Linking Soil Fertility and Improved Cropping Strategies to Development Interventions

Impact Survey

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Executive Summary

The NRSP-funded project "Linking Soil Fertility and Improved Cropping Strategies to Development Interventions" began operation in 2001 with the following objective:

"The project aims to improve the livelihoods of farmers in Western Kenya by expanding their options for resource and crop management and enhancing their capacity to make the relevant management decisions. It will seek to establish a community-based credit scheme to enable a category of poor farmers, identified in earlier studies in SW Kenya to be of intermediate ranking in the scale of poor to very poor, to access limiting inputs (P fertilisers, new / improved crops). Two decision support systems – for assessing credit viability and appropriate soil fertility management strategies – will be developed and promoted, whilst an improved basket of crops will be made available to enable farmers to improve economic returns and enhance the soil resource base."

By 2005 the project was working through contact groups in eight areas of Western Kenya. This report presents the findings of an impact survey conducted in three of those areas during May-June 2005 to assess the impact of the project's activities on the livelihoods of farming households.

A total of 282 respondents from three sub-locations in Siaya and Vihiga districts were interviewed for the impact survey during May and June 2005. These included representatives of 69 households containing current borrowers from the project's SCOBICS credit scheme and representatives of 25 households containing former borrowers. Non-borrower households were randomly selected from lists of all households in the three sub-locations included in the survey.

SCOBICS borrowers were found to be wealthier than non-borrowers, with this difference due to the circumstances of the individual households concerned, not the villages in which they live. Borrowers are more likely to participate in other savings and loans activities than non-borrowers. The majority of borrower households report agriculture, horticulture or livestock as their main income-earning activity. However, a significant minority do not. Moreover, borrowers were found to rely on a variety of income sources for loan repayment, with wealthier borrowers more likely to rely on crop sales – and on salaries and remittances – than poorer borrowers.

The SCOBICS credit scheme has been the entry point for the project into communities and the survey found that it was mainly borrowers who had engaged in, and were aware of, the project's other activities (production of pictorial decision support tools known as DSS use, on-farm demonstrations, visits to Kisumu markets and promotion of participatory crop budgeting).

A high proportion of respondents who had engaged in, or were aware of, the project's other activities claimed to have reaped benefits from them. Thus, 80 respondents had seen one or more DSSs and, of these, 63 claimed to have made changes to their cropping activities as a result of referring to a DSS. The claimed changes could be grouped into two: commencing crop rotation and in some cases also other good agronomic practices (34), and commencing use of top dressing fertiliser, compost and/or striga resistant maize varieties (29). 56 of these respondents reported benefits as a result of the changes (principally better soil fertility, higher yields and greater income from farming) with just two stating that they had not seen benefits.

Similarly, 62 respondents reported making changes to farming practices as a result of on-farm demonstrations, with the most common change being to commence cultivation of soyabean.

Fewer respondents (33) reported making changes as a result of market visits, but this still represented 52% of those who had discussed the findings of these visits. The main change made as a result of these visits was to switch bean variety to one demanded beyond the immediate markets within the project areas. One of the main reasons for the lower claimed response to the knowledge generated through the market visits was that respondent households had insufficient levels of agricultural production to make visits to Kisumu worthwhile. (In addition, however, the project's own analysis suggested that there were few new market opportunities available to producers from the project areas within Kisumu markets).

A desired outcome of the project has been that producers move from a heavy reliance on low productivity maize and beans production to more intensive maize production in the long rains season plus cultivation of additional crops that can be sold at least in part for cash (e.g. soyabean, groundnuts, improved beans) in the short rains season. The objective is to create a sustainable cropping system that, in comparison with current practices:

- leads to households growing and consuming more food;
- generates more cash from crop sales;
- is based on (and permits) greater investment in the soil resource base.

Increased maize yields and changes in cropping patterns (crop diversification) are, therefore, key outcome indicators for the project's activities.

The impact survey generated clear evidence that access to SCOBICS credit had raised maize yields – by an estimated 600 kg/ha in the 2004 long rains season – through enhancing access to key inputs (improved seed and fertiliser). However, even with these benefits of access to credit through SCOBICS, there is still a long way to go before producers in the project area achieve the sorts of yields that would both guarantee their food security and free up land for production of other crops, even though these yields are technically feasible under current smallholder conditions.

With regard to diversification, borrowers planted a lower proportion of their land area to maize (with/without beans) than did non-borrowers in all seasons for which data requested, i.e. long rains 2004, short rains 2004 and long rains 2005. Consistent with the emphasis of the project on raising maize yields in the long rains season, so as to free up land for cultivation of other crops in the short rains season, the difference was particularly marked in short rains 2004, when borrowers planted on average 59% of their land to maize (with/without beans) against 81% by non-borrowers. In regression equations explaining levels of crop diversification, higher available land area and higher maize yield in the long rains 2004 season were both significantly associated with greater diversification, as was either access to SCOBICS credit or use of a DSS(s) in planning what to grow.

Consistent with these outcomes, respondents from borrower households reported perceptions that participation in project activities had contributed to both greater food security and to higher cash income from crop sales, with relatively few reporting negative consequences of either increased risk in agricultural production or unmanageable debt burdens.

However, higher incomes from participation in project activities have not (so far) fed through into increased asset holdings. The survey found that almost all larger holdings of livestock in 2001/02 had declined (often significantly) by 2004/05 and suggested that factors particular to the livestock sector (e.g. theft, disease, decline in support services) accounted for this. However, access to SCOBICS loans did not allow borrower households to buck this general trend. Indeed, the coefficient on access to SCOBICS loans was found to be both negative and significant in the equation explaining changes in poultry holdings between 2001/02 and 2004/05. This could be because, as noted above, some households sold poultry to repay their SCOBICS loans. No such negative impacts were found in the case of durable assets or housing, but equally no evidence was found to suggest that access to SCOBICS loans had made any positive difference to a household's chances of enhancing their stock of these assets during the lifetime of the project.

Introduction

The NRSP-funded project "Linking Soil Fertility and Improved Cropping Strategies to Development Interventions" began operation in 2001 with the following objective:

"The project aims to improve the livelihoods of farmers in Western Kenya by expanding their options for resource and crop management and enhancing their capacity to make the relevant management decisions. It will seek to establish a community-based credit scheme to enable a category of poor farmers, identified in earlier studies in SW Kenya to be of intermediate ranking in the scale of poor to very poor, to access limiting inputs (P fertilisers, new / improved crops). Two decision support systems – for assessing credit viability and appropriate soil fertility management strategies – will be developed and promoted, whilst an improved basket of crops will be made available to enable farmers to improve economic returns and enhance the soil resource base."

By 2005 the project was working through contact groups in eight areas of Western Kenya. This report presents the findings of an impact survey conducted in three of those areas during May-June 2005 to assess the impact of the project's activities on the livelihoods of farming households.

Methodology

Sampling

Table 1 summarises the areas of project operation and the contact groups through which the project has worked in each area. The operation of the SCOBICS[1] lending scheme is used as an indicator of the scope of the project's activities in each year, as other project activities have in practice been organised around SCOBICS operation. (This point will be elaborated below).

Table 1: Areas of Project Operation

		SCOBICS Lending				
Project Contact Group	District(s)	2001	2002	2003	2004	2005
Sauri Sub-Locational Committee	Siaya	√	√	-	-	-
Nyamninia Sub-Locational Committee (NYAMSAC)	Siaya	√	√	-	√	√
Tatro Farmers' Organisation	Siaya, Butere-Mumias	√	√	-	√	√
Gongo Catchment Committee	Siaya	-	-	√	√	√
Ebukhaya Catchment Committee	Vihiga	-	-	√	√	√
Ebusiloli Farmer Field School	Vihiga	-	-	-	√	√
Muyafwa Farmer Field School	Busia	-	-	-	√	√
Kaplelartet Catchment Committee	Kericho	-	-	-	√	√
Wakulima Youth Group	Vihiga	-	-	-	-	√

[1] SCOBICS stands for Sustainable Community Based Input Credit Scheme. Further details can be obtained from "A Guide to SCOBICS", available upon request from Dr.James Ndufa (jndufa@africaonline.co.ke).

The project has thus worked with a number of different types of contact groups:

- Five of the groups shown in Table 1 are either sub-location or catchment committees. A sub-location is a government administrative unit, but the sub-location committees shown in Table 1 were set up by ICRAF as channels for disseminating research and extension information on improved fallows and other soil fertility enhancing technologies in the late 1990s. Meanwhile, a catchment is an area defined by the Ministry of Agriculture for purposes of extension planning. A catchment may cover part of a single sub-location or may cross sub-locational boundaries, thus comprising parts of two or more sub-locations.
- Two of the groups are farmer field schools organised jointly by TSBF and KARI/AHI.
- The final two groups are farmers' organisations: the relatively large and expanding Tatro farmers' organisation, whose membership is distributed across several sub-locations in two districts (Siaya and Butere-Mumias), and the newer and smaller Wakulima Youth Group.

The most constraining resources for the impact survey were time and personnel. With the resources available, it was decided that we should aim to survey 300 households, of whom one third should be households that had participated in project activities (e.g. as borrowers on the SCOBICS credit scheme) and two thirds should be randomly surveyed from surrounding populations.

Sampling for the impact survey, however, had to balance a number of considerations, including that:

- The eight current areas of operation are quite different in important respects (e.g. average land holding, access to non-farm income);
- As Table 1 shows, the project has been operational in the different areas for different periods of time. Even if outcomes were the same across areas when people participated in project activities, we would expect greater impacts where the project had been working longer, as greater disposable income is more likely to translate into increased investment in assets if it is sustained for 2-3 years than if its sustainability is still to be proven. However, whilst we might expect clearer outcomes in the older areas (on the basis of more interaction with them), in some ways it has been easier to make progress with project activities in the newer areas[2].

As Table 2 shows, borrower numbers in most individual areas are still modest. The biggest number of SCOBICS borrowers in 2005 is reached through Tatro farmers' organisation (119, around a third of the scheme total), but these are dispersed over a wide geographical area, making identification of an appropriate control population difficult.

In order to achieve 100 respondents who had participated in project activities, whilst also retaining the ability to relate these to an appropriate control population, it was decided to focus on just three of the eight areas of current project operation. Excluding Tatro, the three areas in which the project had the longest operational experience were chosen, i.e. Nyamninia,

[2] A good example here concerns SCOBICS lending. The structure of repayment incentives was inadequate in the early years of the scheme, such that there were problems achieving acceptable repayment rates in 2002 in Sauri (where the majority of borrowers never repaid) and Nyamninia (where a subset repaid in 2003). Repayment amongst Tatro borrowers was better, but was accomplished too late to permit access to new borrowing in 2003. These problems have not been encountered in the newer areas, as repayment incentives have been strengthened with experience.

Gongo and Ebukhaya. These also reflect the two districts in which the project has focused most of its energies, Siaya and Vihiga. Furthermore, whilst there are important differences between the areas (e.g. in average land holding or access to non-farm income – these are explored in more detail below), they are more similar to each other than they are to either Busia (drier) or Kaplelartet (much larger land areas available).

Table 2: Sampling for the Impact Survey

Sub-Location	No. of Villages	Total No. of Households	No. Randomly Sampled	No. Actually Interviewed	No. of Borrowers in 2005[3]	No. of Borrowers Interviewed
Gongo	7	730	65+20(R)	60	20	31
Nyamninia	7	870	65+20(R)	66	23	26
Ebukhaya	10	1316	65+20(R)	62	45	37

In each of the three areas, it was decided to take the sub-location as the relevant control population. (Gongo and Ebukhaya catchments both fall entirely or largely within a single sub-location). Whilst project activities have generally been confined to one part of each sub-location, it was believed that the sub-locations were each sufficiently homogeneous to be taken as a control population. The experience of the project (confirmed below) suggested that the main constraint on the expansion of the project within a sub-location had been the scope of the social networks of contact group members, rather than the innate unsuitability of other parts of a sub-location for the types of activities that the project was engaged in.

As no current list of all households within a sub-location was available prior to the survey, such a list was obtained for each sub-location as follows. The location Chief was contacted and he instructed the sub-chief of the relevant sub-location to compile the list. This was done by consultation with the elders in each village, who produced a list of all households resident in their village (by name of household head).

Once the compiled list was available, 65 households were randomly selected for interview in each sub-location, along with 20 reserves. It was then intended to interview all current borrowers (35/45 in the case of Ebukhaya) and to supplement this in Gongo and Nyamninia with interviews of households that had previously borrowed from SCOBICS, but were not borrowers in 2005. In these cases, the reason that they were not borrowers in 2005 was generally because they had not completed repayment of a previous loan (Table 3). In the analysis in later parts of this report, "borrowers" refers to all 94 borrower households (i.e. past and present) unless stated otherwise.

[3] Taking 2004 and 2005 together, SCOBICS has advanced loans to a total of 41 clients in Gongo, 24 in Nyamninia and 62 in Ebukhaya.

Table 3: Reasons Why Individuals had not Borrowed in 2005 if they had done so Previously

Reason	Number
Did not repay previous loan	15
Fellow borrowers would not have me in their group	10
Made loss on a previous loan	5
Other source of income for 2005	3
Group did not qualify	2
Heard too late	1
TOTAL	36

Note: The main reason why fellow borrowers would not have someone in their group would be difficulties in securing repayment on a previous occasion.

Table 2 also shows the number of respondents interviewed in each of the three chosen sub-locations. The majority of respondents were either themselves the head of the household (57%) or the head's wife (36%). The remaining questionnaires were answered by sons (11), daughters (4), daughters-in-law (4), a father and a houseboy.

Five trained enumerators administered the questionnaire over a three-week period in May 2005, during which time 264 interviews were completed[4]. The number of borrower households interviewed during this period was only 76, so during the second week of June a further effort was made to interview borrower households, with 18 interviews conducted during this week.

Questionnaire Design

A copy of the questionnaire is included as Appendix 1. Information was collected about household membership, assets, agricultural production and other income earning activities, then about participation by members of the household in project activities. 2001/02 was used as a reference period to identify trends in well-being across households of different types. The election defeat of ex-President Moi and the installation of the current government occurred in December 2002, so the period prior to the election was used to fix the reference period in respondents' minds during interviews.

The questionnaire was pre-tested during enumerator training and small modifications were made prior to commencement of the survey proper.

[4] The team of enumerators was led by Grace Ogolla, who was also responsible for many of the logistics of constructing a sample frame and sampling respondents. Other members of the enumeration team were Omondi Okech, Faith, Olivia, Salome, Zipporah and Ambrose. We also express our gratitude to Peter Maina for leading the work of data entry.

Descriptive Statistics for Respondent Households

According to Kristjanson et.al. (2004)[5], Siaya and Vihiga districts are amongst the poorest in Kenya. According to the 2005 Economic Survey produced by the Ministry of Planning and Economic Development, 67% of households in Nyanza Province (in which Siaya is found) fell below the KShs 80 per day national poverty line, making it the poorest province in Kenya[6]. Western Province (in which Vihiga is found) was the third poorest province in Kenya, with more than 60% of households below the KShs 80 per day poverty line.

In the analysis that follows, reference is made to seven key indicators of household "wealth" and well-being. These relate to: non-farm income sources, education of household head, area of land accessed for cultivation (including fallow), livestock ownership, land and labour hire (in/out), house ownership and nutritional status. Whilst this list mixes asset and outcome indicators, it is used here because it reflects the consensus of a number of focus groups on what defines wealth in the communities in which the project was operating (see Appendix 3). Furthermore, at times during the analysis below, reference is made to a composite wealth indicator, which summarises the status of given household across these seven areas. The construction of this composite wealth indicator is explained in Appendix 2, with additional background information provided in Appendix 3. Across the 282 households surveyed for this report, the maximum score achieved on this composite wealth indicator was 3.13 and the minimum 0.48, with a mean of 1.39.

Importance of Different Income Sources

About half of all respondents reported that their household received three or more income sources during the previous twelve months. Crop production was overwhelmingly the most important income source, especially if considered in conjunction with horticulture (Table 4).

Table 4: Respondents' Ranking of Household Income Sources

Income Source	Rank (rank = 1 if main income source 2004/05, 2 if second source etc; 0 = not ranked in top three)				Total
	1	2	3	0	
Crop Production	99	110	36	27	282
Business	57	26	15	184	282
Casual Employment	38	38	13	193	282
Formal Employment	25	3	5	249	282
Remittances	24	19	14	225	282
Livestock	15	35	40	192	282
Horticulture	14	10	18	240	282
Pension	5	1	0	276	282
Other	2	2	1	277	282
Total	279	244	142		

[5] Kristjanson, P, Krishna, A, Radeny, M and Nindo, W (2004) "Pathways Out of Poverty in Western Kenya and the Role of Livestock", FAO / Pro-Poor Livestock Policy Initiative Working Paper, FAO, Rome, May 2004.
[6] Reported in "The Standard" newspaper, Thursday 26/05/2005.

According to Table 4, whilst livestock production was the most important income source for just 5% of households, it was the second or third income source for many more. Meanwhile, 35% of households ranked income from (non-farm) business activity as one of their three most important income sources and for many of these it represented the single most important income source entering the household. Casual employment was also an important income source for over 30% of households.

By contrast, only 12% of households ranked income from formal employment as one of their three most important income sources and only six households benefited from pension income. Where such incomes were received, however, they were generally the most important income source entering the household.

Table 5: Frequency of Remittances Received during the Past 12 Months

Frequency	Number of Households
None	200
Once or Twice	44
Several Times	23
Every Month	15
Total	282

Table 5 provides some additional insights into remittance payments. Whereas only 20% of respondents ranked remittances as one of the three most important income sources for their household, a total of 29% of respondent households had received some remittance payments from absent family members during the twelve months prior to the survey. However, only 5% had received these remittance payments on a monthly basis.

Education

Respondents were asked to state the educational attainment of their household head. It was found that the majority had completed primary schooling (or less), whilst only 4% had attended some form of college or university (Table 6).

Table 6: Educational Attainment of the Household Head

Educational Attainment	Number	%
No Education	27	10%
Primary (Standard 1-4)	45	16%
Primary (Standard 5-8)	124	44%
Adult Education	2	1%
Secondary	72	26%
College or University	12	4%
Total	282	101%

Land Holding

A distinguishing feature of Siaya and (especially) Vihiga districts is the small land areas available to each household due to high population pressure. During the 2005 long rains season (the main agricultural season), the mean area cultivated per household was 1.28 acres (0.5 hectares). To increase the land available to them, 19% of households had leased land in during the season (included within the area cultivated figure) and a similar number had leased land in during the previous (2004 short rains) season. Meanwhile, 5% of surveyed households leased land out during each of these seasons.

Despite the small land areas, over a third of households (38%) hired in labour to assist them with their agricultural activities during the 2005 long rains season, whilst just under a third (29%) hired labour out on other people's farms during this season. Similar percentages were recorded for the 2004 short rains season.

Livestock Holdings

Table 7 reports the number of different types of livestock owned by respondent households. Not only were numbers owned quite small, but mean numbers of all categories had fallen since 2001/02. This phenomenon is explored in a later section.

Table 7: Livestock Holdings (n=282)

Livestock Type (Numbers Owned 2004/05)	Mean	Maximum	Number with None	Change in Mean 2001/02 – 2004/05
Grade Cattle	.30	7	231 (82%)	-.01
Local Cattle	1.45	20	113 (40%)	-.36
Sheep	1.06	10	162 (57%)	-.04
Poultry	6.64	70	33 (12%)	-7.41

Ownership of Durable Assets

The questionnaire asked respondents about five categories of assets that their household may or may not have owned during the lifetime of the project. These were bicycles, radios, sofa sets, beds and mobile phones. Bicycles, radios and sofa sets were chosen as relatively "affordable" assets that middling-poor households might acquire if their incomes increased, and beds as a basic asset that only the poorest would not have. Mobile phones were chosen as a technology that would have been almost new to the area during the lifetime of the project and one that perhaps only the better-off would aspire to own initially.

