



CLIMATE
CHANGE
AGRICULTURE AND
FOOD SECURITY

**CGIAR Research Program on
Climate Change, Agriculture and Food Security (CCAFS)**

Summary of Baseline Household Survey Results: Lower Nyando, Kenya

September 2011

**Joash Mango, Azinapher Mideva, William Osanya and Amos
Odhiambo**



Correct citation:

Joash Mango, Azinapher Mideva, William Osanya and Amos Odhiambo. 2011. Summary of Baseline Household Survey Results: Lower Nyando, Kenya. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. Available online at: www.ccafs.cgiar.org.

Published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

CCAFS Coordinating Unit - Department of Agriculture and Ecology, Faculty of Life Sciences, University of Copenhagen, Rolighedsvej 21, DK-1958 Frederiksberg C, Denmark. Tel: +45 35331046; Email: ccaafs@life.ku.dk

Creative Commons License



This Report is licensed under a Creative Commons Attribution – NonCommercial–NoDerivs 3.0 Unported License.

This publication may be freely quoted and reproduced provided the source is acknowledged. No use of this publication may be made for resale or other commercial purposes.

© 2011 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

DISCLAIMER:

This report has been prepared as an output for Theme 4/baseline under the CCAFS program and has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies or opinions of CCAFS.

All images remain the sole property of their source and may not be used for any purpose without written permission of the source.

Abstract

CCAFS carried out household baseline surveys in all its benchmark sites in 2010/2011. This report presents a summary of the main results of the analysis of the survey carried out in late 2010/early 2011 in 7 villages, with 139 households, in the Katuk-Odeyo CCAFS benchmark site, located in the Lower Nyando river basin, western Kenya. The survey was carried out using the standardised CCAFS household baseline tool.

The results show that the vast majority of surveyed households in Lower Nyando produce food crops and rely on livestock production for their livelihoods. Most of the crop production is consumed by the family members themselves, as few households sell their agricultural produce. Households that do sell produce usually sell vegetables and/or small livestock and animal produce. On-farm consumption is supplemented with off-farm produce as well, as the majority of households consume fruits and fish which are being harvested off-farm. Generally, maize, sorghum and beans have been cited as the three most important crops in this area, and fertilizer is not commonly used. Only one percent of households are food secure throughout the year; 81% experience difficulties in feeding their families from any source for one to two months each year. A further 17% are food insecure for three to four months annually. Households have been adapting and making changes in their farming practices over the last ten years, with the majority of households stating they had made changes to at least three of their crops, but fewer have made livestock-related management changes. Climate- and market-related reasons are behind these changes, as well as factors relating to land and labour issues.

The radio is the most common source of weather and climate-related information. Surprisingly, women tend to receive more weather-related information than men. With the exception of short-term weather forecasts, most of the information received by these households also included some advice on how to use the information. The aspects of farming that were most commonly changed upon receiving information on short-term weather forecasts, pest and disease outbreaks, or extreme events included changes in livestock (types, breeds), crops (types and varieties) and feed and land management, and in the case of extreme events forecasts, soil and water conservation measures. In response to receiving longer-term weather forecasts, households have been making land management changes, changes in the timing of planting and other activities, and changes in varieties and the types of crop planted.

Keywords

Kenya; baseline; survey; household; livelihoods, agricultural production

About the authors

Mr. Joash Mango, World Agroforestry Centre (ICRAF), P.O.BOX 2389-4010, Kisumu, Kenya

Mrs. Azinapher Mideva, World Agroforestry Centre (ICRAF), P.O.BOX 2389-4010, Kisumu, Kenya

Mr. William Osanya, PO Box 6, Ngiya, Kenya

Mr. Amos Odhiambo, Kasagam Primary School, 1136- 40100, Kisumu, Kenya

Table of Contents

| | |
|--|-----------|
| Abstract ----- | 2 |
| Keywords----- | 2 |
| About the authors ----- | 3 |
| Table of Contents ----- | 4 |
| 1.0 Introduction ----- | 6 |
| 1.1 Household Types and Respondents----- | 7 |
| 2.0 Household Demographics ----- | 7 |
| 2.1 Education Levels----- | 8 |
| 3.0 Sources of Livelihoods ----- | 8 |
| 3.1 On-Farm Livelihood Sources----- | 8 |
| 3.2 Off-Farm Livelihood Sources----- | 10 |
| 3.3 Diversification Indices----- | 10 |
| 3.4 Who Does Most of the Work for On- and Off-Farm Products?----- | 11 |
| 3.5 Sources of cash income----- | 12 |
| 3.6 Discussion----- | 13 |
| 4.0 Crop, Farm Animals/Fish, Tree and Soil, Land Water Management Changes ----- | 13 |
| 4.1 Crop-Related Changes----- | 13 |
| Adopters of new crops/varieties----- | 13 |
| Cropping related changes----- | 14 |
| Water management related changes----- | 14 |
| Soil management related changes----- | 14 |
| Tree/agroforestry management related changes----- | 15 |
| Other changes----- | 15 |
| 4.2 Reasons for Crop-Related Changes----- | 15 |
| Climate-related reasons----- | 15 |
| 4.3 Livestock-Related Changes----- | 16 |
| Adopters of new animal types/breeds----- | 16 |
| Herd related changes----- | 16 |
| Animal management related changes----- | 16 |
| Feed related changes----- | 16 |
| Reasons for changes to livestock rearing practices----- | 16 |
| 4.4 Adaptability/Innovation Index----- | 17 |
| 4.5 Mitigation Indices----- | 17 |
| 4.6 Discussion----- | 18 |
| 5.0 Food Security ----- | 19 |
| 5.1 Food Security Index----- | 20 |
| 5.2 Discussion----- | 20 |
| 6.0 Land and Water ----- | 20 |
| 6.1 Water for Agriculture----- | 20 |
| 6.2 Land Use----- | 21 |

| | |
|---|-----------|
| Communal land----- | 21 |
| Hired machinery or labour----- | 21 |
| 6.3 Discussion----- | 21 |
| 7.0 Inputs and Credit----- | 22 |
| 7.1 Fertilizer Use----- | 22 |
| 7.2 Discussion----- | 22 |
| 8.0 Climate & Weather Information----- | 23 |
| 8.1 Who Is Receiving Information?----- | 23 |
| 8.2 Types of weather-related information----- | 23 |
| Forecast of extreme events----- | 23 |
| Forecast of pest or disease outbreak----- | 24 |
| Forecast of the start of the rains----- | 25 |
| Weather forecast for the next 2-3 months----- | 25 |
| Forecast for next 2-3 days----- | 26 |
| 8.3 Discussion----- | 26 |
| 9.0 Community Groups----- | 27 |
| 9.1 Climate Related Crises----- | 27 |
| 10.0 Assets----- | 27 |
| 10.1 Asset Indicator----- | 27 |
| 10.2 Discussion----- | 29 |
| Appendix 1: Survey Process and Implementation----- | 30 |
| Appendix 2: Sampling Frame – List of Villages----- | 32 |

