Part 1

The Production of Ready to Use Therapeutic Food in Malawi:

Smallholder farmers' experience with groundnut production
Results from a four year livelihoods analysis in Malawi's Central Region

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VALID NUTRITION

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List of Acronyms

ACE	Agricultural Commodity Exchange
ADMARC	Agricultural Development and Marketing Corporation Malawi
ASWAP	Agriculture Sector Wide Approach
AHCX	Auctions Holdings Commodity Exchange
CTC	Community-based Therapeutic Care
DFID	Department for International Development
EAA	ExAgris Africa
FANTA	Food and Nutrition Technical Assistance, USAID
FGD	Focus Group Discussion
FHH	Female Headed Household
FISP	Farm Input Subsidy Programme
HEA	Household Economy Approach
HFIAS	Household Food Insecurity Access Scale
MGD	Malawi Growth and Development Policy
MHH	Male Headed Household
MoAFS	Ministry of Agricultural and Food Security (Malawi)
NASFAM	National Smallholder Farmers' Association of Malawi
NIS	Nuts in Shell (refers to unshelled groundnuts)
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SLF	Sustainable Livelihoods Framework
VN	Valid Nutrition
WASAA	Women in Agri-Business in Sub Saharan Africa

Glossary

Chichewa	The predominant language of Malawi, spoke by approximately 90% of the population
Dambo	Naturally occurring marshland used in the irrigation of *dimba* gardens
Dimba	Dry-Season cultivation
Ganyu	Casual Labour usually of an agricultural nature, which may be paid in cash or food.
Likuni Phala	Maize/soya porridge
Nsima	Maize porridge

Acknowledgements[1]

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Disclaimer

The opinions and recommendations are those of the author, and do not necessarily reflect the views of the organizations/stakeholders or its individual members.

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[1] Cover Photo: Staff member from Exagris Africa at a Groundnut Quality Training Course 2013, taken by Gretta Fitzgerald.

Executive Summary

This report provides a comprehensive analysis of the impact on farming household livelihoods of a specific market-led intervention – a guaranteed groundnut purchasing scheme for smallholder farmers. This intervention is part of an overall aim to develop a locally-based value chain to produce Ready-to-Use Therapeutic Foods (RUTF).

Between 2010 and 2013 the same 200 (±) farmers were surveyed annually to collect information about their groundnut production and livelihoods. Most of the farmers involved in the research received agricultural extension services provided through their local associations facilitated by one of the research partners. A control group did not receive such support.

The Sustainable Livelihoods Framework was used as a conceptual tool resulting in the investigation of various household assets that fall under the human, social, physical, financial and natural capital categories. Given the context food security was looked at through a number of established indicators. For each of the food security indicators there was always a significant proportion of the sample that fell into categories that would class them as being food insecure, be it through limited access or quality of food.

Households' access to finance increased considerably over the study period through Village Savings and Loans (VSLA) groups. Participation in such groups was predominantly by women and the amounts saved and borrowed were very small, only covering some basic household needs. Access to credit at the scale whereby farmers can invest in agricultural inputs remains limited, if not non-existent in many of the study areas covered.

In terms of livelihood strategies results show how households continue to rely on crop production, livestock and casual labour for their livelihoods. However, significant changes occurred in which crops farmers are choosing to cultivate. Tobacco cultivation has declined but there have been considerable increases in the production of groundnuts, soya and other food crops. Increases in productivity can be seen through the increased yields in both groundnuts and soya. Disaggregation by association membership shows that those who participate in training and receive extension visits have significantly higher yields and sell more produce to the market. However, the majority of crop sales over the study period were at farm gate, where prices are at their lowest. This shows the immaturity of the output markets.

A key barrier to local production of RUTF is aflatoxin contamination, largely caused by post-harvest handling; the studied intervention has a strong focus on building the capacity of farmers to be able to produce export quality groundnuts suitable for RUTF manufacture. This was complemented with attempts to develop the high value groundnut markets in the study areas through a number of Nut in Shell (NIS) markets, whereby groundnuts were bought sorted and in their shell. The presence of this market

created a more diversified market place for groundnuts. Previously the main option for farmers was traditional informal buyers whereby nuts are typically bought shelled and at the farm gate. The NIS market saw farmers gaining premium prices, a reduction in labour required for post-harvest handling (i.e. families no longer have to shell groundnuts) and reduced health risks from aflatoxin contamination.

Cumulatively, key results show that despite significant improvements in productivity of the focus cash crop, groundnuts, the livelihood status of households in terms of livelihood capital assets (e.g. human, social, financial, natural, and physical) appears to have remained stagnant over the study period. This highlights the need for integrated policy and large scale interventions that address gaps that are limiting positive returns from projects such as the studied market-led intervention. A prime example of this would be to address the absence of a functioning and appropriate financial market for smallholder farmers. Other promising interventions include addressing long term deficiencies in input/output market development, the provision of extension services, investment in road infrastructure, and the support of associations/cooperatives.

Section 1: Introduction

This report is part of a four-year research project carried out by University College Cork on behalf of Valid Nutrition. The purpose of the study was to establish a comprehensive analysis of the impact on farming household livelihoods of a specific market-led intervention – a guaranteed groundnut purchasing scheme for smallholder farmers[2] - as part of an overall aim to develop a locally-based value chain to produce Ready-to-Use Therapeutic Foods (RUTF). The study, and the guaranteed groundnut purchasing scheme, was undertaken in collaboration with ExAgris Africa (EAA)[3].

The groundnut purchasing scheme has the economic objective of transforming smallholder farmers into reliable suppliers of groundnuts who can adhere to stringent export standards. As many of the stakeholder organisations have a strong social ethos, the intervention was designed with the higher level objectives of reducing poverty and food insecurity levels of the rural economy in which the groundnut value chain is being developed - in this case Malawi's Central Region.

This report examines change in the livelihood status of a cross-sectional sample of rural farming households between the 2009 and 2012 cropping seasons in Malawi. Farmers involved in the research were either beneficiaries of the mentioned market-led intervention for the duration of the investigation, whereby agricultural extension services were provided to local associations (i.e. beneficiary or treatment group), or did not receive such support for its duration (i.e. control group). Other components of the study (not discussed here) investigated the main institutional factors influencing the effectiveness of the market led intervention on the targeted households.

The specific research objectives were as follows:

1. Identify the food security and livelihood situation of the selected households, including the agricultural production, physical assets, health, and household food consumption.
2. Identify the current on-farm and off-farm income generating activities of households.
3. Identify constraining factors on the efforts to improve livelihoods.
4. Determine the coping strategies employed by households and the existing formal and informal social support systems available.
5. Determine the level of uptake by households of groundnuts as a reliable food and cash crop.

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[2] A smallholder farmer from herein will be defined as a farming household with a low asset base and cultivating approximately two hectares and less (Okidegbe, 2001; Nagayets 2005; World Bank 2003).
[3] ExAgris Africa is a private agricultural company with a strong emphasis on social responsibility.

Report Structure

The structure of the report is based around the Sustainable Livelihoods Framework and uses some of its main components. Sections 1 to 4 describe the overall livelihoods status; the welfare of households is investigated in Section 5 in terms of the food security, human, financial and natural capital of households; in addition the wealth status of households is also determined. The main livelihood strategy, crop production, is looked at in detail in Section 6, where the main crops cultivated by households are presented. Other non- and off-farm livelihood strategies are explored in Section 7. Social protection is then looked at in brief using data collection around the national Farm Input Subsidy Programme (FISP) and the provision of extension services. A narrative overview of the overall livelihood changes over the study period is given in section 9. This then leads to Section 10, which takes a more in-depth look at the studied intervention and its impact. Finally, conclusions are drawn in Section 11, where the two main conclusions are discussed: how households remain highly vulnerable due to lack of assets or returns on assets and other key issues, and how the intervention and households' participation in the RUTF value chain development has potential. However the vulnerabilities of households and the lack of adequate infrastructure and institutions at the meso and macro levels are impeding developments.

The Intervention

Farmers involved in the research were either beneficiaries of the mentioned market-led intervention for the duration of the investigation, whereby agricultural extension services were provided to local agricultural associations, or did not receive such support for its duration. It was envisaged that the targeted smallholders would sell their groundnuts graded and in their shell to ExAgris. At the buying station these groundnuts would be bulked, further graded and packaged before being sold onto AfriNut[4]. AfriNut would then process the nuts into peanut paste and supply to Valid Nutrition to process into RUTF[5], thus, in the broadest sense, creating a sustainable value chain (Figure 1).

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[4] AfriNut is a 'pro-poor peanut processor', whose shareholders include: Twin, NASFAM, ExAgris Africa Ltd., Cordaid, and the Waterloo Foundation.
[5] Ready-to-Use Therapeutic Food (RUTF) is a highly nutritional groundnut based paste that is used in the treatment of Severe Acute Malnutrition in young children.

Figure 1: RUTF Value Chain
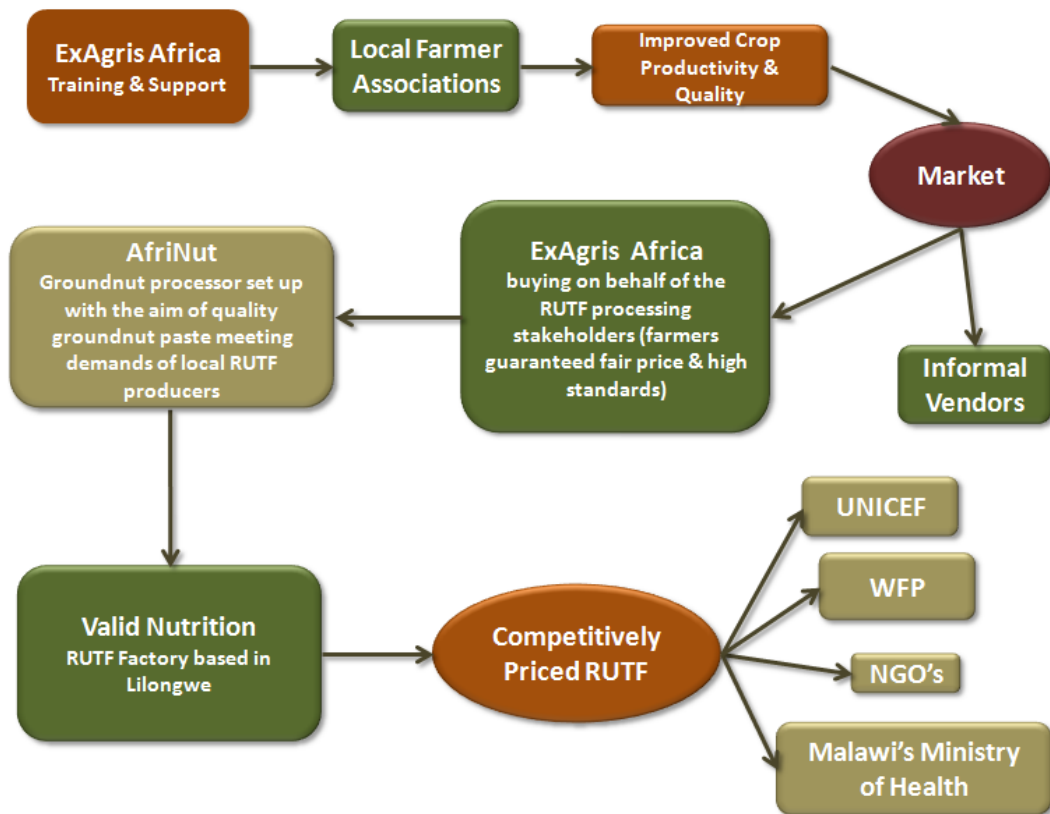
Although the baseline survey for the research project was conducted in 2010, prior to any specific intervention activities, the process of guaranteed groundnut purchasing did not begin until 2013, the final year of data collection.

The intervention is part of a wider outgrowers programme that ExAgris Africa is implementing in 8 districts[6]. This intervention is partially funded by Malawi's Ministry of Local Government and Rural Development's Rural Livelihood Economic Enhancement Programme (RLEEP). ExAgris outlined the main objectives of the intervention in the 2013 'Growing with Groundnuts' annual report:

1. Increase the average yield of groundnuts produced by the target group.
2. Increase the average price per kg of groundnuts produced by the target group.
3. Reduce per unit processing, handling and marketing costs for both commercial and smallholder groundnut farmers.
4. To identify the key determinants of yield and price in various farming scenarios.
5. To increase availability of and access to quality certified seed of a number of appropriate groundnut varieties.

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[6] Mchinji, Dedza, Lilongwe, Salima, Rumphi, Mzimba, Dowa, and Mangochi

Through the provision of agricultural extension services good progress has been made towards these objectives. Farmer associations and groups are supported by the extension advisors in the set-up of sustainable seed systems, and train famers in agronomic practices through the use of demonstration plots, field visits and other activities. There are several agronomic practices that ExAgris is promoting through the groundnut out-growers scheme. These include: early planting, use of improved seed, increased plant population, scouting for pests and diseases and control where economically viable for the small holder, fertilizer application and improved harvesting and drying. Associations and groups are also trained in the calculation of gross margins to enable them to estimate financial benefits of additional costs, and to enable them to make comparisons between crops with the aim of them being able to make more informed planting decisions in the future (ExAgris Africa, 2013).

Country Context

Malawi has an agrarian-based economy with 85 percent of households engaged in various agricultural activities (National Statistical Office, 2012). Rural employment is predominantly made up of smallholder farmers cultivating plots of on average 1.4 hectares (National Statistical Office, 2012). Development of Malawi's agricultural sector has been one of the country's main priorities since independence in 1964, yet the country still faces annual national food deficits. Agricultural development is seen to be the solution for food insecurity, rural poverty, vulnerability, and stagnant GDP growth.

Since independence in 1964 the government, multilateral organisations, non-governmental organisations, and the estate sector, have predominantly led agricultural development policy and initiatives in Malawi. However, the private sector is now playing an increasing role in the implementation of agricultural development initiatives in the country. Out-grower schemes, contract farming and provision of off-farm employment on plantations/estates are a few examples of such initiatives. However, at household level, many farmers still employ cultivation practices and cropping strategies that prioritise food security over income. Through the 'commercialisation' of smallholder farmers it is thought that increased incomes will enable households to meet basic needs, build up productive assets, and reduce their own vulnerability. However, commercialisation in the form of market integration is argued to increase uncertainty and risk because subsistence is replaced with the insecurity of unstable markets and volatile prices (Ellis, 1988).

With regard to groundnuts, in 2012, the FAO ranked Malawi as the thirteenth highest producer of groundnut (with shell) in the world. This is no mean feat for a small land-locked country whose mainly agrarian economy has limited resources and is over-reliant on rainfed production, which is increasingly vulnerable to droughts and floods. Along with the staple crop maize, groundnut is a key crop grown in Malawi with approximately 368,081 hectares allocated to it in 2012 (MoAFS, 2012).

In Malawi groundnuts were once a popular export crop with 64 percent of the total produce being exported in the 1980s; this declined to 0.2 percent in the 1990s (Diaz Rois, et al., 2013). The decline is attributed to several factors: structural adjustment programme and liberalisation of the agricultural sector; deterioration of prices; a fall-off in the use of improved seed; land pressure; changes in international demand; and the introduction of stringent maximum allowable levels (MALs) for aflatoxin contamination by importers, in particular the EU (Diaz Rois, et al., 2013).

Following the drop off in production in the 1990s, groundnuts have made a significant comeback with production growing at an average annual rate of 8 percent since 2000, this growth coming largely from the smallholder sector (Diaz Rois, et al., 2013). For smallholder farmers, groundnuts are seen as an increasingly attractive crop to grow, as there is improved awareness around the nutritional benefits for producing households and the nitrogen fixing properties for farmers' soil. With regard to the economic benefits, farmers see groundnuts as having relatively good gross margins, especially since prices for the traditional cash crop tobacco have become unpredictable and vulnerable to anti-tobacco campaigns and increased cost of inputs. However, for groundnuts, the problem of aflatoxin contamination has not been overcome. Currently, it is estimated that only 15 percent of groundnuts produced are exported[7]; 25% are for local retail and wholesale markets; and 60% for informal local markets and consumption (CYE Consult, 2009, Diaz Rois, et al., 2013).

Malawi's agricultural markets tend to be inefficient, lacking adequate infrastructure and institutions. A culture of non-compliance to grades and standards throughout supply chain systems limits opportunities for farmers by creating barriers to high value agro-processing and export markets. The majority of the estimated 80 percent of groundnuts that stay within Malawi's borders are traded with minimal grading and sold at one set price (Sangole, et al., 2010). This was not always the case: prior to the liberalisation of agricultural markets the monopoly parastatal ADMARC (Agricultural Development and Marketing Corporation) enforced strict grades and standards for groundnuts. These established grades and standards still exist today, however since liberalisation weak enforcement mechanisms have led to the development of the current low-value, low-quality groundnut sector.

This culture of non-compliance to established grades and standards is changing. Recent developments in the private sector, such as the intervention being studied here, have created increased local demand for high value aflatoxin-free groundnuts. This demand can be linked with the emergence of a number of private sector actors; Valid Nutrition and Project Peanut Butter, both local producers of the groundnut based Ready-to-Use Therapeutic Food (RUTF); TWIN and NASFAM (National Association of Smallholder Farmers) who have been buying nuts for the UK fairtrade market since the early 2000s; and the more recent establishment of AfriNut Ltd - a groundnut processing company

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[7] Mainly regionally to eastern and southern Africa with poor regulation; the best quality sent to EU via processing in South Africa.

set up to target EU markets. It is envisaged that such demand will have wider social and economic impacts for smallholder groundnut producers and consumers in Malawi.

Section 2: Methodology

The studied intervention targets approximately 3,000 smallholder-farming households in three districts – Mchinji, Lilongwe and Salima - across the central region in Malawi. The longitudinal study captured data from the 2008-2009 cropping season through to the 2012-2013 cropping season. A mixed method approach was taken for each year of the study by combining qualitative approaches and quantitative approaches.

The study used an adaptation of both the Sustainable Livelihoods Framework (SLF) and the Household Economy Approach (HEA) to provide a conceptual and methodological framework respectively. The SLF is used as a conceptual tool to enhance understanding of influences on livelihoods of poor people (Scoones, 1998; Brock, 1999). The SLF highlights the main factors that affect poor people's livelihoods and the typical relationships between these factors. Figure 2 illustrates the various components of the framework.
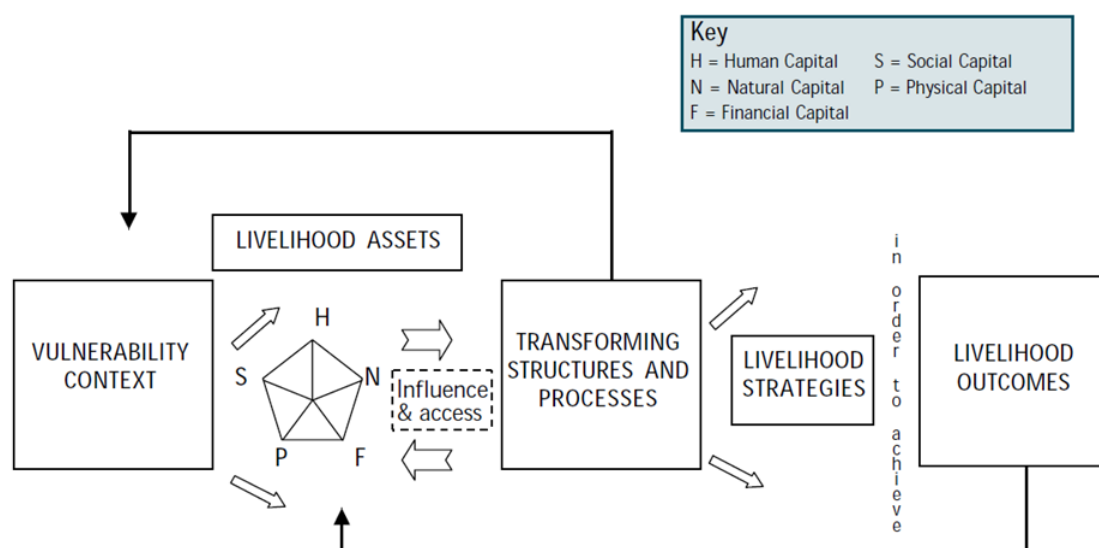
Figure 2: Sustainable Livelihoods Framework (DFID, 1999)

Along with the SLF, the Household Economy Approach (HEA) was used to structure information on livelihoods and key findings[8]. The HEA is a livelihood-based framework for analysing the way households access things they need to survive and prosper (FEG, 2008). The approach is based on the principle that an understanding of how people make ends meet is essential for assessing how livelihoods are affected by wider economic or ecological change and for planning interventions that will support, rather than undermine, their existing survival strategies (FEG, 2008).

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[8] Malawi's National Statistical Office has to date carried out three national 'Integrated Household Questionnaires', which are largely based on the HEA methodology (National Statistical Office, 1999, 2005, 2012).

The HEA therefore involves the analysis of the connections amongst different groups and different areas, providing a picture of how assets are distributed within a community and who gets what from whom (FEG, 2008). To do this spatial, social and methodological triangulation was employed in the annual analysis (Gosling, 2003; Brock, 1999; Vanclay, 2012).