Table 8 shows that numbers of these five categories of assets owned by respondent households had remained essentially static since 2001/02. This is in contrast with livestock holdings, but still indicates that there had been little (if any) economic growth in the survey areas since 2001/02.

Table 8: Ownership of Durable Assets 2004/05 (n=281)

Asset Type (Numbers Owned 2004/05)	Mean	Maximum	Number with None	Change in Mean 2001/02 – 2004/05
Bicycle	.51	3	160 (57%)	.01
Radio	1.07	7	72 (26%)	.03
Sofa Set	.81	6	157 (56%)	.07
Beds	2.35	10	19 (7%)	.20
Mobile Phone	.19	3	242 (86%)	.09

Housing

Respondents were asked to describe the type of houses that household members lived in. (This could often also be directly verified by the enumerator, as most interviews took place at respondents' homesteads). Many households have more then one dwelling in which members live. Previous work (Appendices 2 and 3) has shown that the most "permanent" type of house owned by a household is a good indicator of the overall wealth of a household. In this survey, only a quarter of respondent households had either a semi-permanent house with tin roof (14%) or a permanent (brick) house with tin roof (11%). The most "permanent" type of house owned by the majority of households was a house with mud walls and tin roof (Table 9).

Table 9: Most Permanent Type of House in Which Household Members Lived

Type of House	Number	%
Mud Walls, Thatched Roof	61	22%
Mud Walls, Tin Roof	147	53%
Semi-Permanent House, Tin Roof	40	14%
Permanent House, Tin Roof	30	11%
Total	278	100%

Nutrition

The survey was conducted during the "hungry" months before the main rains harvest. The majority of respondents reported that their households had eaten twice (35%) or three times (57%) per day during the month before the survey. Just 4% reported that they had eaten only once per day. However, 58% (164/280) had not eaten any meat during the previous week and 23% had not eaten any beans, groundnuts or soyabeans.

Perhaps encouragingly, 59 respondents (21%) reported that their diet had improved in some way in the three years prior to the survey. However, 30 others (11%) reported that theirs had declined.

Differences by Area

Table 10 compares the mean scores for the different components of the composite wealth indicator (see Appendix 2) across the three sub-locations.

Table 10: Wealth Differences Across Survey Areas

	Nyamninia vs Gongo	Nyamninia vs Ebukhaya	Gongo vs Ebukhaya
Non-Farm Income	No difference	Lower	Lower
Education of HH Head	No significant differences		
Area Cultivated LR2005	Higher	Higher	No difference
Cattle Ownership	No significant differences		
Labour and Land Hire	No difference	More hiring in	No difference
Main Residential House	Higher	No difference	Lower
Quantity and Quality of Diet	No significant differences		

Note: lower/higher refers to the first sub-location of the named pair, e.g. Nyamninia in the first two columns

Half of all sampled households in Ebukhaya either receive remittances from absent family members every month or rank as their main income source either business, formal employment or pensions (see Appendix 4). This compares with 37% in Nyamninia and 30% in Gongo. The higher dependence on non-farm income in Ebukhaya may be attributed to both pull factors (it is closer to Kisumu than the other two sublocations) and push factors (many very small farms).

Meanwhile, the mean area of land cultivated by respondent households in the 2005 long rains season was significantly higher in Nyamninia sublocation (mean = 1.61 acres) than in either Gongo (mean = 1.19 acres) or Ebukhaya (mean = 1.04 acres)[7]. The median area cultivated was one acre in Nyamninia and Gongo, and just 0.75 acres in Ebukhaya.

The other distinguishing difference between sublocations highlighted in Table 10 is that there has been less investment in housing stock in Gongo than in either Ebukhaya or Nyamninia. In nearly half (43/91) of the respondent households interviewed in Gongo, the most "permanent" type of house owned was one with mud walls and a thatched roof. This is an important indicator of wealth levels in the three sublocations over time. Using our composite wealth indicator (see Appendix 2) as an overall indicator of household wealth, we find that the mean wealth level is significantly lower in Gongo than in either Ebukhaya or Nyamninia, although the difference between the mean level in Gongo and Ebukhaya is only significant at the 10% level (Table 11). We suggest that this is because Gongo lacks either the slightly larger farm sizes found in Nyamninia or the access to non-farm income found in Ebukhaya.

[7] All figures are based on respondents' own reports. However, whenever possible, enumerators sought to corroborate the responses given to them.

Table 11: Wealth Indicator Scores by Sublocation

	Mean	Median	Maximum	Minimum	Std Deviation
Nyamninia	1.49	1.40	2.92	.48	.54
Ebukhaya	1.41	1.30	3.13	.50	.47
Gongo	1.28	1.21	2.31	.50	.44

Gender[8] and Status of Household Head

Surveyed households were categorised according to the gender and status of the household head. The most common household type within the sample was male-headed monogamous households (58%), followed by households headed by widows (24%). Overall, 69% of surveyed households had male heads.

Demographics

Across the entire sample, mean household size is 6.22 persons. Mean numbers by sublocation range from 5.9 in Ebukhaya to 6.5 in Nyamninia. However, these differences are not statistically significant.

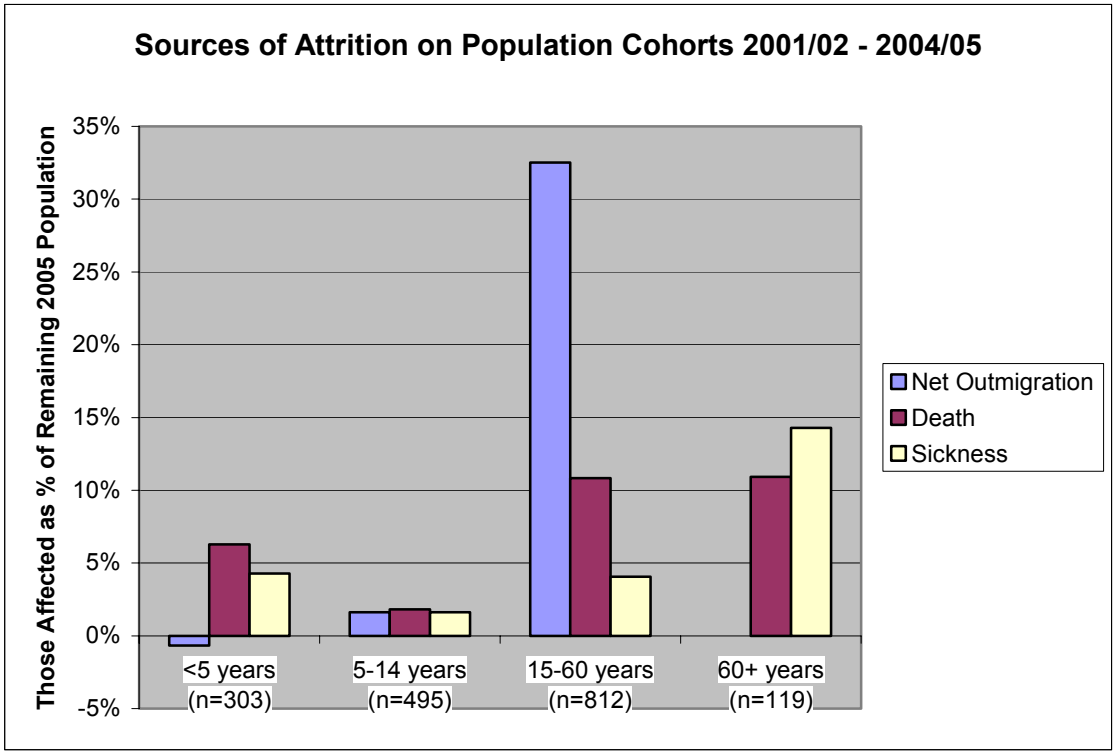
Striking information was received from respondents regarding demographic trends. As well as listing current household members by age cohort, respondents were asked to state the number of household members (of each age cohort) who:

- Had moved away from the area since 2001/02
- Had moved back to live with the household since 2001/02
- Had died since 2001/02
- Had been sick for more than a month at the time of the interview.

Figure 1 shows the responses to these questions. It shows that between 2001/2 and 2005 the number of adults aged 15-60 who moved away from the local area (leaving other members of the household behind) was equivalent to 33% of the number in this age group that was left behind - a massive rate of out-migration! Similarly, over the same period, our respondents claimed that 11% of adults aged 15-60 and 11% of adults aged 60%+ had died. This is consistent with the high proportion of widows reported above.

[8] We relate gender and status of the household head to wealth and to participation within the SCOBICS credit scheme in a later section. However, as the unit of analysis within the questionnaire was the household, we are limited in our ability to draw conclusions about gender dimensions to participation in project activities. Our intention had been to conduct separate focus groups containing male and female respondents to run alongside the questionnaire survey. However, mainly due to lack of staff time, this did not happen.

Figure 1



These figures represent a very bleak backdrop against which the performance of the project has to be assessed. The out-migration is, presumably, linked to the small farm sizes and limited income earning opportunities locally, whilst the deaths reflect the fact that the survey areas now have some of the highest HIV prevalence rates in Kenya. Kristjanson et.al. (2004, p8) report that:

> "Siaya District has the highest levels of HIV prevalence and HIV-related morbidity and mortality rates in Kenya. These prevalence rates have increased rapidly from 14% in 1994 to 27% in 2000 (Opiyo 2001; GOK 2001)."

The same cited sources record prevalence rates of 25% for Vihiga in 2000.

No difference in levels of net out-migration were found across sub-locations. However, higher levels of sickness were reported in Gongo than in Ebukhaya or Nyamninia and fewer deaths were reported in Ebukhaya than in either of the other two sublocations.

Who Has the Project Reached?

In this section we do three things:

- compare the attributes of households whose members have participated in project activities with households where no one has participated in the project. For this purpose we focus on the attributes of SCOBICS borrowers;
- assess how many people who have not borrowed from SCOBICS have participated in, or otherwise benefited from, other project activities;

- report the findings of the survey on the benefits that project participants perceived from the project activities other than SCOBICS.

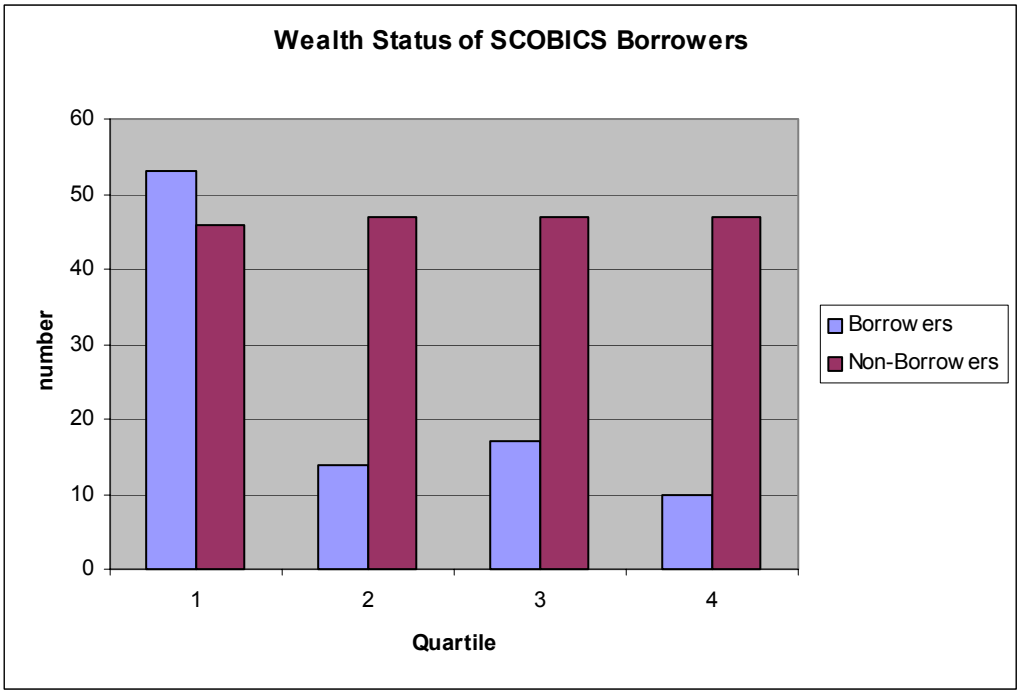
The SCOBICS Credit Scheme

Wealth Attributes of Borrowers

The wealth indicators described in Appendix 2 were used to allocate survey respondents to wealth quartiles. The quartiles were defined by the scores achieved by the 188 non-borrowers, and borrowers were then assigned to these quartiles according to their scores. Figure 2 shows that borrowers were drawn primarily from the top wealth quartile. This provides an interesting insight into both who participated in the original contact groups (e.g. Ministry of Agriculture focal area committees and ICRAF-established sub-locational committees) and whom these people thought could be trusted to repay loans as the scheme was expanded.

Perhaps surprisingly, however, almost 30% of borrowers were from quartiles 3 and 4, with fewer from quartile 2 than from quartile 3. These poorer borrowers do not have access to any more land than their non-borrowing control group in the same quartiles, so one assumes that they were chosen as borrowers because they were believed to be trustworthy enough to repay even out of their limited means.

Figure 2



Comparing means on individual components of the composite wealth index, significant differences are found between borrowers and non-borrowers on all components, with the partial exception of the frequency and significance of non-farm income sources (wages, remittances and pensions) where the difference is only significant at 10%.

Meanwhile, Table 12 divides the sample into three groups: borrower households, non-borrowers households in villages with borrowers in and households from non-borrower villages. This shows that borrowers were generally wealthier than both non-borrowers households in their own villages and households from non-borrower villages, but that there were few significant differences in wealth between these latter two groups.

Table 12: Differences between Borrowers and Non-Borrowers

	1 vs 2	1 vs 3	3 vs 2
Non-Farm Income	No difference	Higher	No difference
Education of HH Head	Higher	Higher	No difference
Labour and Land Hire	More hiring in	More hiring in	No difference
Cattle	Higher	No difference	No difference
Area Cultivated LR2005	Higher	No difference	Higher
Main Residential House	Higher	Higher	No difference
Quantity and Quality of Diet	Higher	Higher	No difference

Notes: 1 = Borrower Households; 2 = Non-Borrower Households in Villages with Borrowers in; 3 = Households in Non-Borrower Villages

Borrowers resided in 14 of the 26 villages where the survey took place. Comparing all respondents from villages where borrowers live and from non-borrowing villages, no significant differences were found between any components of the wealth index, with the partial exception of the frequency and significance of non-farm income sources (wages, remittances and pensions) where the difference was only significant at 10%. Our inference is that the geographical scope of the SCOBICS credit scheme was determined primarily by the social links of the members of the initial contact groups, rather than by economic differences between villages.

Household Type

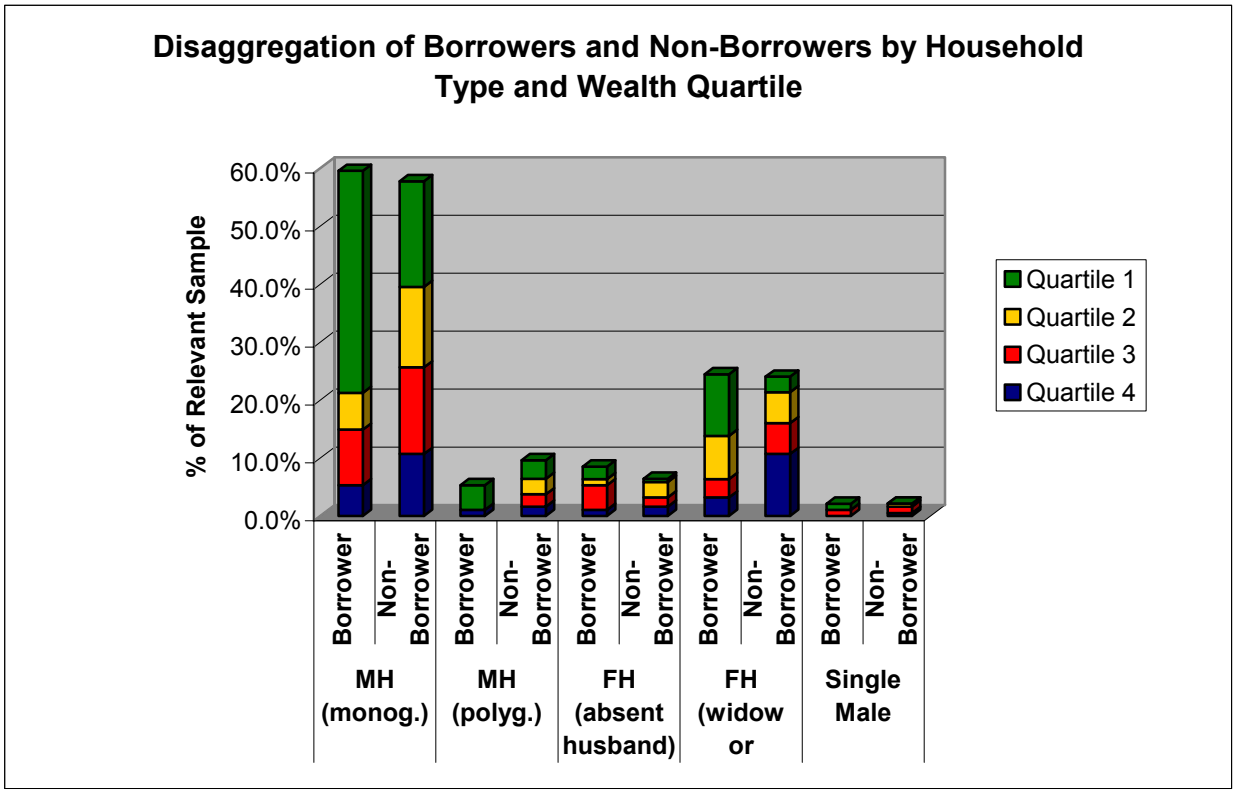
Figure 3 disaggregates both borrower and non-borrower households by household type as well as wealth quartile. Each column in the figure shows the proportion of the relevant sub-sample (borrowers or non-borrowers) accounted for by households of a given type. Thus, monogamous male-headed households were the most common household type (almost 60%) both in the random sample of the local population and within the sample of borrowers. Indeed, a striking observation from Figure 3 is how similar the composition of the borrowers and random (non-borrowers) sample was when disaggregated by household type.

As noted earlier, the second most common household type (around 25% of both borrowers and the local population as a whole) was households headed by widows[9]. Of all the household types, households headed by widows were found to be the most concentrated within wealth quartile 4. (Within the random sample from the local population as a whole, 45% of households headed by widows were found to be within wealth quartile 4, compared with only 19% of monogamous male-headed households). Figure 3 suggests that the participation

[9] Although Figure 3 mentions both widows and divorcees, there was, in fact, only one household headed by a divorcee (a non-borrower household) in the whole sample.

within the SCOBICS scheme by borrowers from households headed by widows has been proportional to the prevalence of such households within the local population as a whole. However, as is true of SCOBICS more generally, it has tended to be people from *better-off* households headed by widows who have managed to access loans.

Figure 3



Notes: MH = male-headed household; FH = female-headed household; monog. = monogamous; polyg. = polygamous

Main Income Source

Given the focus of SCOBICS on supporting agricultural production, we might expect agricultural production to be a major economic activity for the majority of borrower households. Table 13, however, indicates that this is only partially true. A higher proportion of SCOBICS borrower households (56%) than non-borrower households (41%) indicated that their main income source in 2004/05 was either agriculture, horticulture or livestock production. Of the 41 borrower households (44%) for which neither agriculture, horticulture nor livestock were the main source of income in 2004/05, 29 (31%) ranked one of these as their second most import source. This still leaves 12 (13%) for which neither agriculture, horticulture nor livestock featured within the top two income sources in 2004/05.

Table 13: Is Agriculture, Horticulture or Livestock Your Main Income Source in 2004/5?