1.0 Introduction

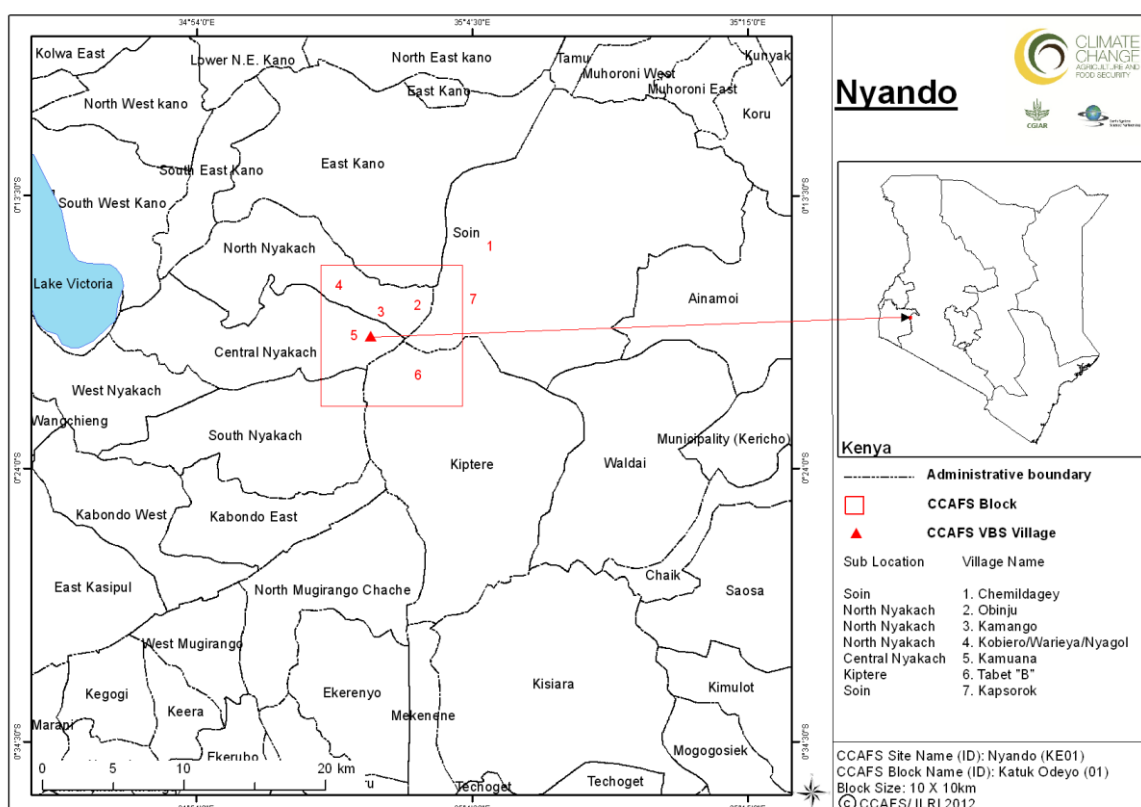
This report presents the results of an analysis of the CCAFS baseline household survey carried out in late 2010/early 2011 in 7 villages, with 139 households, in the Katuk-Odeyo CCAFS benchmark site, located in the Lower Nyando river basin, western Kenya. The Lower Nyando site, not far from Kisumu, is located in the same area as an earlier ICRAF project called Western Kenya Integrated Ecosystem Management Project (WKIEMP) selected due to the high erosion and depletion of natural resources in the area.

The survey team, entire survey process, and some of the challenges encountered are described in [Appendix 1](#). The questionnaire and training materials associated with it, including data entry and management guidelines can be found at www.ccafs.cgiar.org. The code sheet for this particular site is also found at www.ccafs.cgiar.org, and the list of villages surveyed is found in [Appendix 2](#). The list of households is not shared here due to privacy reasons.

The data entry clerks encountered several challenges; wrong or inapplicable codes, particularly when -8 (Not Applicable) was entered in inappropriate areas, triggered error messages thus leading to forced entries. This led to more time being used to manually move the cursor to the next spaces for data entry. The entry and data process took longer than anticipated and the team learned to check for errors after a few questionnaires were entered. CSPro proved effective in cleaning and correcting wrongly entered data and codes.

Figure 1 shows the location of the Katuk-Odeyo site in the Lower Nyando river basin in western Kenya. The red numbers show the villages with sampled households. We now turn to a summary of the main findings of the analysis of the survey data, reported on according to each section of the questionnaire.

Figure 1. Katuk-Odeyo research site map and location of sampled households



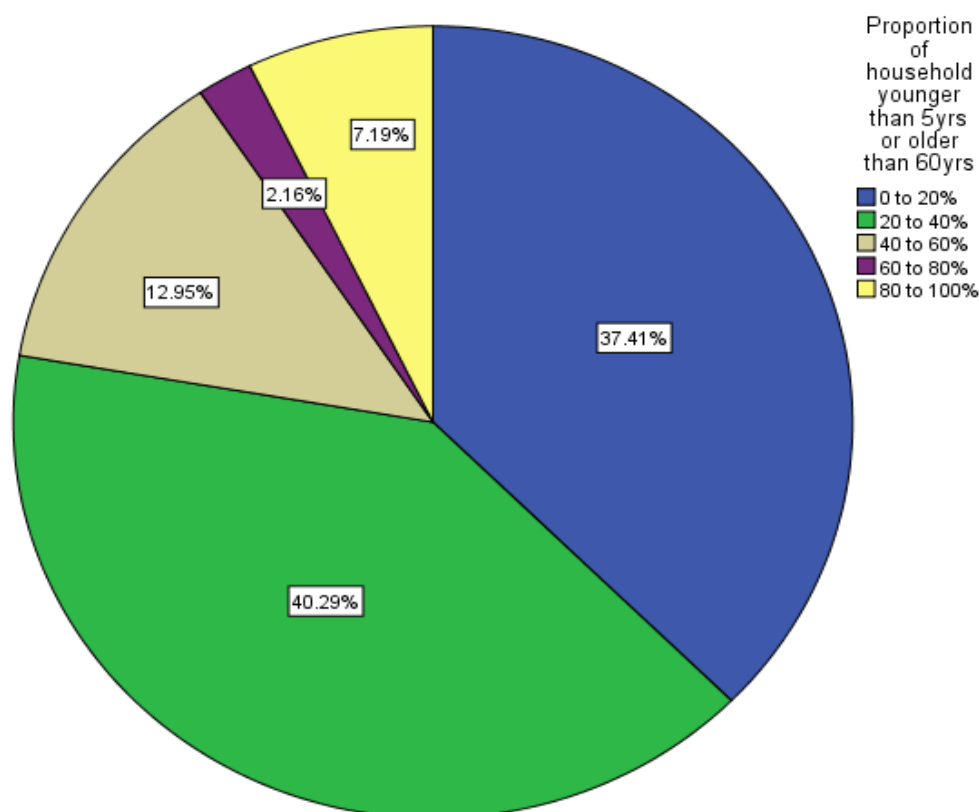
1.1 Household Types and Respondents

63% of the surveyed households were male-headed and 36% were female-headed. Similarly, 69% of respondents were female and 31% were male. In this area women are responsible for the chores done around the homestead and many men have casual employment outside of the village, thus the enumerators were more likely to find and interview women. For many of the women interviewed, their husbands had passed on. With respect to ethnicity, 43% of respondents were Kalenjin and 57% Luo.

2.0 Household Demographics

Median household size is 5 people. Figure 2.1 below shows the percentage of non-working age household members (those younger than 5 years or older than 60 years of age) within the surveyed households. We see that there are 10 households (7.2%) with more than 80% of household members aged <5yrs or >60yrs, i.e. these households have very few people of working age. The majority (78%) of households have more workers than non-workers in the household, as seen in the green and the blue sections below.

Figure 2.1 Proportion of the household that is of non-working age



2.1 Education Levels

Table 2.1 shows that in 42% of households there was someone who had obtained a secondary education or beyond, and only 3% of households had no-one with some formal education.

Table 2.1 Levels of education

| Highest level of education of any resident household member | Number of households | % of households |
|---|----------------------|-----------------|
| No formal education | 4 | 3 |
| Primary | 77 | 55 |
| Secondary | 49 | 35 |
| Post-secondary | 9 | 7 |
| Total | 139 | 100 |

3.0 Sources of Livelihoods

3.1 On-Farm Livelihood Sources

Table 3.1 and Figure 3.1 show the diversity in production, consumption and selling of different types of agricultural products. 90% of households are producing food crops, while only 16% produce some type of cash crop (coffee, tea, sisal, etc.). One-quarter of households are producing fruit, and almost three-quarters produce vegetables on their farms. Livestock production is very important in this area, with 88% of households raising small livestock (sheep, goats, chickens), and 74% raising large livestock (cattle). Three-quarters of these households produce some livestock products, such as eggs or milk.