A mixed method approach was employed for the study. Mixed methods were employed in an attempt to overcome intrinsic biases that come from using single methods. Using both qualitative and quantitative methods allowed for the strengths and weaknesses of both to be compensated by each other. However, more specifically, through using a combination of multiple observers, theories, methods and data sources, greater accuracy and validity are achieved (Greene, 1989; Rocco, 2003; Collins, 2006). This provides a more complete picture of the context in which the intervention is being implemented. Data collection methods included annual household questionnaires, focus group discussions, semi-structured interviews, market visits and trader interviews, and direct observation. The details of each are as follows:

Household Questionnaire

The baseline household questionnaire was undertaken in the three study areas in the first quarter of 2010 capturing data for the 2008/2009 cropping season. 238 farming households were originally selected for the questionnaire through stratified random sampling. 43 of these original houses either relocated, or were unavailable for interview in subsequent years.

The questionnaire consisted of both closed and open questions to investigate key households characteristics and livelihood influences, including:

- Household assets (i.e. human, natural, financial, physical and social)
- Household income and expenditure
- Shocks and supports
- Annual food balance (i.e. consumption and access)
- Crop production and sales

During the 2010 baseline the researcher initially validated the questionnaire with key stakeholders and a local translator. A two-day pre-testing was carried out with randomly selected households; any anomalies or issues that arose were corrected. Following this four enumerators were trained over three days. Data collection took approximately 5 weeks. This was carried out using the traditional paper based data collection approach. Data were then entered into Excel and imported into SPSS for further analysis.

The 2011, 2012 and 2013 household questionnaires largely replicated the 2010 baseline. The time of data collection changed to June/July, as opposed to March to mid-May, to enable real-time information to be generated on groundnut yields and prices immediately post-harvest. However, the timing of data collection also meant that data collected on food security status and consumption levels tended to reflect the more favourable situation prevailing in the post-harvest period, rather than the inferior conditions likely to prevail during the lean season (which were captured in the baseline data). This seasonal effect needs to be kept in mind when considering the survey results. These questionnaires were conducted using digital data gathering devices that allowed for automatic data entry, which increased validity, and reduced data-collection and data processing times.[9] Each year, four enumerators were recruited with the assistance of the Centre for Agricultural Research and Development (CARD) in Lilongwe. Training and piloting of the digital survey took approximately 5 days each year. The same enumerators were employed for the 2012 and 2013 data collection rounds.

Focus Group Discussions

Each year focus group discussions (FGDs) were conducted to provide a more comprehensive contextual picture of the communities that the studied households resided in. Groups were made up of 6 to 12 members in all three study areas. Group discussions were held with different sub-groups depending on the topic for discussion, for example village heads, female, association members, and non-association members. Participatory rural appraisal exercises (PRA) including wealth ranking, seasonal calendars, income and expenditure matrixes, and institutional mapping were conducted in specific FGDs. The FGDs gave insight into community and individual perceptions of what strengths, weakness, opportunities and threats households face in terms of achieving a sustainable livelihood and what influences each of these.

Semi-Structured Interviews

Household representatives and key informants were interviewed with the aim of getting individuals' perspectives and experiences. Households targeted were association members who were considered as case studies with one female and one male farmer interviewed in each study area. Key-informant interviews were conducted with agricultural extension advisors, government officials at national and district level, NGO and CSO representatives, and other key stakeholders in the groundnut supply chain and the RUTF value chain.

Market Visits and Trader Interviews

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[9] For further information around the digital data collection process see appendix for Fitzgerald and FitzGibbon (2013) 'The Evolution of Digital Collection in the Monitoring and Evaluation of Projects in Developing Country Contexts'

Each year the researchers visited the commodity markets in the three areas. Both the nearest small markets were visited and the medium to large markets, also known as trading centres that are located further away from the study sites, were also visited. Observations of the markets were made as well as interviews with agricultural commodity traders.

Direct Observation

The researchers recorded events, structures, processes, institutions, behaviour, relationships, social differences, and enumerator's notes and personal observations from household interviews. This was done to inform the survey data collection processes and also to triangulate the other methods employed.

Study Ethics

For all of the data collection activities oral consent was obtained from all participants. For the household questionnaire a standardised introduction was read out by the enumerator, this introduction gave a background to the intervention, the purpose of the study, how the information would be used and how all information would be treated confidentially. This was also done in FGDs and semi-structured interviews. Participants were also informed that they were entitled to ask any question, and if at anytime they wanted to terminate the interview they could do so, or if they wished, decline to participate.

Statistical Analysis

Results from the four household questionnaires were combined into one dataset and analysed using SPSS version 20. Basic exploratory analysis was conducted which found that a lot of data were skewed or not normally distributed (see Annex 2 for example of a skewed variable). This occurrence is typical, as most social and economic data are not normally distributed (Mukherjee, 2013). It is important to acknowledge this when reporting measures of centrality (i.e. the mean, median, and mode) because the measure needs to give the value that most accurately represents the study sample and in the case of skewed data this is the median as opposed to the mean (Keding et al, 2012, Roberto and Samuel, 1989, Schinka and Velicer 2003, Nicolaisen, 2002, Bakker and Gravemeijer, 2006, Brashares, 1993, Mukherjee, 2013, Tittonell and Giller, 2013). Therefore where data were skewed the median was reported.

Section 3: Study Sample

As mentioned the 2010 baseline study interviewed a total sample of 238 households, these households were selected through stratified random sampling. The baseline sample figures declined over the four years as households moved away, broke-up or were not available for interview. The final sample of 195 consists of households that participated in the four household questionnaires, allowing for a confidence interval of 90% and a margin of error of 5.8%. The reduction in sample size from the baseline to the final survey round resulted in an 18.07% attrition rate.

The treatment or intervention group is made up of members of the associations supported by the ExAgris groundnut outgrowers scheme that began in 2010. As some households were members for only some or one year of the study a second-level treatment group was stratified. The control group is made up of those households that were never members of the associations.

Table 1 shows the association membership status of the households over the four years, the distribution of households across the three study districts, and the sex of the household head in the 2013 round. The mean number of years' education obtained by household heads was 4.65 with a standard deviation of 3.74. Despite 24% of households having no form of formal education, there was an even spread ranging from 1 to 12 years.

Table 1: Distribution of Sample

	n	%
Total Sample	195	100
Association Membership 2010 -2013[10]		
Association Member 4yrs	60	30.8
Association Member <4yrs	89	45.6
Never Association Member	46	23.6
District		
Lilongwe	66	33.8
Mchinji	70	35.9
Salima	59	30.3
Household Head Sex[11]		
Female	79	40.5
Male	116	59.5

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[10] This is in reference to membership of an agricultural association facilitated by ExAgris. It is intended to replace the 'beneficiary/control' variable as a more accurate interpretation of the level of training and support received through the associations.

[11] Sex of household head in 2013

Section 4: Study Areas

The study areas were selected on the criterion that they were areas where the partner organisation ExAgris Africa Ltd. (EAA), which is implementing the intervention being investigated, is operational. Thus EAA served as the entry point in the study.

Lilongwe

Villages surrounding the ExAgris Lisungwi Estate were selected. The Lisungwi estate is approximately 100km south of the capital city Lilongwe and 20km from Mitundu trading centre, one the main trading centres for the Lilongwe district. The selected villages fall under the Mitundu EPA[12]. Households were drawn from 28 different villages.

Mchinji

Villages adjacent to the ExAgris Mchaisi Estate were selected. This estate is approximately 50km east of Mchinji town, and 5km from the Kapiri trading centre. The selected villages fall under the Chioshya and Kalulu EPAs. A total of 6 villages were represented in the sample.

Salima

Villages surrounding the ExAgris Mphatsana Njoka Estate were selected. The estate is approximately 5km outside of Salima town. The selected villages fall under the Tembwe EPA. Households were drawn from 12 different villages.

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[12] Extension Planning Area is the lowest government planning level in Malawi.
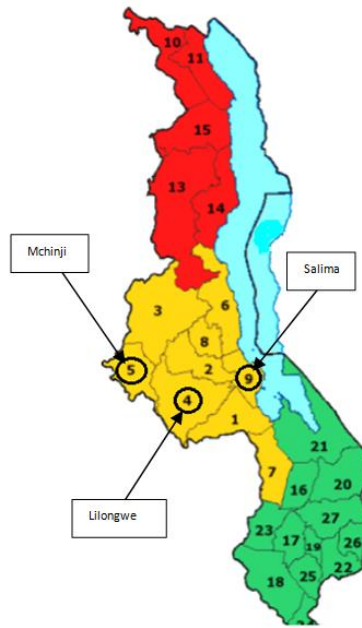
Figure 3: Map of Malawi

Section 5: Livelihood Status of Households

In this section the SLF is used to conceptually frame the discussion of findings. Using a combination of three of the five livelihood assets (also known as capitals); physical (i.e. main dwelling structure), financial (i.e. livestock) and natural (i.e. land and livestock) the study sample were classified and disaggregated in to wealth groups. A number of proxy indicators were used to measure various aspects of food security, as food security can not only be seen as a livelihood outcome but also as an element of human capital. Health was also looked at as another component of human capital. In terms of financial capital household cash savings and credit were considered; livestock were categorised more as natural capital, but for many households they act also as financial capital. Each category will be analyzed in detail in the following sections.

Wealth Groups

Households differ in their ownership of assets. These differences indicate variations in wealth status and also give an indication of the potential of households to meet livelihood needs. Data on key assets were collected in each survey round, and were used to categorize households into different wealth groups.

The wealth groups variable is a composite index of household wealth. Table 2 below represents the results of a stratification procedure undertaken for all the households over the four years, which was in line with Participatory Rural Appraisal (PRA) and the Household Economy Approach (HEA) methodologies.

These wealth groups were determined during the baseline data collection in 2010. Key-informant interviews were conducted in each of the study areas to establish the various groups and what differentiated them from each other. Descriptions of the key defining characteristics and resources of the poorest households in the village were listed. This was then repeated for the wealthiest households in the village and then for the middle group. Once the descriptions of each group were established the community was divided into the wealth groups according to these criteria. This information was triangulated with focus group discussions with community and household representatives. These steps were repeated for each of the annual data collections in 2011, 2012, and 2013.

Table 2: Wealth Ranking Criteria

	Low	Middle	High
Livestock Owned	0 - 8 chickens only	Chickens, 1 - 3 goats, and/or 1 - 3 pigs	Any cattle/oxen. Or chickens, 3+ goats, & 3+ pigs.
Land Owned	0 - 0.61 hectares	0.61 - 1.68 hectares	1.68 hectares and above
House Structure	Mud bricks (unfired/compacted) & grass roof	Burnt bricks & grass roof	Burnt bricks & iron sheet roof

The results from the wealth ranking exercise are presented in Table 3. It appeared that the number of households in the high wealth group was increasing over time; however the final data round in 2013 showed the number declined to close to the baseline figure. This trend is almost mirrored with the proportion of households moving out of and back into the low wealth group. Only the number of households in the middle group appeared constant. A chi-square goodness-of-fit test was conducted; this indicated no statistically significant difference in the proportion of households in each wealth group in the 2013 sample compared with the 2010 sample (p < 0.05, see appendix for statistical tables).

Table 3: Distribution of Households by Wealth Ranking

	2010		2011		2012		2013	
	n	%	n	%	n	%	n	%
Low	83	42.6	74	37.9	71	36.4	79	40.5
Middle	95	48.7	96	49.2	96	49.2	95	48.7
High	17	8.7	25	12.8	28	14.4	21	10.8

Food Security

"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life...." (World Food Summit Plan of Action, Para. 1, FAO, 1998)

Maize, Malawi's staple crop is commonly used as a measure of food security at national and household level. Maize consumed at household level predominantly comes from the household's own production. However, many households fail to produce enough maize to last through to the next harvest. Those who do produce enough maize rarely have the storage capacity to keep the maize until needed; those who do store their surplus can face serious food waste due to spoilage caused by poor storage conditions and pests. Trends in the consumption of maize from own production was investigated over the study period (Table 4). Annual per capita maize consumption from own production was calculated, this was disaggregated by the wealth groups. The Kruskal-Wallis test was conducted for each data round to establish if there was a difference in per capita maize consumption from own production across the three wealth groups. Except for the baseline, each year showed consumption to be significantly different with p values of less than 0.05 (p < 0.05).

Table 4: Maize Consumption from Own Production (kg/per capita)

	Overall	Low	Middle	High	p value
2010	113	117	125	125	0.749
2012	110	85	130	173	0.002
2013	109	86	164	150	0.000

Looking at the overall sample, there was little increase or decrease in the per capita maize consumption from own production. However, there were significant changes in consumption between groups, particularly for the low wealth group; similar trends can be seen in the quantity of maize produced by the low wealth group over the study period. Fluctuations in maize production are discussed further in Section 6.

Households in the low wealth groups experienced decreases in the quantity of maize they are consuming. Therefore, to gain a further insight into the food security situation of households three indicators were used; the Household Food Insecurity Access Scale (HFIAS), the Household Diet Diversity Score (HDDS) and the Hunger Gap. As the baseline was conducted during the lean period when food insecurity would be most severe and the following three study rounds were conducted just after harvest, when food security would be at its best, a direct comparison would not be appropriate; this should be kept in mind by the reader.

Household Food Insecurity Access Scale (HFIAS)

The HFIAS is a commonly used indicator developed by FANTA. Nine generic questions relating to the food security of each household over the past four weeks were asked. Each of the nine questions had a sub question which determines the frequency of occurrence (i.e. rarely, sometimes, and often). The generic questions fall into three groups:

Box 1: Household Food Insecurity Access Scale Indicator Guide (Coates, et al., 2007)

For each of the generic questions a score was applied: if the household said that the example given in the question did not occur in the past four weeks a score of 0 was applied, if it occurred rarely (i.e. once or twice in the past four weeks) a score of 1 was applied, for sometimes (i.e. three to ten times in the past four weeks) a score of 2 was applied, for often (i.e. more than ten times in the past four weeks) a score of 3 was applied. Using the sum of these weighted responses the HFIAS can range from 0 and 27. The higher the score, the more food insecure the household was.

The mean HFIAS score was 10.42 (5.74 SD) in 2010. This was the highest score reached in the study period. In the following study rounds the mean scores were lower: 5.8 (5.74 SD), 6.08 (6.53 SD) and 5.94 (7.2 SD) for 2011, 2012 and 2013 respectively. The sharp divergence from the mean HFIAS score in the baseline can be attributed to the different data collection periods for the baseline and the following study rounds, which shows the extent of the impact of seasonality on food security in Malawi. The

scores were divided into four quartiles; Figure 4 shows the percentage distribution of households across the four quartiles.

Figure 4: HFIAS Score Percentage Distribution Overall Sample
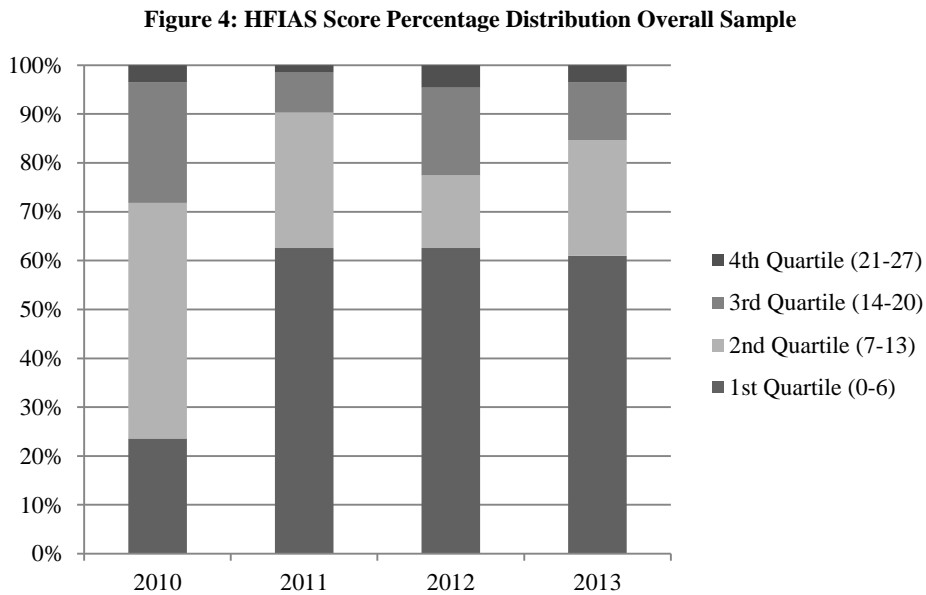
For the 2011, 2012 and 2013 study rounds the majority of households appear to be relatively food secure with little change between the three years. The 2010 HFIAS results show much higher levels of food insecurity and are likely to be more representative of the general food security status of households in the lean season.

When disaggregated by wealth groupings, results show that the majority of the high wealth group was in the 1st and 2nd quartiles in 2010, and in the 1st and 3rd in the final survey round in 2013 (Figure 5 and 6). In comparison, the low wealth group had households who were in the most food insecure HFIAS quartile with scores ranging from 21-27. Although the impact of seasonality and the data collection time is evident

in the increase in the proportions of households in the 1st quartile from 2010 to 2013, the influence of wealth status on the HFIAS is evident.

Figure 5: HFIAS Score Percentage Distribution by Wealth Groups in 2010
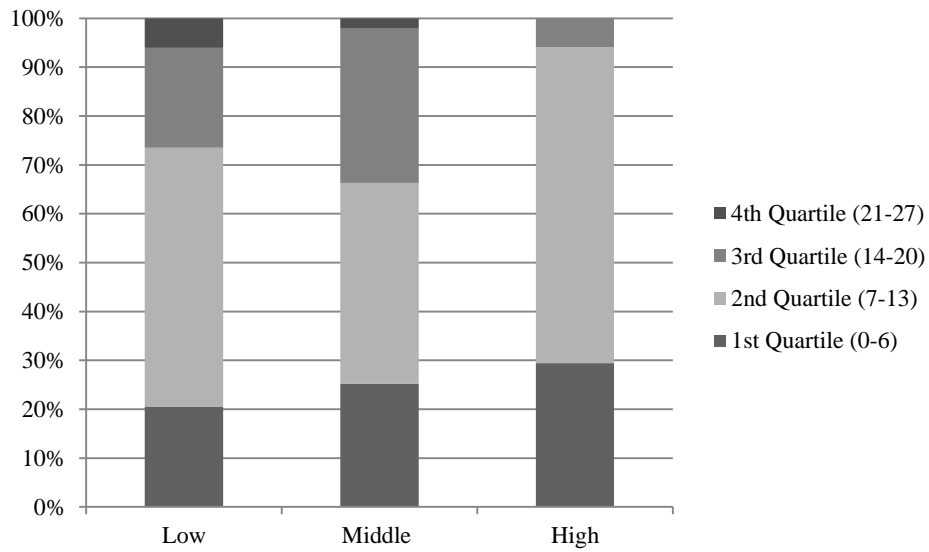
Figure 6: HFIAS Score Percentage Distribution by Wealth Groups in 2013
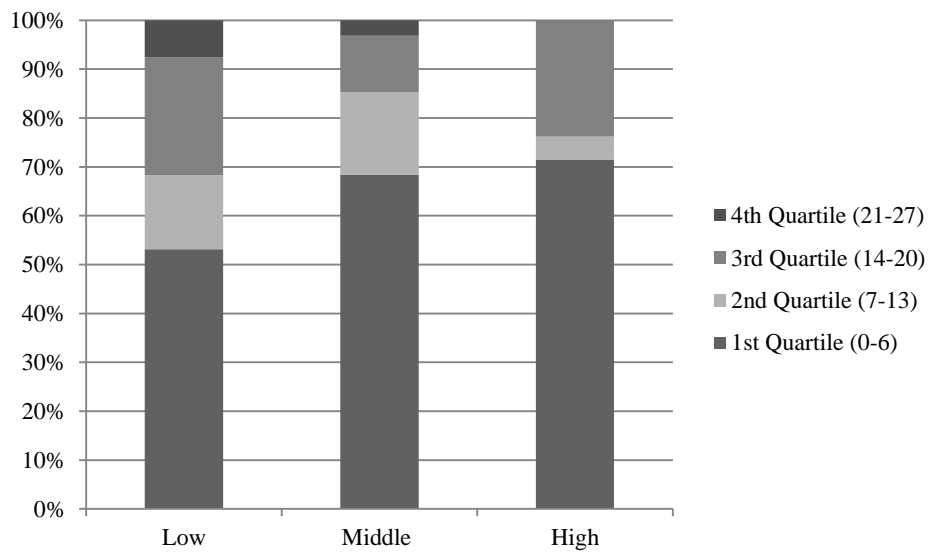
Household Diet Diversity Score (HDDS)

The Household Diet Diversity Score (HDDS) is a measure of dietary diversity: the higher the score the more diverse the diet of the household members. Greater diet diversity generally indicates better nutritional status at household level. The HDDS used was the modified indicator employed by the national Integrated Household Survey III (HIS III) whereby the recall period of 7 days is used and a total of 113 food items are investigated by asking, *"In the past 7 days, have you or any household member eaten..."* The sum of the following food groups gives the score; cereals, roots and tubers; vegetables; fruits; meat; eggs; fish; pulses; legumes and nuts; milk and milk products; oils and fats; sweets; spices, condiments and beverages (National Statistics Office, 2012).

Using the sum of these weighted responses the HDDS can range from 0 and 12; the higher the score the more diverse the diet diversity. Thus, better nutritional status at household level.