Response	SCOBICS Borrower Household?		
	Yes	No	Total
Yes	52	76	128
No	41	110	151
Total	93	186	279

Access to Other Credit Sources

The survey findings show that members of SCOBICS borrower households belong to more savings and loan groups than members of households that have not participated in SCOBICS (Table 14). These savings and loan groups include various self-help groups (e.g. church groups, women's groups), merry-go-rounds (ROSCAs), savings and credit cooperatives (SACCOs) and table banking (ASCAs). For example, 118 respondents reported that one or more household members were involved in a self-help group and 53 that one or more household members were involved in a merry-go-round. Whilst it is possible that participation in these other groups has commenced since involvement in SCOBICS (data was not collected on this), a more likely story is that people with a track record of saving and/or of taking and repaying loans have been accepted as SCOBICS borrowers as the scheme has developed.

There is a significant difference in the mean number of such groups (other than SCOBICS) that members of borrower and non-borrower households belong to. Moreover, this effect is not just the result of there being a disproportionate number of wealthier households within the borrower group. A similar result is found if only households in wealth quartiles 3 and 4 are considered.

Table 14: Mean Number of Savings and Loans Groups (other than SCOBICS) that Household Members Participate In

	Mean Number of Groups	
	Whole Sample	Quartiles 3 and 4 Only
SCOBICS Borrower Households	0.97	0.85
Non-borrower Households	0.59	0.42

Note: difference between means significant at 1% in both cases

However, the fact that households belong to these other groups does not necessarily mean that they obtain credit from them. Indeed, excluding SCOBICS loans, the majority of respondent households took no loans in the twelve months prior to the survey (Table 15).

Table 15: Number of Loans taken from Sources other than SCOBICS, 2005

Number of Loans	SCOBICS Borrower Household?		
	Yes	No	Total
0	70	170	240
1	18	17	35
2	4	0	4
3	2	0	2
Total	94	187	281

We thus observe that:

- SCOBICS clients are often members of households who signal their trustworthiness (and perhaps demand for financial services) by participation in other savings and loan groups found in the area;
- Some SCOBICS borrowers are thereby from households that also have access to loans from other sources;
- Nevertheless, many do not appear to have ready access to other loans.

Meanwhile, Table 16 compares the uses to which loans from different sources, taken in the year prior to the survey, were put. This shows that, even excluding SCOBICS loans from the analysis, agricultural inputs represented the single biggest use of loans along with business and trading activities. Table 16 also shows that a small degree of leakage from the SCOBICS scheme was apparently admitted by respondents (with inputs sold to finance other activities?).

Although a few respondents reported being able to access loans of 12 months or more from self-help groups and SACCOS, the average duration of loans from these sources was in all cases lower than the 10 months' duration of a SCOBICS loan.

Table 16: Uses of Loans taken from Different Sources, 2004/05

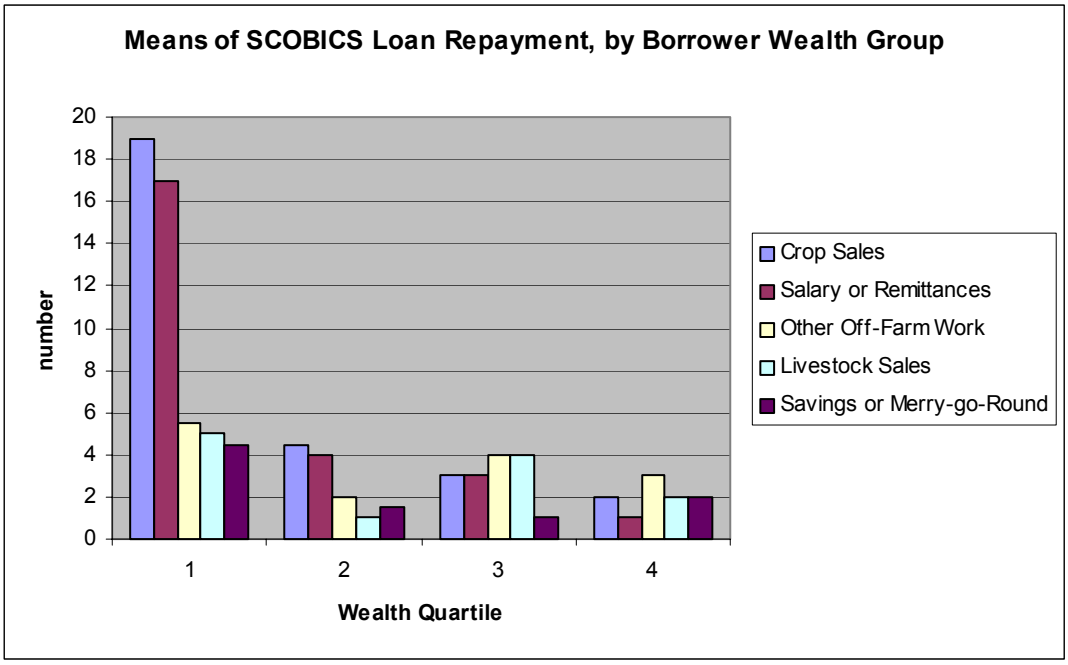
	Merry-go-Round[10]	Self-help Group	SCOBICS	SACCO	Other	Total
Agricultural Inputs	4	9	74	2	1	90
Business / Trading	5	4	4	1	3	17
Food	1	5	0	0	2	8
School Expenses	0	1	0	6	1	8
Medical / Funeral	0	2	0	0	2	4
Other	1	1	1	1	0	4
	11	22	79	10	9	131

[10] Should we understand merry-go-round responses as payouts?

Means of Loan Repayment

Figure 4 shows the means of SCOBICS loan repayment used by borrowers in different wealth groups. (Respondents were asked to say how the last SCOBICS loan that a member of their household had taken was repaid). Interestingly, only 41% of respondents relied on crop sales wholly or partly for loan repayment. Moreover, it was wealth quartiles 1 and (to a lesser extent) 2 who relied most heavily on crop sales, plus salaries and remittances, to repay their loans. On average, producers in the higher wealth quartiles have access to larger plots of land and so are better placed to produce crop surpluses for sale. In proportionate terms, quartiles 3 and 4 were more dependent on other off-farm work (e.g. casual labour) and on livestock sales to repay their loans. Within the fifth category (financial sources of loan repayment), respondents from quartiles 1 and 2 principally mentioned savings, whilst quartiles 3 and 4 cited merry-go-rounds.

Figure 4



Meanwhile, 77 respondents had heard of SCOBICS but not taken a loan. Of these, two thirds (51) said that they had not applied because they did not know how to. The next most common reasons given for not applying were that they did not want or need an input loan (11, plus three who said they had obtained an input loan from elsewhere) and that existing group members would not accept them in their groups (7). There were no clear distinctions across wealth quartiles in these answers.

Dissemination of Technical Information on Integrated Crop and Soil Fertility Management

This was done primarily through the distribution of pictorial decision support tools (DSSs) within the project areas. These tools were developed in consultation with selected farmers, who commented upon them during two workshops dedicated to their development. Once finalised, all group contact persons within the SCOBICS credit scheme were trained in the use

of the three available DSSs in 2004. In addition, the DSSs were presented at the annual Credit Information Days held in each area in late 2003 and late 2004.

Figures 5 and 6 show that it remains essentially borrower households who have seen the DSSs. Responses from borrower households claiming that they have not seen a DSS are explained partly by the fact that DSSs were not actively promoted even amongst borrower households until 2004 and partly by the fact that the questionnaire respondents may not have been the household member who had been trained in DSS use. However, this latter explanation also suggests that intra-household transmission of such information is weak.

Figure 5

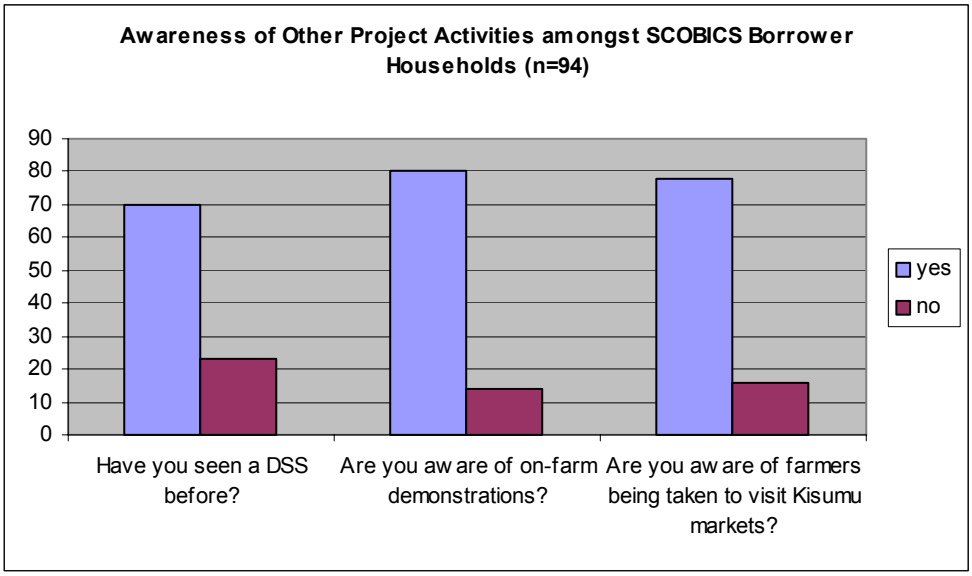
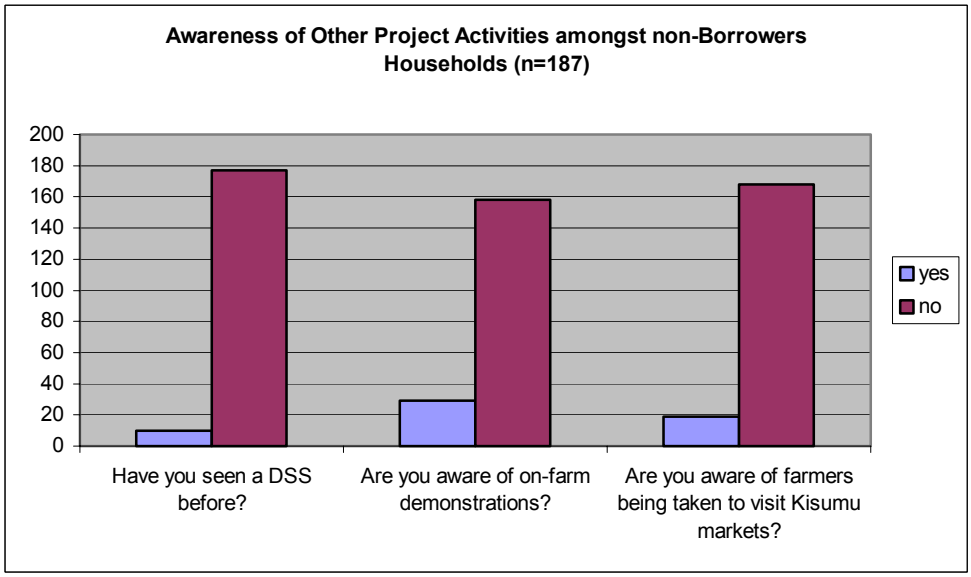


Figure 6



Most of those who had seen the DSSs claimed to use them and also to gain benefit from doing this. A total of 80 respondents claimed to have seen a DSS. The majority of these had seen it/them either at a training day organised by the project (46), at a contact person's home (14) or at a credit information day (12)[11]. Of these 80 respondents:

- 69 said that they could access a DSS if they wanted to, with a contact person's home (49) or project staff (11) being the most commonly cited places where they could do this;
- 68 said that they knew someone who could explain the DSS to them if they needed this, with contact persons (44) and project staff (12) being the most commonly cited people who could do this. A further 12 were confident that they could explain the DSS themselves (probably because they were contact persons);
- 58 claimed to have used a DSS(s) when planning their cropping activities for short rains 2004 and 61 when planning their cropping activities for long rains 2005;
- 63 claimed to have made changes to their cropping activities as a result of referring to a DSS. The claimed changes can be grouped into two: commencing crop rotation and in some cases also other good agronomic practices (34), and commencing use of top dressing fertiliser, compost and/or striga resistant maize varieties (29). 56 of these respondents reported benefits as a result of the changes (principally better soil fertility, higher yields and greater income from farming) with just two stating that they had not seen benefits (and 5 missing data points).

These results show the potential benefits from dissemination of clear and well-presented information on improved farming practices. However, so far dissemination has largely been restricted to households participating in the SCOBICS credit scheme.

Of the ten respondents from non-borrower households who claimed to have seen a DSS before, five came from villages where SCOBICS borrowers live and five were from other villages. Only one respondent from a non-borrower household (who lived in a village where SCOBICS borrowers live) claimed to be using DSSs in their agricultural planning. They claimed to have done this in both the 2004 short rains season and the 2005 long rains. This person claimed to have heard about DSSs at a field day and to be able to talk to a project contact person about the information contained in the DSS, but (surprisingly) claimed not to know about the SCOBICS credit scheme.

Participatory Evaluation of New Crops and Seed Varieties

Figure 6 shows that 29 respondents from non-borrower households were aware of on-farm demonstrations that had taken place in their areas in the previous three years. However, closer inspection reveals that only a third of these respondents were citing demonstrations organised by the project[12]. Other respondents were aware of demonstrations organised by a range of other organisations, including Ministry of Agriculture, KARI, TSBF, Egerton University, the Millennium Village Project in Sauri and CARE. By contrast, all respondents bar one (i.e.

[11] Credit Information Days are annual events organised by SCOBICS in all its areas of operation at which staff explain to current and prospective future borrowers the procedures for applying for a loan for the next lending cycle. Staff also use these opportunities to reinforce the technical (agricultural) knowledge of borrowers, so as to enhance their chances of making productive use of their loans and being able to repay them out of an agricultural surplus.

[12] Ten of the 11 non-borrower households who were aware of demonstrations organised by the project were residents of villages where SCOBICS borrowers live.

79/80) from borrower households who were aware of on-farm demonstrations that had taken place in their areas cited demonstrations organised by the project.

As with the dissemination of DSSs, these figures show relatively little diffusion of the knowledge generated by the project beyond the immediate beneficiaries (i.e. principally SCOBICS borrowers) and almost none beyond the villages where the immediate beneficiaries live.

Irrespective of borrower status, respondents reported that demonstrations had focused on maize, beans, soyabean or groundnut varieties or some combination of these[13]. Table 17 shows how respondents heard about the demonstrations. This shows the importance of farmer-farmer communication and, amongst borrower households, particularly the role played by the credit group contact persons. It is difficult to draw any conclusions about the effectiveness of chief's "barazas" from this table, because we do not know how many of the demonstrations in question were publicised through such meetings. However, the limited importance of local extension workers as a source of information is noteworthy. Indeed, they appear to have been of no significance except when working in conjunction with the project! This reflects, amongst other things, the chronic lack of resources made available to extension staff (e.g. almost no fuel for their motorbikes or, alternatively, fares for public transport).

Table 17: Sources of Information about On-Farm Demonstrations

	Borrower	Non-Borrower	Total
Another Farmer	18	17	35
Contact Person	31	2	33
Project or NGO Staff	22	1	23
Chief's Baraza	6	4	10
Self-Observation		5	5
Extension Worker	3		3
TOTAL	80	29	109

Having become aware of demonstrations, a higher proportion of borrower respondents than non-borrower respondents (80% vs 28%) attended the relevant field day, visited the demonstration plots at other times and/or discussed the findings of the demonstrations with other farmers[14]. This may reflect the fact either that borrowers were given more direct encouragement to attend (e.g. by contact persons or project staff) or that they are more active in seeking out new knowledge on farming (a reason why they were identified as potential borrowers in the first place?).

Having acquired new knowledge through the demonstration, a similar proportion of borrower (56/64) and non-borrower (6/8) respondents then claim to have made changes to their farming practices as a result. The details of the changes that they claim to have made (minus two

[13] There were just three exceptions to this – all non-borrowers – who mentioned demonstrations on millet, kales, tobacco and sunflower conducted by either Ministry of Agriculture or Egerton University.

[14] All the non-borrowers who attended field days or visited demonstration plots were residents of villages where SCOBICS borrowers live. It thus appears safe to assume that the demonstrations in question were ones organised by the project.

missing responses) are shown in Table 18. Clearly, those who observed the demonstrations were impressed by the performance and/or potential both of soyabeans and of the striga resistant maize varieties that were being demonstrated. However, there is also some indication from the table that such demonstrations can be useful vehicles for encouraging changes in cultural practices (e.g. spacing).

Table 18: Changes Made to Farming Practices as a Result of On-Farm Demonstrations

	Borrower	Non-Borrower	Total
Planted Soyabeans (in some cases, also groundnuts)	28	1	29
Use of Recommended Spacing	10		10
Plant Striga Resistant Maize / Change Maize Variety	10		10
Use fertiliser, improved seeds and legumes	6	4	10
Top dress	1		1
TOTAL	55	5	60

Amongst those who did attend a field day, but did not make any changes to their farming practices as a result, the reasons given for not making changes were: lack of capital (4), could not obtain the seeds (4), no market for the crop in question (2) and not food secure so not in a position to make changes (1). The first two responses are somewhat surprising when they come from borrowers, as SCOBICS aimed to improve access to both capital and seeds. However, they are still instructive. The only respondents who answered that they did not make changes because there was "no perceived benefit" were people who did not actually attend the demonstration or discuss it with other farmers!

Exposure to New Markets

During 2003, groups of SCOBICS borrowers were taken by the project to visit the major Kisumu public markets and to meet with traders there. This gave them an opportunity to learn which crops and varieties were in high demand, to understand traders' requirements and to compare Kisumu prices with those prevailing in their local markets[15].

Table 19 provides some context for this. Whilst around half of all respondents claimed to have visited the local markets of Yala and Luanda in the year prior to the survey, even after the market visits only a minority of respondents had visited any of the Kisumu markets in the year prior to the survey – or even the quasi-local markets of Siaya and Ugunja. Farmers in the project areas have very little knowledge of the market environment for the products they produce, beyond their most immediate markets.

[15] The project's own analysis suggests that prices in local markets are nearly always higher than the net price that local producers could obtain by taking their produce to Kisumu.

Table 19: Proportion of Respondents Visiting Different Markets During the Previous Year

		Borrowers (n=92)	Non-Borrowers (n=183)	Total (n=275)
"Local"	Yala	49%	58%	55%
	Luanda	48%	40%	43%
	Siaya	13%	9%	11%
	Ugunja	8%	8%	8%
Kisumu	Kibuye	13%	9%	11%
	Jubilee	10%	5%	7%
	Kondele	4%	6%	5%
Busia	Busia	3%	2%	3%

Twenty of those interviewed had themselves been taken to Kisumu by the project. Of these, seven had been back[16] to Jubilee market and five back to Kibuye in the past year.

Within the sample there was also evidence of a tiny minority of respondents – evenly spread between borrowers and non-borrowers – who make monthly visits to Kisumu markets. However, we did not collect information on what they go to do there. Whilst they may take produce, they may also go to buy food or possibly non-food items (sold at Kibuye and on the streets outside Jubilee market).

Figure 6 (above) showed that only a minority of respondents from non-borrower households were aware of the market visits organised by the project. The majority of these (14/19) were from villages where SCOBICS borrowers live, but five were from other villages. Only five of the 19 had also claimed to be aware of on-farm demonstrations occurring in their area, indicating that it is not just the same small circle of "friends of borrowers" who have been informed about multiple project activities. As with other project activities discussed above, the main transmission channel for information about the visits (where this occurred) was discussion between farmers.

Again, as with the on-farm demonstrations organised by the project, a much higher proportion of borrower respondents (81%) than non-borrower respondents (33%) who were aware of the market visits discussed the findings of the visits with other farmers.

Table 20 shows the changes that respondents claimed to have made to their farming practices as a result of knowledge gained through the market visits. The most common change was to switch to bean varieties that are traded in Kisumu markets (e.g. Canadian Wonder, Rose Coco), as those who visited Kisumu realised that several of the traditional bean varieties that are commonly grown for own consumption or for sale in local markets are not demanded at all by traders in Kisumu.

[16] The market visits organised by the project were more than a year before the survey, but it is possible that some of the respondents were counting the market visits organised by the project in their response. This was not explicitly checked.

