4	34.3	21.3
Buying clothing	2,410	40.5	31.1	28.4	13.2	53.3	33.5	27.3	41.9	30.9
Spending money that you yourself have earned	2,411	45.4	23.6	31.0	2.7	61.7	35.6	24.7	42.1	33.2
Buying or selling major household assets	2,411	23.5	37.1	39.4	1.4	51.2	47.5	12.7	43.9	43.3
Use of loans or savings	2,386	24.3	35.0	40.7	1.3	50.4	48.3	13.2	42.5	44.4
Expenses for your children's education	2,400	23.3	37.5	39.2	1.2	49.9	48.9	12.6	43.5	43.9
Expenses for your children's marriage	2,384	22.3	32.7	45.0	1.4	44.2	54.4	12.2	38.3	49.6
Decisions over children's marriage	2,388	22.5	31.0	46.5	1.2	41.6	57.2	12.2	36.1	51.7
Medical expenses for yourself or your children	2,404	23.7	31.4	45.0	1.3	47.2	51.5	12.8	39.1	48.2
Expenses for family planning	2,401	20.0	12.7	42.4	5.4	21.0	50.4	12.9	16.7	46.3

*can be more than the total number of cases (2000) because these questions were asked of both a male and female household member

Table 80 shows similar results for agricultural production decision-making. The same overall trend of men perceiving decision-making as a male or joint decision continues.

Table 80: Farm Decisions

	Response Rate*	Female Respondents (%)			Male Respondents (%)			Total (%)		
		Female	Male	Joint	Female	Male	Joint	Female	Male	Joint
How to utilize the harvest of maize/rice	2,412	23.4	29.6	47.1	1.3	43.3	55.4	12.7	36.2	51.1
Who to sell the produce to and at what price	2,410	23.6	38.5	38.0	1.1	51.6	47.3	12.7	44.9	42.5
What crop varieties to plant	2,412	23.8	34.6	41.7	1.2	48.5	50.3	12.8	41.3	45.9
How much of which farm inputs should be used	2,410	23.2	39.7	37.1	1.0	52.8	46.2	12.5	46.1	41.5
How sales revenues should be used	2,409	23.5	35.6	41.0	1.1	48.6	50.3	12.6	41.9	45.5
Purchasing farm tools/implements	2,411	23.2	43.0	33.8	0.7	57.1	42.2	12.3	49.9	37.9
Hiring laborers	2,407	23.2	40.5	36.3	1.1	55.2	43.7	12.5	47.6	39.9

*can be more than the total number of cases (2000) because these questions were asked of both a male and female household member

While Table 79 and Table 80 looked at all responses to the decision-making question, Table 81 looks only at the households where two senior members of the opposite sex were present and who responded to the question. These results show a different pattern of gendered response. In contrast to the overall results, when part of a household with both male and female senior members, females were much less likely to view themselves as decision-makers. This may be attributed to the fact that women interviewed in the previous section were single and therefore had all decision-making power by default. On another note, this may be attributed to the fact that women, when interviewed in the presence of a man, feel that they must express their husbands/fathers/brothers' decision-making power.

Table 81: Household Decisions as Reported by a Male and Female in the Same Household

	Resp. Rate	Female Respondents (%)			Resp. Rate	Male Respondents (%)		
		Female	Male	Joint		Female	Male	Joint
Household Decision-making								
Buying small food items	383	38.9	30.8	30.3	383	39.4	36.8	23.8
Buying clothing	383	18.3	39.2	42.6	383	12.3	51.7	36.0
Spending money that you yourself have earned	383	22.5	31.3	46.2	383	2.9	55.6	41.5
Buying or selling major household assets	383	2.9	44.9	52.2	383	1.8	48.0	50.1
Use of loans or savings	376	4.0	41.2	54.8	374	1.6	47.1	51.3
Expenses for your children's education	381	4.5	46.2	49.3	381	1.8	48.6	49.6
Expenses for your children's marriage	376	3.2	39.4	57.5	375	2.4	42.1	55.5
Decisions over children's marriage	378	2.9	36.0	61.1	375	2.1	38.9	58.9
Medical expenses for yourself or your children	381	3.4	37.5	59.1	382	2.4	44.8	52.9
Expenses for family planning	381	8.1	17.6	51.2	378	7.4	20.4	47.9
Farm Decision-making								
How to utilize the harvest of maize/rice	383	3.4	37.3	59.3	383	1.6	40.5	58.0
Who to sell the produce to and at what price	382	3.4	47.6	49.0	382	2.1	50.3	47.6
What crop varieties to plant	383	3.9	43.6	52.5	383	2.1	44.7	53.3
How much of which farm inputs should be used	383	3.1	47.5	49.4	382	1.8	48.4	49.7
How sales revenues should be used	382	3.9	42.9	53.1	382	1.8	45.8	52.4
Purchasing farm tools/implements	383	3.7	50.9	45.4	383	1.0	53.8	45.2
Hiring laborers	383	2.9	50.9	46.2	381	1.8	50.7	47.5

These results are supported by the focus group discussions on gender. Most respondents said that decisions in the families are made by men. Interestingly, some respondents indicated that women are not usually allowed to do business, as people will not buy from them under the assumption that they might have stolen the goods they are selling from their husbands. Such responses are indicative of a stigma against women in business.

