Uganda Journal of Agricultural Sciences, 2004, 9: 23-30
ISSN 1026-0919

Poverty analyses in integrated agricultural research for development

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Abstract

It is essential for integrated agricultural research for development (IARD) to relate research on agricultural innovations to the demands of farmers with different livelihoods and farming systems, especially according to poverty and gender differentiation. Uganda has a relatively long experience with poverty monitoring at the level of the national and regional economy - The Uganda National Household Survey (UNHS) and Uganda Participatory Poverty Assessment Programme (UPPAP). However ARD has done little to adapt innovations to demands of males and females or poverty groups. With support from DANIDA, the external monitoring unit (EMU) of DANIDA's Agricultural Sector Programme Support (ASPS), has developed a gender and poverty analysis methodology, which supplements poverty analyses based on the UNHS and UPPAP. This approach measures poverty statistically using a multidimensional set of indicators developed from rural men's and women's own perceptions. In addition the approach can be used at the household level to analyse demands for, adoption of, and impact of innovations as expressed and experienced by male and female farmers and different poverty groups. The paper describes briefly how multidimensional and participatory poverty and gender well-being indicators were identified. A well-being ranking methodology was used to obtain the indicators. They were then extrapolated and tested statistically for representativeness and aggregated in a quantitative index. Based on a conventional questionnaire survey, poverty analyses are presented for five ASPS pilot districts in Uganda. Among other things, the analysis shows how different faces of poverty are expressed through different indicators, such as landholding, sources of non-agricultural incomes, food security, and standard of housing. Due to limitations of space, related analyses of gender inequality are not included in this paper. In the ASPS study as well as studies undertaken in other districts, The poverty analyses have also been used to assess the extent to which agricultural practices are adopted by farmers of varying well being categories, and how different agricultural interventions reach these categories. Finally the paper discusses the need to base poverty targeted IARD on similar approaches.

Key words: Agricultural research, impact local, perceptions, poverty index poverty monitoring

Introduction

It is widely accepted, that many agricultural innovations are not scale neutral, neither in terms of the size of the operations, nor the social and economic capabilities of the agricultural enterprises targeted (Bie, 1994, Hall et al. 2001). Thus, Uganda's National Agricultural Research Policy "aims at focussing the National Agricultural Research System (NARS) on providing research services that address, in a sustainable manner, the needs and opportunities of the poor in a market driven environment" (MAAIF, 2003). Very seldom, however, do agricultural research and advisory services target their interventions accordingly, from their initiation, at considering the poverty and gender context in which the results are to be disseminated and used (eg MAAIF, 2003).

Farmers' adoption of innovations depends partly on personality, but equally, if not more importantly, on access to assets, capabilities, and activities, ie. the different livelihoods of the rural households (Scoones, 1999. Ahmed & Lipton, 1997). For example, the fate of a new technology may be decided by how it fits into the complex interdependencies of different farming systems (as part of livelihoods), including availability of household labour at the right points in time, or ability to acquire labour when needed, the ability to acquire needed external inputs, education, innovation experiences, culture, etc.

In Uganda the Programme for Modernisation of Agriculture (PMA) is the agricultural sector component of the Poverty Eradication Action Plan (PEAP). However, the recent PMA second annual review examining the progress on monitoring and evaluation, among other things, recommended introduction of more widespread poverty monitoring indicators into components of the PMA and also noted the absence of gender focus (PMA, 2003).

From 2001-2003 an External Monitoring Unit (EMU) has established a baseline and a methodology for monitoring the impact on Poverty and Gender of the DANIDA funded Agricultural Sector Programme Support (ASPS) in Uganda.

Important results have been presented on the degree and composition of poverty and gender inequality in the five ASPS pilot districts namely, Kabarole, Masaka, Pallisa, Rakai, and Tororo. A sixth district, Bundibugyo has recently been analyzed. Results have also been generated on the reach of agricultural interventions in those districts. The second phase of the ASPS is now being fully aligned with the PMA, and mainstreaming of the impact monitoring is at advanced stages.