The 2011, 2012 and 2013 study rounds show that diet diversity is moderate to high with mean scores of 8.24 (SD = 2.09), 8.48 (SD = 1.85) and 8.29 (SD = 2.14). Jones et al. (2014) reported similar findings from the HIS III data with the Rural Central Region having a score of 8.17 (SD = 2.48) and 8.37 (SD = 2.38) for all regions (Jones et al, 2014). This high scoring is likely to have been influenced by seasonality. Not only would the quantity of food be greater at household level at harvest time, but there is also increased cash availability due to crop sales and increased demand for casual labour. In terms of diet diversity, this allows for households to purchase more and a wider variety of foods.

Nonetheless households in the lower wealth groups have the lowest mean HDDS every year, and the high wealth group households have the highest mean HDDS (Table 5). A one-way between-groups analysis of variance (ANOVA) was conducted to explore the impact of the wealth groupings on HDDS. There was a statistically significant difference at the $p < .05$ level in HDDS for the three wealth groups (low, middle and high): $F_{(2, 192)} = 11.89$, $p = 0.000014$. Difference in mean scores between the three groups was also significant with p values ranging between 0.02 and 0.00.

Table 5: Mean HDDS of Wealth Groups by Year

	2011		2012		2013	
	Mean	SD	Mean	SD	Mean	SD
Low	7.7	1.849	7.42	1.729	7.63	2.316
Middle	8.34	2.127	8.91	1.636	8.46	1.873
High	9.4	2.16	9.68	1.565	10	1.517

Hunger Gap

The hunger gap was the third indicator used to look at the food security status of households. Each year households were asked which months they found most difficult to access food. The months mostly identified ranged between November and March, which is comparable to the FEWSNET seasonal calendar (Figure 7).

Figure 7: Seasonal Calendar % Critical Event Timeline (FEWSNET, 2011)
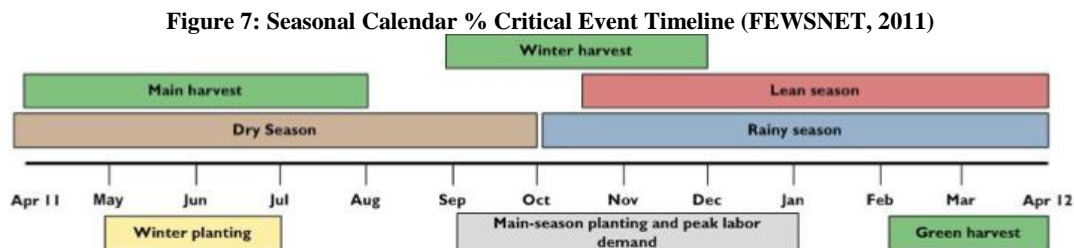
The number of households reporting more than 3 months of restricted access decreased from 18.46% in 2011 to 10.26% of households in 2013 (Table 6). This suggests that, households are finding it less difficult to access food throughout the year. Similarly, the 2011 national Integrated Household Survey employed the same hunger gap indicator and results showed that 72.2% of households experienced up to three months of food shortages (National Statistics Office, 2012).

Table 6: Percentage Distribution of Household Hunger Gap

Months	2011 %	2012 %	2013 %
0-3	81.54	81.54	89.74
>3	18.46	18.46	10.26

Human Capital: Health Status

In the baseline 82.05% of households reported experiencing illness in the past month, this saw a steady decline over the study period to 59.49% of households in the 2013

survey round. The number of household members experiencing illness in the past month was similar for all four years ranging from 1 to 8 days (median = 1).

Figure 8: Number of Case Reported by Illness(2010-2013)
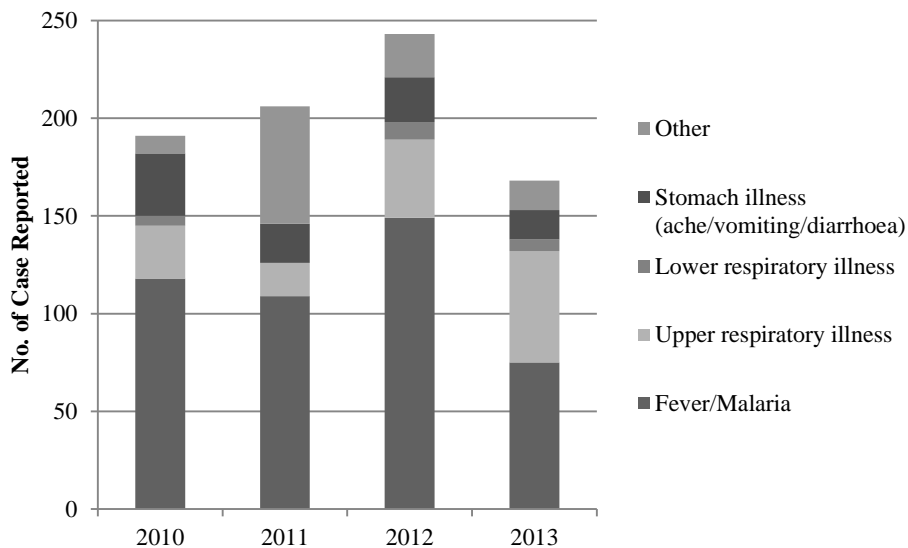
Figure 8 shows particularly the impact of the peak in malaria in 2012 on the reported number of households reporting illness; of the 149 cases reported 44.96% were in Salima. The lakeshore district Salima is one of the districts in Malawi where the prevalence rate of malaria is at its highest (Kazembe et al., 2006). However for this particular year, during data collection and follow-up investigations in 2013, study participants spoke of a spike in the occurrence of malaria in 2012. Key informants and focus group discussions confirmed this observation and village headmen discussed how this type of malaria was proving more severe than normal and was making people extremely sick.

The main preventative measure employed by households for malaria is the use of mosquito nets. Questionnaire respondents were asked *"Do any members of the household sleep under a bed net to protect against mosquitoes?"* They were also asked; *"Has/have the bed net(s) ever been treated with insecticides against mosquitoes in the past six months?"* Results show an increase in the number of households reporting ownership of a bed net with 85.6% in 2013 in comparison to 70.8% in 2010. However, there was a decline in the number who treated their nets in the last six months, from 45.1% in 2010 to 32.8% in 2013; the proportion of households who may have purchased/received their nets within the last six months is not known.

An illness score was calculated for each household for the four years. This represents the sum total of the number of days household members were unable to perform their normal duties/tasks divided by the number of households members, to generate an average household illness score (i.e. days missed due to illness per capita). The mean illness scores over the four years are presented in Figure 9. A paired-samples t-test was

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conducted to evaluate if there were difference in mean illness scores over time (i.e. between years). The only statistically significant change in mean illness score was the increase between 2011 (M = 0.92, SD = 1.76) and 2012 (M = 1.32, SD = 1.60), t (194) = 2.608, p < .0005 (two-tailed) (see annex for statistical table).

Figure 9: Mean Illness Scores by Wealth Groups
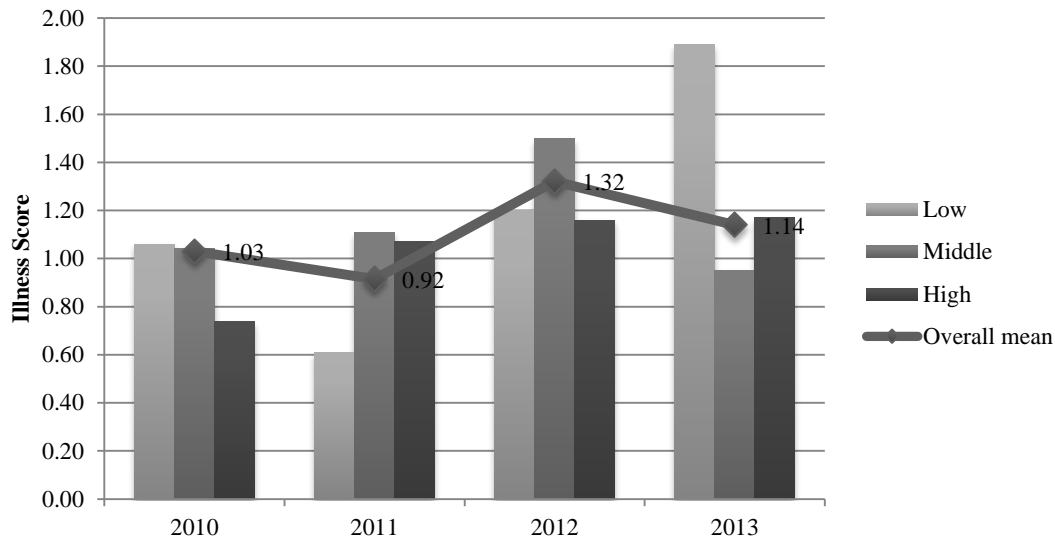
The main action taken to treat illnesses was to visit a medical facility; over the four years the proportion of reported illnesses that led to a visit to a medical facility ranged between 74.27% (2013) and 81.48% (2012) (see Table 7). The second most common action was the purchasing of drugs from a chemist or grocery store, which ranged between 14.74% (2010) and 20.39% (2011). It was established from focus group discussions that it was common practice to visit a medical facility for illnesses. Such medical facilities are provided by Malawi's Ministry of Health and are free of charge. However, the cost of transportation to these facilities is seen as a considerable burden on households. Many stated how a visit to a health centre would have to be paid for by selling small livestock (e.g. poultry) or borrowing from relatives and neighbours, if either is possible. However, medical centres in Malawi often don't have the necessary medication available causing patients to go and buy drugs with a prescription, something that is not affordable for many households.

Table 7: Frequency of Actions Taken to Treat Illness Reported by Year

	2010		2011		2012		2013	
	n	%	n	%	n	%	n	%
Nothing no money	2	1.05	4	1.94	1	0.41	4	2.38
Nothing wasn't serious	6	3.16	1	0.49	3	1.23	3	1.79
Purchased drugs	28	14.74	42	20.39	40	16.46	30	17.86
Traditional healer	0	0	0	0	1	0.41	1	0.6

Visited medical facility	153	80.53	153	74.27	198	81.48	130	77.38
Used own remedy	1	0.53	3	1.46	0	0	0	0
	190	100	203*	98.54	243	100	168	100

With regard to chronic illnesses[13] 23 households in 2013 reported having member(s) that were suffering from a chronic illness, of which 19 households had one member suffering from a chronic illness, 2 households had two members and 1 household had three members.

Financial Capital: Access to Saving & Credit 2013

There was a 350% increase in the number of households saving in 2013 compared to the 2010 baseline figure, and a 28% increase in the number of households accessing credit over the same period (see Table 8).

Table 8: Households Accessing Financial Services 2010 - 2013

	Savings		Credit	
	n	%	n	%
2010	22	11.28	64	32.82
2011	44	22.56	53	27.18
2012	53	27.18	29	14.87
2013	99	50.77	82	42.05

The cause of such increases is linked to the emergence of the 'Village Savings and Loans' clubs between the 2012 and 2013 data collection, as shown in Tables 9 and 10. During focus group discussions participants referred to the appointment of the first female president Joyce Banda and her political party who encouraged people, in particular women, to set up their own village savings and loans groups. Discussions around this topic often included how many women now want to start up their own small business; mandazi (local deep fried doughnut) selling was a very popular choice of business.

Table 9: Location of Households Savings 2010 - 2013

	2010	2011	2012	2013
	n	n	n	n
Bank (commercial)	10	15	17	20
Club/Village Savings & Loans	2	2	15	60
Home	8	19	10	10

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[13] Chronic diseases are diseases of long duration and generally slow progression. Examples of chronic diseases include heart disease, stroke, cancer, chronic respiratory diseases, diabetes and HIV/AIDS.

Lent-out	1	0	0	0
Micro-finance Institution	0	1	1	1
Women's Club	1	6	9	8
Other	0	1	1	0
Total	22	44	53	99

Table 10: Source of Household Credit 2010 - 2013

	2010	2011	2012	2013
	n	n	n	n
Bank (commercial)	2	4	2	3
Club/Village Savings & Loans	0	0	0	19
CUMO	0	0	0	1
CUUM	1	0	0	1
Employer	2	2	0	2
Farmers Club	2	0	0	0
FITSE	0	0	0	1
Grocery/Local merchant	3	0	1	0
Home bank	0	0	0	10
MADEF	1	0	0	0
Money Lender	14	2	4	20
MRFC	1	0	1	1
Neighbor	17	12	4	8
NGO	2	3	2	1
Relative	5	6	2	12
Religious Institution	13	0	0	0
SACCO	0	0	0	1
Women's Club	2	0	0	2
Other	0	24	13	0
Total	43	53	29	82

The reasons for households obtaining credit are shown in Table 11. Purposes of credit that showed an increase were education costs, which more than doubled over the four years, and purchase of food for consumption which showed over 250% increase from the baseline, the largest increase across the list. Agricultural inputs across all four categories (i.e. inputs for food crops; cash crops; tobacco; and food and cash crops) showed a general decline over the four years.

Table 11: Reasons for Households Obtaining Credit 2010 - 2013

	2010	2011	2012	2013
	n	n	n	n
Business start-up capital	12.0	12.0	3.0	10.0
Dwelling construction/renovation	-	-	-	2.0
Educational costs	6.0	6.0	2.0	13.0

Funeral costs	4.0	1.0	-	1.0
Invest in enterprise	-	2.0	2.0	2.0
Legal costs	2.0	-	-	-
Medical costs	11.0	8.0	5.0	7.0
Pay for maize milling	-	-	1.0	-
Purchase food for consumption	7.0	8.0	7.0	25.0
Purchase inputs for cash crop	-	1.0	1.0	3.0
Purchase inputs for food & cash crops	-	1.0	-	4.0
Purchase inputs for food crop	7.0	8.0	7.0	2.0
Purchase inputs for tobacco	2.0	1.0	-	-
Purchase land	-	3.0	-	1.0
Purchase non-farm inputs	-	-	1.0	9.0
Purchase non-food household items	7.0	1.0	-	2.0
Transport costs	4.0	1.0	-	1.0
Other	2.0	-	-	-
Total	64.0	53.0	29.0	82.0

Natural Capital: Livestock Ownership

In Malawi ownership of livestock is commonly perceived as a sign of wealth. Livestock is a relatively liquid asset as in times of stress animals can be sold or killed to respond to shocks experienced by the household. The example of a chicken being sold to cover transport costs when a household member falls ill was repeatedly mentioned in focus group discussions. However, the seasonality of supply and demand of agricultural commodities is also true of livestock, with prices often double in the lean months as opposed to post harvest months. The declines in ownership in chicken and pigs shown in Table 12 could be linked to responses to such shocks and also consumption smoothing.

Table 12: Mean Number of Livestock Owned by Households 2010 - 2013

	2010	2011	2012	2013
	n	n	n	n
Chicken	9.46	9.41	9.71	7.56
Goat	4.93	4.07	4.84	4.09
Pig	5.13	4.9	1.77	2.71
Cattle/Oxen	2.43	4	2.4	2.55

The monetary value (real and nominal values[14]) of livestock owned by households over the study period is shown in Figure 10, while Figure 11 depicts the mean earnings from livestock sales. There were significant increases in the unit value of livestock. The decreases in the mean numbers of livestock owned could be attributed to two main reasons, households destocking and the prevalence of Newcastle disease (especially for pigs).

Figure 10: Mean Monetary Value of Livestock Owned by Households (MK) 2010-13
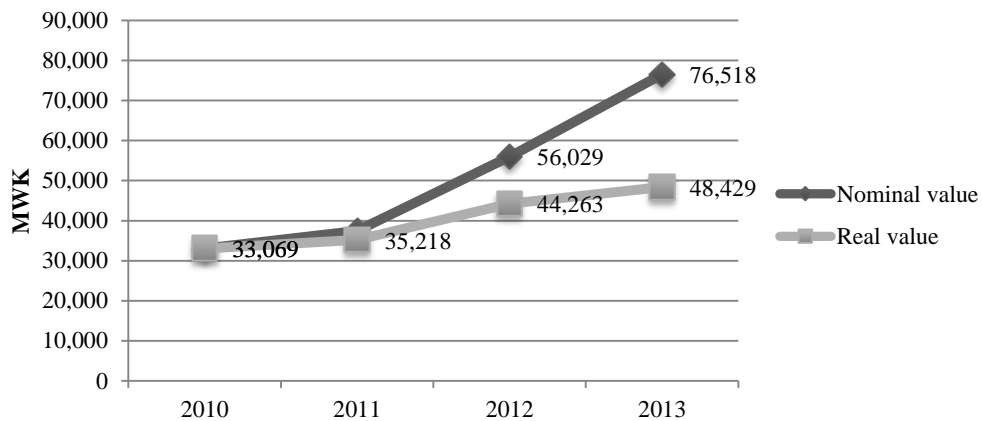
Figure 11: Mean Monetary Earnings From Livestock Sold by Households (MK) 2010-13

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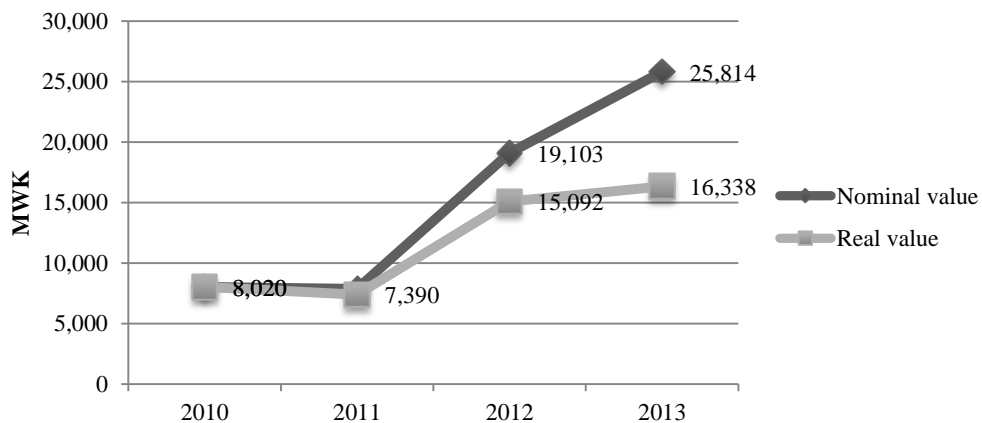
[14] Nominal values were converted to real values using the CPI with 2010 value as the base index.

Section 6: Crop Production as a Livelihood Strategy

Each year respondents were asked a series of questions around crop production and sales. Due to the limitations of using recall methods for production estimates, the timing of data collection was adjusted in an attempt to capture more accurate data. This was done from the 2012 survey round: Table 13 outlines the survey rounds and the data collected.

Table 13: Data Collected by Survey[15]

Survey Round	Production Data	Sales Data
2010	2008-09	2008-09
2011	-	-
2012	2011-12	2010-11
2013	2012-13	2011-12
2014	-	2012-13

Much of the data on crop production are skewed to the right (i.e. positively skewed, not normally distributed), in such cases the median is used in this report as a measure of central tendency along with the minimum and maximum values to depict the spread of the values. Where the data are normally distributed the mean and standard deviation are used.

Land Ownership & Cultivation

The mean land ownership over the four years ranged between 1.16ha in 2010 and 1.06ha in 2013 as shown in Table 14. A paired-samples t-test was conducted to investigate if there were differences between the 2010 and 2013 mean land ownership; results showed no significant difference in land ownership; $t(192) = -1.002$, $p < 0.05$ (two tailed).

Households in Mchinji have larger land holdings than the other two study districts throughout the study period with households in Lilongwe having the smallest land owned. For each year female-headed households (FHH) owned less land in comparison to male-headed households (MHH) with 2013 showing the largest gap. As land ownership is one of the set criteria for establishing the wealth status of households the differences amongst the groups are very visible. However, over time the difference between the low and high groups narrowed with a difference of 2.11ha in 2010 and 1.68ha in 2013. The reasons for this are not clear, a plausible short term reason could be land sales or divesting land to other family members, another factor, although likely

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[15] The rigour of the crop production data from 2011 data collection period was queried due to a number of inconsistencies; therefore it has been omitted from the report.

to be more long term is population growth, something which is predicted to be one of the major challenges for Malawi in the coming years.

Table 14: Land Ownership 2010 & 2013 (ha)

	2010		2013	
	Mean	SD	Mean	SD
Total Sample	1.16	1.16	1.06	0.75
District				
Lilongwe	0.88	0.73	0.83	0.53
Mchinji	1.55	1.28	1.28	0.78
Salima	1	1.29	1.06	0.86
Household Head Sex				
Female Headed HH	1.06	1.02	0.9	0.7
Male Headed HH	1.22	1.23	1.17	0.77
Wealth Groups				
Low	0.66	0.74	0.60	0.44
Middle	1.35	1.01	1.18	0.59
High	2.77	1.96	2.28	0.82

Figure 12 shows the percentage distribution of land cultivated over the study period. As with land ownership, female-headed households cultivate less land than male-headed households, in 2013 FHHs cultivated a mean of 0.83ha compared to 1.09ha for MHH. FHHs are thus disadvantaged in terms of land ownership and cultivation.

A paired-sample t-test was conducted to investigate whether there was a significant difference in proportion of land cultivated allocated to maize between 2010 and 2013: results showed no significant difference; $t(186) = 0.187$, $p < 0.05$ (two tailed).