The FGDs reveal many other reasons why it is very difficult to do business as women. For instance, respondents reported that women face difficulties while trading because there are things that women cannot do like carrying heavy sacks of rice or maize from one point to another. Another issue challenging women is transportation. Respondents reported that it is often difficult for women to ride of motorcycles or bicycles and therefore they cannot carry out their businesses efficiently.

In the focus group discussion with farmers, respondents were asked to indicate their level of agreement with different statements related to gender, such as whether women should be able to work outside the home or whether they have a right to express their opinions (Table 82). The majority of respondents disagreed with strong negative statements against women, for example, over 80 percent of respondents disagreed with the statement 'A wife should tolerate being beaten by her husband in order to keep the family together'.

Table 82: Gender Attitudes

	Agree		Disagree		Do not know/ Depends	
	#	%	#	%	#	%
The important decisions in the family should be made only by the men of the family.	2	9.1	17	77.3	3	13.6
If the wife is working outside the home, then the husband should help her with household chores.	17	77.3	2	9.1	3	13.6
A married woman should be allowed to work outside the home if she wants to.	10	47.6	5	23.8	6	28.6
The wife has a right to express her opinion even when she disagrees with what her husband is saying.	19	90.5	0	0.0	2	9.5
A wife should tolerate being beaten by her husband in order to keep the family together.	2	9.1	18	81.8	2	9.1
It is husband who has the right to make decision on family planning	3	14.3	16	76.2	2	9.5
It is better to send a son to school than it is to send a daughter.	1	4.5	20	91.0	1	4.5
A wife should be allowed to travel alone to the local market to buy things	18	85.7	2	9.5	1	4.8
A wife should be allowed to travel alone to a local health center or doctor	17	80.9	3	14.3	1	4.8
A wife should be allowed to travel alone to homes of friends in the neighborhood	15	75.0	1	5.0	4	20.0
A wife should be allowed to travel alone to a nearby mosque/shrine/temple	21	100	0	0.0	0	0.0
A wife should be allowed to open her own bank account	18	81.9	3	13.6	1	4.5
A wife should be allowed to own land	20	95.2	0	0.0	1	4.8

From FGDs, it emerged that there are strong socio-cultural and behavioral constraints to increased involvement of women in the rice and maize value chains. Women in the village are often tasked with collecting water and firewood, which are usually far away. These trips are both tiring and dangerous as they can be easily kidnapped, robbed or abused.

Maternal healthcare is also a problem. It is expensive to transport pregnant and new mothers to the district hospital, which is far away and difficult for many people to reach, and there are not enough midwives who are trained and equipped to assist with home birthing, as government policy has discouraged this practice. Moreover, women who do give birth at home must pay a fine in order to receive a birth certificate for their children.

Finally, many women have little knowledge or understanding of financial services. They comprise the largest proportion of low-income members, yet have no access to financial services to help them manage their income and that of the family. Most women do not have a lot of capital and therefore tend to run very small

businesses, unlike men who, with more capital, can run bigger businesses. However, in terms of creditworthiness, a majority of respondents said that women are more credit-worthy and can therefore be trusted more than men. Some reasons given were that women always think about their families and their future.

When asked how one might improve the situation for female farmers, respondents listed the following ideas:

- Improve access to financial services, particularly those relating to savings and loans.
- Improve access to water so women do not have to walk too far to fetch it.
- Improve access to health care facilities. Health care dispensaries must be built nearby to cater to maternal healthcare needs and offer family planning services in order to prevent young pregnancies and lower the fertility rate.
- Encourage alternative energy sources to remove the emphasis on firewood for cooking.
- Remove the birth certificate extra fee that women who give birth at home must pay.

INSTITUTIONAL ANALYSIS

This section considers the main stakeholders that are involved in the maize and rice value chains. In the course of focus group discussions with producer/purchaser organizations, input suppliers, farmers and farmer groups and traders at the market, a number of issues were discussed to assess: their relationships with smallholder farmers and perceived risks and opportunities to do business with them; gender balance at each step of the value chain; availability of financial and credit opportunities for farmers; and existence of extension training to improve farmers' skills.

PRODUCER ORGANIZATIONS

Table 83 presents the gender composition of producer/purchaser organizations. Men own more businesses than women (58.8 percent), and even businesses owned by women are often run by men (71.4 percent of businesses are run by men).

Table 83: Gender Composition of Producer/Purchaser Organizations

The company is:	Male		Female	
	#	%	#	%
Owned by	10	58.8	7	41.2
Day-to-day business is run by	10	71.4	4	28.6

Less than 6 percent of survey respondents reported belonging to a producer group. Interviews with farmer groups reflected their belief that one constraint to increasing participation was that people did not see a difference between farmers who are in groups and those that are not. Newly-formed groups may not have the ability to provide services immediately, which may add to this belief. A similar perceived reason was that most farmers do not realize the importance of belonging to a group, suggesting that services provided by farmer groups is limited and/or knowledge of services offered is weak.

Another constraint for increasing participation in farmer groups is the annual fee. As shown in Table 84, households who were members of a group reported that they pay an average membership fee of a little under27,000 TSH (approximately US$17) per year.

Table 84: Producer Groups

	Participation	Fees (TSH)

	Response Rate	#	%	Response Rate	Avg	Stddev
Belong to producer group	1,994	114	5.7	110	26750.0	81388.6

Currently, the farmers that pay membership fees to producer organizations are very few. Result 2.1.1 of the NAFAKA logframe ("Strengthened capacity of service providers") aims at increasing this proportion by the end of the project.