It is important to note that the work of the external monitoring unit (EMU) complements the nationwide efforts aimed at monitoring/measuring poverty that include:-

1. The Uganda Participatory Poverty Assessment (UPPAP) of the Ministry of Finance, Planning and Economic Development (MFPED).
2 The PMA M&E framework and systems of stakeholder institutions.
3. The Uganda Bureau of Statistics' (UBOS) poverty measures derived from the National Household Budget Surveys (NHBS) and focused on the cost of meeting calorie needs, given the food basket of the poorest half of the population and some allowance for non-food needs.

The strength of the approach used by the EMU, which suggests its potential usefulness in the PMA M&E framework, lies in its ability to:-

a) Elicit and statistically quantify local perceptions of well being into an index that can be used to assess changes in well-being (as well as its opposite: poverty).
b) Generate an index based on local perceptions that can similarly be used to assess changes in gender relations.
c) Establish a link between outcomes and impact of agricultural interventions on poverty and gender relations.

Recent research in Adjumani and Kabale Districts has furthermore demonstrated the power of the methodology for poverty analysis in studies of agricultural development in general[1], in addition to monitoring change. This paper outlines the gender and poverty analysis methodology, followed by poverty comparisons among five districts in Uganda, showing how different dimensions of poverty are expressed through different indicators. We also demonstrate the degree to which extension has reached the poor and less poor, as well as variations in their adoption of improved agricultural practices. As earlier noted, the application of the methodology to assess gender inequality is omitted in this paper.

Steps in the Methodology

The two major steps in the methodology are briefly discussed in the following paragraphs.

a) Well-being rankings involved sampling of 6 communities from each of the five pilot districts. In each community 3-4 purposively selected men and women were then asked to rank all households by arranging name cards in three to four heaps of high, middle, low and if needed, very low, according to the perceived well-being of the households. The informants then described the well-being of the groupings (heaps of cards) in their own words.

All descriptions were analysed against broad emerging themes such as land ownership, livestock, health, food, education and marital status. Approximately 781 statements on household well-being were identified. The statements were grouped according to themes and to the level of well-being they indicated. Statistical analysis revealed that the most frequently used indicators were valid in all the five districts. Indicators that were used by few informants added little new information to what could be derived from the most widely used indicators. It was therefore valid to use a common set of indicators in all the pilot districts in a questionnaire formulated to provide data on these indicators.

b) Questionnaire survey and poverty index. A total of 400 households were randomly selected and interviewed in each district. In each district, 14 to 20 different communities (LC1's) were included in the study.

In order to achieve a single measure for household poverty, a set of 13 different indicators was developed based on the themes that were most frequently used by the informants. These include: land ownership, non-agricultural sources of income, performing casual labour, animal ownership, hiring agricultural labourers, food security, quality of diet, housing quality, health status, children's schooling, dressing, marital status and age of household head.

For each indicator, descriptions were made to match three different levels of poverty namely: highest, middle and lowest, and scored accordingly. The mean score on the 13 indicators is the poverty index-figure for the household, according to which responding households can be sorted into the *poorest, the less poor and the better off.*

A Poverty comparison of Ugandan districts

The poverty analysis, comparing the characteristics of the poorest people, the less poor and the better off in five Ugandan districts reveals quite different anatomies of poverty, providing interesting indicators of its different causes in the five areas. Similarly, it shows that even within individual districts the rural populations are far from homogenous, and that the poverty level of a household seems to be an important determinant of its agricultural behaviour and capacity to respond to development interventions and adopt agricultural innovations.

Figure 1 shows that overall, Masaka is the most affluent district, with the smallest part of its population categorized as *poorest* (27%) and with the largest part as *better-off* (37%) while at the other end of the scale, Tororo has the largest proportion of *poorest* households (36%) and the mallest *better-off* (24%).