One-quarter of households produce timber on their land, and 84% produce fuel wood. Manure and charcoal production is also important for these households (with 41% and 23% of households producing these items).

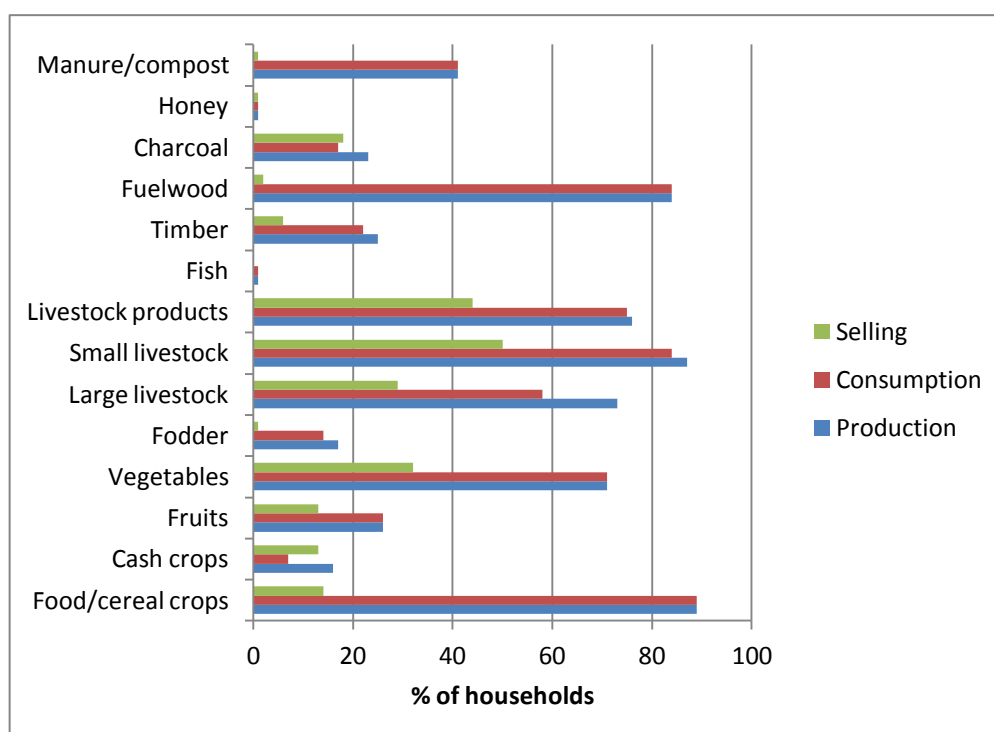
With respect to the diversity in consumption of different products, roughly 90% of households consume the food crops they produce on their own farms, and 70% consume the vegetables they produce. Livestock products are also important in their diets, obviously, with three-quarters of households consuming livestock products they have produced and 84% consuming chickens, sheep or goats they have raised.

Table 3.1 also shows much selling of the products these households are producing is occurring. The most important product consistently sold is small livestock, with one-half of surveyed households reporting selling small livestock, and slightly less selling milk or eggs. Vegetables are also frequently sold, by 32% of households. Fruit and cash crops are only sold by 13% of households, but 18% sell some charcoal produced on their own farms.

Table 3.1 Percentage of households producing, consuming and selling various agricultural products from their own farm

| Product | Percent of households producing | Percent of households consuming | Percent of households selling |
|--------------------|---------------------------------|---------------------------------|-------------------------------|
| Food/cereal crops | 90 | 89 | 14 |
| Cash crops | 16 | 7 | 13 |
| Fruits | 26 | 26 | 13 |
| Vegetables | 71 | 71 | 32 |
| Fodder | 17 | 14 | 1 |
| Large livestock | 74 | 58 | 29 |
| Small livestock | 88 | 84 | 50 |
| Livestock products | 77 | 75 | 44 |
| Fish | 1 | 1 | 0 |
| Timber | 25 | 22 | 6 |
| Fuelwood | 84 | 84 | 2 |
| Charcoal | 23 | 17 | 18 |
| Honey | 1 | 1 | 1 |
| Manure/compost | 41 | 41 | 1 |

Figure 3.1 Own-farm diversity in products produced, consumed and sold



3.2 Off-Farm Livelihood Sources

Table 3.2 shows that 78% of households are obtaining and consuming some food crops from off-farm sources (e.g. forest, communal lands). Fruit and fish are also important sources of food, with 78% and 71% of households consuming these products coming from other sources/areas than their own farms. Fuel wood and charcoal are also gathered from off-farm and used by 69% and 38% of households, respectively.

Table 3.2 also shows the importance of sources of livelihoods in terms of products collected off-farm and sold. Only 6% of households are selling food gathered/harvested off-farm, while 7% report selling charcoal and 4% fuel wood. 84% of households said they were not selling any products they obtained off-farm.

Table 3.2 Agricultural products coming from off-farm sources/areas and consumed by households

| Product coming from off-farm sources | Percent of households consuming | Percent of households selling |
|--------------------------------------|---------------------------------|-------------------------------|
| Food crops | 78 | 6 |
| Fruits | 78 | 2 |
| Fodder | 15 | 1 |
| Fish | 71 | 1 |
| Timber | 17 | 0 |
| Fuel wood | 69 | 4 |
| Charcoal | 38 | 7 |
| Honey | 15 | 1 |
| Manure | 7 | 0 |
| Other | 2 | 1 |

3.3 Diversification Indices

A production diversification index was created by adding up the total number of agricultural products produced on-farm:

- 1=1-4 products (low production diversification)
- 2=5-8 products (intermediate production diversification)
- 3=more than 8 products (high production diversification)

On the selling/commercialization side, the total numbers of agricultural products produced on their own farms, with some of the products sold were added up:

- 0=no products sold (no commercialization)
- 1=1-2 products sold (low commercialization)
- 2=3-5 products sold (intermediate commercialization)
- 3=more than 5 products sold (high commercialization)

The results of these diversification indices for our surveyed households in Lower Nyando are shown in Table 3.3. Half of the households surveyed have an intermediate production diversification index, while one-third of households have a high production diversification index. With respect to

commercialization, only a small number of households (9%) have a high commercialization index, while 26% show no evidence of commercialisation, selling none of their agricultural produce.

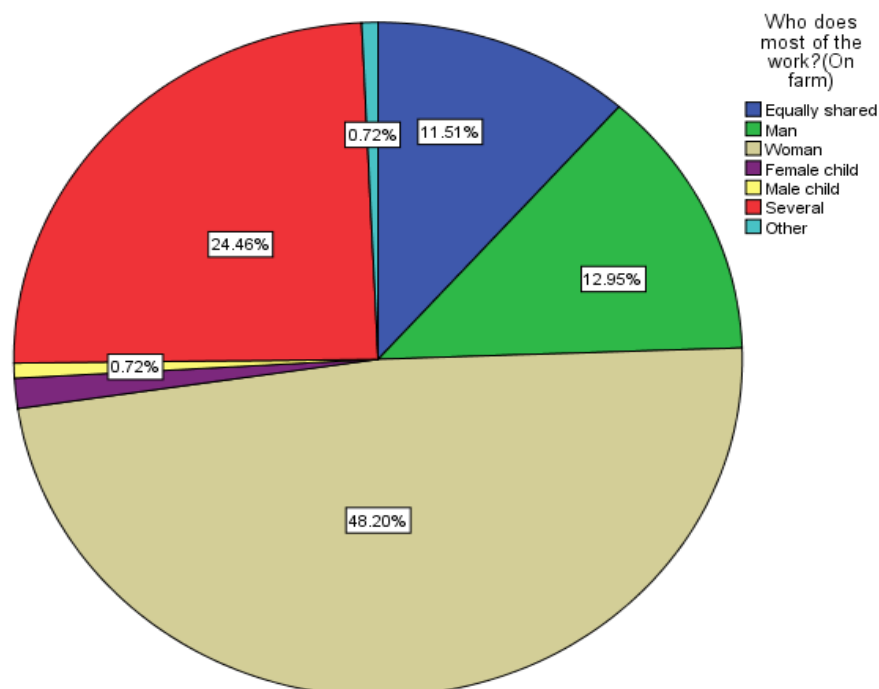
Table 3.3 Production and commercialization diversification indices

| Production Diversification: | % of households |
|--|------------------------|
| 1-4 products (low production diversification) | 16 |
| 5-8 products (intermediate production diversification) | 51 |
| 9 or more products (high production diversification) | 33 |
| Selling/Commercialization Diversification: | |
| No products sold (no commercialization) | 26 |
| 1-2 products sold (low commercialization) | 32 |
| 3-5 products sold (intermediate commercialization) | 33 |
| 6 or more products sold (high commercialization) | 9 |