Table 85: Farmers Paying Membership Fees to Producers' Organizations/Farmers' Groups

District	Crop	Pay fees to producer organizations			
		No		Yes	
		#	%	#	%
Kongwa	Maize	600	0.96	28	0.04
	Rice	0	0.00	0	0.00
Kiteto	Maize	609	0.95	30	0.05
	Rice	0	0.00	0	0.00
Kilombero	Maize	152	0.95	8	0.05
	Rice	338	0.93	26	0.07
Mvomero	Maize	260	0.92	23	0.08
	Rice	244	0.84	46	0.16

Farmers that do participate in farmer groups reported that they join to access market opportunities and access services and investments they need to increase their on- and off-farm revenues (Table 86). Over 75 percent of households who stated that they belong to famer groups reported that their primary reason for joining was the hope of accessing credit.

Other top reasons included access to production inputs and access to extension services at 68.5 percent and 67.6 percent, respectively.

Table 86: Reasons for Belonging to a Producer Group

Reasons for Belonging to PG	# (N = 112*)	%
Access to credit	88	79.3
Access to production inputs	76	68.5
Access to extension services	75	67.6
Better prices	32	28.8
Access to technology	28	25.2
Other, specify	6	5.4

*can total to greater than 112 because respondents cite top three reasons

Producer groups were asked about the range of purchasers buying products from them. As shown in Table87, the majority of purchasers are local traders. This is followed by small-scale processor.

Table87: Type of Purchaser

Type of Purchaser	#	%

Local trader	12	57
Small scale processor	5	24
Large-scale processor	2	9.5
Individual	2	9.5
Total	**21**	**100**

When asked about the commodities that were purchased (Table 88), rice was the largest volume bought and had the highest value. While smallholder farmers constituted a small percentage of total purchases (11.8 percent of maize volume and 5 percent of rice volume), the average price paid to smallholders was higher for both commodities than for other sellers.

Table 88: Commodities Purchased

Seller Type	Maize			Rice		
	Volume (Kg)	Avg price/kg (Tsh)	Total paid	Volume (Kg)	Avg price/kg (Tsh)	Total paid
All Sellers	2,462,000	320.6	786,319,600	2,907,440	713.1	1,755,498,880
Smallholder farmers only	291,520	369.4	102,654,600	149,362	721.7	103,932,664

When looking at the primary sellers among producer groups, small holder farmers are by far the largest group of sellers at 73 percent of the total. Local traders were the next most important at 19 percent (Table 89).

Table 89: Primary Sellers

	#	%
Small holder farmers	38	73
Local traders	10	19
Restaurant	2	4
Farmer groups	1	2
Cooperatives	1	2
Total	**52**	**100**

As shown in Table 90, producers reported numerous constraints in dealing with smallholder farmers, which were primarily cost-related. There are high transport costs to reach rural farms (27.6 percent) and farmers offer prices that are too high. Poor road infrastructure makes the cost of transportation very expensive. The producers must bear this cost, as they have to go to collect maize or rice from the farmers' farms. Smallholder farmers also offer their produce at very high prices in order to compensate for their own expenses, making it difficult for the purchasers to make profits.

Poor produce quality was also mentioned as a reason for low engagement with smallholder farmers, by 20.7 percent of the farmer groups. This is mainly due to the fact that they use low quality seeds and also have poor storage facilities. This often leads to disagreements between purchasers and smallholder farmers, with the

farmers wanting to be paid more money despite the poor quality of their produce. In addition, once the purchasers buy the low-quality produce, they often end up selling them at lower prices, thus at a loss.

Another 8.6 percent reported that smallholder farmers do not produce enough to meet minimum volume requirements. Since almost all smallholder farmers practice local farming, they only produce small amounts.

Table 90: Main Constraints to Buying from Smallholder Farmers

	#	%
High transport costs	16	27.6
Prices offered are too high	14	24.1
Poor quality of produce	12	20.7
Can't meet minimum volumes	5	8.6
Lack of a standard measurement unit of product	4	6.9
Lack of trust between purchaser and smallholder farmers	4	6.9
High local revenue	2	3.4
Product is not accessible	1	1.8
Total	**58**	**100**

Table 91 shows the main risks cited during focus group discussions with producer groups. The main risk that producer groups perceive in terms of developing relationships with smallholder farmers is a lack of trust between the purchaser and the buyer (24 percent of interviewees), as purchasers perceive a high possibility that farmers may default on their contracts. A few respondents reported that some farmers fail to repay the loans/credit after harvesting if the value of the rice harvested has increased since the loan was taken. For instance, if a farmer was given 15,000 Tshs as loan and agreed to pay the purchaser 1 bag of rice after harvesting, then it happens that a bag of rice is worth much more than 15,000Tshs, the farmer will refuse to give the purchaser the whole bag as previously agreed. This can cause conflict between the two parties.

Some respondents also reported that they disagree with the smallholder farmers because they do not use a standard unit of measure: the farmers will come with different containers from what the purchasers use. It is clear that each party seeks to maximize their profits.

Table 91: Main Risks in Building Relationships with Smallholder Farmers

	#	%
Lack of trust between purchaser and smallholder farmers	12	24
Prices offered are too high	9	18
Poor quality of produce	8	16
Lack of a standard measurement unit of product	7	14
High transport costs	6	12
Can't meet minimum volumes	2	4
High local revenue	2	4
Competition from large scale farmers	2	4
Deliveries are too late	1	2
Product is not accessible	1	2

Total	50	100

As shown in Table 92, more than half of the purchasers do not offer any form of credit to smallholder farmers (55 percent). However, a third of the sampled purchasers (32 percent) noted that they may offer cash in advance in exchange for a fixed price. This helps them minimize the risk of high farmer prices. Credit in the form of inputs or cash in advance for harvest are less common solutions.