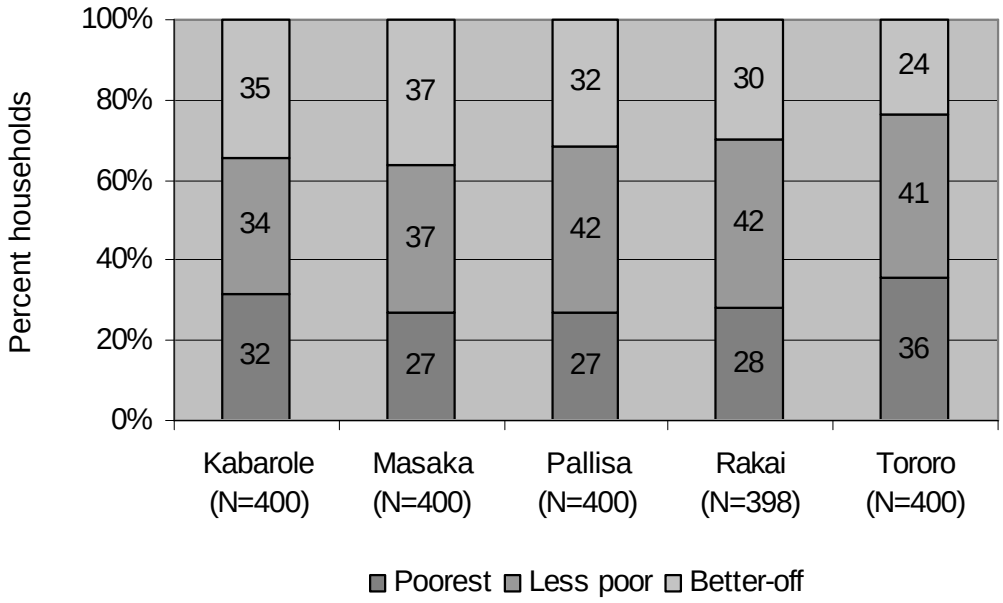

Figure 1 Percent households per district, by poverty level

This pattern coincides with the trend from the 1999/2000 NHBS, which estimates the proportion of poor people to be lowest in the Central Region (includes Masaka and Rakai) at 20%, followed by the Western Region (incl. Kabarole) at 28%, and highest in the Eastern Region (incl. Pallisa and Tororo) with 37% of the population being characterized as 'poor' (Appleton, 2001).

Analysing the household poverty levels, the picture which emerges of the poorest group of households in the five districts is characterised by:

1. dependency upon own agricultural production on small pieces of land;
2. with the exception of Kabarole, most of the poorest households do have more than an acre of land though;
3. agriculture is supplemented with incomes from working as casual labourers. Close to half or more of the poorest households in Tororo, Kabarole and Pallisa districts are heavily involved in casual labour, but only 30% - 40% in Masaka and Rakai;
4. in all the districts less than 40% of the poorest have any non-agricultural incomes;
5. hardly any of the poorest households own cattle, but the majority tend to have smaller animals like chicken, sheep and goats, etc.;
6. despite regional differences, the situation for the poorest households was highly precarious. In all five districts they are characterized by high levels of food insecurity, poor diet, inadequate housing, and low ability to provide for children's schooling.

At the other end of the well-being scale, the better-off households tend to have more land, particularly in Tororo and Pallisa, where land is more abundant, and to complement their agricultural production with incomes from non-agricultural sources like being professionals and running businesses, or owning cattle. The majority of the better-off households have a high level of needs satisfaction. Finally, the picture which emerges of the (intermediate) less poor households is one of owning medium-sized pieces of land and supplementing the income earned from their land with a combination of non-agricultural sources of income such as brick-making, beer-brewing, building and tailoring, charcoal burning etc. on the one hand, and working as casual labourers, particularly in Tororo and Pallisa, on the other.

An analysis of the detailed structure of poverty in each of the five districts reveals that they score quite differently on some indicators on which the poverty index is built, and more similarly on others. Thus certain indicators contribute to the relatively deeper poverty in Tororo and less poverty in Masaka district:

i) *Non-agricultural incomes*. Few households in Tororo have incomes from formal sector sources compared to the other districts, while Masaka and Rakai have fewer people without any non-agricultural incomes at all (Table1).

ii) *Schooling*. Households in Tororo have been less able to send children to secondary or private school, or even to send them to school at all, whereas the opposite trend is strongly prevalent in Masaka (Table 2).

iii) *Casual labour*. It is widely regarded as an indicator of poverty, when household members have to perform casual labour for others to make a living. This is most widespread in Tororo, but also in Pallisa, where 65 and 57% of the rural households respectively have members doing casual labour occasionally or regularly (Table 3).