Figure 12: Distribution of Land Cultivated (ha) 2010 - 2013
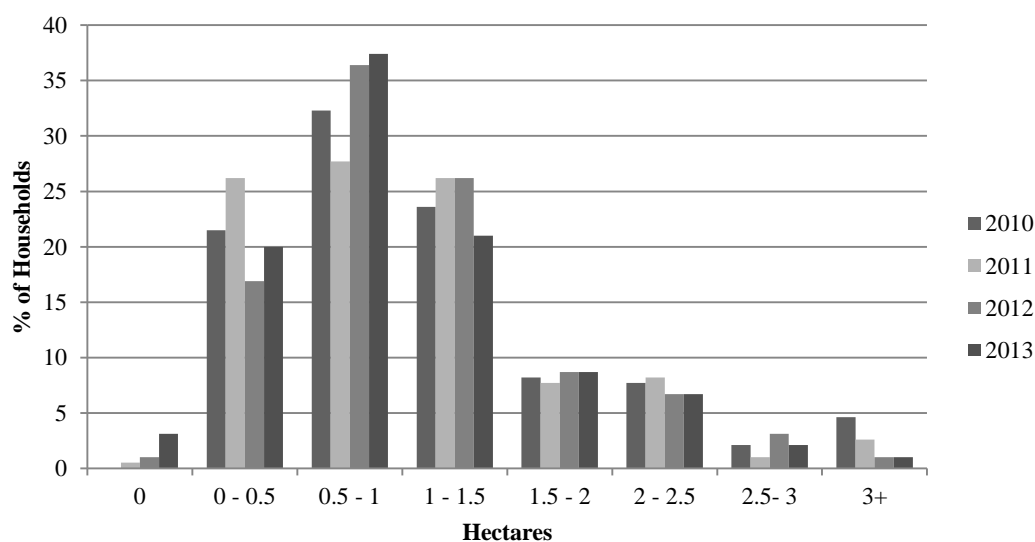
The occurrence of land rentals decreased over the study period. The number of households who rented out land went from 32 households (19.94%) in 2010 to 13 households (6.67%) in 2013, resulting in a 66.54% decrease (Table 15). Similarly, land rented in by households for their own cultivation, went from 59 households (30.26%)

in 2010 to 26 households (13.33%) in 2013, resulting in a 55.94% decrease (Table 16). This is likely due to the increasing rental costs. For land rentals received by households who were renting out land there was a 36.07% increase in the real value received per hectare over the study period (Figure 13), although the increase for those who were renting land for cultivation was only 9.34% (Figure 13).

Table 15: Land Rented Out by Households (2010-2013)

	2010	2011	2012	2013
Rented out (no. of households)	32	26	16	13
Mean hectares rented out (ha)	0.68	0.63	0.51	0.68

Table 16: Land Rented In by Households (2010-2013)

	2010	2011	2012	2013
Rented in (no. of households)	59	49	44	26
Mean hectares rented in (ha)	0.69	0.60	0.67	0.48

Figure 13: Nominal and Real Rentals Paid/Received by Households (2010-2013)
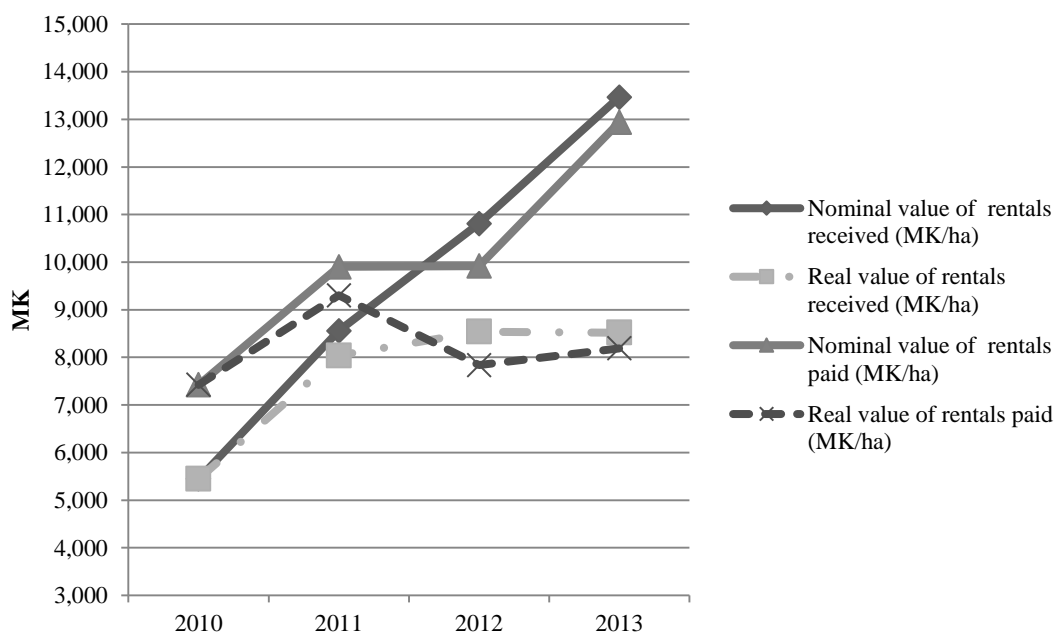
In the 2010 baseline 39 households (20%) left land uncultivated, the mean area of land being 0.75ha. This number fluctuated over the study period with the final study round having 44 households (22.56%) leaving 0.46ha in 2013. The main reasons attributed to leaving land uncultivated over the four study years are shown in Figure 14. The main reason for leaving land uncultivated was labour shortages, be it due to household size and composition or due to illness of a household member. The negative impact that such labour shortages have on livelihood strategies and livelihood outcomes, in particular food security is widely under reported.

Figure 14: Reason Attributed to Leaving Land Uncultivated by Household (2010-2013)
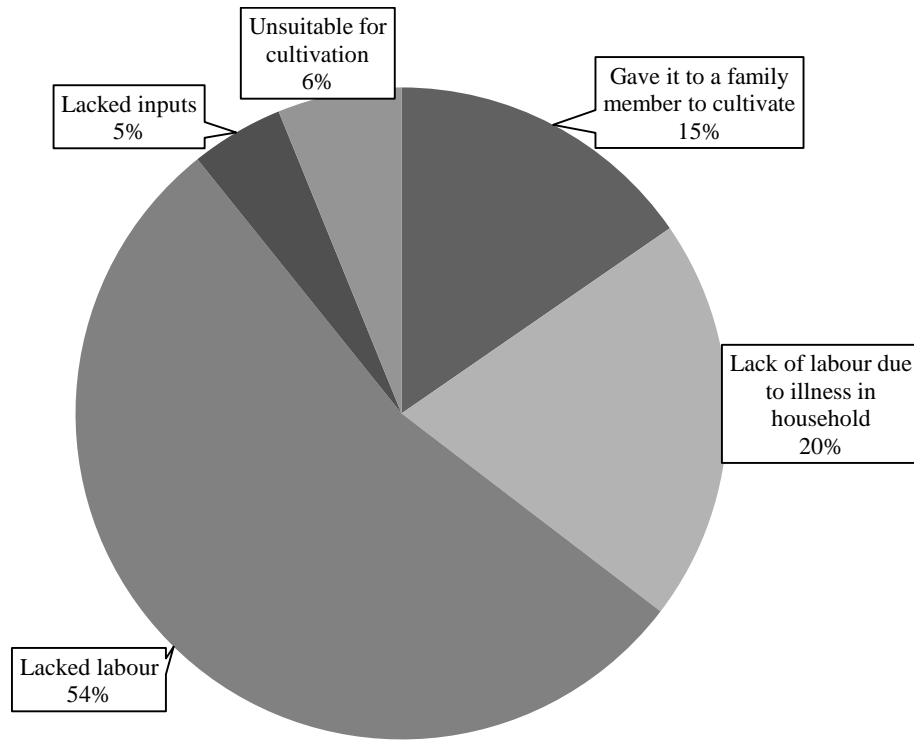
Rainfed Cultivation

Like the majority of farming households in Malawi, the study households are mostly reliant on rainfed crop production as their source of food and income. This harvest typically commences with planting soon after the first rains in October/November (Figure 15). Early harvests or green harvest then commence in February and can last until April. The green harvest is often used as a coping strategy by households who are failing to meet food and/or cash needs during the lean season, these households can sell their prematurely harvested produce at low prices or consume directly.

Figure 15: Seasonal Calendar & Critical Events Timeline (FEWSNET, 2011)
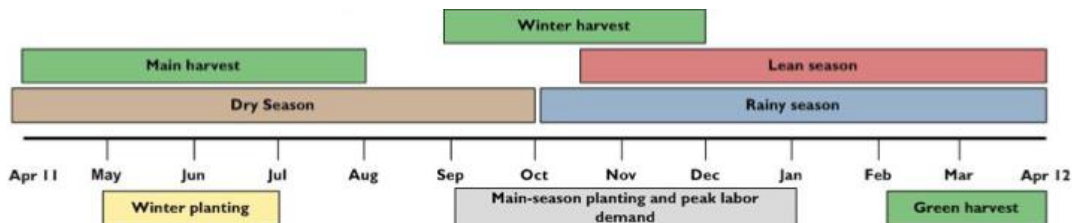
Maize Cultivation

Three types of maize are cultivated in Malawi: local/traditional, hybrid, and composite. Farmers can renew local variety seeds themselves, whereas hybrid varieties need to be purchased every season, and composite varieties (i.e. varieties generated by natural crossings between the local varieties and hybrid varieties developed by modern breeding methods) can be recycled for two or three years (JAICAF, 2008). Due to the low number of households reporting cultivation of composite maize (in the baseline only 3 households reported cultivating composite maze) the analysis combines hybrid and composite varieties as 'improved' varieties. The following section examines the production of local and improved maize varieties over the study period. Results from the household questionnaire and qualitative investigation show a shift in farmers' preferences away from local and traditional varieties towards improved varieties (Table 17).

Table 17: Household Maize Production by Variety

Season	HHs cultivating	Area cultivated	Median quantity harvested	Median yield	Yield range
	N	ha	kg	kg/ha	kg/ha
Local Maize					
2008-09	73	0.4	350	750	99 - 1,750
2011-12	76	0.4	410	1,235	0 – 1,977
2012-13	47	0.4	275	824	247-1,853
Improved Maize					
2008-09	130	0.4	600	1,500	18 - 3,750
2011-12	157	0.4	600	1,483	0 - 3,706
2012-13	160	0.4	500	1,235	62 - 3,954

The main reason reported for this shift from local to improved maize varieties was the promised high yields obtained by the improved varieties and the increased availability of hybrid seed through FISP; however farmers raised concerns about the increasing nominal cost of inputs and the need for in-organic fertiliser due to poor soil fertility. Results show a decline in the median quantities harvested by households and also median yields, particularly between 2011-12 and 2012-13. Reductions in the quantities of fertilizer allocated to the Central Region through the MoAFS Farm Input Subsidy Programme could be impacting yields (Chirwa and Dorward, 2013). However, median quantities of in-organic fertiliser remained unchanged at 50kg (Table 18). During focus group discussions and general observations in field the issue of the 'lack of inputs' (i.e. fertilizer) was repeatedly raised. Discussions were often around how households are unable to afford the fertilisers and also are not getting access to FISP fertiliser coupons; and if they do get access and succeed in sourcing the fertiliser they have to share with many households in the community. In addition to this the persistent and likely worsening issue of soil infertility, in hand with the increased variability of rains due to climate change can all be attributed to the declining maize yields. However, it must be noted that 2012-13 was thought to be a 'good year' in terms of rain fall.

The 2011-12 results for improved maize were taken to investigate the difference in the costs of inputs between those who benefited from fertiliser sourced from FISP versus alternative sources (Table 18).

Table 18: Improved Maize Gross Margins for FISP and Non-FISP Beneficiaries (2011-12)

	Production Scenario (a) Overall		Production Scenario (b) FISP		Production Scenario (c) Non-FISP	
	units/ha	MK/ha	units/ha	MK/ha	units/ha	MK/ha
Gross Revenue						
Average Yield (kg/ha)	1,483		1,483		1,235	
Average price (MK/kg)	60		60		60	
Total Revenue		*88,980*		*88,980*		*74,100*
Variable costs						
Purchased Seed (kg)	19	2,596	13	2,397	20	2,738
Fertilisers (kg)	211	12,272	188	12,243	225	12,383
Labour days	86	21,412	63	15,010	100	25,517
Total Costs		*36,280*		*29,651*		*40,638*
Gross Margin		52,700		59,329		33,462
% Gross Margin		*59%*		*67%*		*45%*

It is difficult to accurately estimate the monetary returns from maize production, due to the seasonality of prices and to the fact that the majority of maize produced in Malawi does not reach the market place as it is kept for home consumption. However, by using Table 18 the gross margins for each of the production scenario can be estimated. There is a 22% difference between the FISP and Non-FISP production scenarios, showing how the subsidy may promote production of maize more for commercial purposes, as opposed to home consumption, which may negate the efforts of farmers producing other crops for commercial purposes (e.g. legumes).

For both varieties the main source of fertiliser was through the government input subsidy program FISP (Table 19). The high frequency of fertilizer sourced through the highly subsidised system has had a considerable impact on the estimated total cost of inputs used for both seasons as the market value of fertiliser during the 2013 data collection was averaging at 15,000MK per 50kg.

Table 19: Distribution of Fertiliser Sources by Maize Variety

	Local Maize		Improved Maize	
	2011-12	2012-13	2011-12	2012-13
ADMARC	21	6	39	29
Co-operative/Association	7	0	17	5
FISP Coupon	34	21	91	88
Homestead Manure	5	4	7	7
Local Market	13	5	20	19
Neighbor/Relative	13	7	11	6
Private Company	10	5	25	23
Trader	11	9	29	49
Total	114	57	239	226

The use of manure and compost was low for both local and improved varieties over the study period, despite the encouragement from government and other extension services providers to produce homemade manure from livestock waste and crop residue (Tables 20 and 21).

Table 20: Distribution of Local Maize Fertiliser Type Applied by Season

| | 2011-12 | | 2012-13 | |
	1st Application	2nd Application	1st Application	2nd Application
Organic	0	1	7	0
In-organic	52	44	26	22
Organic & In-organic mix	16	1	2	0
Total	68	46	35	22

Table 21: Distribution of Improved Maize Fertiliser Type Applied by Season

| | 2011-12 | | 2012-13 | |
	1st Application	2nd Application	1st Application	2nd Application
Organic	11	2	6	4
In-organic	124	91	123	90
Organic & In-organic mix	10	1	3	0
Total	145	94	132	94

There was a larger proportion of households selling improved varieties as opposed to local was (Table 22). Results showed that households sold approximately 25% of their local maize harvests in 2008-09 and 35% in 2011-12. In comparison, households selling their improved maize harvest would sell approximately 42%, this remained unchanged from 2008-09 to 2011-12.

Table 22: Maize Sales by Household

| | Proportion Selling | Quantity Sold (kg) | | Income (MK) | | Price per kg (MK/kg) |
	%	Median	Min - Max	Median	Min - Max	Median
Local Maize						
2008-09	24.66	87.5	25 – 500	2,350	500 – 10,000	27
2011-12	13.16	145	50 – 550	10,500	2,000 –33,000	60
Improved Maize						
2008-09	45.38	250	20 – 2,000	7,350	800 – 80,000	30
2011-12	33.75	250	50 – 2,700	12,000	300 – 80,000	60

Traders were the main buyers of local maize in the 2008-09 season (78%, 14 households), with the predominant reason for choosing such buyers being '*the closest buyer*' (78%, 14 households). Half of those who sold local maize in the 2011-12 season sold to traders, with the main reason again being the close proximity (60%, 6 households), of those who sold local maize. 70% of the transactions were within 5km of the homestead.

As with local maize, the main buyers for improved maize were traders (69.5%, 41 households), and again the main reason for choosing such buyers was *'the closest buyer'* (71.2%, 42 households). 58.5% (31 households) of those who sold improved maize in the 2011-13 season sold to traders, with the main reason again being the close proximity (53%, 28 households): of those who sold local maize 68% (36 households) of the transactions were within 5km of the homestead.

Producing enough maize to meet household consumption needs is the main objective of households that cultivate maize; therefore the production of maize for commercial purposes is rare. The majority of those who do sell maize are for reasons such as meeting immediate or urgent cash needs or due to lack of storage facilities.

Groundnut Cultivation[16]

There was a 6% increase in the total number of households cultivating groundnuts from the baseline season (2008-09) to the final season (2012-13). There was no significant change between mean area cultivated over the study period, however those who were members of the intervention associations for the four years had the highest area of land allocated to groundnut cultivation for each season analysed (Table 23).

Table 23: No. of HHs Cultivating Groundnut (n) & Area Cultivated (ha) by Year

	Number of HHs Cultivating (n)			Area Cultivated (ha)		
	2008-09	2011-12	2012-13	2008-09	2011-12	2012-13
Overall	146	161	156	0.34	0.35	0.36
Association Membership						
Association Member 4yrs	45	53	67	0.42	0.41	0.42
Association Member <4yrs	68	74	52	0.31	0.33	0.35
Never Association Member	33	34	37	0.31	0.3	0.31
Wealth Group						
Low	52	48	54	0.20	0.20	0.20
Middle	77	89	82	0.40	0.34	0.40
High	17	24	20	0.40	0.51	0.40

The mean yield for the overall sample in 2012-13 was 876kg/ha (SD = 637kg/ha); this is in line with national yield estimates (Simtowe et al, 2009, ICRISAT, 2013). However, as the data for quantities harvested is positively skewed, hereafter the median and range will be used. Trends show that there was an increase in the quantities harvested and in yields for groundnuts (Table 24).

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[16] Unless stated otherwise, groundnut quantities reported represent nuts in shell (NIS) as opposed to shelled.

Table 24: Household Groundnut Quantity Harvested (kg) & Yield (kg/ha) by Season

	2008-09		2011-12		2012-13	
	Median	Min-Max	Median	Min-Max	Median	Min-Max
Quantity Harvested (kg)	100	5 - 600	126	11 - 1000	200	10 - 1540
Yield (kg/ha)	371	25 - 1483	435	15 - 2392	696	2 - 2965

*For all seasons extreme outliers were excluded from analysis

Membership of the intervention association is having a positive effect on the members' levels of production for groundnuts (Table 25 and Figure 17). The highest yields reached were in 2012-13 for those who have been members of the associations for the 4 years (927kg/ha). Despite this progress, this still only represents 37% of the estimated potential yields (2,500kg/ha, if using improved seed).

Table 25: Groundnut Yield (kg/ha) by Season & Association Membership

	2008-09		2011-12		2012-13	
	Median	Min-Max	Median	Min-Max	Median	Min-Max
Overall	371	25 - 1483	435	15 - 2392	696	2 - 2965
Association Member 4yrs	412	37 - 1236	605	15 - 1977	927	2 - 2965
Association Member <4yrs	371	25 - 1483	403	89 - 2392	667	99 - 2965
Never Association Member	494	148 - 1236	306	54 - 2224	568	89 - 1824

*For all seasons extreme outliers were excluded from analysis

The stark increase in groundnut yields over the study period can probably be attributed to favourable weather conditions for groundnuts in the 2012-13 season, the promotion of double planting and the culmination of the training and extension support farmers have been receiving around groundnut management over the study period. A Kruskal-Wallis Test revealed there was a statistically significant difference in groundnut yields for all association membership groups in the 2011-12 season with a p value of less than 0.05 ($p = 0.02$). However, the same test for both the 2008-09 season and the 2012-13 season and the association groups revealed there was no statistical significance ($p = 0.68$) and ($p = 0.08$).

Figure 16: Groundnut Yield (kg/ha) by Season & Association Membership
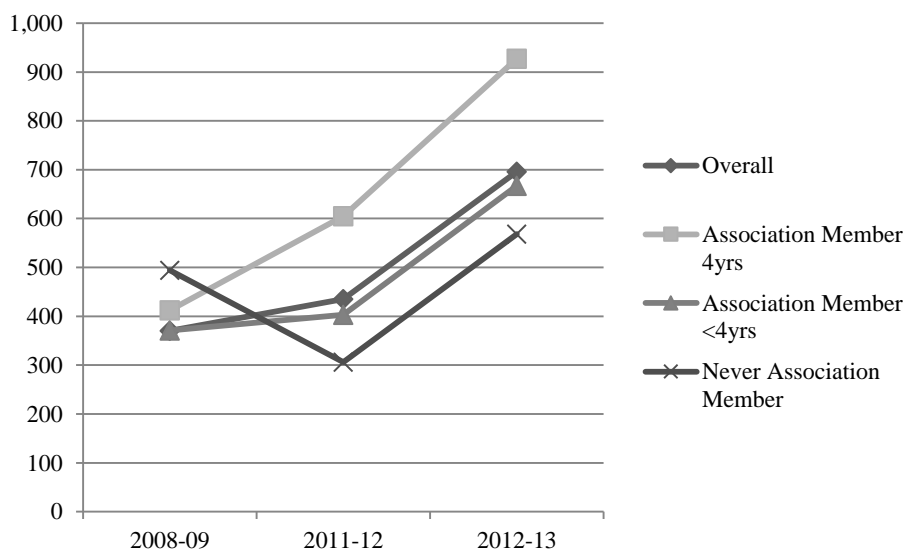
Despite this increase over the study period, as noted earlier, the yields remain persistently low: this can be attributed to the recycling of seed and use of low-yielding varieties, infertile soils, pest and disease attack, competition for labour with other crops, increased variability of rains, and low levels of knowledge and skills.

With regard to the recycling of seed and use of low-yielding varieties, the number of households using improved groundnut seed remains low with 26% of households using some type of improved seed in the baseline season, 37% in the 2011-12 season and 23% in the 2012-13 season. For those who used new seed, as opposed to recycling, availing of groundnut seed on credit was the most common source of improved groundnut seed, however levels of seed on credit remained low with only 14 (9%) households that cultivated groundnuts in the 2012-13 season using seed on credit (Table 26).