Table 92: Type of Credit Offered to Smallholder Farmers

	#	%
None	12	55.0
Cash in advance for fixed price	7	32.0
Other - Cash in advance for harvest	2	9.0
Inputs	1	4.0
Total	22	100

As shown in Table 93, one of the reasons why the credit offered by purchasers to smallholder farmers is limited is similar to the reason purchasers view relationships with smallholders in general to be risky: the perception that they might default on payments (31 percent). Most purchasers reported that they feared that farmers would fail to pay back loans. Some purchasers pointed out that no formal contracts exist between the purchasers and the smallholder farmers. Therefore, there is always the risk of smallholder farmers defaulting payment.

Another main reason is that smallholders might be unable to meet the minimum volumes to repay the credit received (31 percent). Some of the respondents reported that most of the smallholder farmers depend on their produce to repay the loans and, therefore, in case they fail to harvest or if they harvest less amount of produce than expected, they will not be able to repay the loans/credit.

If the farmers were to default, the lack of collateral (which smallholder farmers are often unable to provide) is considered as a risk factor by 19 percent of the purchasers. Another 19 percent believe that smallholder farmers are likely to delay their repayments.

Table 93: Main Risks in Providing Credit to Smallholder Farmers

	#	%
Smallholder farmers might default payment	5	31.0
Can't meet minimum volumes required to repay loan	5	31.0
Delays paying loan	3	19.0
Lack of collateral	3	19.0
Total	16	100

INPUT SUPPLIERS

When examining the gender breakdown of input suppliers (Table 94), the majority of companies are owned by men but run by women.

Table 94: Gender Composition of Input Supplies

The company is:	Male		Female	
	#	%	#	%
Owned by	14	66.7	7	33.3
Day-to-day business is run by	11	44.0	14	56.0

As shown by Table 95, most of input suppliers' clients consist of individuals (37 percent) or smallholder farmers (35 percent). We can assume that individuals purchasing agricultural inputs are also smallholder farmers, and can therefore deduce that actually 72 percent of agricultural input purchasers are individual smallholder farmers. Another 15 percent are farmer groups, followed by local traders (5 percent), cooperatives (3 percent) and agro-processors (3 percent).

Table 95: Average Number of Smallholder Farmer Clients

Primary Clients	#	%
Individuals	23	36.5
Small holder farmers	22	34.9
Farmer groups	10	15.9
Local traders	3	4.7
Cooperatives	2	3.2
Agro-processor	2	3.2
Other (specify....)	1	1.6
Community based groups	0	0
NGOs	0	0
Restaurant	0	0
Supermarket	0	0
Total	**63**	**100**

As shown in Table 96, the main inputs sold are seeds (33 percent), followed by pesticides (25 percent), fertilizers (20 percent) and herbicides (13 percent).

Table 96: Main Inputs

Input Type	#	%
Seeds	22	32.8
Pesticides	17	25.3
Fertilizer	13	19.4
Herbicides	9	13.4
Animal/ Chicken Feed	5	7.5
Other (specify....)	1	1.5
Land in Acres (Rental costs)	0	0

Irrigation water in litres	0	0
Hired labour (persons)	0	0
Organic fertilizer	0	0
Animal house (Construction Material)	0	0
Extension services to farmers	0	0
Total	**67**	**100**

During focus group discussions, input suppliers reported that many smallholder farmers do not understand the value and the importance of quality inputs and are therefore not willing to invest in them (32 percent). Some input suppliers have taken initiative to teach and train the farmers in using herbicides and pesticides (Table 97) in order to promote use.

One aim of the NAFAKA extension training is to educate farmers on the value that quality inputs can bring to their plots. After the implementation of the NAFAKA program, the percentage of farmers lacking understanding of the value and/or use of inputs should decrease. This will indicate that the extension activities have achieved at least part of their intended impact. In some cases, the price of inputs is too high for smallholder farmers to afford (30 percent) due to suppliers bringing them from far distances. On top of this, farmers must travel a great distance to get to the suppliers, thus incurring additional expenses.

Table 97: Main Constraints in Selling to Smallholder Farmers

	#	%
Poor skills – lack of understanding on value/use of inputs	20	31.8
High price of inputs (smallholders cannot afford)	19	30.2
Lack of demand (no smallholders in market)	7	11.1
No access to credit (to purchase the inputs)	7	11.1
Poor transport networks	4	6.3
High cost of transportation	4	6.3
Competition from larger suppliers	1	1.6
Other (specify….	1	1.6
Total	**63**	**100**

Input suppliers also indicated that they do not usually sell to farmer groups. However, since most suppliers allow farmers to pay credit in installments, they reported that selling to groups would make tracking down farmers with bad debts easier.

The main risks identified in dealing with smallholder farmers (Table 98) are consistent with these constraints. Input suppliers perceive risks related to farmers' poor skills (38 percent of responses),the high cost of inputs (34 percent), lack of demand (14 percent), and a lack of trust (14 percent).