Table 20: Changes Made to Farming Practices as a Result of Knowledge Gained through the Market Visits

	Borrowers	Non-Borrowers
Changed Bean Varieties (to ones sold in Kisumu)	13	
Started Producing Marketable Crops	8	1
Started Planting Soyabean	6	
Started Planting Hybrid Maize	4	
Planted Onions	1	
Planted Large Quantity of Groundnuts	1	
TOTAL	33	1
As % of Those Who Discussed Findings of Visits	52%	20%

The total number of changes in this table is higher than the number of respondents who participated in market visits, indicating that it is not just those who personally participated in the market visits who made changes as a result. However, the proportion of respondents who made changes is lower than the proportion who claimed to make changes as a result either of exposure to DSSs or of the on-farm demonstrations. The reasons given by respondents, who discussed the findings of the market visits but didn't make changes, for not making changes are, therefore, instructive. Table 21 summarises these responses. It shows that low levels of production are the main reason why respondents did not consider it important to modify their cropping system in response to opportunities in Kisumu markets.

Table 21: Reasons Given for Not Changing Cropping Pattern in the Light of the Findings of the Kisumu Market Visits

	Borrowers	Non-Borrowers
Surpluses Too Small (to be influenced by Kisumu markets)	14	2
Not Food Secure (so not ready to start producing for market)	4	1
Cannot afford transport	2	
No attractive opportunities identified	1	1
Don't trust Kisumu traders	1	
Lack of seeds	1	
	23	4

Efforts to Encourage Participatory Budgeting

During 2002 and 2003, the project made some initial attempts to encourage SCOBICS borrowers to keep records of their expenditure and labour input into particular crop production activities so as to construct activity budgets that could be used to assess the returns from different crops and technologies (use of improved seed, fertiliser use, other soil fertility enhancing technologies). Two half-day workshops were held on the subject and on several subsequent occasions forms to assist farmers to keep records were distributed to any farmers who wished to take them. However, the impression gained at the time was that, whilst farmers found it interesting to attend the workshops and discuss the worked examples that were

developed there, the concept of keeping records at home was an alien one for which the time was perhaps not yet right.

As part of the impact survey, respondents were asked about their experience with budgeting. This revealed that there has also been some attempt by other organisations (e.g. KARI and Ministry of Agriculture) to encourage producers in the project areas to keep records and construct budgets. However, 50 of the 59 respondents who claimed to have attended a workshop on the subject in the previous three years had attended one of the workshops organised by the project. Furthermore, only six non-borrowers had attended any form of budgeting workshop.

Perhaps surprisingly, half of the borrower respondents who had attended a budgeting workshop claimed to have kept (or to be keeping) records and constructed a budget for at least one plot during both short rains 2004 and long rains 2005. We did not ask to see evidence of this, so there may be an element of "telling the researchers what you think they want to hear" in these responses. In all cases, the budgets being constructed related to some combination of maize, beans, groundnuts and soyabeans. Asked about what they had learnt from their experience, respondents tended to give rather general answers such as the benefits of keeping records and treating farming as a business, whilst the main claimed change to cropping practices as a result of record keeping was equally general: "plant profitable crops". Amongst those who said that they had made no changes as a result of budgeting experience, the main reasons given were "not food secure" (8) and "no capital to adopt new technologies" (7).

It is hard to know how to interpret these findings. Benefits from budgeting are most likely to accrue once a farmer – or preferably a group of farmers – has constructed a sufficient number of budgets to be able to compare across crops and varieties, allowing for idiosyncratic effects in particular seasons and for changes in relative market prices. It is possible (although more evidence would be desirable to confirm or refute this) that a small group of farmers with an interest in crop budgeting does now exist, in which case further input to help them compare results and lessons would be beneficial.

Summary of Findings on Participation in Project Activities

To summarise the findings of this section, the SCOBICS loan scheme has been used by the project as its main entry point for working with communities. The scheme has only begun working where there was some pre-existing farmers' organisation, be it a sub-location committee, catchment committee or farmers' organisation such as Tatro. Participation in other project activities has then been dominated by SCOBICS borrower households, at least partly by design as the ethos of the project has been to investigate the impact of providing a coordinated service package to semi-subsistence farmers with limited land holdings.

SCOBICS borrowers are drawn predominantly from the top wealth quartile in the areas concerned. Irrespective of wealth, they are often members of households who signal their trustworthiness (and perhaps demand for financial services) by participation in other savings and loan groups found in the area. However, they are unevenly distributed within their respective sub-locations, as expansion of the scheme has depended on the social networks of the members of the original contact groups. Thus, borrowers resided in 14/26 villages where the survey took place, but not in the other 12.

The survey showed the importance of SCOBICS borrower group contact persons as conduits for information about the project's activities. They are recognised as resource people for the DSSs (by those who are aware of DSSs) and also played an important role in publicising on-farm crop and varietal demonstrations. The other main channel for information dissemination was farmer-farmer contact. Participation by non-borrowers in project activities occurred mainly in villages where SCOBICS borrowers lived.

There is some evidence that SCOBICS borrowers were more likely to act on awareness of project activities and try to capture the knowledge arising from these activities, for example by attending field days or discussing the findings of these activities with people directly involved. This may indicate that SCOBICS borrowers are more entrepreneurial or keen to seek out knowledge than non-borrowers. However, the evidence base for this is weak. Opportunities were created by the project for borrowers to discuss the findings of project activities and borrowers were encouraged to engage with these findings, whereas non-borrowers may have got the impression that such opportunities were "not for them".

Where people (borrowers and non-borrowers) did engage with the findings of project activities, the claimed incidence of changed behaviour in response to new knowledge was high. This is particularly true for changes in cropping pattern or land use practice associated with use of DSSs and the widespread adoption of new varieties (especially striga resistant maize and soyabean) following on-farm crop and varietal demonstrations. We suggest that the fact that new knowledge was provided as part of a package of support services, that also included enhanced access to inputs and credit, may have contributed to this high incidence of changed behaviour. However, we note that non-borrowers who made changes did not access this wider support package.

Outcomes and Impacts from Participation in Project Activities

A desired outcome of the project has been that producers move from a heavy reliance on low productivity maize and beans production to more intensive maize production in the long rains season plus cultivation of additional crops that can be sold at least in part for cash (e.g. soyabean, groundnuts, improved beans) in the short rains season. The objective is to create a sustainable cropping system that, in comparison with current practices:

- leads to households growing and consuming more food;
- generates more cash from crop sales;
- is based on (and permits) greater investment in the soil resource base.

Changes in cropping patterns are, therefore, a key outcome indicator for the project's activities. Without these fundamental outcomes, we would not expect significant impact from the project on either food security, incomes or asset holding. In the following sections, therefore, we consider the available evidence from the impact survey on the influence of the project on:

- maize yields, especially in the long rains season, as a result either of new maize varieties (e.g. striga resistant varieties), greater fertiliser use or improved cultural practices;
- diversity in what is cultivated, especially in the short rains.

We then examine available evidence on the impacts on livelihoods of increased maize yields and greater diversity in what is cultivated.

Maize Yields[17]

In a year a family of seven people in Kenya consume around one ton of maize. If a maize yield of 4 tons per hectare is achieved in own production, then an area of 0.625 acres is required (for one season) to produce enough maize to last the household for the whole of the following year. On the other hand, at a maize yield of 1.5 tons per hectare, the same household would require 1.67 acres (for one season, or 0.84 acres farmed to maize in both seasons) to feed itself for the year. As noted above, during the 2005 long rains season, the mean area cultivated (including fallow) per household was only 1.28 acres. Indeed, 45% of households had access to less than 0.84 acres of land and a third had access to 0.5 acres or less. This illustrates the importance of seeking to raise maize yields in the project areas, particularly if households are reluctant to diversify into other crops until they have achieved a degree of basic food self-sufficiency (see below).

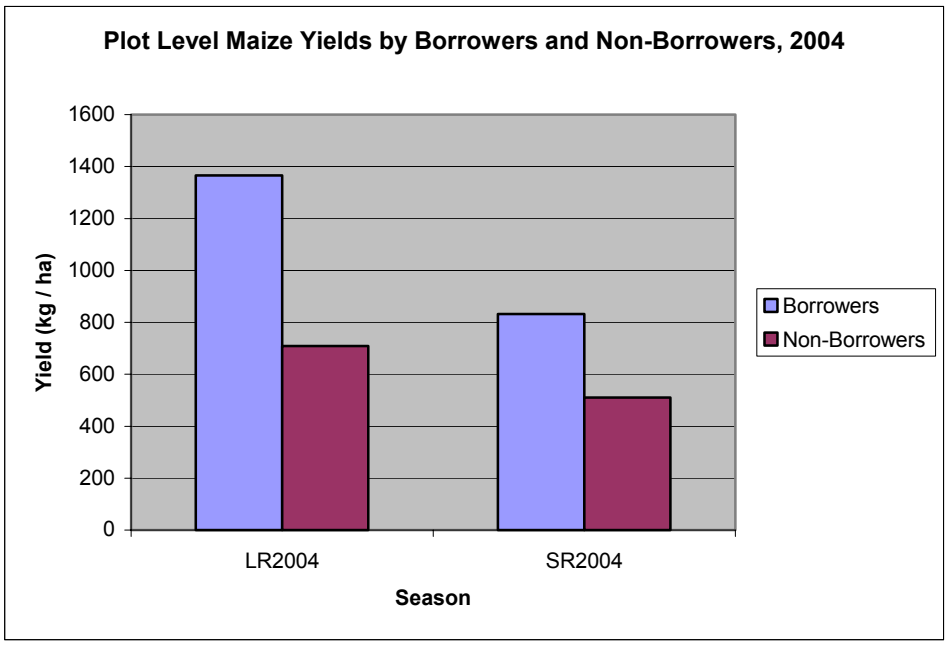
On-farm varietal demonstrations show potential yields in the project area of 4-6 tons in plots without striga and 1.5-2.8 tons in plots with striga infestation during the long rains. However, actual yields are well below this. According to the impact survey, the mean farm-level[18] maize yield across the whole sample in the long rains 2004 was 1060 kg per hectare, whilst that for the short rains 2004 was just 585 kg per hectare.

The project's Biophysical Survey Report indicates that a number of factors explain yield variability across plots, including the initial fertility of the soil[19], rate of fertiliser application, planting date and seed type. The impact survey did not collect data on any of these variables. Nevertheless, it did collect data that allow us to assess the impact of access to credit through the SCOBICS scheme (and hence to improved seed and fertiliser) on maize yields in 2004.

Figure 7 shows (using plot-level data) that households that borrowed from SCOBICS in 2004 achieved higher yields than households that did not, in both long and short rains seasons.

[17] In this section, "borrowers" refers to the 81 respondent households that took a SCOBICS loan in 2004.
[18] On many farms maize production is spread across more than one tiny plot.
[19] Respondents to the Biophysical Survey, conducted in 2004-05, were asked to classify plots according to soil fertility status (good, medium, poor). This was also related to striga incidence, with 90% of poor fertility plots suffering from striga in long rains 2004.

Figure 7



Meanwhile, Table 22 reports the results of two regression models that estimate the impact of access to SCOBICS credit on maize yields, using household level data (i.e. yields were calculated across all the plots on which the household grew maize). The two models adopt different responses to the fact that there could be endogeneity in the selection of SCOBICS borrowers (i.e. those chosen by their peers to be borrowers may be chosen at least in part on their superior agricultural skills and/or commitment - factors that would raise their maize yields even in the absence of SCOBICS credit):

- In the simple linear regression model (performed in SPSS), a dummy variable indicating those households for which agriculture (or horticulture or livestock) production was the main income source in 2004/05 is included as a proxy for household agricultural skill and/or commitment;
- In the two-stage regression model (computed in LIMDEP and using maximum likelihood estimates[20]), the first equation predicts participation in SCOBICS based on a number of household attributes. The predicted participation variable is then used in the second equation. (However, we note that, according to LIMDEP, in practice no endogeneity problem was observed in the model).

The credit selection probit equation in the two-step model indicates that village, household wealth status, participation in other savings and loans activities and whether or not a household depended on agriculture for its main source of income all influenced a household's chance of accessing SCOBICS loans[21]. These variables can be thought of as capturing:

- ability to repay a loan (the wealth variable)
- willingness to repay a loan (as discussed in an earlier section, participation in other savings and loans activities may signal the trustworthiness of the person concerned)

[20] The authors are indebted to Kelvin Balcombe for assisting them to run this model.
[21] Between them, these four variables correctly predicted whether or not a household would access credit in 79% of cases.

- commitment to, or skill at, agricultural production (which could influence both ability and willingness to repay a loan targeted at supporting agricultural production)
- whether this information is available to existing scheme members (do you live in the same village as them?).

Table 22: Explaining Maize Yields in Long Rains 2004

Variable	Two-Stage Model		Simple Linear Regression	
	Coefficient	Significance	Coefficient	Significance
Credit Selection (Probit)				
Intercept	-3.7145	.0000		
Village	1.9277	.0000		
Wealth	0.8355	.0004		
Other Savings / Credit Activity	0.3457	.0158		
Agricultural Dependence	0.5119	.0125		
Yield Regression				
Intercept	38.9063	.8667	32.757	.871
Access to SCOBICS Credit	597.5337	.0287	610.965	.000
Wealth	590.4800	.0021	587.677	.000
Ebukhaya Sub-Location Dummy	-587.2415	.0001	-583.050	.000
Total Land Area Cultivated (acres)	-269.7840	.0000	-268.882	.000
Adults 15-60 in the Households	105.2493	.0001	105.779	.000
Main Income = Agriculture	526.0597	.0002	526.845	.000
		F =	17.927	.000
		R^2 =	0.296	

Meanwhile, the other variables in the main yield equations were chosen for the following reasons:

- wealth also enables a household to hire in labour in a timely fashion if so required and possibly also to purchase inputs on a cash basis (we did not collect data on such input purchases directly);
- The Ebukhaya sub-locational dummy reflects the greater degree of soil fertility depletion in this area compared to the other two;
- With a higher total land area available to the household, we would expect there to be less pressure on the household to raise yields simply to feed itself from its available land. By contrast (one of the assumptions at the heart of the project), where land area is very small, it is imperative for the household to raise its maize yield so as to be able both to feed itself and also to free up land for growing other crops;
- We did not collect data on family labour input into particular plots or crops. However, the number of adults in the household gives an (admittedly crude) estimate of the amount of labour available for agricultural production activities.

We conclude from Table 22 that access to credit through the SCOBICS scheme (and hence to improved seed and fertiliser) had a significantly positive impact on maize yields in the long

rains 2004 season. Holding other factors constant, accessing SCOBICS credit enabled households to raise maize yields by around 600 kg per hectare. Moreover, the value of the coefficient associated with the SCOBICS credit dummy has been found to be robust (600+ kg/hectare) across a number of model specifications (including several not reported here).

Table 23: Explaining Maize Yields in Short Rains 2004

Variable	Simple Linear Regression	
	Coefficient	Significance
Intercept	158.127	.277
Access to SCOBICS Credit	196.857	.096
Wealth	236.747	.027
Ebukhaya Sub-Location Dummy	-333.207	.000
Total Land Area Cultivated (acres)	-97.397	.010
Adults 15-60 in the Household	56.688	.006
Main Income = Agriculture	190.281	.021
Use of DSS	145.347	.261
F =	6.901	.000
R^2 =	0.171	

Meanwhile, Table 23 reports the results of a simple linear regression model explaining maize yields in short rains 2004. All coefficients are lower than in the corresponding model for long rains 2004, reflecting the generally lower yields obtained in the short rains season. The R^2 for the equation as a whole is also lower, perhaps reflecting the less reliable (localised) rainfall in the short rains season. As in the model for long rains 2004, the household's wealth score, the number of adults in the household and the dummy indicating that a household's main income source is agriculture (or horticulture or livestock) all contribute positively to yields, whilst the Ebukhaya sublocation dummy and the total land area available to the household are negatively correlated with yield. In the case of short rains 2004, the coefficient for access to SCOBICS credit is positive, but only significant at the 10% level. This reflects the fact that fewer SCOBICS inputs are used during the short rains season, with the main emphasis of activities being to raise maize yields in the long rains season, so as to release land for other crops in the short rains season.

Perhaps disappointingly, the coefficient for DSS use in Table 23 is not significant. However, this again may be because the emphasis of the project with respect to short rains production has been to encourage diversification, rather than to promote greater productivity in maize production. It may also be reflect the fact that it was almost exclusively borrowers who used DSSs and the majority of them did so (hence the model will show either access to SCOBICS loans or use of DSS as significant, but not both).

The questionnaire also asked respondents for their perceptions of how their maize yields had changed since 2001/02 (i.e. during the lifetime of the project). These provide further evidence that participation in project activities[22] has made a difference to maize yields and also

[22] In Tables 24-26, "borrowers" once again refers to all households that had taken a SCOBICS loan at some point in time.

highlight the importance of access to fertiliser and improved seeds in a context of declining soil fertility, including striga infestation (Tables 24-26).

Table 24: Changes in Maize Yields Achieved Since 2001/02

	Borrowers	Non-Borrowers	Total
Increased	65 (69%)	22 (12%)	
Decreased	11 (12%)	81 (44%)	
Stayed the Same	18 (19%)	81 (44%)	
"It Varies"		1 (-)	
TOTAL	94 (100%)	185 (100%)	279

Table 25: Reasons Given for Increased Maize Yields

	Borrowers	Non-Borrowers	Total
Use of Fertiliser (inorganic)	21	6	27
Use of Fertiliser (organic and inorganic)	14	8	22
Use of Fertiliser and Improved Seeds	22	6	28
Use of Fertiliser and Improved Seeds + Weeding	3		3
Good Agronomic Practice / Better Management	2	2	3
Credit Availability	1		1
TOTAL	63	22	84

Table 26: Reasons Given for Reduced Maize Yields

	Borrowers	Non-Borrowers	Total
Lack of Fertiliser and Improved Seeds	5	33	38
Lack of Fertiliser	2	11	13
Declining Soil Fertility	1	16	17
Striga Weed Infestation	1	3	4
Use of Poor Seeds	1	3	4
Failing Health		4	4
Little Care due to Other Commitments		2	2
TOTAL	10	72	82

A final insight into the impact of the project on maize production is provided by Table 27. This shows that the majority of SCOBICS borrowers claimed to have switched to planting a new maize variety during the lifetime of the project, whereas only 10% of non-borrower households have done this. Of those borrowers who explained the nature of the change that they had made, 55/57 said that they had switched from local to (unspecified) hybrid seed or more specifically that they had switched to striga-tolerant Western Seed Company varieties. The project conducted on-farm trials of a number of maize varieties and made the Western Seed varieties available through the SCOBICS credit scheme following the very positive response of farmers to the on-farm trials. By contrast 4/14 non-borrowers who explained the

nature of the change that they had made said that they had switched from hybrid seed back to local seed since 2001/02.

Table 27: Have You Changed the Maize Variety that you Plant Since 2002/01?

	Borrowers	Non-Borrowers	Total
Switched	61 (65%)	19 (10%)	80
Not Switched	33 (35%)	168 (90%)	201
TOTAL	94 (100%)	187 (100%)	281

In conclusion, there is clear evidence that access to SCOBICS credit has raised maize yields for borrowing producers – through enhancing their access to improved maize varieties and to fertiliser – with our best estimate being that yields have risen by around 600kg/ha as a result of participation in the SCOBICS scheme. Tables 22 and 23 also provide evidence that, *ceteris paribus*, smaller farms have higher yields.

However, even with the benefits of access to credit through SCOBICS, there is still a long way to go before producers in the project area achieve the sorts of yields that would both guarantee their food security and free up land for production of other crops, even though these yields are technically feasible under current smallholder conditions.

Crop Diversification

In the survey, respondents were asked to describe the crops that their households were growing on their various plots during the long rains 2005 season and also all the crops that their households had grown (by plot) for the previous two seasons. More than 20 crops were recorded by respondents[23] and these were often grown in intercropping arrangements. In addition, some land was put under either improved fallow or woodlot or left as natural fallow. The share of land devoted to each of these latter options was very small, however, as is shown in Figures 8-11.