Table 26: Source of Purchased Seed

	2011-12	2012-13
FISP Coupon	0	3
Local Market	10	6
Neighbor/Relative	13	7
NGO	2	0
Private Company	3	0
Seed on Credit	25	14
Trader	7	3
Total	60	33

In addition to the recycling of seed and use of low-yielding varieties, the use of fertiliser, both organic and in-organic, is not practiced by farmers. In the 2012-13 season no households cultivating groundnut reported using fertiliser in comparison to the 2011-12 season when two households reported use of fertiliser.

The main cost when cultivating groundnuts is labour. For those households who hired labour (27 in 2011-12, 45 in 2012-13) the median cost was 4,500MK (min = 700MK, max = 65,000MK) and 5,000MK (min = 100MK, max = 35,000) for the 2011-12 and 2012-13 seasons respectively.

Groundnuts are a relatively labour intensive crop with the majority of the work done by women and children. Groundnuts are traditionally seen as a woman's crop, however as there are increased efforts to commercialise the crop this view is waning, but unfortunately this has not resulted in a more equal division of labour for the crop. Focus group discussions in all three study areas reported how women mainly carry out the harvesting, drying and shelling. Both men and women do the land preparation, weeding and banking/ridging, although many women complained that the majority of this work also tends to be done by the women. When it comes to marketing men typically take control as with other crops.

Responses to the questions relating to the decision making for the planting, consumption and sale of the crop confirmed this picture. For male-headed households who cultivated groundnut in the 2012-13 season (94 households), 58% reported the planting decisions to be made by the male head, 34% by both the male head and the female spouse, and 7% by the female spouse. This breakdown was consistent with consumption and sales decisions.

Overall the number of households selling groundnuts increased over the study period by 20% (Table 27). There was a large shift in the number of those choosing to not go through the shelling process and sell Nut in Shell (NIS) as opposed to the shelled kernel. For the majority of groundnut varieties the shell accounts for approximately a third of the overall weight.

Table 27: Household Groundnut Sales

| | % Selling | % of Sales | | Quantity Sold (kg) | |
	Overall	NIS	Kernel	NIS	Kernel
2008-09	54.87	-	-	-	75
2010-11	61.03	55.46	44.54	110	120
2011-12	68.21	94.74	7.52	109	122
2012-13*	78.57	66.94	43.80	-	-

*Sample size = 154

Despite the increased quantities harvested over the study period the quantities sold by households remained constant (Table 27). There was a significant shift in farmers selling NIS as opposed to shelled kernels in the 2011-12 season with 126 (92.65%) farmers selling NIS and 10 (7.35%) selling shelled kernels in contrast to 66 (55.46%) NIS and 53 (44.54%) kernels in 2010-11. The difference in distance travelled to sell either NIS or shelled kernel form in the 2011-12 season was 2.07km, with NIS at 0.4km away and shelled kernels 2.4km away. During the 2013 focus group discussions this difference was investigated and participants revealed that selling NIS at farm gate to

informal buyers was becoming increasingly popular. Two main reasons were reported to be causing this: the reduction in labour hours spent on shelling, and the need for cash, which informal buyers take advantage of. In addition to this, is the emergence of ExAgris as a buyer of NIS. The participants revealed prices received at the farm gate were considerably lower than those of any other buyer; the travelling buyers would go from door to door on bicycles at times when cash was needed and it was too early to sell crops.

In 2011-12 there was little difference in the proportion of male-headed households and female-headed households and which form they sold their groundnuts in, although there was some difference in 2010-11 (Figure 18).

Figure 17: Proportion of Groundnut Sales by Gender
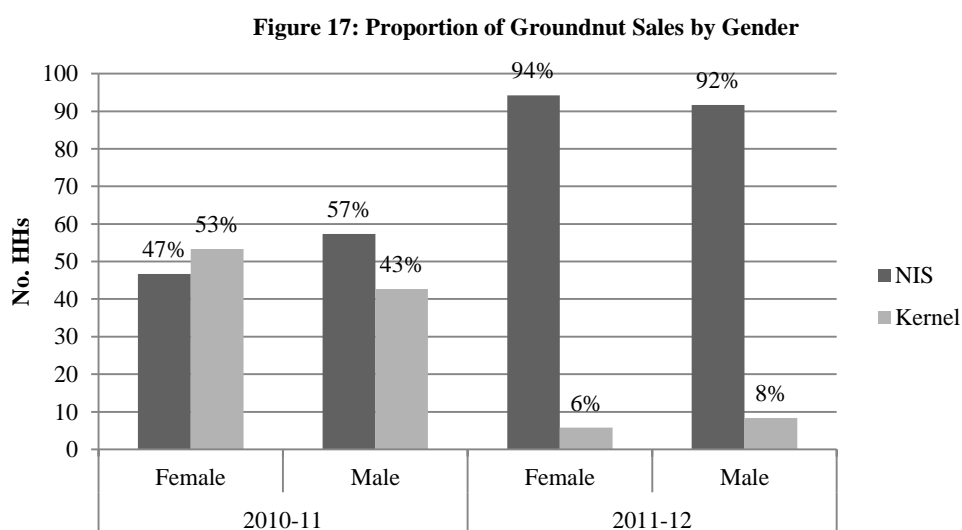
The main buyer of NIS is the informal trader with ExAgris increasing its share in the market in 2011-12 (Figures 19 and 20).

Figure 18: Proportionate Share of Buyers for NIS sold (2010-11)

ExAgris
Local Market
Neighbour/Relative
Trader
Cooperative/Association

3% 6% 2%
17%
73%
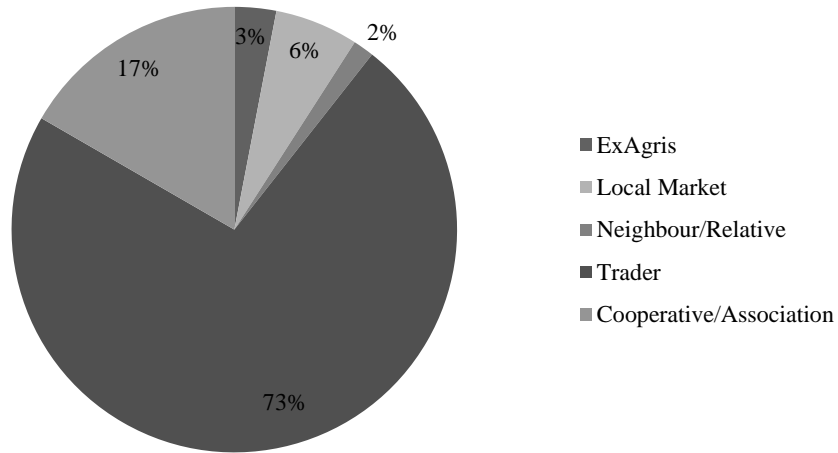
Figure 19: Proportionate Share of Buyers for NIS sold (2011-12)

ExAgris
Local Market
Neighbour/Relative
Trader
Cooperative/Association

2%
20%
6%
4%
68%
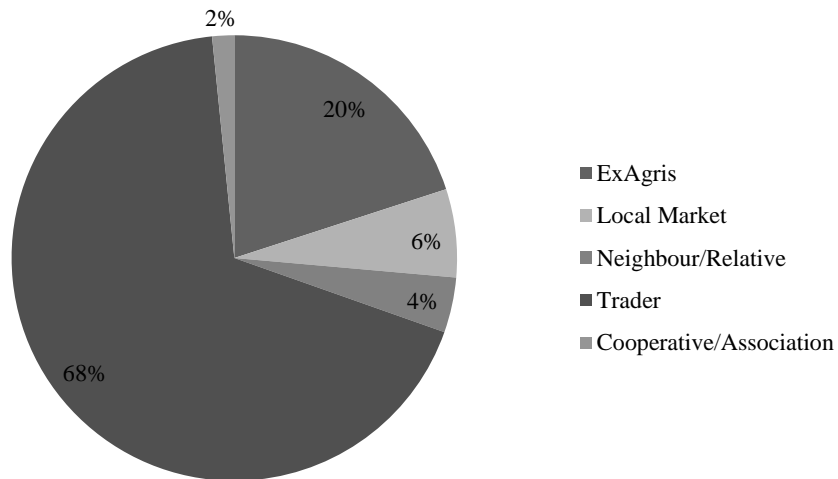
The reason for households selling NIS to their first buyer is mainly linked to the distance needed to travel for the transaction. However, as shown in Figures 21 and 22 the reasons are more diversified in 2011-12 compared to 2010-11 sales, with the prevalence of 'best price' as

an explanation showing an increase. This is likely due to the emergence and/or increased share in the marketplace of companies such as ExAgris and organised buyers like NASFAM.

Figure 20: NIS Sales (2010-11) Percentage Breakdown of Reason for Selling to First Buyer

Legend:
- In need of cash (i.e. distress sales)
- Other
- Contracted/promised to sell to buyer
- Closest buyer
- Best price
- Always sell to buyer

X-axis categories: Trader, ExAgris, Local Market, Cooperative/Association (inc. NASFAM), Neighbour/Relative
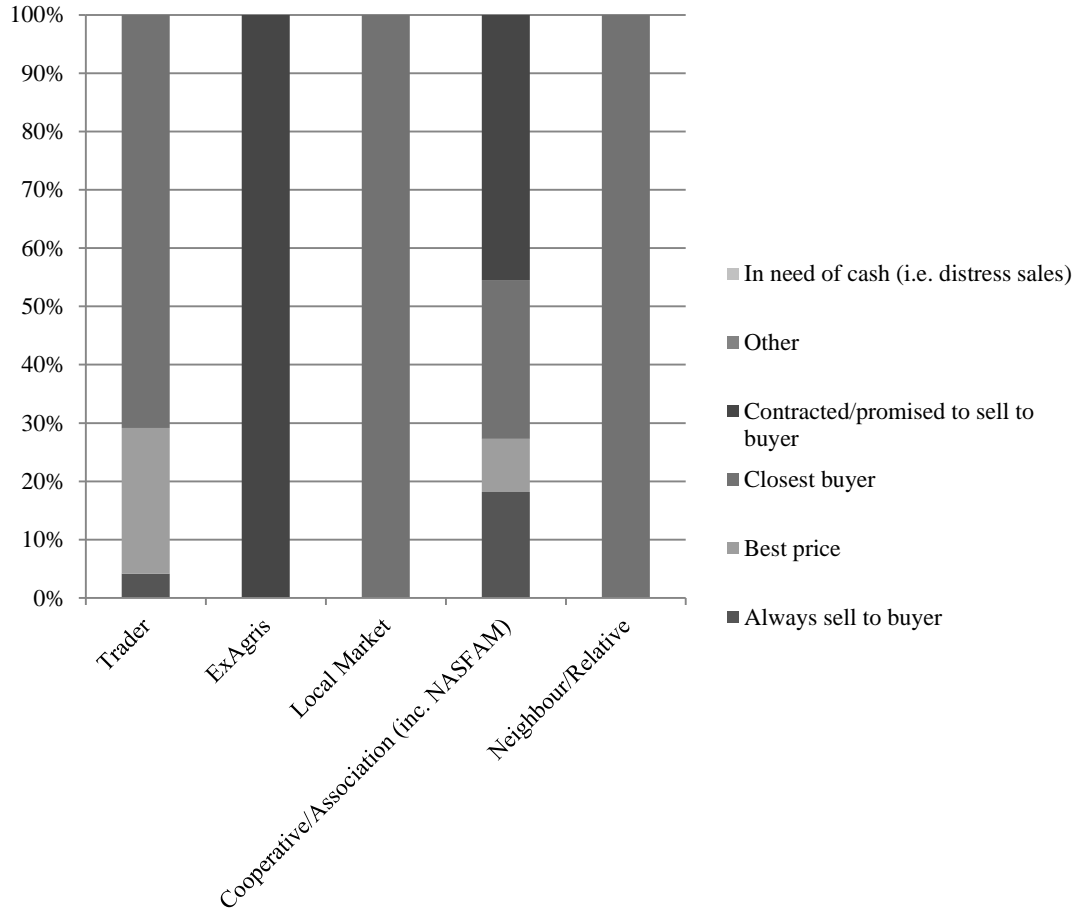
Figure 21: NIS Sales (2011-12) Percentage Breakdown of Reasons for Selling to First Buyer

41
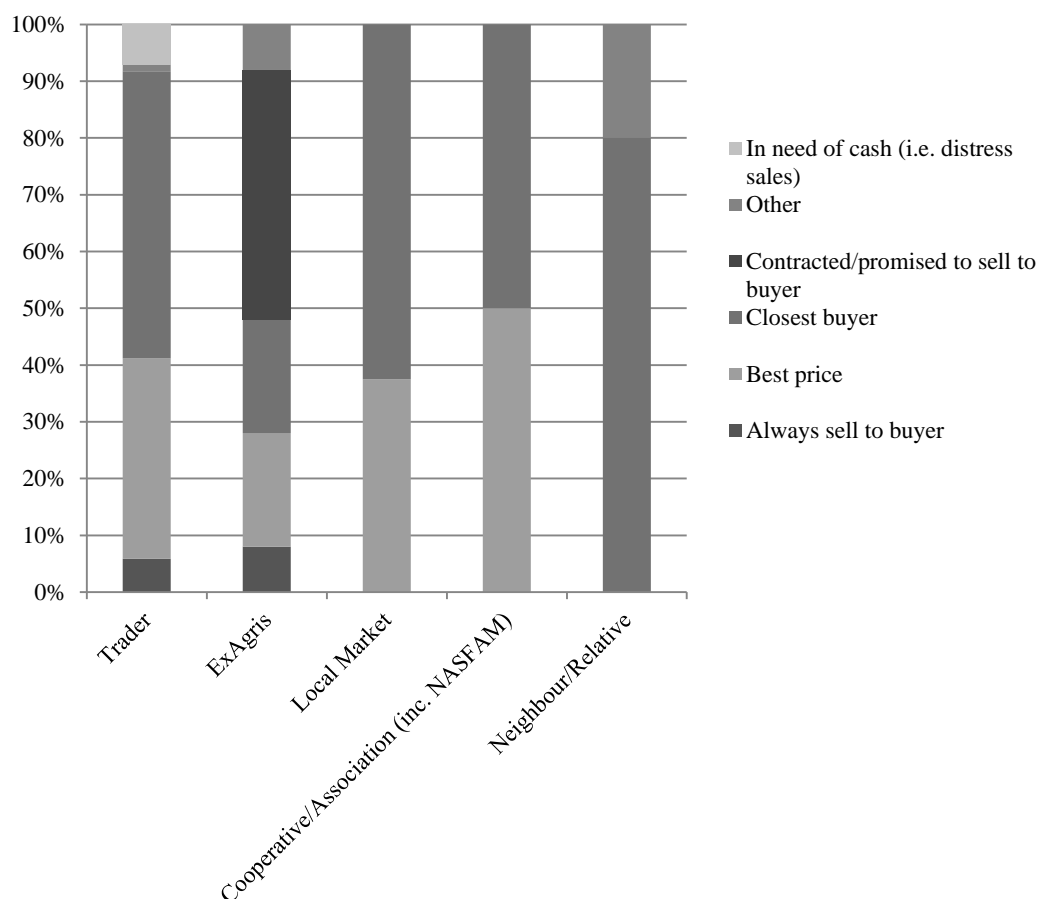
The average price received for groundnut sales increased by 80% between 2008-09 and 2011-12 (for Kernel). The difference between price per kg for NIS and kernel is comparable to the NIS to kernel ratio of 1:0.66. When that ratio is applied, there was a 2.5% difference in the amount received for Kernel in 2010-11, and a 4.8% difference in 2011-12 (Table 28).

Table 28: Groundnut Sale Prices Received by Households

	Income received		Price per Kg	
	NIS	Kernel	NIS	Kernel
2008-09	-	5,000	-	65
2010-11	7,950	15,400	77	120
2011-12	12,250	25,000	117	189

These figures are in line with the market prices collected during fieldwork. The groundnut prices were adjusted to real prices using the consumer price index (Malawi NSO, 2014). Figure 23 shows a steady climb in the real prices for groundnuts sold in both NIS and kernel form.

Figure 22: Groundnut Sale Prices Adjusted to Real Prices
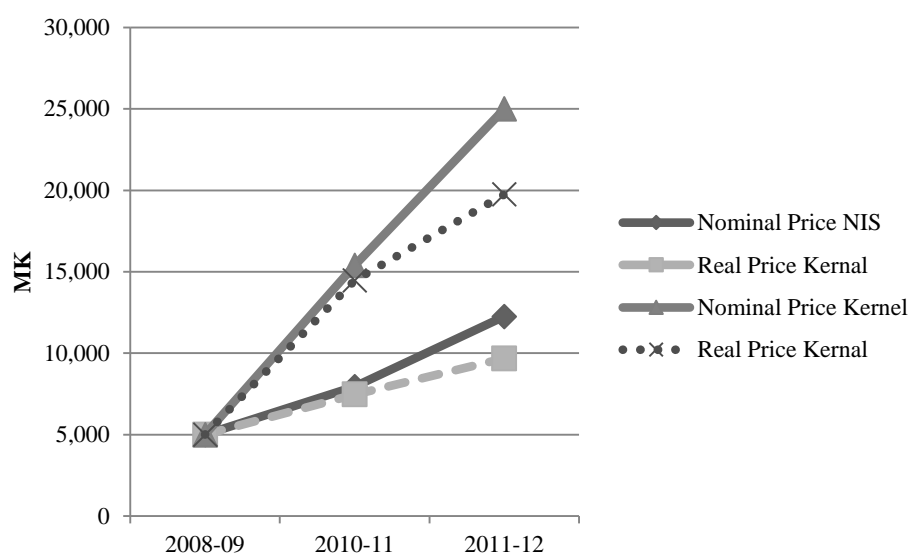
Soya Bean Cultivation

Like groundnuts, soya bean has been heavily promoted through the FISP and also agricultural and nutritional development programmes by governmental departments and NGO actors. Table 29 shows a rise and fall in the number of households cultivating soya bean during the study period, peaking at 61 (31.28%) households in the 2011-12 season. For all years households that were never association members during the study period comprised the lowest proportion of those who cultivated soya bean. This can be attributed to the promotion of soya bean through the associations and the availability of improved seed on credit through the associations. The mean area cultivated by soya bean did not change significantly over the study period and across the groups.

Table 29: No. of HHs Cultivating Soya Bean (n) & Area Cultivated (ha) by Year

	Number of HHs Cultivating (n)			Area Cultivated (ha)		
	2008-09	2011-12	2012-13	2008-09	2011-12	2012-13
Overall	26	61	50	-	0.23	0.22
Association Member 4yrs	8	27	20	-	0.24	0.15
Association Member <4yrs	15	28	22	-	0.22	0.25
Never Association Member	3	6	8	-	0.27	0.32

Njira et al (2013) found mean yields for soya bean of 700kg per ha (based on 2006 -2008 data): this level was reached by the group who were association members for 4 years in the 2012-13 season. However, these yields are still far below the potential 4,000kg per ha for soya bean (Table 30) (Njira et al, 2013). The decline in the yields for some groups can be linked to the decrease in the amount of fertiliser used from the 2011-12 to the 2012-13 seasons, which can be attributed to farmers' disappointment in the price received at market in the previous season.

	Quantity Harvested (kg)			Yield (kg/ha)		
	2008-09	2011-12	2012-13	2008-09	2011-12	2012-13
Overall	100	51	70	-	474	494
Association Member 4yrs	75	50	83	-	494	741
Association Member <4yrs	150	60	60	-	455	351
Never Association Member	100	52	120	-	247	432

*Two extreme outliers for 2011-12 were removed from analysis

In the 2011-12 season a total of 19 (31%) households reported using fertiliser on their soya plot. 13 households reported using one type of fertiliser (12 in-organic, 1 organic) and 6 households reported using two types of fertiliser (all in-organic). The sources reported for the fertiliser included intervention association (13 households), ADMARC (1 household), local market (2 households), FISP coupon (2 households), homestead manure (1 household). Fertiliser costs for the 2011-12 season ranged between 2,500 and 11,750 MK, with the mean quantity of all types of fertiliser used 25kg.

In contrast to this, in 2012-13 there was a 62% decline in the number of households reporting using fertiliser for their soya plot. Of the 6 (12%) households, 5 reported using one type of fertiliser (all in-organic) and 1 reported using two types of fertiliser (in-organic). Of the 6 instances of fertiliser use 5 of these were sourced through the intervention associations, the other through an agro trader. Fertiliser costs for the 2012-13 season ranged between 600 and 6,000 MK. The mean amount of fertiliser used in the 2012-13 season was 7.7kg.

The majority of the 61 households who cultivated soya bean in 2011-12 used improved/purchased seed (36 households, 59%), this seed was likely to be recycled in the 2012-13 season as 33 (65%) reported using recycled seed and 18 (35%) purchased/improved. The main source of the purchased seed for the 2011-12 season was the intervention association (16 households), followed by traders (10 households), neighbours/relatives (5 households), the local market (3 households), and a private company (1 household). The source for the soya bean seed purchased in the 2012-13 season varied from the previous season with the local market being the main source (6 households), followed by traders (4 households), intervention association (4 households), neighbour/relative (3 households) and FISP coupon (1 household).

Like groundnut, for soya the main cost is labour, although it is not as demanding on labour. For those households who hired labour (9 households in 2011-12, 8 households in 2012-13) the median cost was 4,000MK (min = 300MK, max = 13,440MK) and 1,800MK (min = 600MK, max = 2,000) for the 2011-12 and 2012-13 seasons respectively.