Table 98: Main Risks in Building Relationships with Smallholder Farmers

	#	%
Poor skills	11	37.9

High price of inputs	10	34.5
Lack of trust	4	13.8
Lack of demand	4	13.8
Total	29	100

As shown in Table 99, 35 percent of suppliers reported that they do provide inputs on a credit basis to smallholder farmers. The other 65 percent of suppliers do not provide any type of credit.

Table 99: Credit Offered to Smallholder Farmers

Type of credit	#	%
None	15	65.2
Inputs	8	34.8
Cash in advance for fixed price	0	0.0
Other	0	0.0
Total	23	100

When asked to identify the main risks in dealing with smallholder farmers, suppliers said that bad credit (Table 100) is the greatest risk when providing credit to them. The smallholders do not pay back the debts and proceed to get inputs from another supplier.

Also, keeping track and tracing those farmers is difficult, because they live in scattered areas. Often, retardation of capital is an issue: when the suppliers provide credit, capital declines because their money is not in circulation. Delays in payments from farmers therefore affect their flow of capital.

Finally, the suppliers have no insurance for the credit extended, as the farmers rely on their yields to payback the supplier.

Table 100: Main Risks in Providing Credit to Smallholder Farmers

	#	%
Bad Credit	14	70.0
Retardation of capital	3	15.0
Lack of security	3	15.0
Total	20	100

EXTENSION SERVICES

The great majority of farmers (66.7 percent) indicated that they never receive extension training, and 16.6 percent said that trainings are provided occasionally (Table 101).

Table 101: Frequency of Farmers' Extension Training

	#	%
Never	12	66.7
Occasionally	3	16.5
Always, every planting season	1	5.6
Often, in most planting seasons	1	5.6
In emergencies e.g. when there is a disease outbreak	1	5.6

Of those who answered the question on frequency of trainings only a third were able to mention the training provider. In all cases, trainings were reported as provided by the government (Table 102).

Table 102: Training Providers

	#	%
Govt Extension	6	33.3
Research Institute	0	0
Local NGO	0	0
Private Company	0	0
Farmer Group	0	0

FARMERS' GROUPS

In addition to collecting data on producer groups during the household survey, 10 focus groups were held with members of farmers' groups. This data will help explain some of the constraints and benefits of joining farmers' groups from the perspective of members.

Farmers groups have the potential to allow smallholder farmers to improve their productivity and tackle their problems, defend their interests and try to better coordinate their work. They can offer farmers the benefits of better representation and market power, organizational strengthening, agronomic services, market strategies and funding for other areas of problem-solving. It is crucial to identify and promote appropriate strategies for organizing and empowering farmers' groups in order for them to assist farmers inimproving their livelihoods and to alleviate rural poverty in general.

Of the 10 farmers groups interviewed, the average group size is 103 active members, of which an average of 63 members are men and 46 are women (Table 103). Board members are generally well-balanced in terms of gender: they have an average of three women and three men on their boards. Half of the members on average are smallholder farmers, cultivating a piece of land that is smaller than three hectares.

Table 103: Farmers Group Details

Group Characteristics	
Average number of years of activity of the group	4.7
Average number of active group members (group size)	103
Average number of women members	46
Average number of men members	63
Average number of women board members	3
Average number of male board members	3

Average of members who cultivate 3 hectares or less in total	50
Approx. avg. cultivated area (all crops) of farmer group members (hectares)	5866
Approx. avg. cultivated area (maize) of farmer group members (hectares)	158.6
Approx. avg. cultivated area (rice) of farmer group members (hectares)	1127 (for 4 of 10 grps)
Approx. avg. number of additional members expected to join in the next year (2012)	28

Increasing their income through increasing crop production was the reason most farmers cited for joining producer groups. Not only did they believe that they would have access to loans, inputs and trainings, but sharing challenges, support from peers and exchanging knowledge with other farmers were important aspects that they thought membership would provide.

Farmers' satisfaction with the groups is high in terms of issues concerning group membership roles, decisions and resolution of disputes. Women play important roles in all groups and are treated equally. A general lack of satisfaction lies in the availability of market/price information, accessibility of quality inputs to members, storage capacity and provision of financial services. There were a few exceptions to this. For example, one group received price information via SMS; another group had just bought a tractor and had access to improved seeds due to the support of an NGO.

Except for in a few organizations, most members participated in group sales and marketing. None of the groups sold on contract but instead conducted direct cash transactions. Although selling on contract was appealing, groups were deterred from using this method of sales because of the difficulty in meeting the quantity required. Low production due to the lack of quality inputs is a major problem. Another reason for not selling on contract was the fear of agreeing to a lower price than the market price at the time of harvest, as the buyer was reported to be the one who has the power to set the price. Members believed this was unfair because of the low prices offered but did not see another option. One group claimed that they had bargaining power, but because purchasers claimed bad quality of the crops, they settled for lower prices. As previously mentioned, buyers can also temper with weights and scales to cheat farmers. The lack of markets was an obstacle to creating the competition needed to increase prices. Part of this problem stems from poor infrastructure, including bad roads.

A common theme emerged from the focus groups regarding constraints for increasing membership – the cost-benefit ratio. Almost all groups mentioned that one reason farmers did not join was because of the annual fee. Farmers either could not afford it or feared the debt it would cause. Another common response was that farmers could not see a difference between group members and individual farmers. This could be because of the lack of good management that was mentioned by several as a constraint or because there is no provision of loans in many of the groups. In an all-female FGD, members said that their husbands did not want them to join. The negative reputation of groups and the high cost of joining dissuade membership.