For analytical purposes, land uses were aggregated into the following five categories:

- Maize (monocrop or intercropped with local beans)
- Soyabean and groundnut (as these were two crops that the project specifically promoted through demonstrations and by providing improved germplasm through SCOBICS)
- Fallows (improved and natural)
- Napier grass (which has been adopted as a fodder and cash crop by a sizeable number of farmers in Ebukhaya in recent years, although the project has not played any part in napier promotion)
- Other (including beans grown as a monocrop, which are likely to be improved varieties).

To calculate the areas grown to each, in the absence of more precise data, where two or more crops were grown in an intercropping arrangement, the total land area under the intercrop was divided equally across the crops.

[23] A few were coded as "other", hence the inability to give a specific figure.

Figures 8-9 show a lower proportion of land devoted to maize (with/without beans intercrop) by borrowers than non-borrowers in long rains 2005. In place of maize and beans, borrowers planted a higher proportion of their land to soyabean and groundnuts, napier and other crops than non-borrowers. A similar pattern was observed in long rains 2004, when borrower households devoted 74% of their land to maize and non-borrower households 83%.

Meanwhile, Figures 10-11 show a dramatically lower proportion of land devoted to maize (with/without beans intercrop) by borrowers than non-borrowers in short rains 2004. Indeed, whilst borrower households followed the project recommendations to diversify their production in the short rains season, having achieved higher yields than non-borrowers in the 2004 long rains season, non-borrowers exhibited almost the same land use pattern in short rains 2004 as they had in the long rains 2004 season. Amongst borrowers, the big change between long and short rains seasons was the greatly increased production of soyabean and groundnuts in the latter season.

Figure 8

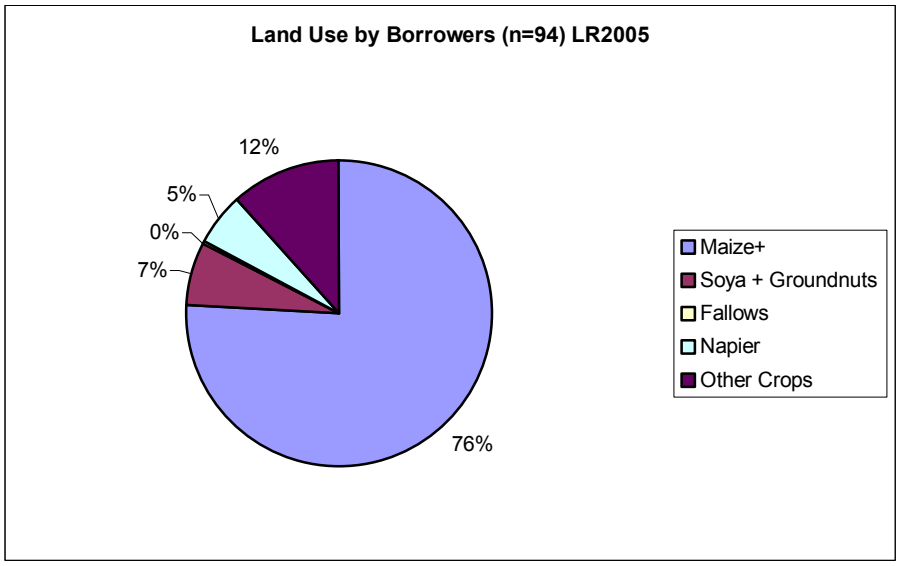


Figure 9

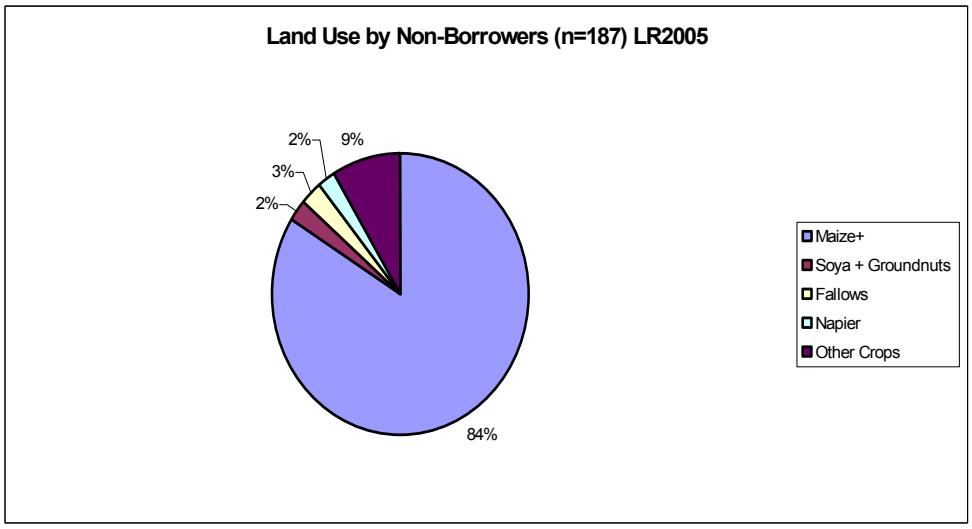


Figure 10

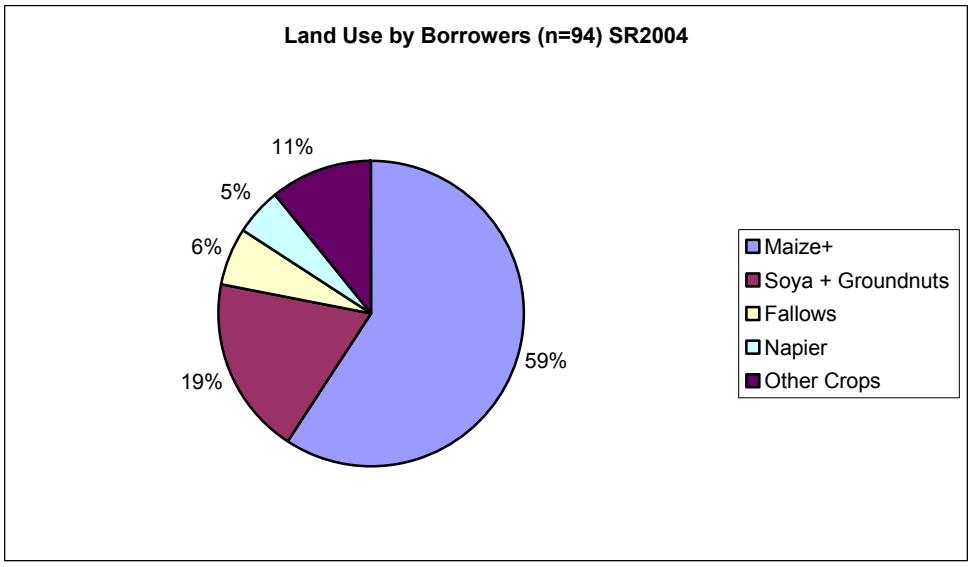
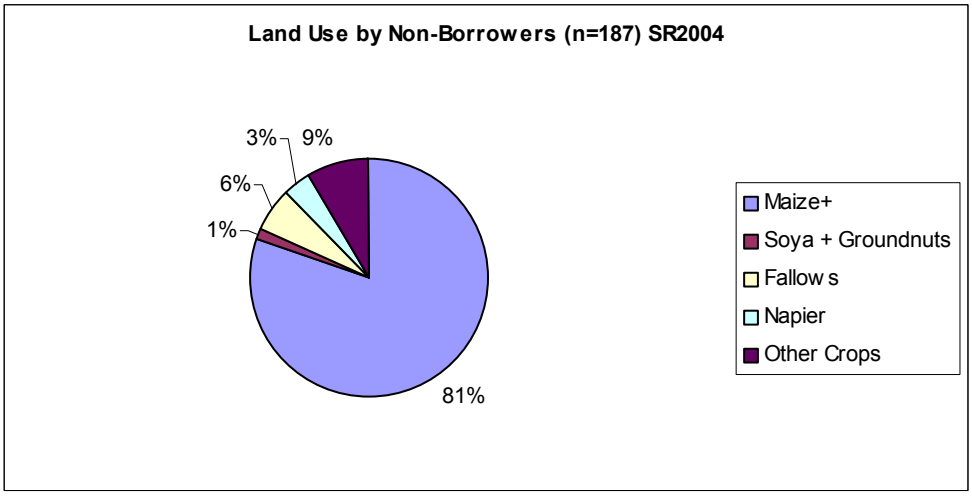


Figure 11



We ran various regression models to explain the extent of diversification in both the short rains 2004 and long rains 2005 season. As dependent variables we used both the proportion of land area devoted to maize (with/without beans intercrop) and a Herfindahl index[24] calculated using the shares of land devoted to each of the five crop categories listed above. In these models:

- Available land area and maize yield in the long rains 2004 were always found to be significant and negative (i.e. associated with greater diversification);
- Either access to credit or use of DSS were found to be significant and positive if only one of these was included, but neither were significant if both were included;
- No other variables that were tried (e.g. wealth index or whether or not agriculture was the household's main income source) were significant.

Tables 28 and 29 thus report the results for representative regression models (having excluded the regularly non-significant variables) for each of the two seasons.

Table 28: Determinants of Crop Diversification in Short Rains 2004

Variable	Coefficient	Significance
Constant	0.787	.000
Maize Yield in LR2004 (kg/ha)	-0.00006	.000
Available Land Area (acres)	-0.0445	.000
Use of DSS	-0.0985	.003
F =	24.006	.000
R^2 =	0.216	

Note: the dependent variable used in this model was the Herfindahl index of crop diversification, for which a lower value signifies greater diversification

Table 29: Determinants of Crop Diversification in Long Rains 2005

Variable	Coefficient	Significance
Constant	0.934	.000
Maize Yield in LR2004 (kg/ha)	-0.00005	.000
Available Land Area (acres)	-0.0349	.000
SCOBICS Borrower	-0.0813	.013
F =	13.684	.000
R^2 =	0.137	

Note: the dependent variable used in this model was the Herfindahl index of crop diversification, for which a lower value signifies greater diversification

[24] This is calculated as the sum of the squared values of each of the five land use proportions; hence $0 < HI <= 1$.

These results reinforce the findings from Figures 8-11 that participation in project activities encouraged households to diversify their production activities, with all coefficients slightly higher in the short rains 2004 than long rains 2005. However, we also note that:

- There may be an element of endogeneity in these regressions, as members of contact groups (i.e. the initial borrowers in each area) are more likely to receive any additional external encouragements to crop diversification (e.g. promotion of napier grass cultivation) than non-borrowers;
- The coefficients in Tables 28 and 29 are uniformly small. Thus, for example, raising maize yield in long rains 2004 by a ton per hectare would, other things being equal, reduce the Herfindahl index in short rains 2004 by just six points (e.g. from its current mean of 0.84 to 0.78). However, we expect that this coefficient would increase if mean maize yields in the area increased (i.e. as more households approached food self-sufficiency) and possibly also if more clear market opportunities were identified for crops produced by households in the project areas.

Finally, Table 30 shows that the majority of respondents from borrower households claimed that they had started growing one or more new crops during the lifetime of the project, whereas only a small minority of non-borrower households had done this. A higher proportion of borrower households claimed to have ceased the cultivation of one or more crops during the same period as well.

Table 30: Have You Started or Stopped Growing Any Crops Since 2001/02?

		Borrowers	Non-Borrowers	Total
Started Growing New Crops Since 2001/02	Yes	55 (59%)	29 (16%)	
	No	39 (41%)	158 (84%)	
Stopped Growing One or More Crops Since 2001/02	Yes	31 (33%)	27 (15%)	
	No	63 (67%)	158 (85%)	
	Total	94 (100%)	187/185 (100%)	281/279

Reflections on the "Diversification beyond Maize" Hypothesis

Referring back to Tables 28 and 29, we find that households felt able to diversify their production if either:

- They had achieved a higher maize yield in long rains 2004. In short rains 2004 this would have enabled them to devote less area to maize cultivation because they had harvested more during the long rains harvest, whereas in long rains 2005 this perhaps gave them confidence that they could achieve a high yield again, so need not devote so much land to maize;
- They had more land available. Thus, even if maize yield in long rains 2004 had not been that high, they had enough land to put some of it under other crops.

Combining these findings with those from Table 22, we see that:

- land holding size is negatively correlated with maize yield, but positively correlated with diversification;
- maize yield is positively correlated with subsequent diversification.

The low coefficients in Tables 28 and 29 notwithstanding, these results lend clear support to the project's hypotheses about the behaviour of food insecure households under conditions of considerable land scarcity. Integrated crop management programmes need to assist such households both to intensify their maize production (so as to obtain a sense of food security that will enable them to devote land to other crops) and to diversify successfully into other crops (which in turn will assist them to fund the intensification of their maize production).

Perceived Benefits from Participation in Project Activities

Food Security

In a context where households strongly prioritise producing food for their own consumption and income to buy food is limited, food self-sufficiency is an important indicator of (perceived) food security. Table 31 reports how many months respondent households ate from their long rains and short rains harvests respectively. This confirms that higher maize yields amongst borrower households do translate into greater food security. However, it also reconfirms the message of Figure 7: that yields even amongst borrowers are still way too low for true food self-sufficiency. Diversification beyond maize requires that households be able to eat for closer to 12 months from their annual long rains harvest. In 2004 only one borrower household in seven ate for eight months or more from their long rains harvest, whilst amongst non-borrower households this figure was one in 14.

Table 31: For How Many Months Did You Eat from your Long Rains / Short Rains 2004 Harvest?

	Borrowers		Non-Borrowers	
	Mean	Median	Mean	Median
Months Eaten from Long Rains 2004 Harvest	4.68	4.00	3.00	3.00
Months Eaten from Short Rains 2004 Harvest	2.32	2.00	2.02	1.75

Regression analysis to explain differences in the number of months that households could eat from their long rains 2004 harvest yields unsurprising results, given the analysis of preceding sections (Table 32). Other things being equal, participation in the SCOBICS credit scheme raised the length of time that a household could eat from its own long rains production by just over a month. Households whose primary source of income was agriculture, other things being equal, also ate from their own long rains production for one month longer than other households. These two variables, plus the wealth index, all influence self-sufficiency through their demonstrated effect on maize yield (see Tables 22 and 23). Meanwhile, an extra acre of land per adult equivalent member enabled the household to eat for an extra month simply because, holding yield constant, the household had more land on which to plant maize to feed its own members.

Table 32: Explaining Food Self-Sufficiency

Variable	Coefficient	Significance
Constant	0.681	.129
Wealth Ranking	1.217	.000
SCOBICS Borrower	1.119	.000
Agricultural Dependence	0.980	.001
Land per Adult Equivalent Household Member (acres)	1.174	.006
F =	19.576	.000
$\mathbf{R^2}$ =	0.225	

At the end of the questionnaire, respondents from borrower households were asked to choose one of the following responses - strongly agree, agree, disagree, strongly disagree - to five questions. Figures 12 and 13 report their responses to the first two of these questions. Responses are reported by wealth quartile.

Figure 12 shows that almost all respondents agreed, many of them strongly, that access to SCOBICS loans had increased their (household's) agricultural production. Similar responses are shown in Figure 13 in relation to household food security. This supports the earlier findings of Table 31.

Figure 12

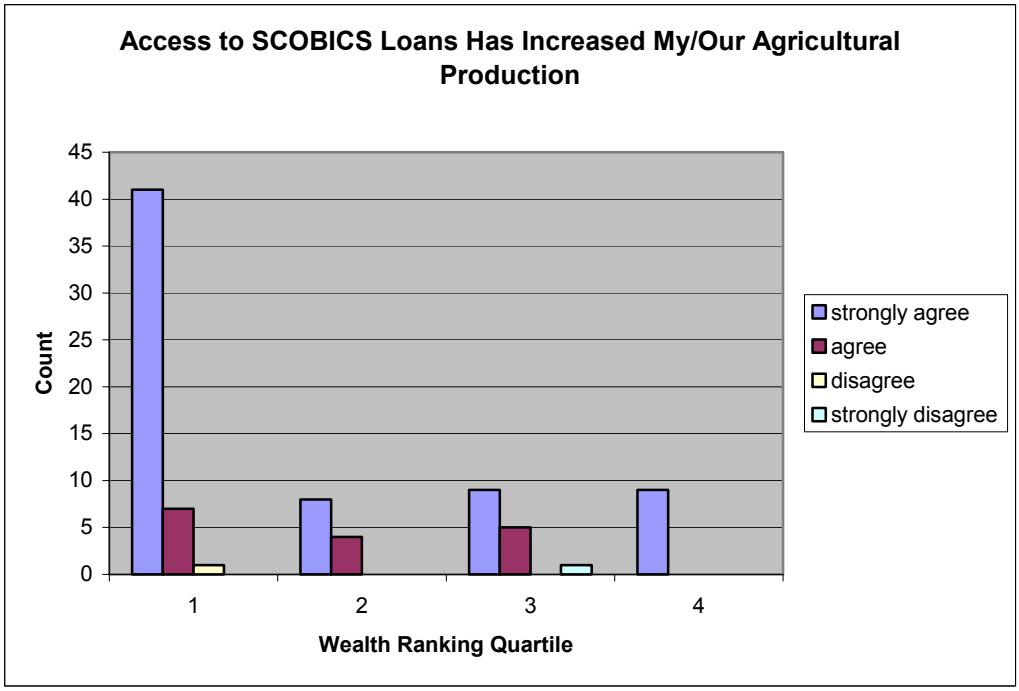
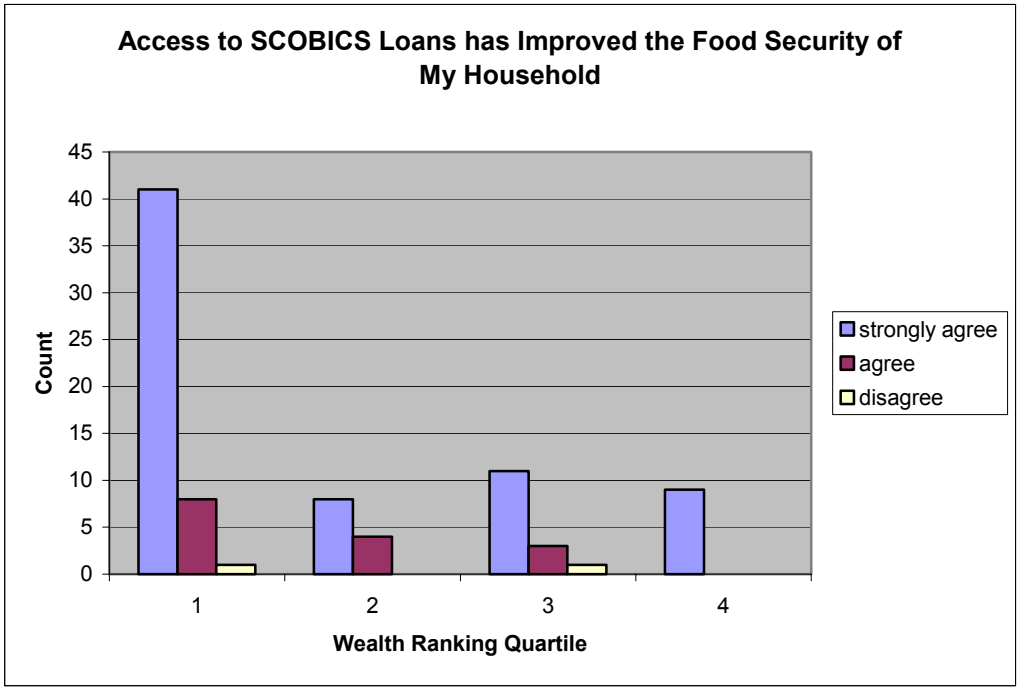


Figure 13



Nutrition

Table 33 goes beyond food self-sufficiency to explore changes in diet during the lifetime of the project. This shows that respondents from borrower households were more likely to report improvements in diet, and less likely to report deteriorations in diet, than non-borrowers.