3.4 Who Does Most of the Work for On- and Off-Farm Products?

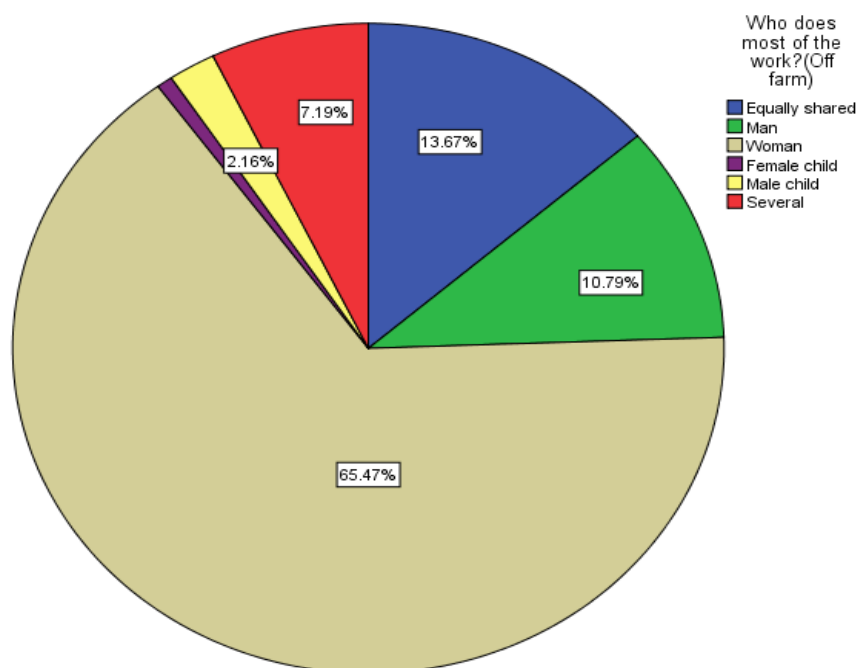
Figure 3.2 below shows that women bear the primary responsibility for agricultural-related on-farm work for half of the surveyed households. It also shows that girls bear more of the responsibility for this work than do boys. In terms of a break-down by task (data not shown), women have the greatest responsibilities with respect to livestock products and fuel wood. Children have the greatest responsibilities concerning care of large livestock.

Figure 3.2 Agricultural workload on-farm by gender/sex



With respect to the workload off-farm (Figure 3.3), the results show that 65% of this work is the primary responsibility of women, 11% by men, 2% by girls, 4% by boys, with the rest jointly or equally shared across household members.

Figure 3.3 Agricultural workload off-farm by gender/sex



3.5 Sources of cash income

Table 3.4 shows diversity of cash income sources from off-farm activities. Employment on other peoples' farms, remittances, and businesses are the most important sources of cash income (other than from their own farms), with 45% of these households reporting receiving cash income from each of these sources. Only 14% of households receive cash income from other types of employment. Very few reported receiving a loan from either a formal source (e.g. a bank), or an informal source (e.g. a group).

Table 3.4 Sources of cash income other than from own farm

| Source of Cash Income | % of households |
|---|-----------------|
| Employment on someone else's farm | 45 |
| Other off-farm employment | 14 |
| Business | 45 |
| Remittances/gifts | 45 |
| Payments for environmental services | 6 |
| Payments from government or other projects/programs | 5 |
| Loan or credit from a formal institution | 6 |
| Informal loan or credit | 4 |
| Renting out farm machinery | 7 |
| Renting out your own land | 7 |
| No off-farm cash source | 9 |

3.6 Discussion

Most of the households are working in sugarcane plantations in neighbouring communities within the Lower Nyando site. Some farmers in neighbouring communities have big parcels of land, where they are employing some household members to help during harvesting and planting season. The government also has a 'food for work' program in this area, aimed at the rehabilitation of degraded areas. Most households in this area are involved in small businesses, selling farm products such as maize and sweet potatoes. Some are selling vegetables, charcoal and/or household goods. Towards the eastern side of the site, a lot of households are generally more involved in commercially oriented agriculture, whereby much of their produce is sold in the market when prices are favourable.

4.0 Crop, Farm Animals/Fish, Tree and Soil, Land Water Management Changes

4.1 Crop-Related Changes

Households were asked what their 3 most important crops are (from an overall livelihoods perspective). In Lower Nyando 99% of the surveyed households cited maize as one of their most important crops, 73% cited sorghum and 35% cited beans. These were the 3 most popular crops in the area.

They were then asked about changes they had made to their farming system/practices over the last 10 years, and for which crops. Looking at the proportion of households who have made changes to one or more of their most important crops, we found that all households have made at least one change to at least one of their main crops. The results show us that on average, households made changes to 3 crops, and the majority of households (84%) had made changes to 3 or more crops in the last 10 years.

Adopters of new crops/varieties

We looked into more detail at changes households had made to farming practices. With respect to how many households in the last 10 years had introduced new crops or new varieties, we found that 37% of households had not introduced any new crops or varieties, 32% had introduced one or two new crops or varieties, and similarly, 32% of households had incorporated three or more new crops or varieties into their farming systems over the last decade.

Table 4.1 Adoption of new crops/varieties over the last 10 years

| Change in Practice | % of households |
|---|-----------------|
| No introduction of new crops or varieties | 37 |
| Have introduced 1 or 2 new crops and/or new varieties | 32 |
| Have introduced 3 or more new crops and/or varieties | 32 |

Cropping related changes

With respect to cropping-related changes, we examined whether households had made one or more of the following changes over the last 10 years:

- Introduced intercropping;
- Earlier land preparation;
- Earlier planting;
- Later planting;
- Expanded area;
- Reduced area;
- Started using pesticides/herbicides;
- Integrated pest management;
- Integrated crop management.

The results showed that 83% of households had made 3 or more of these cropping related changes in the last decade.

Water management related changes

For the water management-related changes, the following changes in practice were considered:

- Started irrigating;
- Introduced micro-catchments;
- Introduced improved irrigation;
- Introduced improved drainage.

Here, we found that 88% of households had made none of these water management-related changes.

Soil management related changes

For the soil management related changes, we considered the following behavioural changes:

- Stopped burning;
- Introduced crop cover;
- Introduced ridges or bunds;
- Introduced mulching;
- Introduced terraces;
- Introduced stone lines;
- Introduced contour ploughing;
- Introduced rotations;
- Started using or using more mineral/chemical fertiliser;
- Started using manure/compost.

The results show quite clearly that very few households have introduced soil management practices in Lower Nyando, with only 26% of households reporting having made two or more soil management related changes in the last 10 years.

Tree/agroforestry management related changes

The results show that 90% of households have made some tree/agroforestry management related changes in the last decade. Here we considered whether households have either planted or protected trees within the last year.