Current members mentioned that investing in trainings is necessary in order to increase group membership. Extension trainings, management training (for group leaders to improve management of the organization and for all members to improve agricultural management), and entrepreneurship trainings were all mentioned. Providing access to loans and inputs was another way thought to increase membership.

Despite the fact that on average, groups reported expecting 28 new members in the next year, they also mentioned a number of constraints that make it difficult to increase their membership base (Table 104). The most prevalent constraint is the inadequacy of physical facilities (21.1 percent), followed by the lack of staff to

manage the group, the lack of skills to increase the volume of sales, the fact that farmers prefer to sell on their own rather than joining the group, and the perception that agriculture is not profitable (10.5 percent each). Other difficulties included the fact that farmers are far from one another; they don't see the benefit of membership or fail to pay fees, and also the bad reputation of farmer groups.

Table 104: Main Constraints to Increasing the Size of the Group

	#	%
Physical facilities are inadequate	4	21.05
Farmers want to sell produce themselves	2	10.53
Not enough staff to manage the group	2	10.53
Don't have the skills to increase the volume of sales	2	10.53
Agriculture is not profitable	2	10.53
Farmers are too spread out	1	5.26
Not enough farmers want to join the group	1	5.26
Not enough local smallholder production	0	0
Other, specify	5	26.32

When asked about investments that could be made to increase the size and improve the effectiveness of famer groups, group members had a range of suggestions (Table 105). Groups suggested that key members should be trained in management skills and that overall training should be provided in terms of AE management. Other investments the groups proposed included: making sure that the quality of services offered is improved, that membership goals are clarified and explained and that internal disputes are reduced. To a lesser degree, the following measures were suggested: the use of advocacy and recruitment campaigns, the use of better information on prices, an increase in the size of stores, more transparency in decision-making and the provision of financial services and inputs to farmers.

Table 105: Investments Needed to Increase the Size of the Group and to Improve Effectiveness

	Increase group size		Improve group effectiveness	
	#	%	#	%
Training of key group members	6	20.69	3	10.35
Improve quality of services	3	10.35	3	10.35
Provide training in AE management	3	10.35	7	24.14
Improve access to price information	3	10.35	1	3.45
Provide training in marketing	2	6.9	3	10.35
Clarity in defining membership goals	2	6.9	0	0.0
Ability to resolve internal disputes	2	6.9	2	6.9
Advocacy / recruitment campaigns	1	3.45	0	0.0
Increase size of store	1	3.45	2	6.9
Transparency in decision-making	1	3.45	4	13.79
Increase density of farmer groups	0	0.0	0	0.0
Other, specify	5	17.24	4	13.79

Focus group discussion leaders asked groups about crop growing conditions in the last long-rain season. As shown in Table 106, crop yields were mostly normal for rice and slightly above normal for maize. Rainfall was considered average to slightly above average. Pest infestation was considered below normal.

Table 106: Average Crop Growing Conditions in the Last Long Rain Season

	Maize (%)			Rice (%)		
	Below normal	Normal	Above normal	Below normal	Normal	Above normal
Rate crop yields compared to normal or average season	22.22	55.56	22.22	25	50	25
Rate rainfall situation compared to level for healthy plant growth	11.11	66.67	22.22	25	50	25
Rate pest situation this season compared to normal	66.67	11.11	22.22	50	25	25

Farmer groups were also asked about group sales. As shown in Table 107, maize was by far the largest volume sold in 2011, and most sales were through direct negotiation with traders.

Table 107: Group Sales Information - Average Values

	Rice (N=3)	Maize (N=7)
Average number of months crop is marketed/ available on the market	2.67	3.25
Average marketed volume of the crop in KG in 2011	12,590.3	66,382.86
Average price received per kilo on 2011	726.33	336.86
Of which: Sales through contract farming in KG	0	0
Sale through competitive tender in KG	0	0
Sale through warehouse receipts in KG	0	0
Sales through direct negotiation with trader on spot market in KG	12,590.3	9,211.43
Sales to other cooperatives in KG	0	0

The recommended and most-needed marketing investments identified by the groups are: building and improving market places, building better roads, marketing farmer training, and regulating prices (Table 108).

Table 108: Marketing investments (for Farmer Group)

	Maize/ Rice	
	#	%
Build more market places / improve public market facilities	5	20.83
Marketing training for farmers	3	12.5
Investment in on-farm storage facilities and practices	2	8.33
Build better roads	4	16.67
Regulate prices	3	12.5
Price info services for traders and farmers	2	8.33
Invest in farm production	1	4.17
Establish more collectives/ farmer groups	1	4.17
Better security at markets	1	4.17

Reduce roadblocks and bribes	1	4.17
Improved public storage facilities	1	4.17
Encourage new traders	0	0.0
Better security on roads	0	0.0
Reduce taxes on fuel	0	0.0
Lower taxes	0	0.0
More government purchases	0	0.0
Peace-building	0	0.0
Market training for traders	0	0.0
Better contract enforcement in courts	0	0.0
More credit for traders	0	0.0
Other (specify here ...	0	0.0

As shown in Table 109, commodity sales through competitive tender is ranked as the preferred method of selling, followed by sales to other farmer groups or agro-enterprises, sales on future contracts, sales through a warehouse receipts system and finally sales to traders on the spot or in the open market.