Soya like groundnut is becoming a popular cash crop, however the price for soya is seen by farmers as relatively more prone to price fluctuations. This can be related to the arbitrary national policy, in particular the export policy, and the influence of the poultry feed industry and grain traders and their influence on ad hoc export bans.

Table 31: Soya Bean Sales per Household by Season

	n	Quantity Sold (kg)	Price Received (MK)	Price per kg (MK/kg)
2008-09	20	100	4,750	55
2010-11	36	70	3,800	76
2011-12	48	52	8,500	137

The co-operative/association went from being the main buyer in 2008-09 to not buying at all in the 2011-12 buying season despite the increase in soya bean sales. In all the association focus group discussions and key informant interviews the main constraint to the associations' growth was finding markets where they could sell their goods collectively. ExAgris' share in the soya bean market in the studied areas is increasing; this is due to the promotion of soya through the ExAgris-facilitated associations.

Figure 23: Proportionate Share of Buyers for Soya Bean by Season
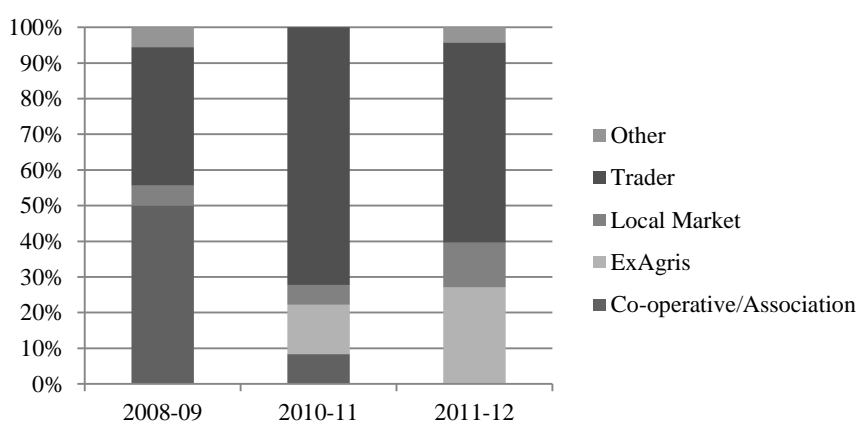
The main reasons attributed to selling to the first buyer by households over the study period are similar, with slight increases in the number of households obtaining the best price from their first buyer. The occurrence of contracts is also increasing; it is most likely that these contracts are of an informal nature as there is as yet no policy or regulation for contract farming in Malawi[17].

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[17] A policy for contract farming in Malawi is said to be in draft form and has been in this state with several years without real commitment from relevant stakeholders on driving it forward and finalising the policy.

Figure 24: Proportionate Share of Reasons for Selling Soya Bean to First Buyer by Season
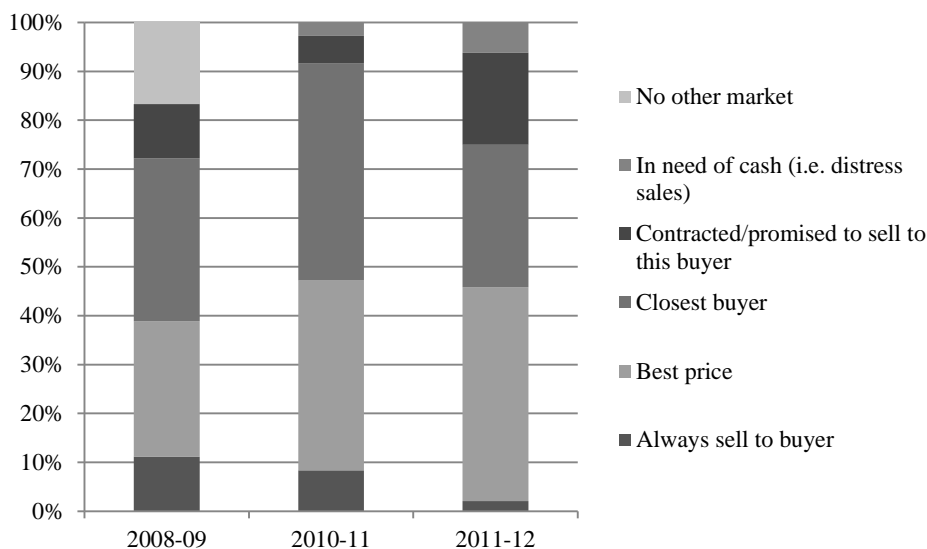
The distance travelled by farmers to sell soya bean was 1.5km (min = 0km, max = 10km) in 2010-11 and 1km (min = 0, max = 25) in 2011-12.

Tobacco Cultivation

Despite the national growth in the area allocated and yields achieved for tobacco (FAOSTAT, 2013, MoAFS, 2012) the study sample shows a decline in the number of farmers growing tobacco from 86 in the baseline season to 21 in the final study season in 2012-13, a 75.6% drop (Table 32). Almost all the tobacco grown was burley.

Table 32: No. of HHs Cultivating Tobacco (n) & Area Cultivated (ha) by Year

	Number of HHs Cultivating (n)			Mean Area Cultivated (ha)		
	2008-09	2011-12	2012-13	2008-09	2011-12	2012-13
Overall	83	23	21	-	0.37	0.41
Association Member 4yrs	32	10	8	-	0.54	0.40
Association Member <4yrs	37	10	10	-	0.23	0.41
Never Association Member	17	3	3	-	0.29	0.40

The cause of this decline in the study sample can be seen in the poor harvests achieved in the 2008-09 season with 200kg per household and the 2011-12 season with 300kg per household. Farmers expressed frustration with tobacco cultivation throughout the 2012 and 2013 data collection periods. The remaining farmers growing tobacco in 2012-13 are predominantly from the middle (11 households, 38%) and high (8 households, 38%) wealth groups. The low prices, high cost of production (in particular fertiliser costs), transaction costs associated with getting their produce to the auction floors - where often the farmer is at the mercy of the buyer -

increasing variability of rains, and the growth of alternative cash crops (e.g. legumes) are putting farmers off cultivating tobacco.

Table 33: Quantity of Tobacco Harvested & Yield

	2008-09	2011-12	2012-13
Quantity Harvested (kg)	200	300	400
Yield (kg/ha)	-	741	988

Fertiliser use for tobacco declined between the 2011-12 and 2012-13 seasons with 74% (17 households) applying one or more fertilisers in 2011-12, in comparison to 67% (14 households) in the 2012-13 season. Almost all farmers using fertiliser applied in-organic fertiliser.

However, there was a sharp increase in the price of tobacco in the 2011-12 but this still did not meet the average prices reported by the Tobacco Association of Malawi which for 2012 was US$2.45 per kg of all types of tobacco (790.78MK/kg) (Table 34). This price increase can be attributed to some of the economic reforms (e.g. devaluation and the return of major donors) that occurred mid-2012 and/or the low national production levels which led to a supply/demand imbalance in favour of the farmers that produced.

Table 34: Tobacco Sales by Season

	Quantity Sold (kg)	Price Received (MK)	Price per kg (MK/kg)
2008-09	200	27,000	145
2010-11	300	30,000	102
2011-12	300	120,000	448

*Two extreme outliers not included in 2008-09 analysis

As tobacco is sold through auction floors the main buyers reported were 'auction floors', with 90% and 92% selling to the auction floors for the 2010-11 and 2011-12 season respectively, the only other buyers reported were traders. Farmers in Lilongwe face the lowest transport costs as the median distance to point of sale was 30km, in comparison to Mchinji which was 150km and Salima 137km.

Cotton Cultivation

The number of households cultivating cotton over the study period ranged between 21 and 25 (11% - 15%) (Table 35). Cotton cultivation is predominantly in the lakeshore district, Salima in particular: of all the instances of cotton being cultivated in the study sample over the three seasons investigated (75 households), all were from Salima, apart from one who was from Mchinji.

Table 35: Cotton Production by Season

	2008-09	2011-12	2012-13
Number of HHs Cultivating (n)	21	29	25
Mean Area Cultivated (ha)	-	0.37	0.33
Quantity Harvested (kg)	200	130	86

Yield (kg/ha)	-	643	494

Figures for cotton sales are difficult to interpret as the sample size for those cultivating is quite small (Table 36). Like tobacco, the cotton market is relatively more organised than that of consumption cash crops (e.g. groundnut and soya bean). The majority of cotton sales over the study period were to private companies on the basis of contracts with farmers through cotton cooperatives or associations.

Table 36: Cotton Sales by Season

	Quantity Sold (kg)	Price Received (MK)	Price per kg (MK/kg)
2008-09	200	5,215	26.07
2010-11	230	27,000	117.39
2011-12	200	27,350	136.75

Dry Season/Wetland (Dimba) Cultivation

It is common practice for Malawian smallholders to cultivate small gardens during the dry season; they typically cultivate vegetables and small amounts of maize to help alleviate the hunger gap. It was reported by the baseline researcher that the Village Elders in Mchinji said that prior to 2001 maize was almost never grown in Dimba gardens but as a result of the famine of 2001 NGOs working in Malawi as well as the Malawian government began promoting the Dimba cultivation of maize. Yields are generally higher in Dimba soil, as the heavy rains (associated with the rainy season) have not yet washed the nutrients from the soil. As rainfall is almost zero during Malawi's dry season, Dimba crops must be irrigated in some way. Dimba cultivation was almost non-existent in the villages in the Salima study areas. Reasons for this include a shortage of dambos (naturally occurring marshland) in the region, or where they do occur they often coincide with sandy soils, which are not good for dimba cultivation.

Dimba cultivation of vegetables is generally for household consumption and meeting basic cash needs. Table 37 shows the main types of dimba crops grown by households in the 2008-09 season and the 2011-12 season. The median area of maize crops (both improved and local) cultivated on dimba land in the 2011-12 season was 0.20ha, with the median area for other crops 0.10ha.

Table 37: Households Cultivating Dimba Crops (% of all households)

	2008-09		2011-12	
	n	%	n	%
Local Maize	12	6.15	17	8.72
Hybrid Maize	80	41.03	86	44.10
Green Veg	68	34.87	44	22.56
Beans (inc. Soya Bean)	31	15.90	14	7.18
Potato	8	4.10	14	7.18

Summary

Crop production is not only a source of income but also food and labour for the studied households. Over the study period households have altered their cropping strategies towards food cash crops (i.e. groundnut and soya) as opposed to non-food cash crops (i.e. tobacco). Table 38 shows how the number of households cultivating one cash crop only has increased with groundnut cultivation comprising the largest share of households in the 2012-13 season. Over the study period those cultivating groundnut only increased by 44% (39 households). However, this increase can be linked to the decline in households choosing the groundnut and tobacco combination which declined by 85% (49 households).

Table 38: Household Crop Combinations by Season

	2008-09	2011-12	2012-13
1 Cash Crop			
Cotton	5	8	6
Groundnut	49	77	88
Soya	1	0	3
Tobacco	10	2	0
	65	87	97
2 Cash Crops			
Cotton & Groundnut	10	12	13
Cotton & Tobacco	0	1	1
Groundnut & Soya	14	46	31
Groundnut & Tobacco	58	10	9
Soya & Tobacco	2	0	1
	84	69	55
3 Cash Crops			
Cotton, Groundnut & Soya	0	6	5
Cotton, Groundnut & Tobacco	6	1	0
Groundnut, Soya & Tobacco	9	8	10
	15	15	15
4 Cash Crops			
Cotton, Groundnut, Soya, & Tobacco	0	1	0
No Cash Crop	31	23	28

The level of crop diversity of households appears to be influenced by the wealth group of the household (Table 39). Those households cultivating only one cash crop, in particular groundnut, which is a crop that requires relatively low financial investment, and the no cash crop category, were predominantly comprised of households in the low and middle wealth groups; whereas the majority of the households in the high wealth group had 2 or more cash crops, of which groundnut, cotton and tobacco were the most frequent for the baseline year followed by a shift towards food crop combinations. These shifts are likely due to the increased market opportunities in the study area with buyers such as ExAgris's growing demand for legumes like groundnuts and soya. With this, declines in tobacco production are a result of farmers growing frustration with the crop and unreliable prices at the auction floors. Declines

in cotton production are harder to interpret due to the small sample size and how it is only grown in one of the study areas - Salima.

Table 39: Household Crop Combinations by Wealth Group

	2008-09			2011-12			2012-13		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
1 Cash Crop									
Cotton	3	2	0	3	4	1	4	2	0
Groundnut	27	22	0	31	39	7	41	43	4
Soya	1	0	0	0	0	0	2	1	0
Tobacco	5	5	0	1	0	1	0	0	0
	36	29	0	35	43	9	47	46	4
2 Cash Crops									
Cotton & Groundnut	2	4	4	2	7	3	1	8	4
Cotton & Tobacco	16	0	0	0	1	0	0	0	1
Groundnut & Soya	5	8	1	13	25	8	9	18	4
Groundnut & Tobacco	0	36	6	1	7	2	1	6	2
Soya & Tobacco	0	2	0	0	0	0	0	1	0
	23	50	11	16	40	13	11	33	11
3 Cash Crops									
Cotton, Groundnut & Soya	0	0	0	0	5	1	1	3	1
Cotton, Groundnut & Tobacco	1	2	3	0	1	0	0	0	0
Groundnut, Soya & Tobacco	1	5	3	1	4	3	1	4	5
	2	7	6	1	10	4	2	7	6
4 Cash Crops									
Cotton, Groundnut, Soya, & Tobacco	0	0	0	0	1	0	0	0	0
No Cash Crop	22	9	0	19	2	2	19	9	0

Section 7: Non- and Off-Farm Livelihood Strategies

The main source of income (including in cash and in-kind income) in the study areas for households was crop production; however casual labour and non-agricultural enterprises were also important sources of income at various stages of the calendar. The diversification of rural economies in SSA is a long standing recommendation by many experts and organisations. The ASWAp and MGD policies[18] both highlight and prioritise the diversification of household income so as to reduce the reliance on crop production and vulnerability to exogenous shocks

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[18] The Agricultural Sector Wide Approach (ASWAp) and the Malawi Growth and Development (MGD) policies are discussed in the Howard Dalzell's paper *"Constraints faced by farmers and possible policy remedies"*

such as climate change and price fluctuations. Paid employment, migration and remittances and non-agricultural enterprises were investigated amongst the study sample through the household questionnaire, focus group discussions and key informant interviews, and findings are discussed in the following section.

Paid Employment

The number of households gaining an income from paid work in the previous 7 days over the study period showed an increase for the 2011 and 2012 study rounds, and dropped back to 36% of the overall sample in 2013 (Table 40). The lowest wealth group and female-headed households showed the largest proportions of households reporting paid work across the study period (Table 40). During focus group discussions group participants discussed how the most vulnerable were more reliant on ganyu labour as a source of cash and food; however male-headed households were in a stronger position typically as these households have greater labour capacity than female-headed households.

Table 40: HHs with Members Carrying out Paid Work in the Last 7 Days
(Overall, by Wealth Group & by Gender of HH Head)

	Overall		Low		Middle		High		MHH		FHH	
	n	%	n	%	n	%	n	%	n	%	n	%
2010	70	36	33	40	33	35	4	24	47	41	23	29
2011	103	53	43	58	50	52	10	40	58	50	45	57
2012	109	56	50	70	47	49	12	43	63	54	46	58
2013	70	36	33	42	30	32	7	33	38	33	32	41

The amount of hours worked by households over the 7 days ranged between 0.5 to 126 hours: the median amount of hours worked by households was 8 hours for 2011, 2012 and 2013. The median amount of hours worked for the baseline was 5 hours. Casual labour can be paid in cash or in kind: where the person was paid in kind the estimated cash value was asked. The median income earned by households fluctuated over the study period (Figure 26). A drop in real wages during the 2012-13 cropping season was reported as being a result of rising maize prices which have been affected by devaluation and consequential export and inflationary pressures (Dorward et al, 2013). However, causes for the other fluctuations were not determined.

Figure 25: Median Income Received by Households
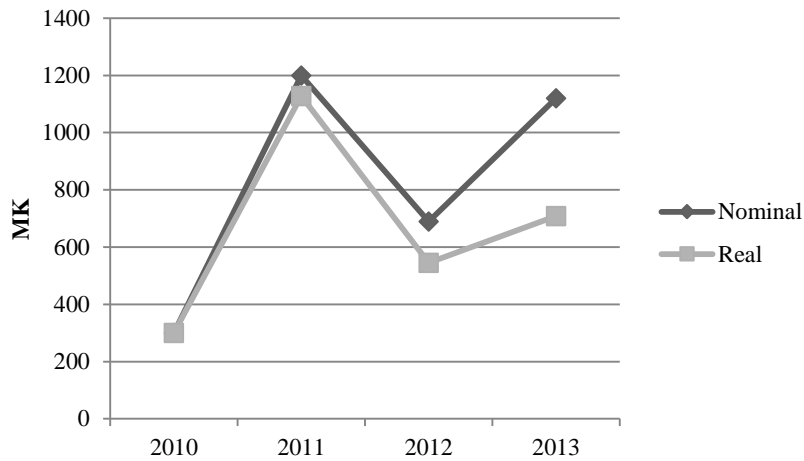
In each study round there was a clear difference in the wage rates received by female headed households and male headed households (Figure 27). The difference in wage rate could be due to the nature of the work carried out by men which tend to be more physically demanding tasks, whereas women typically are seen to carry out tasks that are seen to be physically, less demanding, such as weeding and post-harvest processing. It is clear that MHHs have numerous advantages with regard to casual labour in comparison to FHHs.

Figure 26: Median Hourly Rate by Gender of Household Head (MK/hr)
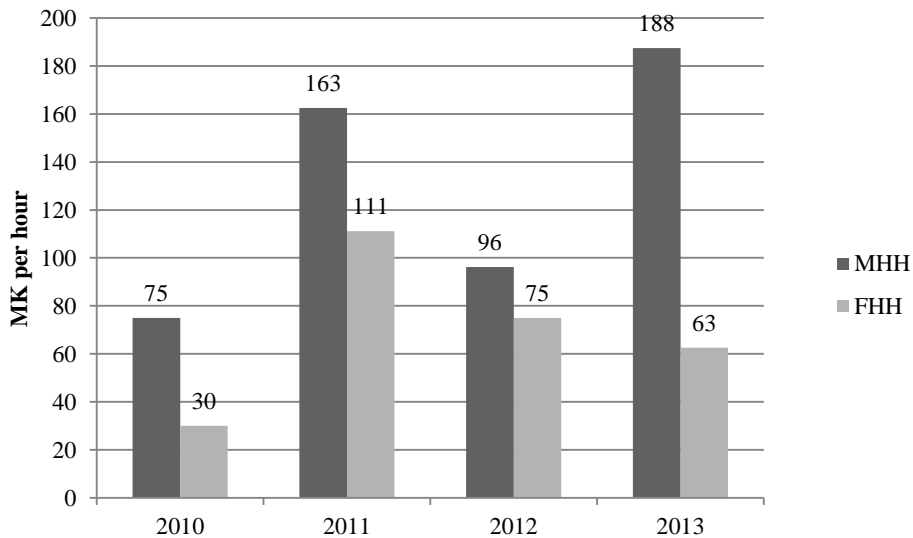
The most common type of paid employment or work reported over the four years was agricultural (Table 41). A decline in the sorting and packing of tobacco has been replaced with construction (i.e. making bricks and drawing water to make bricks). The reduction in tobacco sorting and packing is largely due to the decline in the cultivation of the crop over the study period, however the timing of the data collection must also be taken into account - the baseline data collection was between March to May, which is the peak labour demand for the harvesting

and hanging of tobacco leaves, whereas the subsequent data collection periods were around the month of July when tobacco is sent to auction floors.

Table 41: Frequency Distribution of Types of Paid Work

	2010	2011	2012	2013
Agriculture	51	122	125	61
Construction	1	13	12	15
Guard/guarding crops	1	4	2	2
Performing HH duties for others	1	2	2	1
Sorting/packing tobacco	11	3	0	0
Other	5	8	4	4
	70	152	145	83

Casual labour, or 'ganyu' labour, is the most common type of paid work in rural Malawi, especially for subsistence farming households, and is an important income source often used as a coping strategy. Ganyu labour is generally piecework where labourers are given a task (e.g. planting or weeding) and paid on completion of the task. Demand for ganyu labour peaks during the planting season between September and January. At this time, especially for the poorest households, cash tends to be becoming scarce, food stocks are running out, and households need to begin to purchase maize at its highest price. Despite scarcity, cash requirements are at the highest at this time of year also, households need to invest in inputs for planting and there is increased frequency in sicknesses brought on by the rains (e.g. malaria and diarrhoea). Households hiring out their labour often face labour shortages when it comes to planting their own plots, increasing the risk of failed crops or poor yields.

Migration & Remittances

Remittances from migration were not a common source of income amongst the study sample over the study period. The number of households with a household member away for work ranged from 2.6% in 2013 to 13.85% in 2011. Casual labour, agriculture and visiting other family members were the main reasons for migration with the majority being within their home districts.

Non-Agricultural Enterprises

The occurrence of ownership of non-agricultural enterprises was at its highest in 2013 with 63 households after a drop since the baseline (Table 42). Small-scale businesses as a source of income appear to be more prevalent amongst the low and middle wealth groups. This is likely due to the small turnover gained from such small businesses and the limited resources to invest in crop cultivation (e.g. land ownership and labour).