Other changes

We also looked at whether households have made any other changes to crops not specified in the questionnaire. Our findings show that no households reported making any additional changes.

4.2 Reasons for Crop-Related Changes

We looked into the reasons households had made the specified changes (Table 4.2). We grouped the reasons into the following areas: *Markets, Climate, Land, Labour, Pests & Diseases, and Projects* and first examined the percentage of household citing one or more of these categorized reasons. The results suggest that 80% of households have made changes to their farming practices due to climate reasons, but market-related reasons were even more prevalent, cited by 86% of households. Land and labour-related constraints/issues were also important drivers of change for these households, as was pest and disease incidence.

Table 4.2 Reasons for changing cropping practices, by category

| Reason for changing cropping practices, related to: | % of households citing |
|---|------------------------|
| Markets | 86 |
| Weather/climate | 80 |
| Land | 71 |
| Labour | 70 |
| Pests/diseases | 55 |
| Projects | 7 |

Climate-related reasons

We looked at the reasons related to climate that households were giving to explain their changes in farming practices (Table 4.3). The most common reason for change, given by 80% of the households who cited at least one weather-related reason, was due to a perceived earlier start of the rains. Next came less overall rainfall (75%) and more frequent droughts (70%).

Table 4.3 Weather/Climate-related reasons for changes in cropping practices

| Weather/Climate-related Reason | % of the households that cited at least one weather-related reason |
|--------------------------------|--|
| Earlier start of rains | 80 |
| Less overall rainfall | 75 |
| More frequent droughts | 70 |
| Later start of rains | 41 |
| More frequent floods | 38 |
| More overall rainfall | 28 |
| Higher temperatures | 17 |
| Strong winds | 2 |
| Lower groundwater table | 2 |

4.3 Livestock-Related Changes

The results show that 10 households do not have any livestock and a further 17 households only have one type of animal. Most though, 64% of households, have at least 3 types of animal.

With respect to changes over the last 10 years, we see that the majority of households (78%) have 2 or 3 animal types and either these are all the same as 10 years ago or they have only changed one type of animal. The results shows that almost 80% of households made changes with respect to their main farm animals. On average, the changes made affected 2 animal types and the highest number of animal types affected was 3. The types of animals affected include beef and dairy cattle, donkeys, goats, sheep and chicken.

Adopters of new animal types/breeds

The results suggest that over one-half of households have not introduced any new types of animal or new breeds, and only 7% have introduced 3 or more new types or new breeds.

Herd related changes

For herd related changes the following indicators were considered:

- Reduction in herd size;
- Increase in herd size;
- Change in herd composition.

108 households (78%) made 1 or 2 herd-related changes over the past 10 years.

Animal management related changes

For animal management related changes we consider the following changes:

- Stall keeping introduced;
- Fencing introduced;
- Cut and carry introduced.

98 households (over 70%) did not make any animal management related changes in the past decade.

Feed related changes

For feed related changes we consider the following:

- Growing fodder crops
- Improved pastures
- Fodder storage

78% of the surveyed households have made no feed-related changes in the last 10 years.

Reasons for changes to livestock rearing practices

80% of households that have made changes mentioned market-related reasons behind those changes made in their livestock production systems, and a similar percentage made such changes because of pests & diseases. One-half of households that made changes cited climate-related reasons for making changes to their livestock production practices (Table 4.4).

Table 4.4 Reasons for changing livestock practices, by category

| Reason for changing livestock practices, related to: | % of households citing |
|--|------------------------|
| Markets | 80 |
| Weather/climate | 50 |
| Labour | 19 |
| Pests/diseases | 78 |
| Projects | 30 |

Over 70% of households who mentioned climate reasons related to their changes in livestock practices gave the reason of “*More frequent droughts*”, although 27% cited “*More frequent floods*” as the reason driving livestock system-related changes.

For those who cited market-related reasons related to changes in livestock practices, 90% stated that the change was due to higher productivity (e.g. of the new breeds adopted). Two-thirds of these adapting households said they did so because they would receive a better market price.

4.4 Adaptability/Innovation Index

An adaptability/innovation index was defined as the following:

0-1=zero or one change made in farming practices over last 10 years (low level)

1=2-10 changes made in farming practices (intermediate level)

2=11 or more changes made in farming practices (high level)

We see in Table 4.5 that no households made zero or only one change in what and how they farm over the last 10 years, 39% of households made between 2 and 10 changes, and 61% made 11 or more changes. Further analysis, particularly of these more adaptive households, is needed to better understand exactly what adaptations they have made and why.

Table 4.5 Adaptability/Innovation index

| Number of changes made in farming practices in last 10 years: | % of households citing |
|---|------------------------|
| Zero or One (low) | 0 |
| 2-10 changes (intermediate) | 39 |
| 11 or more changes (high) | 61 |

4.5 Mitigation Indices

Several climate mitigation-related behavioural changes were used to create the following indices:

Tree management:

This index shows whether a household has either protected or planted trees within the last year.

Soil amendments:

This index shows if the household has used fertilizer in the last year, or have started using fertilizer or manure on at least one crop.

Input intensification

There are 7 'changes in agricultural practices/behaviour over the last 10 years' considered here to create an index with 3 levels - no intensification (none of the following), low intensification (1-3 of the following), and high intensification (4-7 of the following). They are:

- Purchased fertilizer
- Started to irrigate
- Started using manure/compost
- Started using mineral/chemical fertilizers
- Started using pesticides/herbicides
- Started using integrated pest management techniques
- Planted higher yielding varieties

Productivity Index

This index shows if a household has reported achieving a better yield from any crop, or that their land is more productive for any crop over the last 10 years – such households are classified as showing an "increase in productivity".

Table 4.6 shows the results for the mitigation-related indices for the surveyed households in Lower Nyando. 91% of households reported some tree management activities over the last year, but only 42% undertook soil amendment (e.g. fertilization) actions. Most (86%) households had experienced increases in agricultural productivity. 14% have not increased their input use, roughly two-thirds have intensified their input use at a low level, and 17% at a higher level.

Table 4.6 Mitigation-related indices

| Index | No (% of hh's) | Yes (% of hh's) |
|--------------------------|----------------|-------------------|
| Tree management | 9 | 91 |
| Soil amendments | 58 | 42 |
| Increase in productivity | 14 | 86 |
| Input intensification | 14 | Low-69 High-17 |

4.6 Discussion

Tree planting in this area is widespread, even on the poorest farms, because there have been tree planting projects in some parts of Lower Nyando. There has also been some spill-over to neighbouring communities, leading to adoption of tree planting practices. However, this has only occurred in the last 5 years in this area. There is a general lack of knowledge or projects in this area dealing with soil and water management changes, hence there is a need to train households in such techniques and about their importance and potential benefits. This area also falls into two different agro-ecological zones, with the eastern part of the block receiving more rainfall - it falls within a tea growing area - while the central and western parts of the site are semi- arid.

5.0 Food Security

The monthly source of food for the family was queried, i.e. whether it came mainly from their own farm, or elsewhere for each month (in an average year). Households were also asked during which months of the year they struggled to have enough food to feed their family, from any source.

Figures 5.1 and 5.2 indicate that many households suffer a shortage in the period March to May which corresponds to the time when there is less food available from on-farm sources. January, February and June are also food insecure months for up to 15% of households.