Table 109: Ranking of Preferred Method of Selling (1 = most; 5 = least)

	Ranking of options (%)				
	1	2	3	4	5
Sales through competitive tender	50.0	16.7	16.7	0.0	16.7
Sales through warehouse receipts system	33.3	0.0	16.7	33.3	16.7
Sales to traders on the spot or in the open market	33.3	50.0	16.7	0.0	0.0
Sales to other farmer groups or agro-enterprise	20.0	40.0	0.0	20.0	20.0
Sales on future contract	0.0	14.3	42.9	28.6	14.3

The main problems associated with increasing sales include: not producing enough surplus, poor road conditions, poor open market trading facilities, expensive transportation to the markets, unfavorable prices and farmers' lack of knowledge related to trading practices (Table 110).

Table 110: Marketing Constraints for Farmers Group

	Maize		Rice	
	#	%	#	%
Not enough surplus produced	3	30	2	33.33
Prices are not favourable	2	20	0	0
Poor roads	1	10	1	16.67
Poor open market trading facilities	1	10	0	0
Transport to market too expensive	1	10	0	0
Farmers lack knowledge of trading practices	0	0	1	16.67
Other, specify	2	20	2	33.33

When looking at constraints to increasing sales (Table 111), sales through a warehouse receipt system is preferred, followed by sales based on future contracts and to other farmer groups and agro enterprises.

Table 111: Constraints to Increased Sales

	%				
	Sale on Future Contract	Sales to other FGs or Agro Enter-prises	Sales through Competitive Tender	Sales through Warehouse Re-ceipts System	Sales to Traders on the Spot or in Open Market
High risk of being cheated	25	0	0	18.18	37.5
Quantities requested are too large	16.67	16.67	0	0	12.5
Can't meet bagging and stitching requirements for bulk deliveries	16.67	0	0	9.09	0
Prices offered are too low	8.33	25	7.14	0	0
Can't access or afford storage facilities for bulk consignments	8.33	16.67	0	18.18	0
Purchasing is at the wrong time of year	8.33	16.67	0	9.09	0
Payments are too late	8.33	0	0	27.27	0
They require too much paperwork	8.33	0	0	18.18	0
Bid bonds or performance penalties are too high	0	16.67	0	0	0
Can't access credit for bulk purchases	0	8.33	0	0	12.5
Lack of information about tenders (don't know when/where they come out)	0	0	57.14	0	0
Don't know/understand tender regulations and how to respond	0	0	28.57	0	0
Quality standards are too stringent	0	0	7.14	0	25
Don't know how to get shortlisted as a supplier	0	0	0	0	12.5

MAIZE AND RICE TRADERS / MAIZE AND RICE IN THE MARKET

The factors that are considered responsible for influencing the market prices of rice and maize (Table 112) are: transport (26 percent of traders interviewed), the seasonality (23 percent), and the presence of multiple buyers and middlemen at the market (23 percent).

Table 112: What Factors Influence the Price of Maize/Rice at the Local Market?

	#	%
Cost of transport	8	25.8
Seasonality e.g. rainy season, dry season	7	22.6
Access to multiple buyers/middlemen	7	22.6
Other, Specify	3	9.6
Form in which the rice/maize is sold e.g. processed vs. not processed	2	6.5
Access to current market information (e.g. price, quality, etc.)	2	6.5
Variety; some varieties cost more	1	3.2
Distance from the farm to the market place	1	3.2
Total	**31**	**100**

Current unit prices for most of the common processed products are listed in Table 113.

Table 113: Current Unit Price of Most Common Processed Products

Maize		Rice	
Processed product	Average Current price per unit	Processed product	Average Current price per unit
Flour	825 per KG	Rice	1425 per KG
Traditional Beer	200 per LTR		
Polished Maize	600 per KG		
Maize Husks	100 per KG		

KEY OBSERVATIONS

The baseline survey has revealed that the project assumptions were largely correct and that the activities planned are in line with the major needs of the targeted areas. The full potential of the maize and rice value chains is far from being fully tapped, and the survey results suggest which should be the main areas of intervention.

The demographic data collected show that a large majority of households solely rely on their farm's income, and they are usually unable to store it beyond the harvest season. The Progress out of Poverty Index (PPI) suggests that poverty is diffused in the targeted areas. The limited prevalence of kitchen gardens and the complete reliance on farmed crops also suggest a situation of food insecurity and malnutrition. Gender inequalities have emerged throughout the analysis, and show a context in which men are the final decision-makers, both at the household and farm levels. Women's trading capacity is limited, and despite being considered credit-worthier than their husbands, their access to credit is smaller. NAFAKA's focus on women and youth are appropriate and highly needed because without their involvement, durable improvements will not be achievable.

Households have reported that the primary crops they are interested in are maize and rice, indicating that NAFAKA has focused on the right commodity value chains and those with the highest demand. Result show that these value chains can be improved in several stages to make the crop production more efficient and improve the smallholder farmers' competitiveness in the market.

Most stakeholders see smallholder farmers as a risky business partners. They are considered unreliable, difficult to reach, unable to repay loans and ill-equipped to understand the importance of investing in quality inputs (or at least unable to pay for them). They are poorly organized: existing farmers' groups have limited outreach and poor coordination and management capacity. Farmer groups are deterred from selling on contract because of both their difficulty in meeting required quantities and their lack of contractual power in setting the price. They recognize their difficulties in improving their efficiency and their poor skills.