Table 33: Reported Changes in Diet Since 2001/02

Nature of Change	Borrower	Non-Borrower	Total
Diet Has Improved	36	21	57
More Fish and Milk	1	1	2
No Change	49	138	187
Unspecified Change		3	3
Diet Has Become Worse	7	23	30
TOTAL	93	186	279

Cash Income from Crop Sales

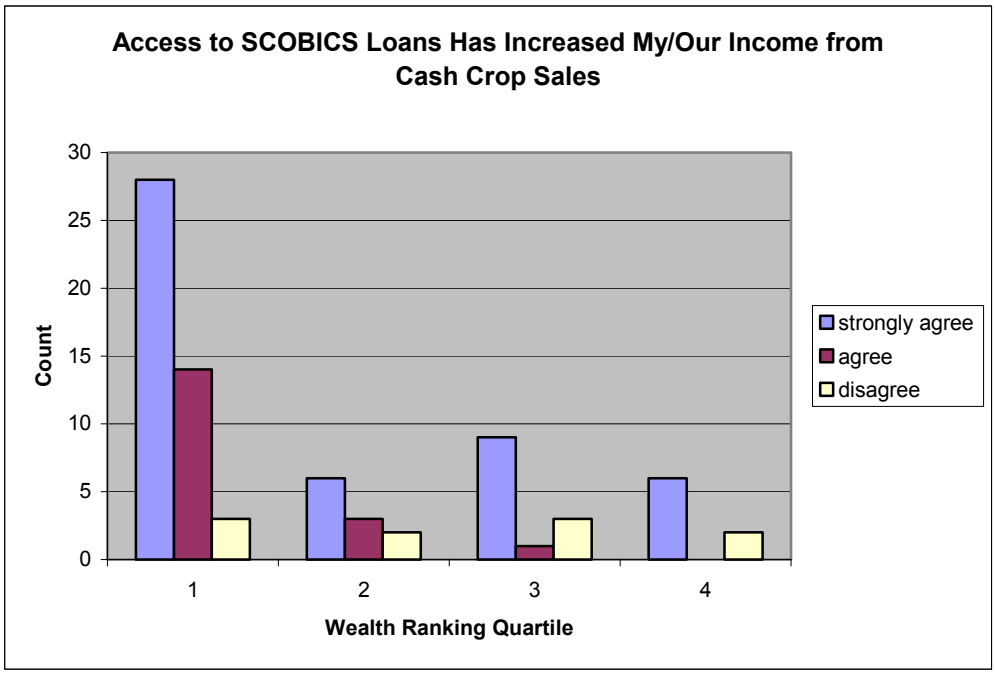
As mentioned earlier in this report, one objective of the project was to assist households to increase their income from crop sales (having diversified into new crops), so as to:

- pay for simultaneous intensification of maize production
- be able to invest more in enhancing the soil fertility resource base upon which future production depended
- meet other pressing cash needs.

Increased crop diversification (Figures 8-11) does indeed suggest increased potential to earn income through crop sales. Equally, however, the project's lack of success in identifying promising new market opportunities for crops produced in the project areas leads us to expect at best only modest increases in income from crop sales.

In the light of the importance of this objective, it is unfortunate that we did not collect primary data on household crop sales[25]. We, therefore, have to rely on the qualitative assessment of respondents from borrower households as to the impact of access to SCOBICS loans on their income from cash crop sales. According to Figure 14, the majority of respondents (87%) agreed that access to SCOBICS loans had increased their (household's) income from cash crop sales. We do not that there were only 77 respondents to this question out of 94 borrowers and it is likely that some of these missing values should really have been recorded as statements of disagreement[26]. However, even taking this into account, this represents quite a positive assessment. Anecdotal evidence during the course of the project leads us to the assumption that the main source of increased income would be sales of beans and groundnuts in local markets.

Figure 14



Risk Factors

In Figures 15 and 16 we present respondent's assessments of two potential "downsides" to taking SCOBICS loans. Again, the picture presented is a fairly bright one. Figure 15 shows that the majority of respondents did not agree that access to SCOBICS loans had increased the riskiness of their agricultural production activities, whilst Figure 16 shows that the majority of

[25] This represents a regrettable oversight in survey design.
[26] There were 85-86 responses to the remaining four statements. The five statements were the final item on the entire questionnaire and it appears that enumerators forgot to go through them with a few respondents.

respondents did not agree that access to SCOBICS loans had burdened them with a debt that they could not repay.

Figure 15

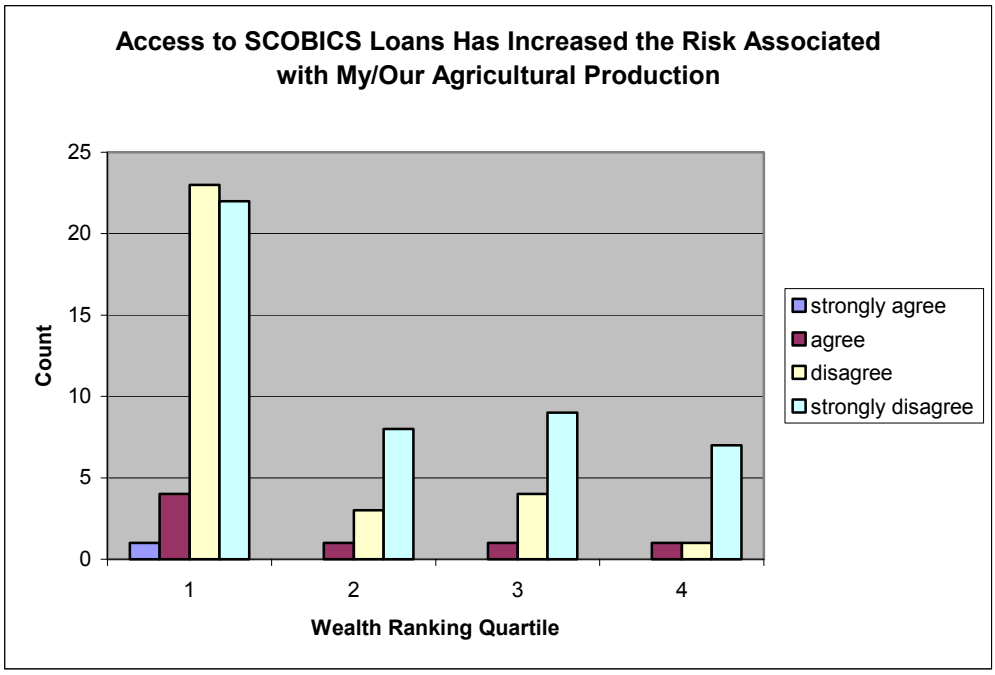
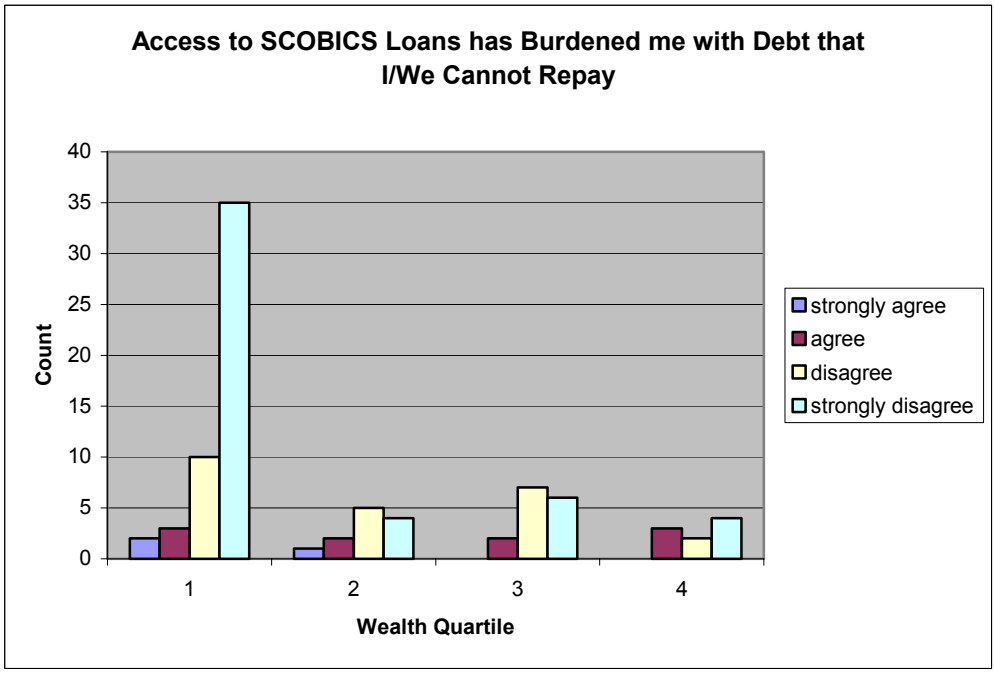


Figure 16



However, the picture painted by Figure 16 requires an important qualification. We remind ourselves from Table 2 that the 94 respondents included around 25 who had been excluded from borrowing from SCOBICS in 2005 due to problems with repayment of a previous loan.

However, the sample of borrowers used for the impact survey was not a random one. Especially in Nyamninia, a random sample of all SCOBICS borrowers, past and present, would have included more households who were currently excluded from the scheme for failure to repay a past loan. Thus, the number of respondents expressing agreement in Figure 16 would probably have been higher. Even as it is, Figure 16 has more respondents reporting a negative outcome (13/86 = 15%) than any of the other four figures. Whilst absolute numbers are too small to draw any firm conclusions, we note that one third of respondents from wealth quartile 4 reported that access to SCOBICS loans had burdened them with a debt that they could not repay. This lends some support to the apparent caution of community members – and the caution of the original project proposal – in recommending seasonal loans to members of very poor households.

Changes in Asset Holding

So far we have established that participation in project activities increased maize yields, thereby enhancing food security, and encouraged crop diversification, which permitted an unquantified increase in income from crop sales (and perhaps also contributed to the perceived improvements in diet where these were recorded). In this section we explore whether increases in income were sufficient to lead to increases in asset holdings amongst project participants.

At the start of this report, we distinguished three types of assets owned by respondent households: livestock, durable items (of which we concentrated on five) and housing. As livestock are the most liquid of these asset types, we would expect more change in livestock holdings during the course of the project than in durable goods and more change in durable goods than in housing.

Livestock

Our earlier summary (Table 7) showed that overall livestock holdings fell during the life of the project. Did participation in project activities allow borrowers to "buck this trend"? Whilst, on the one hand, greater income from higher crop production could have assisted livestock purchases, on the other hand we know from Figure 4 that livestock sales were one means used by borrowers to repay SCOBICS loans.

Closer inspection of the data shows that 132 households reported net losses in livestock holdings whilst 119 reported net gains. Borrowers were more likely (54%) to report a loss than non-borrowers (43%). However, Table 34 suggests that access to SCOBICS loans made no significant difference to what happened to a household's livestock holdings during the lifetime of the project[27]. Instead the dominant influence was starting holding: the more livestock owned in 2001/02, the greater loss in value a household tended to sustain over the period! The negative coefficient associated with non-farm income may be explained by some households selling their livestock to invest in other businesses during the period in question.

[27] The total value of a household's holdings in both 2001/02 and 2004/05 was calculated using the following set of 2005 market prices: "grade" cow = KShs 25,000, local cow = KShs 16,000, sheep/goat = KShs 4,000, chicken = KShs 300.

If value of starting holding is excluded from the equation, then both net outmigration and a variable denoting the number of family members who died during the period become statistically significant (both negative)[28]. However, the model as a whole performs far worse, such that we do not present it here.

Table 34: Explaining Changes in the Total Value of Livestock Holdings 2001/02 – 2004/05

Variable	Coefficient	Significance
Constant	-47840.468	.000
Value of Starting Holding	-0.672	.000
Wealth Ranking	50562.358	.000
Non-Farm Income Score	-11187.105	.000
Access to SCOBICS Loan	6593.011	.161
Net Outmigration from Household (persons)	-1776.667	.153
F =	64.930	.000
R^2 =	0.543	

Table 35 provides some more insight into the falling livestock numbers over the lifetime in the project. It shows that the vast majority of "large" holdings of all types of livestock in 2001/02 had been reduced in size by 2004/05 – often quite considerably. (By contrast, increases in livestock holdings, where they occurred, were much more modest than these falls). This suggests that there were factors particular to the livestock sector – for example, disease incidence or a collapse in the type of support services that would allow households to maintain large holdings – driving the decline in large holdings over this period, whilst the more modest gains represented "normal" processes of asset accumulation by those households able to save. Where explanations were provided within the questionnaires as to why livestock numbers had fallen, theft and sickness (both also cited as major problems by Kristjanson et.al. 2004) featured prominently[29].

Table 35: Declines in "Large" Livestock Holdings 2001/02 – 2004/05

Livestock Type	Mean Holding Size 2001/02	"Large" Holding	No. with Large Holdings 2001/02	No. of these Experiencing Decline in Holding Size	Magnitude of Decline where Experienced (%)		
					Minimum	Maximum	Mean
Poultry	14.05	20+	47	41	-25%	-100%	-72%
		10+	149	120	-8%	-100%	-63%
Small Ruminants	1.10	5+	25	20	-14%	-100%	-53%
Cattle	2.42	5+	51	39	-14%	-100%	-54%

Notes: 1) small ruminants = sheep + goats; 2) the cattle variable used here is actually the cattle score variable used in the composition of the wealth index, i.e. no. of local cattle + (2 * no. of grade cattle).

[28] This may be expected given the practice of slaughtering cattle to pay for medical and funeral expenses. It is possible that livestock are sold to fund migration costs, too.

[29] In addition, Kristjanson et.al. note that livestock are often slaughtered to pay for funeral and health expenses.

When livestock holdings are disaggregated by livestock type, regressions to explain changes in cattle and small ruminant holdings look much like the regression presented in Table 34. However, in the case of poultry, the coefficient on the SCOBICS loan variable is both negative and significant (Table 36), suggesting that sales of poultry to repay loans may have contributed in a small way to declining poultry holdings.

Table 36: Explaining Changes in Poultry Holdings 2001/02 – 2004/05

Variable	Coefficient	Significance
Constant	2.80	.260
Number of Poultry Owned 2001/02	-1.000	.000
Wealth Ranking	7.564	.000
Non-Farm Income Score	-2.454	.001
Access to SCOBICS Loan	-2.256	.018
Agricultural Dependence	-1.813	.083
F =	1540.675	.000
R^2 =	0.966	

Note: unlike in Table 34, poultry holdings are here calculated simply as number of birds owned, as there is no need to aggregate across livestock types of different sizes and values.

Durable Assets

Table 37 shows that there have been relatively few changes in the ownership of the five chosen durable items during the lifetime of the project. Whilst only 31 households recorded no change in livestock holdings during the period, 171 households recorded no changes in any of the five durable asset categories. We have already commented that there appear to have been factors specific to the livestock sector (sickness, reduced effectiveness of support services?) that have contributed to falling livestock numbers amongst those with larger opening and also that livestock holdings play a short-medium term savings function (which could account for both increases and decreases in holdings) that the durables do not. Theft (reported by some respondents) could negatively affect both livestock holdings and durables, but otherwise we would expect relatively few incidences of declining holdings of durable assets. (Declining quality is another matter, but the questionnaire only asked for numbers of working assets – not about their quality). What we observe from Table 37 is that ownership of durable assets has stayed fairly constant or, at best, increased only slightly. This is consistent with the view that times have been difficult for most households in the survey area. As importantly for the purposes of the current report, participation in project activities has not had a sufficiently large impact on household incomes to change this. We have been unable to construct a regression with any power to explain observed changes in durables ownership. Certainly, access to SCOBICS loans does not seem to have made any difference to whether or not a household has accumulated the five chosen durable assets during the lifetime of the project.

Table 37: Changes in Ownership of Selected Durables During the Lifetime of the Project

Change in Number	Bicycles	Radios	Sofas	Beds	Mobiles
-3		1			
-2		1			1
-1	24	18		5	
0	231	234	268	241	255
+1	24	22	7	22	22
+2	2	5	4	6	3
+3			2	3	
+4				3	
+5				1	
TOTAL	281	281	281	281	281

Housing

Finally, according to Table 38, one in six households had managed to upgrade their housing stock in some way during the previous three years, either by adding additional buildings or by upgrading the status of their building stock (e.g. by putting a tin roof on a house that was previously thatched or by replacing a mud walled building by a brick walled one). Only three had seen a discrete decline in the status of their building stock (e.g. the collapse of a building – not replaced – or the replacement of an old tin roof with a thatched one). However, we have no qualitative data on the condition of the buildings and it is quite possible that the condition of some of the buildings may have declined over the period in question. As with durable assets, access to SCOBICS loans does not seem to have made any difference to whether or not a household has enhanced the quantity or quality of its housing stock during the lifetime of the project.

Table 38: Change to Housing Stock 2001/02-2004/5 by Borrower Status

Change to Housing Stock	Borrowers	Non-Borrowers	Total
No Change	79	152	231
Fewer Buildings in Use / Usable		1	1
Status of Building Downgraded	2		2
Status of One or More Buildings Upgraded	3	16	19
Increased Number of Buildings	10	17	27
Number and Status of Buildings Increased		1	1
TOTAL	94	187	281

In conclusion, therefore, any increases in household income that participation in the project has brought about have been insufficient to feed through into greater asset holdings. This could be because:

- net income increases (after loan repayment) are too small to encourage investment in assets. Indeed, in the case of the cheapest asset studied (poultry), the impact of access to SCOBICS loans appears to have been a small reduction in asset holdings, perhaps because chickens were sold by some borrowers as a means of repaying their loans;

- net income increases have not yet been sustained for long enough for borrower households to plan to increase assets rather than meeting pressing consumption needs (or possibly paying off other debts).

Project OVIs

The findings of this impact survey are directly relevant to the following objectively verifiable indicators (OVIs) within the project logframe:

Purpose

3. By mid-project year 4, farmers acknowledge stronger knowledge base for their decision-making on management of their resources and expenditures on farm inputs.

This was explored in the sections on DSSs, on-farm crop and varietal demonstrations, market visits and participatory budgeting. In particular, a high proportion of project participants claimed to be using DSSs and seeing benefits from doing so. The challenge, however, is to disseminate knowledge and understanding of the DSSs to those who do not participate in the SCOBICS credit scheme.

4. By end of project at least 10% of farmers who have participated in the project achieve better food security and income generation from agriculture.

The report has shown conclusively that participation in the project has assisted households to raise maize yields. Consistent with this, Figures 12 and 13 show that the vast majority of respondents believe that participation in the project has assisted them to raise agricultural production and has enhanced their food security, whilst Table 33 shows that almost 40% of project participants believe that their diet has improved during the life of the project. (This is a higher proportion than for non-borrowers, although it is not possible to quantify the exact contribution of the project here).

Meanwhile, Figure 14 shows that 87% of respondents[30] believed that access to SCOBICS loans had enhanced their income generation. Unfortunately, however, we do not have primary data to support this claim.

Output

3a. By end of year 4 survey enumerators determine that at least 250 farmers have changed their cropping systems as a result of the project.

It is likely that this target has been met. However, this survey cannot prove that conclusively.

Figures 8-11 show that project participants have begun to diversify their cropping systems in a way that non-borrowers have not, whilst Tables 28 and 29 show that access to SCOBICS loans has had a positive effect on crop diversification. In addition, 59% of project participants claimed to have planted at least one new crop since the start of the project, whereas only 16%

[30] As explained earlier, this may be something of an overestimate as there were several missing values associated with this question.

of non-borrowers claimed to have done so, whilst 65% of project participants claimed to have switched maize varieties, whereas only 10% of non-borrowers claimed to have done so. Finally, 62 borrower respondents (66% of all borrower respondents interviewed) and one non-borrower claimed to have made some change to their cropping system, including improved cultural practices, as a result of using a DSS.