Figure 5.1 Main source of food for the household

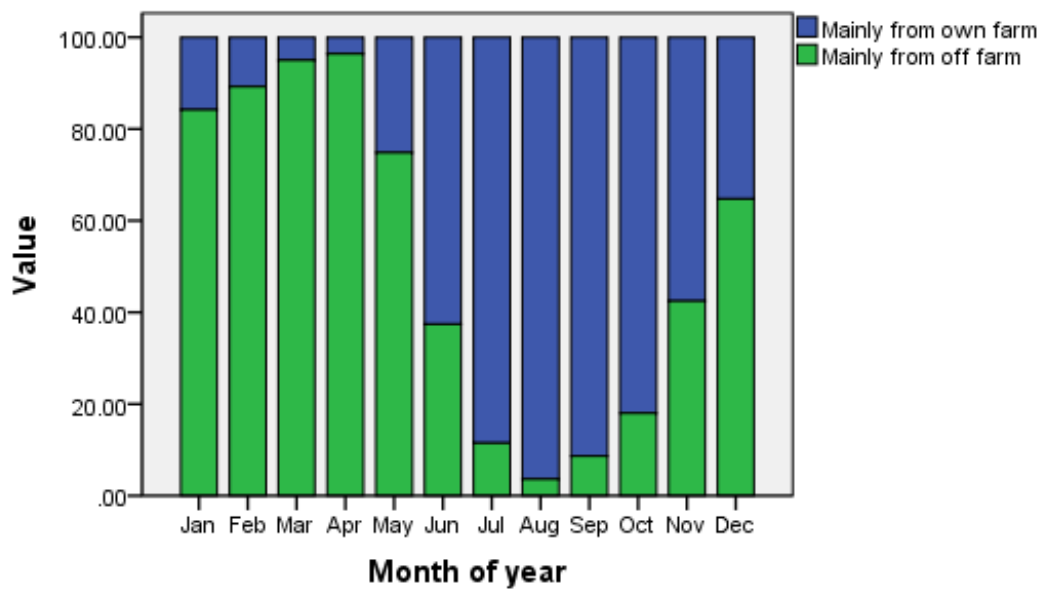
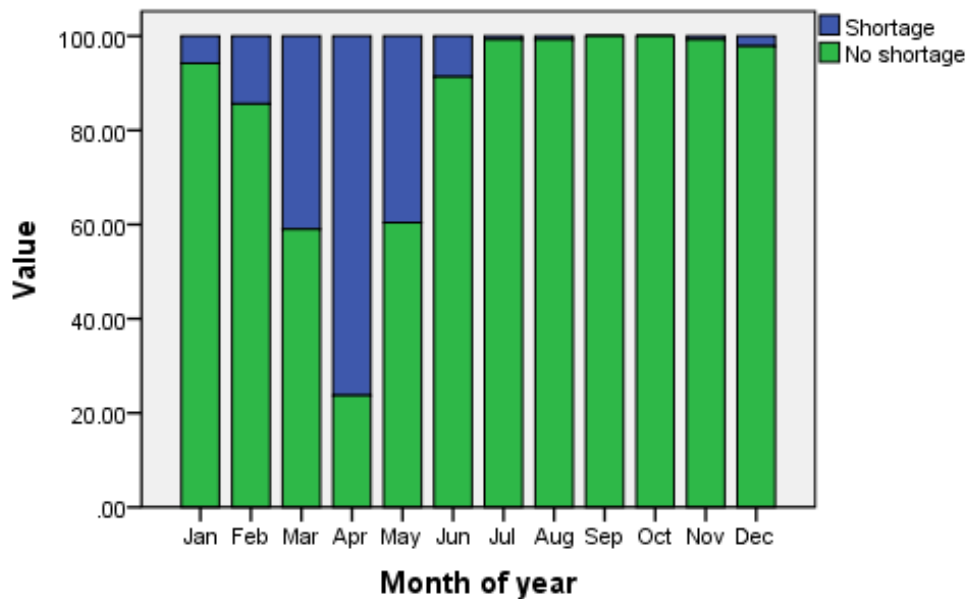


Figure 5.2 Hunger/Food shortage months



5.1 Food Security Index

The food security index we created is based upon the number of months that the household has difficulty getting food from any source (i.e. from their own farm or off-farm, from stores, gifts, purchases or transfers).

For our surveyed households in Lower Nyando, only 1% are ‘food secure’ all year long. 81% have enough food for their families for at least 10 months of the year, and 17% of these households struggle to get enough food to feed their family for more than 2 months out of a year (Table 5.1).

Table 5.1 Food Security Index

| Percent of surveyed households reporting: | | | | |
|---|--------------------|--------------------|--------------------|--------------------------------------|
| More than 6 hunger months/year | 5-6 hunger months/ | 3-4 hunger months/ | 1-2 hunger months/ | Food all year round/No hungry period |
| 0 | 0 | 17 | 81 | 1 |

5.2 Discussion

Only two households were completely ‘food secure’, i.e. with no shortage of food throughout the year. The majority (70%+) are having to find food from off-farm sources for the 6-month period from December through May. This area experiences both extremely erratic rainfall and frequent droughts, with only one fairly reliable cropping season (i.e. during the long rains, as the short rains are not sufficient to support crops in this particular area).

Accessing food through markets during periods of food scarcity from their own farms is a problem in this site, as most of the roads are not accessible. This increases the amount of time and effort it takes for households that have some surplus to deliver farm products to local markets and towns, and can prevent them from doing so. Thus many rely on alternative coping mechanisms, such as food rationing (reducing to one meal per day), or relying on government donations during occasional times of food scarcity.

6.0 Land and Water

6.1 Water for Agriculture

For the on-farm water sources (used for agricultural purposes, not for household use), Table 6.1 shows the number and percentage of households using each water source. It also shows that 59% of households have none of the agricultural water sources we asked about on their own farms.

Table 6.1 Water sources for agriculture on-farm

| On-farm agricultural water source | % of households |
|-----------------------------------|-----------------|
| Irrigation | 17 |
| Tanks for water harvesting | 11 |
| Dams or waterholes | 22 |
| Boreholes | 3 |
| Water pumps | 1 |
| None of the above | 59 |

In examining how this varies by household type (table not shown), the results showed that 62% of male-headed households and 54% of female-headed households have none of the water sources mentioned, so no large gender difference is evident in on-farm access to water for agricultural purposes.

6.2 Land Use

The land available for each household includes both land that is owned by the household and land that is rented. Table 6.2 shows that 36% of households have less than one hectare of land, and 58% of households have access to between 1 and 5 hectares of land. Only 6% of households have more than 5 hectares.

Table 6.2 Total land size accessed by households

| Number of hectares of land owned and rented in | % of households |
|---|------------------------|
| Less than one hectare | 36 |
| 1-5 hectares | 58 |
| Over 5 hectares | 6 |

Communal land

For our surveyed households, 92% said that they do not use communal land.

Hired machinery or labour

The results show that 60% of households sometimes hire farm labour and half hire animal drawn ploughs. Very few households hire tractors.

By household type, half of all households sometimes hire animal drawn ploughs, regardless of whether they are male- or female-headed, but a slightly higher proportion of male-headed households hire farm labour.

6.3 Discussion

In this area there are problems of access to land, labour and water. Land is scarce due to high population growth, resulting in very small parcels of land per household. In some areas, land has been severely degraded, due to gully formation and depleted soils. In some areas, this is due to the lack of proper land management practices by these households.

Community members typically only use resources that are easily accessible near their homesteads, which has led to over-use of natural resources, particularly soils and water. In most of this area, households have no access to tap water. In areas where there is access to tap water, it is regulated and households only receive it twice a week. There is also lack of sufficient farm labour, as most youths are engaged in charcoal making and sand harvesting in the gullies, as well as going to school. With the free primary education program, most children are now attending school, leaving the parents to carry out all the farm-related chores. And many of those parents are working on others' farms or plantations, so the time left for their own farms is limited.

7.0 Inputs and Credit

Table 7.1 shows that for our surveyed households, 64% bought seed in the last 12 months, 20% purchased fertilizer, 23% purchased pesticides, and 79% bought veterinary medicines. Only 2% of households received any loans/credit for agricultural activities.