Lack of quality inputs and limited mechanization emerged as a major cause of low production. One of the objectives of the NAFAKA program is to introduce and encourage the use of new technology and improved inputs for increasing productivity. One way to do this is through the use of new, improved or hybrid seeds. Currently, there are few plots that take advantage of this type of seed. The vast majority, especially maize fields, uses local seeds that have been saved from the previous crop. Pesticides, herbicides and fertilizers are inputs that can greatly increase production. However, a low percentage of households use these inputs, especially for maize, showing a large margin for improvement and a great need for the NAFAKA activities in this field.

New techniques like intercropping multiple non-competing crops within the same area can drastically increase production and profitability levels. Currently, only about half of maize plots in this study used this technique, and far fewer rice plots at less than five percent.

Trainings in the targeted area are limited. This indicates that there is indeed a role for the NAFAKA extension activities and verifies that such activities will not be overlapping with those of another organization. Households confirmed that irrigation, conservation agriculture, soil fertility management, green manure, pest management and soil conservation for maize and rice are the topics with the highest demand for training services, suggesting that NAFAKA extension services will be well-received by the communities. However, farmers do not seem to be accustomed to receiving new knowledge about their farming practices via radio and

SMS, which NAFAKA is planning to use as the main channels for its training. The extension services can still be successful, but initial barriers and resistance should be considered and carefully planned for. The current most common ways that households gain knowledge is through friends, relatives and other farmers, suggesting a strong possibility that 'train the trainer' type programs may be successful.

The findings on access to credit also support the need for interventions in expanding financial services, as planned in NAFAKA. Close to 20 percent of households interviewed reported having no access to any source of credit – whether informal, semi-formal or formal. Roughly one-third said they had access to only one or two different sources, usually friends/neighbors and family members. Semi-formal and formal institutions were listed less frequently less than half of households reporting access to Microcredit institutions and less than one fifth reporting a bank as a potential credit source. Farmers' high default rates, often due to a lack of steady production, limits their access. One of the input suppliers' main hesitations for providing credit, according to interviews with them, is that farmers are not reliable with repayment. This could explain why only about one-fifth of households believe that input suppliers are a potential source of credit. This highlights the need for small-scale farmers to have affordable financing for agri-business activities. Smallholders also need support in accessing existing services, through capacity building in developing business proposals, conducting feasibility studies and providing guarantees on loans.

CHALLENGES

Sampling was challenging, due to difficulties in obtaining census data from the National Bureau of Statistics. Once the data was obtained, problems arose with the districts' definitions, as the latest census was carried out in 2002 and numerous changes in demographics (much higher density) has occurred since then. When undertaking the impact survey, we recommend that the 2012 census data needs to be obtained at least 3 months before the survey is expected to start. Given the lag time in sourcing data from the National Bureau of Statistics, we advice making the request for census data one year in advance.

The survey started slowly in Mvomero District with all the five teams deployed together, but it picked up later in the rest of the districts. It was very useful to start in one district and then to disperse to the other districts, as the experience in Mvomero prepared the enumerators for the other districts. In most enumeration areas, respondents were cooperative. However, in the FGD survey, farmer groups were not easily available and when found they were either female or mixed farmer groups. Formal male farmer groups were difficult to find. When undertaking the impact survey, we recommend having all enumerators start in one district, as this will allow supervisors to re-train and correct problems. With respect to FGD; it would be prudent to have one person assigned to identify and set up meeting times for all FGD.

Other challenges included the land use conflict in Kiteto District, which to a certain extent affected the survey in terms of slightly higher refusals and absenteeism. More support was also requested from the officials at various administrative levels. Other challenges included roadblocks in Kilombero district due to road construction requiring the team to look for and use longer routes. Rainfall towards the middle and end of the survey made local roads difficult, and in one case in Kongwa, a bridge to a village was not accessible due to floods. This forced the team to enumerate another village and go back after the rains subsided. For the impact survey, we recommend hiring on logistics officer. Planning the logistics and developing the logstics/survey plan should be finalized at least one month before fielding the survey team.

It is important to highlight the fact that the capacity of locally hired enumerators is limited; this resulted in excessive quality control issues and the need to conduct call backs. This can be solved through enhanced training; however, we feel strongly that follow-on surveys will require the following to ensure quality data: (1) One international Survey Expert; (2) One International Survey Manager; (3) One International Survey Quality Control Specialist; and (4) One trained National Quality Control specialist on each enumeration team.

Data entry is another area of concern. We had intended to conduct data entry in Tanzania with Tanzanian data entry operators; however, after conducting interviews and skill tests, we decided it was too risky and so conducted data entry at our offices in Nairobi. For the impact survey, it would be prudent to consider outsourcing data entry to a qualified data entry company in the region. The use of computer based data capture should be considered; however, given the low skill levels of enumerators, this could bring an added set of problems.

CONCLUSIONS

Conclusions from baseline data will be developed through monitoring data collection and through a project end-line or impact survey. The results of the NAFAKA baseline survey provide data and information necessary to better manage project implementation and results through the project monitoring and evaluation system. The data form the baseline for all results indicators and will be used for target setting for the indicators. Monitoring forms have been developed to allow project staff to conduct regular monitoring and then compare monitoring data to the baseline statistics.

ANNEXES

The following are attached as Annexes to this report.

NAFAKA Results Model & Logical Framework

Grameen Foundation, Progress out of Poverty (PPI) Tool

Description of Sampling Procedures

Survey Instruments

Survey Training Manual

District Maps

U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
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