Table 42: HHs with Non-Agricultural Enterprises
(Overall, by Wealth Group & by Gender of HH Head)

	Overall		Low		Middle		High		MHH		FHH	
	n	%	n	%	N	%	n	%	n	%	n	%
2010	55	28	22	18	28	27	5	1	35	41	20	16
2011	36	18	13	10	19	18	4	1	26	30	10	8
2012	36	18	9	6	22	21	5	1	26	30	10	8
2013	63	32	21	17	31	29	11	2	47	55	16	13

The female groups spoke recurrently about the start-up of small businesses and how it has grown in popularity, this is evident in the distribution of the types of enterprises over the four years (Table 43). Petty trading, small-scale groceries and the making and selling of baked goods were the most common types of enterprises owned by households. Focus group participants stressed that the profits made from a small business like small-scale groceries were minimal, enough to cover the running costs and contribute to household costs (e.g. purchasing soap, salt, contributing to educational costs).

Table 43: Distribution of Types of Non-agricultural Enterprises

	2010	2011	2012	2013
Brewing and distilling local beers	8	5	6	9
Making and selling baked goods (e.g. mandazi)	13	7	3	10
Petty trading	12	12	15	18
Fish trading	6	2	1	4
Grocery	5	5	3	11
Making baskets/mats	2	0	3	2
Restaurants/teas rooms	5	3	1	5
Tailoring	1	1	0	3
Other	3	1	4	1
	55	36	36	63

The income gained from business was difficult to accurately estimate due to the precarious nature of these small-scale businesses and the vulnerability of households to shocks (Table 44). Many of these businesses are, like ganyu labour, seasonal in nature, the peak business period being after harvest when households begin to sell crops and cash is more available.

Table 44: Annual Net Income from Non-Agricultural Enterprise

	Nominal Income			Real Income		
	Median	Min	Max	Median	Min	Max
2010	1,800	100	50,000	1,800	100	50,000
2011	6,450	200	84,000	6,061	188	78,939
2012	1,000	0	58,000	790	0	45,820
2013	8,000	1,450	50,000	5,063	918	31,646

 Six focus group discussions were held comprising three mixed gender groups and three all-female groups, and in each of the study areas an income matrix was constructed by the participants. The overall results showed that the most highly ranked source of income was production of crops for sale, followed by casual/ganyu labour and small business (e.g. petty

trading, grocery, mandazi selling, beer brewing and selling). In response to the question of how this has changed over the last five years, group participants discussed how crop production is less profitable as inputs are more expensive and the prices received at market are poor. The growing popularity of non-agricultural enterprises shows how households who are capable are beginning to diversify their income portfolios; although the reliability and impact of these small scale businesses and casual labour is questionable due to the precarious and seasonal nature of such activities.

Section 8: Social Protection and Supports

In the last decade the importance of transforming structures and processes and how these influence access to the five livelihood capitals (i.e. human, natural, financial, social and physical), has become apparent. Two agricultural social protection programmes and supports are discussed here: the Farm Input Subsidy Programme and the provision of Extension Services.

Farm Input Subsidy Programme (FISP)

The number of households benefiting from FISP over the study period was at its highest in the 2010 baseline with 70.26% of households, this dropped sharply in 2011 to 34.90% in 2011 (Table 45). This decrease is likely as a result of the macro-economic situation which was in crisis during that time. In 2012 and 2013, about 60% of sample households benefitted from FISP.

Table 45: % Distribution of FISP Beneficiaries Overall and by Wealth Group

	2010	2011	2012	2013
Overall	70.26	34.90	59.50	60.50
Low	42.34	30.88	27.59	23.38
Middle	49.64	54.41	55.17	46.76
High	8.03	14.71	17.24	14.61

The percentage distribution of the allocation of FISP coupons showed that for every year the middle wealth group had the greatest share of coupons, followed by the low group and then high group (Table 45). Although the official target population of FISP is the extreme poor, this is not often the case in reality. The long running FISP targeting issues have been widely discussed in the literature (see e.g. Chirwa and Dorward, 2013).

Figure 27: Distribution of FISP Beneficiaries by Wealth Group
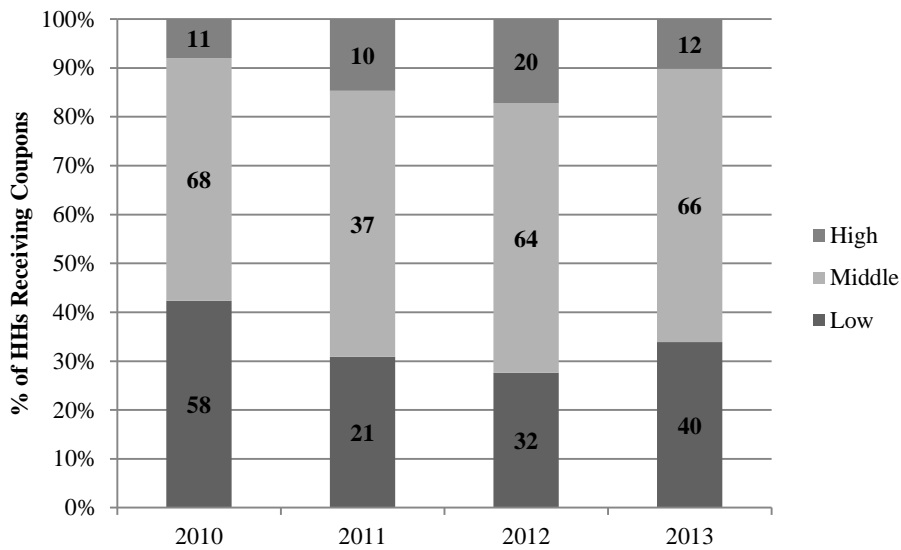
The intended FISP package per household is one voucher for a 50 kg bag of 23:21:0 +4S basal fertilizer (NPK) and one voucher for a 50 kg bag of urea for top dressing. These are supplemented with improved maize seed (OPV or hybrid), legume seed, and maize storage chemicals, however on a very ad hoc basis compared to the fertiliser. For the 2012-13 season the majority of households who benefited from FISP received one fertiliser (70%) and one seed coupon (80%) (Figure 29). This was followed by those who received two fertiliser coupons (27%) and two seed coupons (19%).

Figure 28: % No. of Coupons Received for the 2012-13 Season
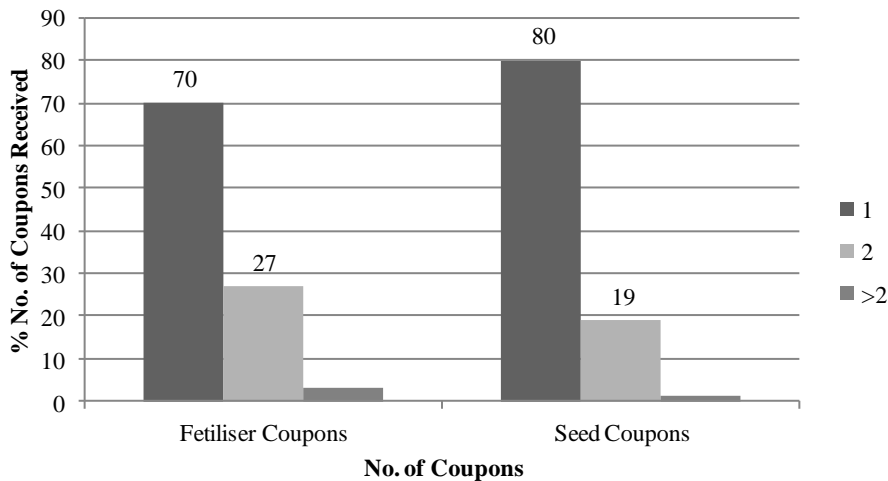
Extension Services

Agricultural extension services are mainly provided by government, ExAgris Africa and others (e.g. CadeCom, Limbe Leaf, IRLAD). The average number of visits received by households over the study period has increased by 124%, with households receiving 4.01 visits in 2010 and 8.99 visits in 2013. The study samples in Lilongwe, Mchinji and Salima have the advantage

of having both a government extension officer and an ExAgris extension officer, both of whom are actively working in the areas. Farmers repeatedly referred to their improved knowledge of improved agricultural practices (e.g. double planting, making composts, post-harvest processing) as one of the major changes over the study period. There was a clear difference in the number of extension visits between association members and non-members, particularly in 2011 and 2013.

Table 46: Number of Extension Visits Received by Households in the Last 12 Months

	2010	2011	2012	2013
Overall	4.01	7.82	3.91	8.99
Association Member <4yrs	3.45	9.05	4.21	9.04
Association Member 4yrs	5.00	8.21	4.11	10.65
Never Association Member	3.26	4.06	2.35	4.73

The type of extension advice given over the study period has diversified; Figure 30 shows the percentage distribution of the types of extension advice given to respondents. In 2010 the main focus of extension advice was crop husbandry (89%), this reduced in subsequent years with market advice, livestock disease and pests and disease getting a greater share.

Figure 29: Percentage Breakdown of Types of Extension Advice Given to Households

2012

- Livestock Disease 4%
- Market Advice 19%
- Pest and Disease 16%
- Husbandry 61%

2013

- Livestock Disease 12%
- Market Advice 29%
- Pest and Disease 13%
- Husbandry 46%

2011

- Livestock Disease 2%
- Market Advice 4%
- Pest and Disease 5%
- Husbandry 89%
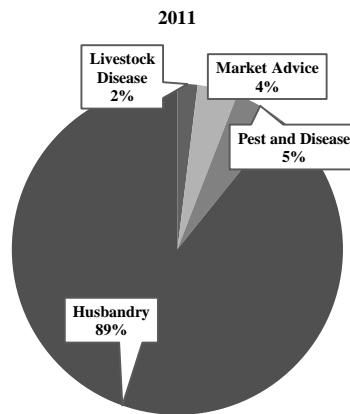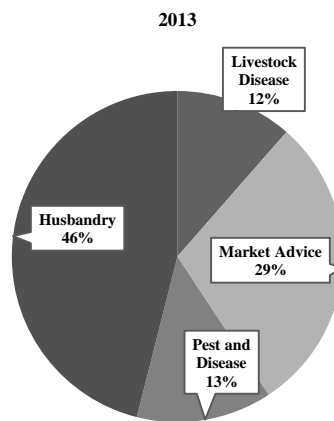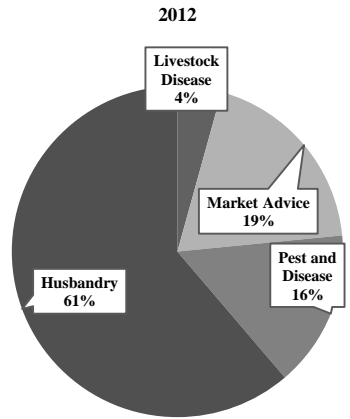
Section 9: Livelihood Change over Time

It is discussed extensively in the literature that when looking cumulatively at livelihood strategies of households, such as the study sample here, it is difficult to get a comprehensive and true picture of the real monetary income households have. This is due to many factors; a diverse range of income sources, difficulty in estimating non-monetary sources of income, seasonality, under/over reporting by survey respondents, low literacy/numeracy skill levels, inappropriate recall periods, etc. It is important to acknowledge that many of these challenges were faced in this study and throughout the study attempts were made to overcome these limitations whilst maintaining comparability across the four study years.

This section presents the results from the 2010 and 2013 household survey on the estimated total income from the identified sources. An attempt to triangulate this with results from a FGD income ranking is also presented. This is followed by a discussion around the limiting factors for change in livelihoods.

Main Income Sources

During focus group discussions the main items of household income and expenditure were established through the development of a matrix which showed the typical income of a household (Table 47). Interestingly livestock sales were not mentioned as a source of income despite results from the HH survey showing significant increases in livestock sales.

Table 47: Household Income Matrix

Level of Importance	Source	Peak Months
1	Crop sales	May -Aug
2	Ganyu	Nov-Dec
3	Small scale business	April-June

When the main income sources are ranked in terms of amounts, the quantitative household survey results are similar to those of the qualitative results from the focus group discussions (Table 48). For the baseline, casual labour is the biggest earner, followed by crop sales, livestock sales and small scale businesses. In 2013 casual labour was again the biggest earner, followed by small scale business, crop sales and lastly livestock sales. In real monetary terms, the estimated total median income showed a percentage change of 10% over the study period.

Table 48: Household Real Income from Main Sources (MK) (2010 and 2013)

	2010		2013	
	Median	Min - Max	Median	Min - Max
Crop sales	7,600	200 - 67,800	14,582	190 - 113,924
Livestock sales	4,500	300 - 54,500	8,228	316 - 75,316
Casual labour	15,600	50 - 3,864	34,886	20 - 6,329
Small scale business	1,801	101 - 50,000	14,873	7,595 - 50,633
Estimated Total Income	16,880	1,600 - 109,200	18,576	633 - 91,898

Limiting factors for Change in Livelihoods

Looking at welfare indicators (e.g. wealth ranking, illness score, HFIAS, HDDS, etc.) there appears to have been little change in terms of overall livelihood status and asset endowment, over the study period. However, the findings presented show significant changes in the way in which households earn their income from crop cultivation. This was evident in the shifts in the cropping combinations of households (Table 38 and 39). There is an obvious shift away from local maize towards hybrid maize varieties, which is unsurprising given the level of promotion through programmes like FISP and also the potential increase in yield. However maize remains a crop for household consumption, very few households grow maize commercially, although many end up selling some of their harvest, typically in response to a shock to the household, to meet immediate cash needs or due to lack of suitable storage. Maize yields also appear to be stagnant or declining. The combinations of crops grown for income have also changed significantly with pure cash crops like tobacco which can't be consumed seeing significant reductions in all areas, amongst all groups. These crops are being largely replaced with legume crops like groundnuts and soya bean which are relatively less input intensive, can be consumed at household level and also can be sold for income.

With regard to marketing of crops a lot remained the same, the majority of households sell early and at farm gate, with little value addition to produce. When households sell at farm gate, especially female headed and the more vulnerable households, it is to informal buyers or 'vendors'. These vendors are small scale intermediaries who offer very low prices and target entire villages soon after harvest when households are cash poor. However one change was the emergence of selling groundnut in shell (NIS), as opposed to soaking in water and hand shelling and just selling the kernel. For those who sold NIS to buyers such as ExAgris who were offering a competitive price for well graded NIS this can be seen as a positive change. However, for those selling NIS to informal buyers at farm gate this can be seen as the worst possible market for their groundnuts as the vendors would be buying at very low prices and then employing casual labourers to conduct the hand shelling. Households selling NIS to the informal buyer could see this as saving time and labour, and are in need of cash fast and thus opt for the low price. However, this highlights the dis-functionality of product markets in the study areas and all across Malawi.

Throughout the field work for the research it was evident that there are serious gaps and weaknesses in the market. This is also widely reported in the literature where the problems

brought by thin markets are often discussed (Chirwa and Dorward, 2013, Dorward and Kydd, 2005, Dorward, et al, 2008, Wiggins and Keats, 2013). Access to market information, particularly price information, is a problem, as is the lack of storage facilities at household and association levels, and lack of organised buying and selling. Strengthening famers and associations through addressing these problems could support smallholder farmers' move from subsistence production systems to a more commercial orientation. Examples of how this could be done with associations include the development of warehouse receipts systems, complemented with information flows with the use of ICTs, such as the current system being developed by Agricultural Commodity Holdings Africa (ACE) and Auction Holdings Ltd. Commodities Exchange (AHCX).

Findings around the importance of training and extension support were presented (see section 'Extension Services and Association Participation'). Farmers identified their increased knowledge and capacity to adopt improved agricultural practices as the most significant change in terms of their farming over the last five years. Repeatedly during data collection farmers spoke of how they now know how to get 'bumper yields' by using the new techniques they had learned. However, exposure to risks such as climate change, worsening soil fertility and price volatility, in particular for maize, is reducing the impact of their newly acquired skills.

From the farmers' perspective, interventions such as ExAgris' Growing with Groundnuts can help alleviate these challenges. Evidence of this can be seen in the increased groundnut yields and awareness and management of aflatoxin. However, interventions such as this need not only focus on the production of crops, but also on the economics of production and how farmers can grow crops successfully to meet household consumption and income needs. Additionally, assisting associations to build their organisational and management capacity should be incorporated into such interventions. Such support to the development of social capital should contribute to the improvement of the roll out of association activities, and also strengthen the leadership and team relations so as to build trust amongst the groups. It would be envisaged that from social capital formation, when it comes to collective buying or selling, deals are less likely to fall through; as it is assumed that the stronger the group the better the price that can negotiated. This also applies to cooperatives and other groups/clubs like Village Savings and Loans groups.

Wiggins and Keats (2013) highlight some of the benefits of buying/selling collectively for both the farmer and the commodity traders. However, for the phenomenon of collective buying, or other such initiatives aimed at improving the market situation, the private sector needs to make efforts to facilitate the buying/selling. This could be done by providing transport (and incorporating the cost in the agreed price), ensuring they are buying in a timely manner so famers don't lose patience and begin side selling; and the provision of price incentives for grading and value addition where appropriate. The development of the ExAgris Growing with Groundnuts NIS market is one such example of some of these initiatives. Such models are gaining momentum, with similar models being implemented in Malawi by organisations such as NASFAM, Concern Universal and Women in Agri-business in Sub-Saharan Africa (WASAA).

Section 10: Groundnut Value Chain participation

In the 2012-13 ExAgris Growing with Groundnuts annual report, yield and gross margin results were reported for three different production scenarios, which were carried out on demonstration plots on ExAgris estates across Malawi. The three scenarios are (a) double row planting with fertilisers, (b) double row planting without fertilisers, (c) single row planting without fertilisers. Findings from the Mchinji demonstration plots show that increasing plant population is one of the easiest ways of increasing yields in groundnuts with double the amount harvested; the addition of fertiliser sees further production increases. Table 49 shows the yield obtained by each plot and uses the average price for NIS at the beginning of the sales period for groundnuts in 2013. Certified seeds and seed treatment were used in each of the plots; for the study sample the frequency of such use was low with 22% of households growing groundnuts in 2012-13 using improved seed.

Table 49: Groundnut Gross Margins, Mchinji Demonstration Plots (2012-13)

	Production Scenario (a) Double Row Planting with Fertilisers		Production Scenario (b) Double Row Planting without Fertilisers		Production Scenario (c) Single Row Planting without Fertilisers	
	kg/ha	MK/ha	kg/ha	MK/ha	kg/ha	MK/ha
Gross Revenue						
Average Yield (kg/ha)	4,200		2,100		930	
Average price NIS (MK/kg)	200		200		200	
Total Revenue		*840,000*		*420,000*		*186,000*
Variable costs						
Certified Seed	140	56,000	140	56,000	85	34,000
Seed treatment	3 liters	19,278	3 liters	19,278	1.5 liters	9,639
Fertilisers:						
Compound D	200	64,600	0	0	0	0
Gypsum	200	10,880	0	0	0	0
Man days	150	48,000	150	48,000	150	48,000
Storage (Sacks)	110	13,200	55	6,600	24	2,880
Total Variable Costs		211,958		129,878		94,519
Gross Margin		628,042		290,122		91,481
% Gross Margin		74.77%		69.1%		50.82%

In comparison, the study sample falls more into Production Scenario (c) whereby they would typically plant single rows and not use inputs, however what differs is the majority of smallholders would use recycled seed, whereas here certified seed was used (37% used purchased seed in 2011-12 season which would likely be a certified/improved variety). Production Scenario (c) resulted in average yields of 930kg/ha, whilst the median yields for the same cropping season 2011-12, were 435kg/ha per household for the study sample (Table 24), the only group that achieved comparable yields was those who were in the 'Association Members for 4 years' who reported 927kg/ha in the 2011/12 season.

By using Table 49 when calculating the benefit cost ratio for groundnuts, if comparing production scenario (a) with (b) the ratio is 5.11, also if comparing (b) with (c), which (c) is the most likely best case scenario for smallholders involved the studied associations, the ratio is 6.62. Comparing these production scenarios to the results from the household surveys, farmers are recycling seed, and unable to invest in seed treatment and in-organic fertilisers and are achieving a yield of below what was achieved in production scenario (c) of 696kg/ha (Table 25).Therefore marginal investments in certified seed, fertiliser organic or otherwise, and improved agricultural practices could see large returns in yields and thus income.

Association participation (2012-13)

The importance of training and supports to farmers was discussed earlier. A major source of extension training and support is from those who facilitate farmer associations and groups. A main component of the intervention being studied here is the support of local associations and groups through the provision of extension support and training, specifically with reference to the ExAgris Africa associations. However; there are a variety of other associations functioning in the study areas. During the study period some of the associations that were identified were facilitated by IRALD, Malawi Basin, Action Aid, CadeCom, Limbe Leaf, Africa Child Mission and NASFAM. Results show a decrease in the proportion of the study sample that are members of such associations, with 66.15% of households having at least one or more memberships in the household in 2010, declining to 54.36% in 2013, showing a 17.82% decrease in membership. The distribution of association membership by wealth groups also shows decreases in the low and middle wealth groups, but not the high group (Table 50).