Table 7.1 Purchased input use

| In the last year, did you use: | % of households |
|---|-----------------|
| Purchased Seeds | 64 |
| Purchased Fertilizers | 20 |
| Purchased Pesticides | 23 |
| Veterinary medicine | 79 |
| Received credit for agricultural activities | 2 |

7.1 Fertilizer Use

Table 7.2 shows the types of fertiliser households were using. As we saw above, only one-fifth of households in this area are applying any types of chemical fertilizers at all. For those that do, we see that the most common fertilizer applied is DAP. A very few households are using Rock Phosphate and Urea.

Table 7.2 Type of fertilizers used

| Fertilizer type | % of fertilizer-using households |
|-----------------|----------------------------------|
| Urea | 8 |
| DAP | 89 |
| CAN | 4 |
| Rock Phosphate | 15 |
| Local mixture | 4 |

Further analysis shows (table not shown) that for the households applying fertilizer, 87% apply it to maize, 26% apply it to sorghum and 61% apply it to beans, these being the 3 main crops in the area with respect to the number of households citing them among their most important crops.

At the household level 87% of households who use fertiliser apply it to their most important crop, 65% apply it to their second most important crop and 61% to their third most important crop.

7.2 Discussion

Farmers in this area purchase veterinary inputs as they value their livestock highly. They sell livestock, primarily small stock, when the household needs cash (e.g. for a health emergency). Most farmers have little or no knowledge about fertilizers. The other major issue is limited market access to farm inputs due to large distances to markets where they can purchase these agricultural inputs.

There is no government agency or non-governmental organisation providing agricultural credit in this area. The low use of purchased inputs we have seen in this area suggests a need for awareness creation of the use of farm inputs.

8.0 Climate & Weather Information

An analysis of which households are receiving any type of climate- or weather-related information shows that almost all (96%) households are receiving some type of weather or climate-related information. We next looked at who is receiving what kinds of weather-related information within the households.

8.1 Who Is Receiving Information?

For roughly one-quarter of households accessing any of these different types of weather-related information, only men are receiving it (Table 8.1). For roughly one-third of households, both men and women access it, and for around 40% of these households, it is the women in the household that receive it.

Table 8.1 Gender breakdown of different kinds of weather-related information

| Type of weather-related information | Of those households accessing this type of information: | | |
|-------------------------------------|--|---|---|
| | % of households reporting women receiving this information | % of households reporting both women and men receive this information | % of households reporting only men receive this information |
| Extreme events | 44 | 35 | 22 |
| Pest or disease outbreak | 43 | 35 | 22 |
| Start of the rains | 42 | 31 | 27 |
| Weather for the next 2-3 months | 39 | 32 | 29 |
| Weather for the next 2-3 days | 49 | 19 | 31 |

8.2 Types of weather-related information

Next we examine the different types of weather-related information that households are using and who is receiving it and if is being used (and for what).

Forecast of extreme events

Nearly 83% of households received information about extreme events (e.g. droughts, floods). The most frequent response regarding source of information about extreme events was the radio (Table 8.2; multiple responses possible). The second and third most frequently cited sources of information on extreme events were via friends, neighbours or relatives, and through their own observations.

Table 8.2 Sources of information about extreme events

| Source of information on extreme events | Number of responses | Percent of households |
|---|---------------------|-----------------------|
| Radio | 106 | 92 |
| Television | 6 | 5 |
| Government agricultural or veterinary officer | 4 | 4 |
| NGO project officers | 1 | 1 |
| Friends, relatives or neighbours | 28 | 24 |
| Meteorological offices | 1 | 1 |
| Newspaper | 9 | 8 |
| Traditional forecaster/ indigenous knowledge | 4 | 4 |
| Own observations | 18 | 16 |
| Local group/ gatherings/meetings | 12 | 10 |
| Religious faith | 3 | 3 |

In 66% of these cases, extreme event forecasts included some advice on how to make use of the information, and of these households receiving advice, 89% were able to use it.

Of the households who received and made use of information regarding extreme events, the following agricultural management changes were made (tables not shown):

- feed management (54% of households),
- land management practices (40%),
- implementing soil and/or water conservation measures (18%),
- change in the timing of some of their farm activities (37%),
- switching crop varieties (31%), and
- switching crops (27%).

Forecast of pest or disease outbreak

70% of households reported receiving information about pest or disease outbreaks over the last year. Again the radio is the most common source of information reported, with 58% of households receiving this information in this manner. Other common sources for this type of information include government agricultural extension or veterinary officers, friends & neighbours, local groups and individual's own observations. Once again, twice as many women as men received the information. In 84% of cases, the information included advice and of those receiving information with advice, 93% of households were able to use the advice. How did they use this advice? Table 8.3 shows that with respect to those households that made use of this type of information, 65% switched the type of livestock they produced and 36% changed livestock breeds. 36% switched crops and 26% switched varieties when they received pest/disease outbreak forecasts (Table 8.4).

Table 8.3 Actions taken upon receipt of pest/disease outbreak forecasts

| Aspects of farming changed | Number of responses | % of households |
|----------------------------|---------------------|-----------------|
| Livestock type | 49 | 65 |
| Other | 33 | 43 |
| Livestock breed | 27 | 36 |
| Crop type | 27 | 36 |
| Crop variety | 20 | 26 |
| Change in input use | 4 | 5 |

Forecast of the start of the rains

87% of households received information on the start of the rains during the last year. The most frequent response regarding source of information about the likely start of the rains was once again the radio (89% of households, Table 8.4). Households rely quite heavily on their own observations for this information (38% of households), or as advised by friends, neighbours or relatives.

Table 8.4 Sources of information on the predicted timing of the start of the rains

| Source of information on start of the rains | Number of responses | Percent of households |
|---|---------------------|-----------------------|
| Radio | 108 | 89 |
| Television | 5 | 4 |
| Government agricultural or veterinary officer | 5 | 4 |
| NGO project officers | 1 | 1 |
| Friends, relatives or neighbours | 26 | 22 |
| Newspaper | 5 | 4 |
| Traditional forecaster/ indigenous knowledge | 9 | 7 |
| Own observations | 46 | 38 |
| Local group/ gatherings/meetings | 10 | 8 |
| Religious faith | 2 | 2 |

For those who received this type of information, 81% said it included advice and 93% of these households said were able to use the advice. Changes in practices associated with start of the rain forecasts were, in order of importance: changes to land management, changes to the timing of farm activities, changes in crop variety and soil and water conservation measures (Table not shown).

Weather forecast for the next 2-3 months

85% of households stated they received information regarding predicted weather patterns over the next 2-3 months. Regarding sources of information for this information, a similar pattern as seen for information on the start of the rains can be seen. 88% of respondents mentioned the radio as an important source of information for these 2-3 month weather forecasts. Households rely quite heavily on their own observations for this information (26% of households), or as advised by friends, neighbours or relatives (19% of households) (Table not shown).

In 67% of the cases, these 2-3 month weather forecasts included some advice, and 87% of households receiving advice said they were able to use it. Table 8.5 shows the aspects of farming that were changed the most frequently upon receiving this information. These were land management and the timing of farming activities, followed by switches in crop variety and crop type.

Table 8.5 Aspects of farming changed with 2-3 month forecast information

| Aspects of farming changed with 2-3 month forecasts | Number of responses | % of households |
|--|----------------------------|------------------------|
| Land management | 40 | 59 |
| Timing of farming practices | 40 | 59 |
| Crop variety | 19 | 28 |
| Feed management | 16 | 24 |
| Crop type | 15 | 22 |

Forecast for next 2-3 days

83% of the surveyed households received short-term weather forecast information (usually today and tomorrow). 80% of respondents gave the radio as a source of information. 34% of respondents referred to relying on their own observations about the weather in the next few days. In only 17% of these cases was advice provided alongside the short-term weather forecast. Nonetheless, 84% of those receiving the advice were able to use it.