This survey only interviewed representatives of 94 households that have participated in project activities and one important finding of the survey has been that few of the lessons that project participants have learned have so far disseminated to non-participants. Thus, this survey did not encounter 250 farmers who have changed their cropping systems as a result of the project. However, over the course of the project, SCOBICS loans have been given to around 780 individuals[31]. During 2004 and 2005 – when we consider the encouragement given by the project to modify cropping systems to have been most effective - the total number of loan recipients across all project areas has been 414. If we take 60% of this figure as a crude estimate of the percentage of borrowers who were influenced *by the project* to modify their cropping systems (see above), this comes to 248 farmers who have made some change to their cropping system as a result of the project's activities. Including farmers who participated in project activities prior to 2004, but have not participated since, the total should, therefore, exceed 250.

3b. By end of year 4 at least 50 farmers report financial benefits arising from new resource management strategies adopted as a result of the project.

At the start of the project, it was hoped that sufficiently large numbers of farmers could be persuaded to take up participatory crop budgeting that this indicator could be verified through those means. However, this did not happen. We thus have to make a rather more nuanced assessment.

Higher maize yields and an enhanced sense of food security are clear benefits resulting from the project. However, these do not necessarily equate to financial benefits unless use of fertiliser on maize is also shown to be profitable. The profitability of fertiliser use has not been addressed by this survey. However, the project's biophysical survey did attempt to estimate the response of maize and beans production to fertiliser use and thereby to calculate the profitability of fertiliser use, assuming that the fertiliser input was purchased through the SCOBICS credit scheme. The finding of the biophysical report was that, assessed in terms of increased maize and beans production alone, fertiliser use on credit was only marginally profitable. This reinforced the findings of other project activities: that crop diversification is essential if more sustainable farming enterprises are to be created in western Kenya.

Turning to the data presented in this report, it is clear that more than 50 farmers have diversified their production during the lifetime of the project. If one assumes that 43% of borrowers had planted a new crop as a result of participation in the project (59%-16% - see above), and then multiplies this by 414, one arrives at an estimate of 178 farmers who have diversified their production through participation in project activities in 2004 and 2005. Whilst not all of these will have realised a financial gain through doing so, it is highly likely that 50 will have done so, particularly if the strategy that enabled them to diversify also enabled them to enjoy higher maize yields.

[31] The number of households involved may be slightly fewer than this.

Appendix 1: Impact Questionnaire 2005

Date of Interview : _____2005__

Name of Enumerator : _____

Village Name : _____

Sublocation / Catchment: _____

Name of Respondent : _____

Name of Household Head: _____
(if different)

Relationship to household head:

1 = self 2 = wife
3 = daughter 4 = son
5 = daughter-in-law 6 = Other (specify) _____

Household Information

1.1 How many members of the household are resident within the homestead?

Age Group	Number	Sick for 1+ months	Changes Since 2001/2		
			Moved Away	Returned	Died
< 5 years					
5-14					
15-60					
> 60 years					

N.B. We define "household" as a household head plus all the people who are dependent on them. Note that, in polygamous households, this could include more than one wife, plus the children of each. However, please do ***not*** *record non-resident household members in this table (except possibly in the "Moved Away" column). Note also that there could be more than one household living in a single homestead, but we only want the details for the household of the sampled household head.*

1.2 Type of household:

1 = male-headed (monogamous) 2 = male-headed (polygamous)
3 = FH (absent husband) polygamous 4 = FH (absent husband) monogamous
5 = FH (widow) 6 = FH (divorcee)
7 = single male 8 = other (specify) ……..

1.3 Level of education of household head (please give highest level achieved)

0 = no education 1 = primary (Std 1-4)
2 = primary (Std 5-8) 3 = secondary
4 = college / university 5 = adult literacy

1.4 Do any members of your household (not mentioned in the first column of Q1.1) live away from the homestead?

1= Yes 2=No

1.5 Has the household received any remittance payments during the past year?

1= Yes 2=No

1.6 If yes to Q1.5, how frequently have such remittances been received during the year?

1=once or twice 2=several times 3=every month

1.7 Compared to 2001/02, has the level of remittances:

1 = increased 2 = stayed the same 3 = decreased

1.8 Does the household own livestock? 1 = Yes / 2 = no

If yes, please provide details:

Type of Livestock	Number Owned	
	2004/5	2001/2
1=Cows (grade)		
2=Cows (local)		
3=Goats / Sheep		
4=Pigs		
5=Poultry		
6=Other (specify)		

1.9 What type of a house(s) does the household possess now and what type(s) did it possess in 2001/02?

Type of House	Number Owned 2004/5	Number Owned 2001/2
1= Mud walls with thatched roof		
2= Mud walls with tin roof		
3= Semi-permanent with tin roof		
4= Permanent		
5=Other (specify)		

1.10 How many of the following assets (in working or good condition) does the household own?

Asset	Number Owned 2004/5	Number Owned 2001/2
1= Bicycle		
2= Radio		
3 = bed		
4 = sofa set		
5 = mobile phone		

1.11 Is any member of the household involved in any of the following types of activity?

	1 = yes 2 = no	Type of Involvement (see codes below)
Groups / CBOs		
Research or extension activity		
NGO activities		

Codes: 1 = savings and credit group member; 2 = marketing group member; 3 = church / youth / women's group member; 4 = catchment or sublocation committee member; 5 = contact farmer/person; 6 = other (specify).

Agricultural Production Activities and Food Security

2.1 Indicate the size of the plots (both owned and leased) that the household farmed and the crops planted in each plot in the long rains season 2005, short rains 2004 and long rains 2004 respectively.

Field No.	Size (Acres)	Land use/cropping strategy (including fallow)		
		Long rains 2005	Short rains 2004	Long rains 2004
1				
2				
3				
4				
5				
6				
Total				

Codes:

1 = maize
2 = beans
3 = maize + beans
4 = groundnuts
5 = soyabeans
6 = maize + soyabeans
7 = maize + groundnuts
8 = millet
9 = sorghum
10 = improved fallow
11 = natural fallow
12 = sweet potatoes
13 = cassava
14 = onion
15 = kales
16 = tomatoes
17 = fruits
18 = simsim
19 = cowpea
20 = napier
21 = napier + maize
22 = other

2.2 Are there any new crops that you have started cultivating since 2001/02?

1 = yes / 2 = no

If yes, please give details:

Crop	Year Started Cultivating	Subsequent Trend 1 = increased area or production 2 = area the same 3 = reduced area or production 4 = stopped again

Use same crop codes as for Q2.1

2.3 Since 2001/02, have you stopped cultivating any crops? 1 = yes / 2 = no

If yes, please give details:

Crop	Reasons for stopping cultivation

Use same crop codes as for Q2.1

2.4 Compared with 2001/02, has the variety of maize that you are planting changed?

1 = yes / 2 = no

If yes, please give details:

……

2.5 For plots with maize (either monocropped or inter-cropped – see Q2.1), please indicate the harvests achieved in 2004

Field No. (as per Q2.1)	Short rains 2004		Long rains 2004	
	Maize harvest (specify units)	Intercrop (specify units)	Maize harvest (specify units)	Intercrop (specify units)

N.B. Maize bags can be 50kg or 90kg – please check which is being referred to!

2.6 For how many months did you eat from your long rains 2004 harvest? ☐

2.7 For how many months did you eat from your short rains 2004 harvest? ☐

2.8 Compared with 2001/02, has the yield of maize that you are achieving: ☐

1 = increased 2 = decreased 3 = stayed the same

If yield has changed, give reasons:

……
……
……

2.9 During the past month, how many meals has your family eaten per day? ☐

2.10 How many times during the past week have you eaten meat? ☐

2.11 How many times during the past week have you eaten beans, groundnuts or soyabeans? ☐

2.12 Has there been any change in your household's diet (quantity or quality) since 2001/2?

1 = yes / 2 = no ☐

If yes, please give details:

……

2.13 For the current (long rains 2005) and previous (short rains 2004) seasons, did/have you – or do you plan - to:

	Long rains 2005	Short rains 2004
Hire labour in		
Hire labour out		
Lease land in		
Lease land out		

1 = yes / 2 = no

2.14 Please rank the **three** most important income sources for the household during this past year and before the project started. *(For each year, put 1 as highest; 2 as second highest etc. Check that answers are consistent with earlier answers before recording!)*

Source	Ranking 2004/5	Ranking 2001/2
1=Crop production		
2=Livestock		
3=Horticulture		
4=Formal employment		
5=Casual off-farm employment		
6=Business (specify)		
7=Remittances		
8=Pension		
9=Other (specify)		

Awareness of, and Participation in, Project Activities

DSSs

3.1 [Show sample DSS]: Have you seen a "poster" like this before?

1 = yes / 2 = no

If yes to Q3.1, where?

1 = Credit Information Day 2 = field day
3 = SCOBICS training session 4 = contact person's home
5 = Ministry of Agriculture office 6 = workshop / exhibition
7 = other (specify) …….

3.2 Do you know where you could access one of these posters now if you wanted information?

1 = yes / 2 = no

If yes, where?

……..

3.3 Do you know anybody who could help you work through one of these posters if you wanted information?

1 = yes / 2 = no

If yes, who?

……..

3.4 If yes to Q3.1, did you use one of these posters or information obtained from one of these posters when planning your cropping activities for:

a) short rains 2004 1 = yes / 2 = no

b) long rains 2005? 1 = yes / 2 = no

3.5 If yes to Q3.4 a) or b), did you make any changes to your cropping activities as a result of referring to the poster(s)?

1 = yes / 2 = no

If yes, what changes?

……..

3.6 If yes to Q3.4 a) or b), what benefit (if any) did you get from referring to the poster(s)?

1 = no benefit 2 = better informed about options
3 = more confident of choices 4 = higher soil fertility / yields
5 = more income from farming 6 = fewer striga problems
7 = other (specify) …….

3.7 If aware of DSSs (Q3.2), but did not use (Q3.4), why not?

1 = no perceived benefit 2 = no one to interpret poster
3 = no capital to adopt new technologies
4 = other (specify) ……

Participatory Evaluation of New Crops and Seed Varieties

4.1 Are you aware of any on-farm demonstrations of new crops or varieties that have taken place in your area in the last three years?

1 = yes / 2 = no

If yes, which organisation undertook them?

1 = Ministry of Ag. 2 = KARI
3 = TSBF 4 = KEFRI / project
5 = other (specify) ……

If yes, which crops were involved?

1 = maize 2 = beans
4 = groundnuts 5 = soyabean
(For other crops, please use same codes as Q2.1)

If yes, how did you hear about the trials?

1 = contact person
2 = extension worker
3 = another farmer
4 = baraza
5 = NGO / project staff
6 = other (specify) ……..

Q4.2 If yes to Q4.1, did you attend a field day to discuss the outcomes of the trials?

1 = yes / 2 = no

Q4.3 Did you visit the trial plots or discuss the outcomes of the trials with other farmers at other times?

1 = yes / 2 = no

Q4.4 If aware of outcomes (Q4.2, Q4.3), have you made any changes to the crops or varieties that you plant in the light of the outcomes of the trials?

1 = yes / 2 = no

If yes, what changes?

……..

Q4.5 If no to Q4.4, why not?

1 = no perceived benefit from trialled technologies
2 = could not obtain seeds
3 = no capital to adopt new technologies
4 = no market for crop in question
5 = not food secure, so have to plant maize
6 = other (specify) ……..

Exposure to New Markets

Q5.1 Are you aware of any farmers from your area being taken to visit Kisumu fresh produce / wholesale markets in the past two years?

1 = yes / 2 = no

If yes, how did you hear?

1 = participated myself
2 = heard from another farmer
3 = attended feedback meeting
4 = other (specify) ……..

Q5.2 If yes to Q5.1, have you discussed the findings from these visits with these or other farmers?

1 = yes / 2 = no

Q5.3 If yes to Q5.2, have you made any changes to the crops or varieties that you plant in the light of the findings of these visits?

1 = yes / 2 = no

If yes, what changes?

……..

Q5.4 If no to Q5.3, why not?

1 = no attractive market opportunities identified
2 = do not trust Kisumu traders 3 = surpluses too small to take to Kisumu
4 = cannot afford transport 5 = not food secure, so have to plant maize
6 = other (specify) ……..

Q5.5 How many times have you visited the following fresh produce markets in the past year?

Name of Market	Number of Visits
Kisumu (Kondele)	
Kisumu (Jubilee)	
Kisumu (Kibuye)	
Siaya	
Ugunja	
Luanda	
Busia	

Participatory Budgeting

Q6.1 In the last three years have you attended a workshop on crop budgeting or otherwise been encouraged to keep budgets for the crops that you grow?

1 = yes / 2 = no

Q6.2 If yes to Q6.1, did you keep budgets for any crops during:

a) short rains 2004 1 = yes / 2 = no

b) long rains 2005? 1 = yes / 2 = no

Q6.3 If yes to Q6.2 a) or b), for which crop(s)?

1 = maize 2 = beans
4 = groundnuts 5 = soyabean
(For other crops, please use same codes as Q2.1)

Q6.4 If yes to Q6.1 or Q6.2, what did you learn from your exposure to crop budgeting?

……

Q6.5 If yes to Q6.1 or Q6.2, have you made any changes to the crops or varieties that you plant in the light of this new knowledge?

1 = yes / 2 = no

If yes, what changes?

……..

Q6.6 If no to Q6.5, why not?

1 = no perceived benefit from trialled technologies
2 = could not obtain seeds 3 = no capital to adopt new technologies
4 = no market for crop in question 5 = not food secure, so have to plant maize
6 = other (specify) ……..

Credit

Q7.1 Are you or any other member of the household a member of any savings and/or credit group? (check answer against Q1.11!)

Type of Group 1 = merry-go-round 2 = table banking /ASCA 3 = self-help group (women's, church etc) 4 = SCOBICS 5 = SACCO 6 = other (specify) ……	Household Member 1 = self 2 = wife 3 = husband 4 = other (specify) ……

Q7.2 Have you or any other member of the household taken any loan within the past year?

1 = yes / 2 = no

If yes, please give details:

Source 1 = table banking /ASCA 2 = self-help group 3 = SCOBICS 4 = SACCO 5 = shylock / moneylender 6 = commercial bank 7 = microfinance (e.g. Wedco, Kenya Women) 8 = village bank 9 = neighbour or relative 10 = other (specify) ……	Purpose 1 = (food) consumption 2 = school fees / uniforms 3 = medical expenses 4 = business / trading 5 = agricultural inputs 6 = funeral 7 = other (specify) ……	Duration (months)	Rank by size 1 = largest 2 = second largest etc

Q7.3 Have you heard of the SCOBICS credit scheme?

1 = yes / 2 = no

If yes, what is your source of information on SCOBICS?

1 = contact person
2 = extension worker
3 = another farmer
4 = baraza
5 = project staff
6 = Credit Information Day
7 = poster
8 = other (specify) ……..

Q7.4 Have you or anyone in your household ever received a loan from SCOBICS?

1 = yes / 2 = no

Q7.5 If has heard (Q7.3) but not taken loan (Q7.4), why not?

1 = don't know how to apply
2 = no need for input loan
3 = SCOBICS loans too small
4 = interest rate too high
5 = current borrowers would not have me in their group
6 = other (specify) ……

Q7.6 If yes to Q7.4, please give details of **all** SCOBICS loans received:

Year	Household Member 1 = self 2 = wife 3 = husband 4 = other (specify) ……	Products Obtained 1 = seeds 2 = fertiliser 3 = both

N.B. SCOBICS started lending in Nyamninia in 2001 and in Gongo and Ebukhaya in 2003

Q7.7 Take most recent completed case from Table 7.6: How was loan repaid?

1 = crop sales 2 = salary income
3 = remittance income 4 = other off-farm work
5 = sale of livestock or livestock products
6 = other (specify) …….

Q7.8 If loan prior to 2005, but no loan in 2005 (see Table 7.6), why not?

1 = did not repay previous loan
2 = made a loss on previous loan 3 = other source of income for 2005
4 = fellow borrowers would not have me in their group
5 = other (specify) ……

Q7.9 For 2005 (if appropriate): How will loan be repaid?

1 = crop sales 2 = salary income
3 = remittance income 4 = other off-farm work
5 = sale of livestock or livestock products
6 = other (specify) …….

Q7.10 If yes to Q7.4, please indicate your strength of agreement or disagreement with the following statements: Access to SCOBICS loans has:

(tick appropriate box for each statement)

	Strongly agree	Agree	Disagree	Strongly disagree
Increased my/our agricultural production				
Improved the food security of my household				
Increased my/our income from crop sales				
Increased the risk associated with my/our agricultural production				
Burdened me with debt that I/we cannot pay				

Appendix 2: Wealth Indicators from the Impact Survey

This report describes the process of compiling a composite wealth ranking indicator for households surveyed during the 2005 Impact Survey. It is based on a similar exercise conducted using 2002 data (see Appendix 3), which also permitted comparison of the composite indicator derived from formal survey data with participatory wealth ranking scores obtained for a subset of the same households. As in 2002, survey data are uses to create seven component indicators (each corresponding to a household attribute identified as important by participatory wealth ranking exercises). These are then summed to produce a composite wealth indicator.

Each of the seven component indicators is explained in turn below.

Non-Farm Income

In the survey, respondents were asked to rank the three most important types of income to their household (for both 2004/05 and 2001/02). This provided data on the existence and importance[32] of the following types of non-farm income: remittances, business income, income from formal employment and pensions. In addition, separate questions were asked about remittances received, including how frequently the household had received these over the previous twelve months (1 = once or twice, 2 = several times, 3 = every month). To compute a non-farm income score, the information on business income, income from formal employment and pensions was scored as follows: 3 if main income source in 2004/05, 2 if second income source, 1 if third income source. These scores were then summed, together with the score for frequency of remittance receipts, to give a non-farm income indicator. The resulting variable had a range 0-8, so was halved.

With 281 observations, the final variable thus had the following properties: max = 4; min = 0; mean = 0.86.

Education of Household Head

The survey recorded the highest educational attainment of household heads, with responses recorded as either no education or completion of Primary 1-4, Primary 5-8, Secondary school or college or university. In addition, two respondents recorded their education as adult literacy. The indicator thus gave a score of 1 for every (approximately) four years of education completed, with the adult literacy respondents being scored as 2.

With 282 observations, this gave: max = 4; min = 0; mean = 1.99.

Farm Labour Hire and Land Leasing

In the survey, respondents were asked whether or not their household had hired labour in or out or leased land in or out during the short rains 2004 and long rains 2005 season. The answers were scored as shown in Table 1 below. This is based on the observation that land lease transactions have the same poverty features as farm labour hire: poorer households rent their assets our to wealthier ones. The four scores were then summed and divided by three. With 279 observations, this gave: max = 4; min = 0; mean = 1.87.

[32] Note that importance was relative to other income sources within the same household, not to the income flows from the same source received by other households.

Table 1: Scoring for Labour Hire and Land Leasing

Hire Labour / Land In	Hire Labour / Land Out	Score
yes	no	3
yes	yes	2
no	no	1
no	yes	0

Land Cultivated

In the survey, respondents were asked about plots cultivated during the long rains season 2005 and both long and short rains seasons 2004. In all cases except 6, all the recorded plots were being cultivated during the long rains season 2005 (a good season weatherwise). The land indicator was thus created by summing the areas of the plots cultivated in long rains 2005 and dividing the resulting figure by 2. With 281 observations, this gave: max = 4; min = 0 (1 household only); mean = 0.64.

House Type

Earlier work on wealth indicators, based on 2002 data, showed house type to be the best single indicator of household wealth. In the 2005 survey, respondents were asked to state the number of houses of each of the following types that the household live in (numbers in brackets denote the score given to each type in constructing the indicators):

mud, grass thatched (1)
mud, iron-roofed (2)
semi-permanent, iron-roofed (3)
permanent (4)

From these data, two indicators were prepared. The first indicator ("houset_1") recorded the single highest score (see numbers in brackets above) of any of the houses that the household live in. This is the same indicator as was used in the work based on 2002 data mentioned above. With 278 observations, this gave: max = 4; min = 1; mean = 2.14.