Table 50: Percentage Distribution of Household Association Membership amongst Wealth Groups

	2010	2011	2012	2013
	%	%	%	%
Overall	66.15	69.23	52.31	54.36
Low	57.83	58.11	43.66	40.51
Middle	71.58	72.92	53.13	58.95
High	76.47	88.00	71.43	85.71

Such decreases could be as a result of farmers' frustration with the failure of associations to fulfil one of their main objectives: to find buyers offering fair prices for their produce. This along with other frustrations around lack of leadership, cooperation, and poor organisation were identified in focus group discussions. When these issues were raised with key informants from the private sector and those civil society actors who facilitate these associations, none of the key informants had a specific strategy in place to support the groups in team or leadership building exercises. The main focus of their supports is around production. This is evident in Figure 31 which shows the types of trainings that households who had members of associations attended in 2013. Crop husbandry (i.e. the care and cultivation of crops) was the most prevalent type of training offered by the government, ExAgris and other actors facilitating trainings. Marketing advice was the second most prevalent type of training attended.

Figure 30: Types of Training Attended in 2013
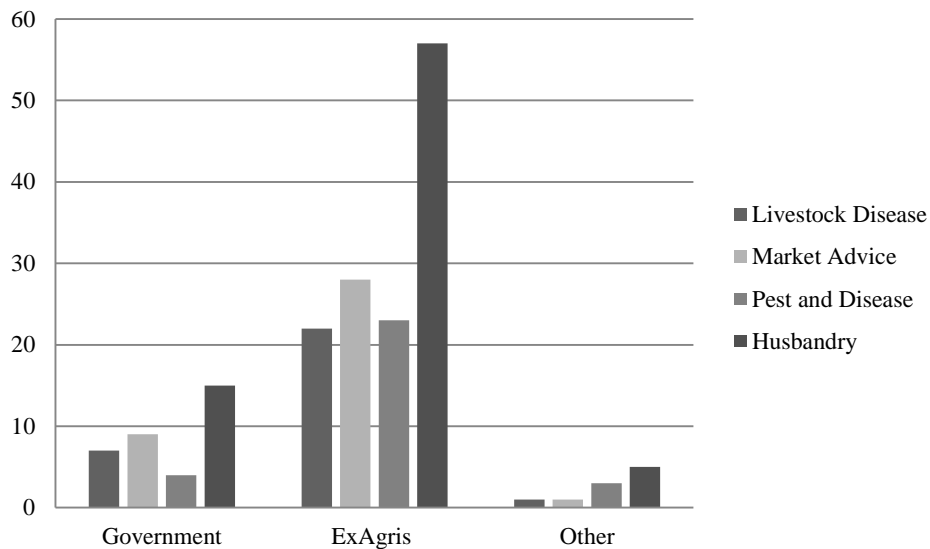
Aflatoxin Awareness

Since 2010 members of the intervention associations have been receiving training and sensitisation around aflatoxin and its impact on health and crop production. Results from the household surveys show an over 6-fold increase (24 households in 2010 to 155 households in 2013) in the number of respondents who were aware of aflatoxin (Table 51).

Table 51: Percentage Distribution of Respondents Reporting Awareness of Aflatoxin

	2010	2011	2012*	2013
	%	%	%	%
Overall	12.31	72.31	73.11	79.49
Association Member 4yrs	16.67	85	89.58	93.33
Association Member <4yrs	13.48	71.91	72.34	70.79
Never Association Member	4.35	56.52	41.67	78.26

*Asked only of those households that sold groundnuts (119) as opposed to other years where entire sample were asked (195)

From the 2011 survey, respondents were asked about the effect of aflatoxin on health. There were substantial increases in awareness between 2011 and 2013 (Table 52). As with general awareness of aflatoxin, the respondents who were members of the association were shown to be more aware of aflatoxin's risk to human health.

Table 52: No. of Respondents Correctly Reporting an Aflatoxin Effect on Health

	2010		2011		2012		2013	
	n	%	n	%	n	%	n	%
Overall	-	-	40	20.51	46	23.59	104	53.33

Association Member 4yrs	-	-	18	30.00	26	43.33	52	86.67
Association Member <4yrs	-	-	19	21.35	17	19.10	39	43.82
Never Association Member	-	-	3	6.52	3	6.52	13	28.26

Each year respondents were asked to name three techniques to combat aflatoxin contamination. Figure 32 shows a stark increase since the 2010 baseline, with the majority of those able to identify three techniques. These techniques are usually around the planting, drying through the '*Mandela cock*'[19], use of good seed, grading and sorting, etc.

Figure 31: No. of Households Aware of up to Three Techniques to Combat Aflatoxin
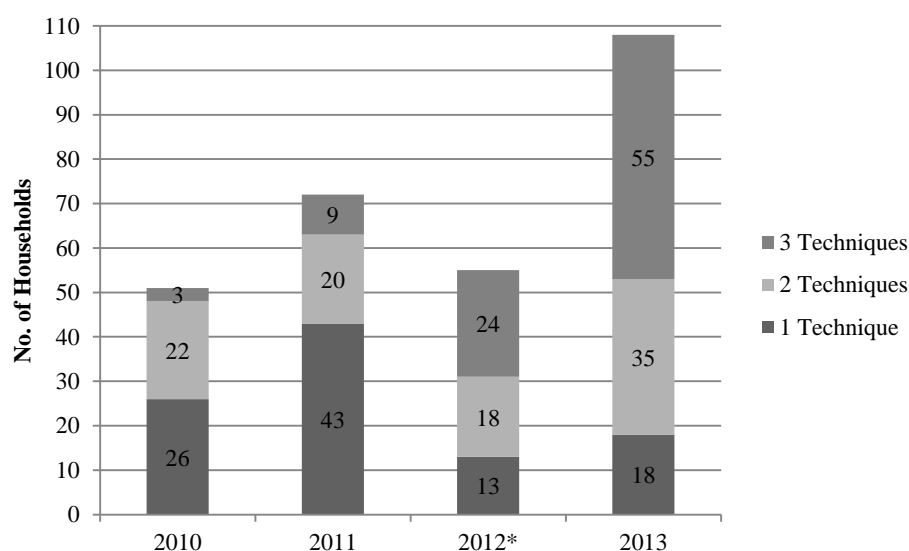
When it came to utilisation of 'bad nuts', the most common action taken with groundnuts that are affected by mould and seen as 'bad nuts' was to throw them away, however the next most popular action was to use the bad nuts for groundnut flour. This groundnut flour is likely to be highly contaminated with aflatoxin. Other actions included feeding to animals, using in compost, and even one instance of giving to children as a snack. The number of households who reported having groundnuts rejected by buyers was very low, with 6 households in 2013, 5 households in 2012 and the highest in 2011 with 8 households.

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[19] "The Mandela cock is a technique developed by scientists in South Africa and has been tested and recommended by ICRISAT/Department of Agriculture Research Services in Malawi. It is a structure that uses the free flowing air to gradually remove moisture from groundnut pods" (Diaz Rois, et al., 2013, p31).

Emerging Quality Groundnuts in Shell (NIS) Markets

The selling of nuts in shell has been already referred to in the Groundnut Production section, where the increased prevalence of households selling NIS was investigated. For the 2012-13 season ExAgris Africa launched their NIS buying stations in earnest.

By buying NIS soon after harvest the stages in the supply chain where groundnuts are most at risk of aflatoxin contamination are reduced if not removed (i.e. storage and shelling at household level) (Emmott and Stephens, 2012). The intervention outlined earlier provided extension support, training, and agricultural inputs on credit for groundnuts and a number of other crops. It is envisaged that with these inputs and services farmers have the potential for significant increases in their crop productivity and in particular will produce groundnuts with lower levels of aflatoxin contamination. The incentive for following the recommended best practices would be to receive a premium price for their high quality produce from ExAgris who would be buying on behalf of their partners AfriNut and Valid Nutrition. This premium price would have a direct positive impact on farmers' livelihood status but also indirectly impact on the nutrition of the farmers' household as the increased yields with reduced aflatoxin levels mean the home consumption of clean high quality groundnuts will probably increase. Also, as groundnut has nitrogen fixing properties the soil fertility of farmers' plots will benefit from practices such as crop rotation.

It took several seasons for the farmers to be convinced of the benefits of the improved agronomic practices being promoted, such as early planting, use of improved seeds, increased plant population, treatment and prevention of pests and diseases, fertilizer application (where economically viable), and improved harvesting and drying techniques. In the studied areas farmers and extension officers report how farmers participating in the association and their neighbours are moving away from unproductive traditional practices such as lower plant population, recycling old seed, and drying nuts on the flat as opposed to the now widely recommended drying system using the Mandela cock.

The Mandela cock technique is reported to be increasing in popularity in the studied areas. However, as the intervention to buy NIS only began in 2013 many farmers would have still employed one traditional practice that is a significant contributor to aflatoxin contamination, whereby nuts in shell are soaked with water to aid with the hand shelling - a long arduous process, mainly carried out by women (Diaz Rois, et al., 2013, Emmott and Stephens, 2012, Emmott, 2012, GoM, et al., 2012, Simtowe, et al., 2009).

The prices offered in the 2013 NIS were 200MWK (US$0.62)[20] per kg for nuts in shell; this was in comparison to approximately 240MWK (US$0.74) per kg for shelled kernels at the trading centres in the studied areas. Taking away the weight of the shell (typically a third of total weight) that gives the NIS a premium of 55MWK per kg (US$0.17) or 25 percent in comparison to what a farmer would receive if they were to shell all their nuts and transport to the trading centres, which can range from 0.5 kilometres (i.e. farm gate) to seven kilometres

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[20] Currency exchange as of July 2013 US$1 = MWK322.77 (Reserve Bank of Malawi, 2013)

away. The flow diagram in Figure 33 gives a basic overview of the possible markets available to farmers in the study area in 2013, the left hand side showing the high value nutrition sensitive value chain targeting the RUTF and export markets. The right hand side of the flow shows the informal market which mainly targets local consumption and informal regional exports with minimal processing.

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            ┌─────────────────────────────────────────────────────┐
            │              Extension & Input Supply               │
            │  ExAgris Africa Ltd / Ministry of Agriculture /     │
            │            Agro dealers / NGOs                       │
            └─────────────────────────────────────────────────────┘
                                    │
                                    ▼
                        ┌───────────────────────┐
                        │      Production       │
                        │ Smallholders /        │
                        │   Associations        │
                        └───────────────────────┘
                                    │
                                    ▼
                        ┌───────────────────────┐
                        │      Marketing        │
                        └───────────────────────┘
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Extension & Input Supply
ExAgris Africa Ltd / Ministry of Agriculture / Agro dealers / NGOs

Production
Smallholders / Associations

Marketing

'Nuts in Shell' Market
ExAgris Africa Ltd.
Private company buying dried & sorted g'nuts in shell

Informal Market
Small scale traders / intermediaries buying mainly shelled nuts at one set price with minimal grading

Primary Processing
Afrinut Ltd.
G'nut processing company, purchases NIS from buyers& processes for various markets

Processing
- Community/household level
- Large scale traders
- Processors (e.g. confectionary)
- Regional exporters

Consumption after Primary Processing
- EU Fairtrade markets
- South Africa

Consumption
- Community/household level (60% of production)
- Retail & wholesale (25% of production)
- Regional export markets (15% of production)

Secondary/RUTF Processing
Valid Nutrition
Purchases g'nuts with <4ppb aflatoxin contamination and processes in RUTF

RUTF Storage / Distribution
UNICEF/WFP/Ministry of Health/Clinton Foundation/Other NGOs

RUTF Consumption
Local & regional severe acute malnourished population

As discussed earlier, prior to the 2013 NIS pilot market groundnut farmers in the studied areas mainly sold shelled nuts to small scale traders and intermediaries, who then sold onto larger scale buyers and assemblers, who then sold onto exporters or local processors (Sangole, et al., 2010). Farmers selling to these small-scale traders or intermediaries typically transport the produce to the next trading centre by bicycle and receive one set price per kg of produce. The traders in the three study areas reported the only requirements they impose on farmers selling groundnuts is that the nuts are dry and free from 'trash' (i.e. non-nut material). Traders often complained that they had to turn away farmers who brought nuts that were not dried to an acceptable level - such a level being determined by the buyer - and traders believed that farmers soak the nuts in shell in water so as to increase the weight. In response, farmers stated in focus group discussions that they do sprinkle the nuts with water to aid with shelling as mentioned previously, but also to increase the weight so as to circumvent losing out from the traders' tampered scales. This lack of trust between farmers and buyers is a persistent problem in the agricultural sector in Malawi.

Small-scale informal buyers are seen as the biggest competition to the NIS initiative and the overall development of the groundnut sector (Emmott and Stephens, 2012). These buyers enter the market early; some even enter villages and go from door to door offering very low prices for immature groundnuts, something that is evident from the results above. Such offers can be tempting for farmers who, at that stage of the season, are very cash-poor due to the lack of alternatives or supplementary income generating activities for households (Emmott and Stephens, 2012).

Observations from the 2013 NIS Market

In comparison to the informal trading centres the NIS buying stations appeared more organised in 2013 as prices were published in the local area and word was spread of the new market place for groundnuts. The message disseminated by ExAgris extension staff and association leaders was that a price of 200MWK per kg of NIS would be offered, however the nut must be dried as per recommendations and well sorted prior to coming to the buying station (i.e. shrivelled, cracked, mouldy, and non-nut material must be removed). Electronic scales were used at the buying stations which farmers reported to have more confidence in. Details of each sale were recorded, including the tagging of each bag of NIS bought by ExAgris.

Despite the reported success of the first NIS market many challenges remain that will take time to address through behaviour changing activities and the continued commitment to develop a clean groundnut sector. One of the biggest challenges already touched on is the competition from the informal sector. For the NIS scheme buyers like ExAgris need to come in as early as possible with competitive prices to secure a sufficient supply to meet the RUTF and other markets adhering to international restrictions. Emmott and Stephens (2012) recommended that practical demonstrations with smallholders on the kernel to shell ratio of groundnuts (shells typically comprise a third of total weight as mentioned earlier) are needed to ensure farmers are aware of the actual differences in the prices.

A major issue that arose from the piloted NIS initiative in 2013 was that ExAgris was only accepting the best quality groundnuts at first. Therefore the grade outs, which could be up to 30 percent of total produce, would likely have high aflatoxin contamination and would go back into the community to be consumed at household level or sold on the local market, thereby worsening the aflatoxin problem at community level. It is proposed that future NIS markets should buy all grades of groundnuts at differential prices, and the grade outs that are purchased would be used for cold pressed groundnut oil – a venture AfriNut and its partners are trying to develop. This would remove the aflatoxin-contaminated groundnuts from the community and by processing the grade outs, transform once toxic and costly grade outs into a safe and more profitable product. However, a major challenge will be to decontaminate or blend the meal or be able to ensure it is used in livestock production systems that can cope with higher aflatoxin levels (e.g. beef)[21]. What remains is the price offered for grade outs: if it is lower than what the farmers would receive on the informal market, then farmers could sell their grade outs on the local market or keep for home consumption. This will test how effective the aflatoxin awareness messages have been.

Initial acceptance of the NIS market initiative was reliant on a number of factors: farmers employing the recommended agricultural practices; awareness of the multiple opportunity costs of selling NIS as opposed to shelled kernels on the informal market; and full and transparent participation of the private sector actors. These factors will need to be maintained if such groundnut value chains are to succeed. In the 2014 buying season it is envisaged groundnuts will be bought based on the results of on-site moisture testing, the optimal moisture level being >9 percent (Emmott and Stephens, 2012). This will increase the efficiency of the grading system for both farmer and buyer.

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[21] Correspondence with Andrew Emmott of TWIN

Section 11: Conclusions

This report has analysed the results of the research in terms of households and their livelihoods and then has more specifically focussed on farmers as groundnut producers. In terms of the overall livelihood and food security situation of the households, the results showed little change in their welfare over the four year period. However, results for groundnut production and the sale of groundnuts show quite positive outcomes at household level.

Households Hanging On

Households have low asset endowment and lack of returns on what assets they do have and remain highly vulnerable to shocks. From this we can say that households are 'hanging on'[22]. As mentioned, the food security and livelihood situation of the selected households remained relatively unchanged, despite the majority of the households benefitting from FISP, government extension support and the ExAgris groundnut intervention.

Wider meso/macro-economic and political economy issues such as increased land availability, access to affordable finance, appropriate and sustainable social protection polices for the most vulnerable, basic market infrastructure and institutions (e.g. roads, information flows, regulation of standards, etc.) are areas that are identified in this study (and in many other studies) that need to be improved if real and long lasting change is to be seen at household level.

Smallholder Farmers: High Quality Groundnut Producers

Despite these challenges, in the long run it is possible that more smallholder farmers will be able to meet the standards and participate in high-value groundnut markets; however this cannot be achieved without the provision of multi-sector support to smallholders, all buyers, extension service staff and input providers (Narrod, et al., 2008). The past experiences of sanitary and phyto-sanitary standards acting as a barrier for the poorer and resource constrained farmers, most often women farmers, need to be appreciated and used to inform schemes such as the development of the RUTF value chain and the broader groundnut value chain (Maertens and Swinnen, 2006, Wiggens and Keats, 2013). Continued efforts to increase, not only awareness, but also appreciation of aflatoxin and the health risks it poses will be needed to achieve this. From fieldwork observations it appeared that those mainly targeted by aflatoxin awareness messages were the farmers. Other key actors who need to be targeted include the small scale traders, processors and peri-urban and urban dwellers.

If leveraged successfully by the relevant stakeholders – which includes the governmental departments (health, agriculture, trade), the Partnership for Aflatoxin Control in Africa (PACA), the Malawi Programme for Aflatoxin Control (MAPAC), civil society organisations, micro-finance institutions, etc. - the renewed efforts for setting standards for the development

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[22] A term coined by Chirwa and Dorward (2013) in reference to households relying on FISP for food security.

of sustainable groundnut value chains can act as a catalyst for wider agricultural and economic growth.

All in all, this research shows that the short to medium term objectives of the RUTF value chain are being progressively met year on year, and this is likely to continue with time and the strengthening of stakeholders individually and collectively. However, it is important to note that there is clearly much more to do to establish a reliable, inclusive, cost-effective value chain based on smallholder supply of groundnuts – and, even if that is achieved, it will likely improve, but will not transform livelihoods.

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Annex 1: Description of Variables

Welfare Variables	
Variable	**Description**
HDDS	The Household Diet Diversity Score (HDDS) is a measure of dietary diversity, is constructed by asking, "In the past 7 days, have you or any household member eaten . . ." The sum of the following food groups gives the score, the higher the score the more diverse the diet of the household members. 1. Cereals 2. Roots and tubers 3. Vegetables 4. Fruits 5. Meat 6. Eggs 7. Fish 8. Pulses, legumes and nuts 9. Milk and milk products 10. Oils and fats 11. Sweets 12. Spices, condiments and beverages
HFIAS	The Household Food Insecurity and Access Scale is constructed using the answers to the following nine questions, asked with respect to the 30 days preceding the survey: 1. Did you worry that your household would not have enough food due to a lack of resources? 2. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? 3. Did you or any household member have to eat a limited variety of foods due to a lack of resources? 4. Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food? 5. Did you or any household member eat a smaller meal than you felt you needed because there was not enough food? 6. Did you or any household member eat fewer meals in a day because there was not enough food? 7. Was there ever no food at all in your household because there were not resources to get more? 8. Did you or any household member go to sleep at night hungry because there was not enough food?

	9. Did you or any household member go a whole day without eating because there was not enough food? For each, responses are scored "0" if the answer is "never," "1" if "rarely" (1–2 times), "2" if "sometimes" (3–10 times), and "3" if "often (>10 times). The responses are then summed to create the HFIAS score used in the data set.
Illness score	For those who were sick in the previous 4 weeks how many days were they unable to perform their normal duties/tasks was asked, the sum total of the number of days for the entire household is divided by the number of household members to generate an average household illness score.
HH size	Number of people who have been living in the household for the majority of the past 12 months, commonly referred to as "people who live together and share food from a common pot".
Average years schooling/HH head	Sum total of the number of years schooling obtained by each household member divided by the number of household members.
Hunger Gap	Number of months met by own food production The number of months reported to be self-sufficient for maize consumption.

Annex 2: Statistical Tables

MHS13WealthRanking

	Observed N	Expected N	Residual
Low	79	83.1	-4.1
Middle	95	95.0	.0
High	21	17.0	4.0
Total	195		

Test Statistics

	MHS13WealthRanking
Chi-Square	1.159[a]
df	2
Asymp. Sig.	.560

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0.

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	MHS13IllnessScore – MHS10IllnessScore	.11512	2.69432	.19294	-.26541	.49566	.597	194	.551
Pair 2	MHS13IllnessScore – MHS12IllnessScore	-.18418	2.68470	.19226	-.56336	.19499	-.958	194	.339
Pair 3	MHS12IllnessScore – MHS11IllnessScore	.41300	2.21175	.15839	.10062	.72538	2.608	194	.010
Pair 4	MHS11IllnessScore – MHS10IllnessScore	-.11369	2.26248	.16202	-.43324	.20586	-.702	194	.484

Test Statistics[a,b]

	MHS10P Gnut Yield kg.ha	MHS12P Gnut Yield kg.ha	MHS13P GNut Yield Unshelled
Chi-Square	.763	7.569	4.952
df	2	2	2
Asymp. Sig.	.683	.023	.084

a. Kruskal Wallis Test

b. Grouping Variable: AssociationMembership_2010.2013

Annex 3: Consumer Price Index

	Price Index	Re-indexed to 2010	Decimal form
Deflating Nominal Values to Real Values using Malawi's National Statistical Office Annual Consumer Price Index			
2010	281.9	100.00	1.00
2011	300.0	106.41	1.06
2012	356.8	126.58	1.27
2013	446.2	158.28	1.58