The most frequently cited agricultural management practices changed in response to short-term weather forecasts cited were land management changes (25%), changes in the timing of some farming activities (31%), and changes in water management practices (19%). However, 50% of respondents said they made no changes. (Tables not shown)

8.3 Discussion

It appears that, for all types of weather-related information, the radio appears to be the most common source of the information. Women tend to receive more weather-related information than men, which may reflect their higher day-to-day involvement on the farm, with many men leaving periodically for off-farm activities and employment. With the exception of the short term weather forecast, most of the information received included some advice on how to use the information.

The aspects of farming that were most commonly changed upon receiving information including short-term weather forecasts, pest and disease outbreaks, and extreme events included changes in livestock (types, breeds), crops (types and varieties) and feed and land management, and in the case of extreme events forecasts, soil and water conservation measures.

For longer-term weather forecasts, changes were made as to how the land was managed, the timing of planting and other activities, the varieties and the types of crop planted.

9.0 Community Groups

Group membership in general appears to be quite low for the Lower Nyando surveyed households – the only type of group with more than 9 members is the savings and credit group, with 33% of households belonging to this type of group (Table 9.1). Over 50% of households are reportedly not members of any group.

Table 9.1 Group membership

| Does someone in your household belong to the following groups? | % of households |
|--|-----------------|
| Tree nursery/tree planting | 5 |
| Water catchment/management | 1 |
| Soil improvement related | 2 |
| Crop improvement related | 1 |
| Irrigation | 2 |
| Savings/credit related | 33 |
| Agricultural product marketing | 1 |
| Agricultural productivity enhancement related | 7 |
| Seed production | 1 |
| Vegetable production | 6 |
| Other group not mentioned above? | 1 |
| No groups | 51 |

9.1 Climate Related Crises

We looked at whether households have faced a climate related crisis in the last 5 years and whether or not they received help. For those who received help we inquired as to the source of this help.

The results show that nearly 88% of Lower Nyando households faced a climate-related crisis in the last 5 years and only 39% of them received assistance. 63% of female-headed households received help compared to only 21% of male-headed ones. Most of this help came from government agencies, which provided assistance to 80% of both female- and male-headed households (tables not shown).

10.0 Assets

10.1 Asset Indicator

Households were asked about what assets they had, from a set list. The assets they were asked about include the following:

Energy: generator (electric or diesel), solar panel, biogas digester, battery (large, e.g. car battery for power);

Information: radio, television, cell phone, internet access, computer;

Production means: tractor, mechanical plough, thresher, mill;

Transport: bicycle, motorbike, car or truck;

Luxury items: fridge, air conditioning, fan, bank account, improved stove.

The total number of assets in all categories was added up and the following asset indicator created:

- 0=no assets (basic level)
- 1=1-3 assets (intermediate level)
- 2=4 or more assets (high level)

It is important to note that this indicator is not intended to include every possible type of asset, and that the checklist includes some indicators that we expect to see becoming more important in the future than they may be at present. It also does not include a critical asset for resource-poor households - livestock assets.

The results of the analysis for these Lower Nyando households show that 11% have none of the household assets we inquired about, 66% of the surveyed households have between 1 and 3 of these assets, and 23% own 4 or more of these assets (Table 10.1).

Table 10.1 Asset indicator

| Number of queried assets | % of households |
|--------------------------|-----------------|
| None (basic level) | 11 |
| 1-3 (intermediate level) | 66 |
| 4 or more | 23 |

Table 10.2 shows the percentage of households with various assets and access to utilities. None of the surveyed households have electricity and only 16% have running water in their homes. In relation to food security, only 12% have improved storage facilities for crops. Over one-third have separate housing for their livestock, however.

In looking more closely at the recent phenomena of cell phone ownership in rural Kenya, 60% of households reported owning one (Table 10.2). A gender-related breakdown of this figure revealed that 70% of male-headed households own a cell phone, while only 46% of female-headed households do.

Table 10.2 Asset ownership

| Asset/utilities | % of households |
|--|-----------------|
| Cellphone | 60 |
| Radio | 82 |
| Bank account | 4 |
| Improved housing (e.g. concrete, brick) | 6 |
| Improved roofing (e.g. tin, tile) | 73 |
| Electricity from grid | 0 |
| Running water | 16 |
| Improved stove | 47 |
| Improved storage facility for crops | 12 |
| Separate housing for farm animals | 37 |
| Household water storage tank (>500 litres) | 6 |
| Well/borehole | 3 |

10.2 Discussion

This wealth proxy indicator suggests these households are very poor. Eleven percent of these households don't have a radio, a cell phone, or a bicycle. To more comprehensively measure the wealth status of households in this area, the number of livestock should have also been included, but unfortunately that was beyond the scope of this particular survey. Farmers in this area use livestock as their bank, i.e. like a savings account.

Appendix 1: Survey Process and Implementation

The survey team was led by Joash Mango of ICRAF Kisumu and three experienced enumerators, Azinapher Mideva, William Osanya and Amos Odhiambo. All took part in a 5-day training that included a field test of the questionnaire, in September 2010. The questionnaire was translated into Kiswahili. In the field, the team worked closely with the respective village elders to identify the survey respondents, following the sampling frame as per the training they had undergone. Each enumerator was tasked to administer three questionnaires per day. The supervisor, Joash Mango, went through each questionnaire upon completion to check for errors, which were corrected immediately while the team was still in the village. At ICRAF, two computer experts, Brian Wamubeyi and Monica Otieno, both with previous data entry experience each entered the same questionnaire data (following the 'double entry' quality control protocols), using CS Pro, and the supervisor oversaw the corrections needed after the data from each questionnaire was checked for possible data entry mistakes or errors made by the enumerators when filling out the questionnaires.

Before the questionnaires were administered, a sensitization meeting was convened within each sublocation with all the village elders and the Assistant Chief. The survey objective of better understanding households' farming practices, how they have changed, and why particular practices have changed, was discussed at this time. A list was drawn up of all the villages identified in the 10 x 10km² block. 7 villages were randomly chosen and a further list was made of the names of household heads for these villages.

The village authorities then informed community members as to the procedures and forthcoming household visits by the team, so as to avoid suspicion or conflict as to the household listing procedure, and enhance cooperation with the team. The exact boundaries of the 7 selected villages also had to be determined with the help of the village elders. The team walked the perimeter of each village with the village elders and several community members that knew the community well, and then proceeded to go from dwelling to dwelling, numbering them and registering each.

Some of the challenges faced at this stage, and how the team leader dealt with them included the following:

- a. Some of the households did not want to be listed as residents of the village, claiming to belong to other villages where they had migrated from. They did this because they want to maintain their lineage. The team explained to them that this was fine, but for quick and easy accessibility, their name would be included in the household list for that village, and obtained their agreement on this arrangement.
- b. In the first instance, daughters with independent households were omitted from the list of all households in the village, as they were listed under their parents. Women do not (or did not at the time of the survey) have the legal right to own land. The team reached agreement that the list would include such households that were independently farming, even though they did not 'own' the land (but customary law may grant them tenure rights); this also held for farming households led by orphans. In polygamous families where there were independent households, the husband of the households wanted his name to be written on the list of households as the head. The team explained that they would like to have each household identified independently, thereby the man needed to choose where he

wanted his name to appear, and for the other households, the name of the wife would appear.

Household structured interviews

This activity was carried out between 24th November 2010 and 17th December 2010.

Data entry started on 6th December 2010 and continued through to 30th December 2010, and data cleaning started in January 2011 with the use first of CS-Pro software, followed by a second cleaning step using SPSS (see data management guide available at: www.cgiar.ccafs.org).

Code sheet and village and household sampling frames are available upon request from CCAFS.

Appendix 2: Sampling Frame – List of Villages

Chemildagey

Obinju

Kamango

Kobiero/Warieya/Nyagol

Kamuana

Tabet "B"

Kapsorok