However, this indicator says little about the space available to each household. Therefore, a second indicator ("housesc2") was calculated in the following way:

- Multiplying the number of each house type by its numerical value (above) and summing the resulting figures for each household;
- Creating a weighted score of resident household membership for each household (with children under 5 scored at 0.5, children 5-14 scored at 0.8 and adults 15+ weighted as 1);
- Dividing the house score by the weighted score of resident household membership.

With 274 observations, this gave: max = 5 (only one score above 4); min = 0.13; mean = 0.79.

These two indicators were positively correlated (99% confidence), but the correlation coefficient was only 0.35.

A third indicator ("housescf") was calculated as the mean of the other two indicators. With 274 observations, this gave: max = 4.5 (only one score above 4); min = 0.57; mean = 1.46.

Cattle Ownership
The survey asked about various type of livestock owned by respondents' households. However, following the importance attached to cattle in participatory wealth ranking exercises, the creation of the indicator focused on cattle. The cattle indicator was thus created as:

Cattlesc = ((gradeno * 2) + localno) / 5

where gradeno and localno are the number of "grade" (improved breed) and local cattle owned by the household respectively. With 281 observations, this gave: max = 4.40 (only one score above 4); min = 0; mean = 0.41.

Household Diet and Nutrition
Data were available from the survey on both the number of meals per day eaten by the household over the previous month and two measures of the quality of that diet: the number of times that the household had eaten meat during the previous week and the number of times that it had eaten beans, groundnuts or soyabeans. These three measures were positively cross-correlated (95% or 99% confidence), but the correlation coefficients were only in the range 0.11-0.29. The final variable was created as follows:

Nutritif = ((mealsday * 2) + eatmeat + eatbeans) / 4

With 280 observations, this gave: max = 3.75; min = 0.5 (four respondents); mean = 1.85.

Overall Wealth Ranking
The seven wealth indicators were then summed and divided by seven to give an overall wealth ranking[33]. The maximum score achieved was 3.13 and the minimum 0.48, with a mean of 1.39.

Correlations were examined between the component indicators and the overall wealth ranking. Furthermore, correlations between the two individual housing indicators, the meals per day score, the other component indicators and the overall wealth ranking were explored. This showed that the composite nutrition indicator was better correlated with the other component indicators and the overall wealth ranking than the simpler meals per day score, but that the first, simpler housing indicator (that had performed so well in the 2002 analysis) outperformed both the second, more complex housing indicator (which exhibited low correlations) and the composite housing indicator. Thus, the wealth ranking score was recalculated using the simpler housing indicator.

The final correlations are shown below. The table presents a fairly robust set of cross-correlations. However, it is interesting to note that non-farm income is not correlated with cattle ownership and only weakly correlated with area cultivated, suggesting that agricultural and non-farm livelihood strategies are as much alternatives as complements.

[33] Of the 282 respondent households, only nine did not have scores for all seven components of the wealth ranking indicator. Of these, seven had scores for six components, one had scores for five and one had scores for four. For the purposes of analysis, these households were given wealth ranking scores that were an average of their scores over the available components.

Correlations Between Component Indicators and Final Wealth Ranking Indicator

Correlations

		Nonfarm	Education of Household Head	Land and Labour Hire	Area Cultivated	Cattle	Housing	Nutrition	OVERALL Wealth
Nonfarm	Pearson Correlation	1	.261	.231	.136	.069	.200	.252	.521
	Sig. (2-tailed)	.	.000	.000	.023	.252	.001	.000	.000
Education of Household Head	Pearson Correlation	.261	1	.200	.206	.162	.233	.279	.572
	Sig. (2-tailed)	.000	.	.001	.001	.006	.000	.000	.000
Land and Labour Hire	Pearson Correlation	.231	.200	1	.405	.301	.353	.353	.703
	Sig. (2-tailed)	.000	.001	.	.000	.000	.000	.000	.000
Area Cultivated	Pearson Correlation	.136	.206	.405	1	.362	.265	.345	.597
	Sig. (2-tailed)	.023	.001	.000	.	.000	.000	.000	.000
Cattle	Pearson Correlation	.069	.162	.301	.362	1	.422	.306	.574
	Sig. (2-tailed)	.252	.006	.000	.000	.	.000	.000	.000
Housing	Pearson Correlation	.200	.233	.353	.265	.422	1	.344	.664
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.	.000	.000
Nutrition	Pearson Correlation	.252	.279	.353	.345	.306	.344	1	.628
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.	.000
OVERALL Wealth	Pearson Correlation	.521	.572	.703	.597	.574	.664	.628	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.

272 < n < 282 in all cases

1/8/2005

Appendix 3: Developing a Composite Wealth Indicator for Western Kenya

This document uses data from two sources – a 2002 survey of 188 SCOBICS borrowers in Nyamninia, Sauri and Anyiko sublocations, plus participatory wealth ranking exercises conducted for a subset of 108 of these borrowers – to explore possible composite indicators of wealth for households in Siaya and neighbouring districts in western Kenya.

Tables 1 and 2 summarise the findings of a number of participatory wealth ranking exercises conducted in Siaya and Vihiga districts by Mary Nyasimi and other ICRAF staff in 1999-2000. These are standardized to four wealth classes. Whilst the same indicators appear in both tables, some differences are seen between Luo and Luhya communities regarding the details of how these indicators relate to local perceptions of wealth.

Table 1: Wealth Ranking - Luo

	Class 1	Class 2	Class 3	Class 4
Non-Farm Income	Salary/Pension or remittances avail.	Salary/Pension or remittances small	No salary; remittances small or none	No salary or remittances
Education of HH Head	University/College or Secondary	College/Secondary	Secondary or Primary	Primary
Labour Hire	Hire labour in	May hire labour in or out	Hire labour out	Hire labour out
Land Owned	2 acres	2 acres	< 2 acres	< 2 acres
House Type	Permanent	Semi-permanent, iron roof	Semi-permanent, grass thatch	Mud
Grade cows	1-2	1 or None	None	None
Local Cattle	2-4	2	1 or none	1 or none
Meals per Day	3-4	2-3	2	1-2
Type of food	Balanced diet	May have meat, fish, chicken, milk	Ugali, vegetables and porridge	Ugali, vegetables and porridge
Children nutritional status	Healthy	Healthy	Malnourished	Malnourished
Children educational	Most attend colleges	May reach college	May reach secondary	Reach primary
Household fuel source	Gas or Kerosene	Kerosene or firewood	Firewood/Maize cobs	Firewood/Maize cobs
Household furniture	Sofa sets, beds, and glassware	Wooden sofa sets, glass and plastic wares, beds	Wooden and reed furniture, sleep on floor, plastic wares	Wooden and reed furniture, sleep on floor, plastic wares

Table 2: Wealth Ranking - Luhya

	Class 1	Class 2	Class 3	Class 4
Non-Farm Income	Salary/pension or remittances avail.	Salary/pension, or small remittances	No salary; remittances small or none.	No salary or remittances.
Education of Hh Head	Secondary	Some secondary	Many primary	Few primary
Labour Hire	Hire labour in	May hire labour in or out	Hire labour out	Hire labour out
Land Owned	1-2 acres	0.5-1 acres	0.5 -1 acres	< 0.5 acres
House Type	Permanent	Semi-permanent, iron roof	Semi-permanent, grass thatch	Mud
Grade cattle	Few have 1-2	None	None	None
Local cattle	1-2	1-2	Few have 1	None
Child education	Secondary	Some secondary, many primary	Primary	Primary
Malnutrition	None	Few suffer	Many suffer	All suffer
Meals per Day	3-4	2-3	2	1 or none
Casual labour	None	Few sometimes work	Many work	Many work
Household furniture	Sofa sets, beds, and glassware	Wooden sofa sets, glass and plastic wares, beds	Wooden and reed furniture, sleep on floor, plastic wares	Wooden and reed furniture, sleep on floor, plastic wares

In what follows, we use the first seven of these indicators (taking livestock as one indicator) to develop a wealth index for SCOBICS borrowers in Nyamninia, Sauri and Anyiko sublocations in 2002. We then compare the wealth index thus generated with the findings of participatory wealth ranking exercises conducted for a subset of these borrowers around the same time to see how the wealth index generated from the formal survey data compares with the communities' own perceptions of wealth as revealed by the participatory wealth ranking exercises.

Wealth Indicators from the Formal Survey

As the 2002 participatory wealth ranking scores (like those reported in Tables 1 and 2) were all in the range 1-4, the aim was to produce a composite wealth indicator from the formal survey data that fitted within this range. Thus, an index with a range of roughly 0-4 was developed for each of the seven chosen wealth indicators. These seven indices are explained below.

Non-Farm Income
In the 2002 survey, respondents were asked to score the importance of different types of income to their household. These were coded as follows: 1 = reliable, 2 = unreliable, 3 = n/a (i.e. the household does not receive any income of this type). Three types of non-farm income were enquired about: salary income, remittance payments from relatives and income from business activities. The non-farm income indicator was thus created as:

Nonfarsc = 10 – (salary + relative + business)

With 183 observations, this gave: max = 5 (2 households only); min = 1; mean = 1.74.

Education of Household Head
The 2002 survey only recorded the highest educational attainment of respondents, not all of whom were the heads of their households. Thus, only a subset of households could be scored on this indicator. The survey asked whether respondents had no education or had completed Primary 1-4, Primary 5-8, Secondary school or college or university. In addition, one respondent recorded their education as adult literacy. The indicator thus gave a score of 1 for every (approximately) four years of education completed, with the adult literacy respondent being scored as 2.

With 122 observations, this gave: max = 4; min = 0; mean = 2.08.

(Farm) Labour Hire
In the 2002 survey, respondents were asked whether or not their household had hired labour for any of the following activities: land preparation, weeding, harvesting, herding. This was initially scored as 1 = no, 2 = yes for each of the four categories. In addition, respondents were asked to score the importance of income from casual labour hire (hiring out) to their household. This was coded as follows: 1 = reliable, 2 = unreliable, 3 = n/a (i.e. the household does not receive any income of this type). The (farm) labour hire income indicator was thus created as:

Labsc = (land preparation + weeding + harvesting + herding + casualla) / 3

With 185 observations, this gave: max = 3.67; min = 1.67; mean = 2.60.

Land Owned and Used
In the 2002 survey, respondents were asked about land both owned and leased in by the household. It is predominantly wealthier households that lease land in, often from poorer households who do not have the resources to farm the land that they own. The land indicator was thus created as:

Land = (ownfarm + leasfarm) / 3

where ownfarm and leasfarm are both given in acres. With 188 observations, this gave: max = 3.75; min = 0.08; mean = 0.56.

House Type
In the 2002 survey, respondents were asked to describe the type of house that they lived in. The "Housesc" indicator was thus created by giving their answers the following scores:

mud, grass thatched = 1
semi-permanent, thatched or mud, iron-roofed = 2
semi-permanent, iron-roofed = 3
permanent = 4

Out of 188 observations, 46 were type 1, 96 were type 2, 27 were type 3 and 19 were type 4 (mean = 2.10).

Cattle Ownership
The 2002 survey asked about various type of livestock owned by respondents' households. However, as per Tables 1 and 2 above, the creation of the indicator focused on cattle. The cattle indicator was thus created as:

Cattlesc = ((gradeno * 2) + localno) / 3

where gradeno and localno are the number of "grade" (improved breed) and local cattle owned by the household respectively. With 188 observations, this gave: max = 4.67 (only one score above 4); min = 0; mean = 0.47.

Number of Meals Eaten per Day
This indicator was simply the number as reported by the respondent. With 185 observations, this gave: max = 4 (10 respondents); min = 1 (only one respondent); mean = 2.75.

Assessing the Composite Wealth Indicator

Having constructed the seven individual indicators of wealth, a composite indicator ("meansc") was constructed by simply taking the mean of these seven. However, as a third of the households did not have a score for education of the household head, a second composite indicator ("meansc1") was constructed by taking the mean of the other six indicators. Finally, a third composite indicator ("meansc2") was constructed as follows:

meansc2 = meansc (where this exists); meansc1 (where no score for education of the household head was available)

The scores for these three composite indicators are shown in Table 3. There is very little difference between the scores achieved under the three indicators. We thus work with meansc2 from now on.

Table 3: Descriptive Statistics for the Composite Wealth Indicators

Indicator	N	Maximum	Minimum	Mean	S.D.
Meansc	118	3.48	0.95	1.78	0.43
Meansc1	182	3.39	0.97	1.71	0.41
Meansc2	182	3.48	0.95	1.75	0.42

Correlations between the Component Indicators

Table 4 shows that there is plenty of positive correlation between the seven component indicators that make up the composite indicator(s). More detailed observations include the fact that:

- meansc2 is positively correlated with all seven component indicators;
- The housing indicator is positively correlated with all the other component indicators. It is also strongly correlated with meansc2;
- The labour hire indicators is also positively correlated with all the other component indicators, except that for education of the household head. Wealthier households appear to hire labour into their farm – and do not hire themselves out as casual labourers, irrespective of whether their source of wealth is farming or non-farm activities;
- education of the household head is the component indicator showing the least correlation with the others;
- non-farm income shows no correlation with either land or cattle holding, suggesting that there are two separate routes (farm and non-farm) to accumulate wealth. Perhaps more surprisingly, education of the household head does not seem to be a good indicator of non-farm income.

Relationship between the Composite Indicator and Scores from Participatory Wealth Ranking

Figure 1 plots the relationship between meansc2 and the outcomes of the participatory wealth ranking exercises. It shows a reasonable correlation between the two, albeit with three "outliers": two that were recorded as being in the poorest class during the participatory wealth ranking exercises, but which have attributes apparently more typical of the top class, and one for which the opposite is the case. Statistically, there is a significant positive correlation between the composite wealth indicator and the outcomes of the participatory wealth ranking exercises. Table 5 shows this with the three outliers discarded from the sample.

Table 4: Correlations between Component Indicators and Meansc2

		HOUSESC	LABSC	CATTLESC	MEALSC	LANDSC	NONFARSC	EDUCSC	MEANSC2
HOUSESC	Pearson Correlation	1	.362**	.209**	.219**	.162*	.424**	.193*	.720**
	Sig. (2-tailed)	.	.000	.004	.003	.026	.000	.033	.000
	N	188	185	188	187	188	183	122	182
LABSC	Pearson Correlation	.362**	1	.267**	.261**	.289**	.281**	.098	.591**
	Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.290	.000
	N	185	185	185	184	185	183	119	182
CATTLESC	Pearson Correlation	.209**	.267**	1	.064	.170*	.003	.174	.483**
	Sig. (2-tailed)	.004	.000	.	.383	.020	.965	.055	.000
	N	188	185	188	187	188	183	122	182
MEALSC	Pearson Correlation	.219**	.261**	.064	1	.100	.157*	.159	.441**
	Sig. (2-tailed)	.003	.000	.383	.	.174	.034	.079	.000
	N	187	184	187	187	187	182	122	182
LANDSC	Pearson Correlation	.162*	.289**	.170*	.100	1	.107	.194*	.456**
	Sig. (2-tailed)	.026	.000	.020	.174	.	.148	.032	.000
	N	188	185	188	187	188	183	122	182
NONFARSC	Pearson Correlation	.424**	.281**	.003	.157*	.107	1	.049	.584**
	Sig. (2-tailed)	.000	.000	.965	.034	.148	.	.595	.000
	N	183	183	183	182	183	183	118	182
EDUCSC	Pearson Correlation	.193*	.098	.174	.159	.194*	.049	1	.562**
	Sig. (2-tailed)	.033	.290	.055	.079	.032	.595	.	.000
	N	122	119	122	122	122	118	122	118
MEANSC2	Pearson Correlation	.720**	.591**	.483**	.441**	.456**	.584**	.562**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.
	N	182	182	182	182	182	182	118	182

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Figure 1: Relationship between the Composite Indicator and Scores from Participatory Wealth Ranking

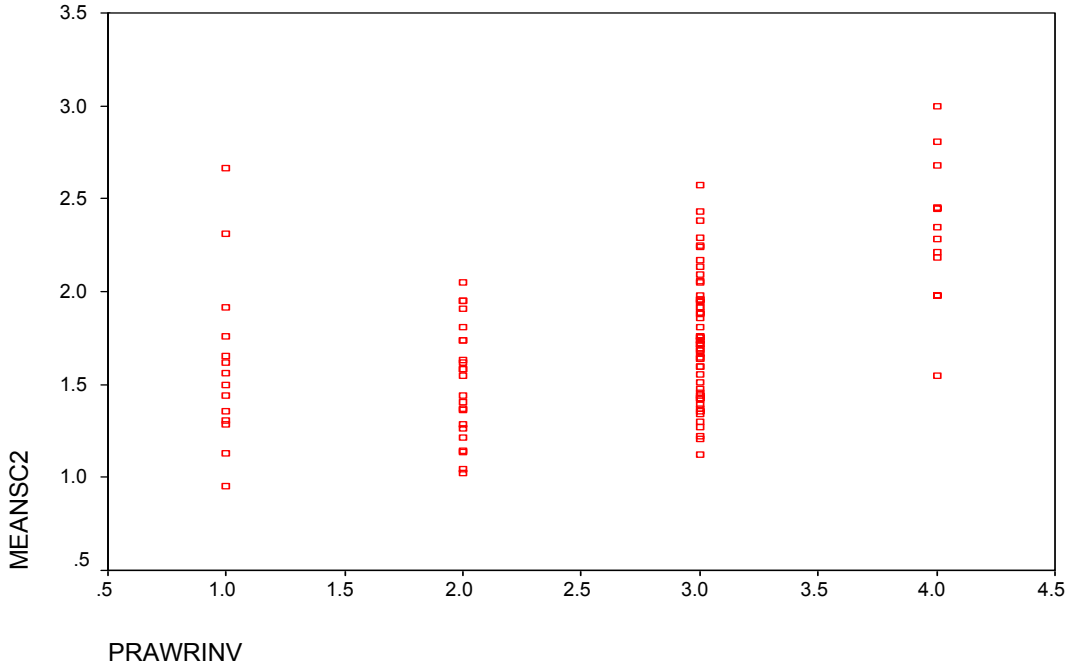


Table 5: Correlation between Composite Indicator, Housing Indicator and Participatory Wealth Ranking Scores (with three outliers removed)

		Participatory Wealth Ranking	Housesc	Meansc2
Participatory Wealth Ranking	Pearson Correlation Sig. (2-tailed) N	1 - 105	.555** .000 105	.552** .000 102
Housesc	Pearson Correlation Sig. (2-tailed) N	.555** .000 105	1 - 188	.720** .000 182
Meansc2	Pearson Correlation Sig. (2-tailed) N	.552** .000 102	.720** .000 182	1 - 182

Table 5 gives some confidence that a composite indicator, based on the seven component indicators and derived from formal survey work, can be used in subsequent analysis as a multi-dimensional indicator of wealth / poverty in Siaya and neighbouring districts in western Kenya. However, Table 5 also shows that the housing indicator may be as good an indicator of wealth / poverty in these areas as the more complex composite indicator.

Prepared by: Colin Poulton

14/04/2005

Appendix 4: Importance of Non-Farm Income Sources by Sub-location

Frequency of Remittances

Frequency	Sublocation			Total
	Nyamninia	Gongo	Ebukhaya	
none	62	72	66	200
once or twice	22	10	12	44
several times	4	3	8	15
every month	5	6	12	23
Total	93	91	98	282

Business Income
(score = 3 if main income source 2004/05, 2 if second source etc)

	Sublocation			Total
	Nyamninia	Gongo	Ebukhaya	
0	61	65	57	183
1	6	3	6	15
2	4	10	12	26
3	22	12	23	57
Total	93	90	98	281

Formal Employment
(score = 3 if main income source 2004/05, 2 if second source etc)

	Sublocation			Total
	Nyamninia	Gongo	Ebukhaya	
0	85	80	84	249
1	3	1	1	5
2	0	1	2	3
3	5	9	11	25
Total	93	91	98	282

Pension Income
(score = 3 if main income source 2004/05, 2 if second source etc)

	Sublocation			Total
	Nyamnina	Gongo	Ebukhaya	
0	91	91	94	276
2	0	0	1	1
3	2	0	3	5
Total	93	91	98	282