Table 1 Non-agricultural sources of income by sector

	% of households				
Non-agric sources of income	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
Formal Sector	35	35	26	33	19
Informal Sector	23	31	34	36	37
None	42	34	40	31	44
Total	100	100	100	100	100

Significant correlation at 0.05 level (Pearson chi-square test)

Table 2 Children's schooling

	% of households				
Types of schooling	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
Secondary and private school	32	42	26	38	20
UPE school	50	51	57	47	58
No school	19	7	17	14	22
Total	100	100	100	100	100

Significant correlation at 0.05 level (Pearson chi-square test)

Table 3 Households where somebody perform casual labour

	% of households				
Performing casual labour	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
No casual labour	65	68	43	67	35
Only occasionally	14	20	26	16	34
Regularly	22	12	31	17	31
Total	100	100	100	100	100

Significant correlation at 0.01 level (Pearson chi-square test)

Table 4 Quality of housing

	% of households				
Quality of housing	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
Permanent walls and roof	11	43	16	19	18
Either perm. walls or roof	78	40	79	54	67
Neither perm. walls nor roof	12	17	5	27	15
Total	100	100	100	100	100

Significant correlation at 0.01 level (Pearson chi-square test)

Table 5 Landownership

	% of households				
Landownership	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
>5 acres (2 ha)	20	17	27	17	28
<5acres>1acre (0.4 ha)	51	57	58	69	56
<1acre (0.4 ha)	29	26	16	14	17
Total	100	100	101	100	100

Significant correlation at 0.05 level (Pearson chi-square test)

iv) *Housing.* Masaka, on the other hand, also stands out in terms of housing quality, with more than twice as many households with both permanently walled and roofed houses as in any other district (Table 4).

Land and animal ownership, on the other hand, are poverty indicators which confirmed the different anatomy poverty can have, by giving quite different results from those above. For both indicators, Tororo and Pallisa score higher with most households in the ">5 acres" and "own cattle" categories, while more than a quarter of the households in Kabarole and Masaka own less than 1 acre of land and more than 20% in these two districts as well as Rakai do not have any animals (Tables 5 and 6). Even the poorest household may have a high score on one or two indicators, while being low on most. That is how complex poverty is!

Poverty analysis of adoption of some agricultural improvements

We have seen the variation of assets and capabilities between the levels of poverty, and it can also be shown that agricultural activities, characterizing livelihoods, correspond with poverty levels, on which agricultural improvement and access to agricultural advisory services further seem heavily dependant.

More than 50% of all households claimed to perform some soil conservation. Not surprising, the percentage is higher among the better off households, followed by the less poor, but even among the poorest, 47% state that they practice soil conservation! That it was furthermore claimed that terracing and other earth works were the most frequent type of soil conservation performed in all three groups is even more surprising, and would definitely merit some further investigation (Table 7).

The distribution of households claiming to perform three of the four categories of soil conservation used here, i.e. contour ploughing, mulching, and terraces and other earthworks, was significantly skewed towards the better off households. Possible explanations may be that mulching is mainly done by farmers with large, possibly commercial banana plantations; that contour ploughing requires oxen and plough; and that earthworks are generally resource demanding? Making grass strips and trash lines does not require any specific resources (apart from taking up a little land), and was the only category that was equally distributed among the poverty levels.

During the early colonial time soil conservation was the major extension message in Uganda. After independence more efforts were put into increasing production, first with chemical fertilizers, followed by other soil improvement measures, the latest being incorporation of crop residues into the soil, compost, and green manure (Carswell, 2000, World Bank 1993, and own observation). Fallowing is often regarded as part of the farming system, practised by anybody who has suffficient land resources or are not able to cultivate all land in a certain season. It is likely therefore to be forgotten as an explicitly mentioned soil improvement measure.

The number of households claiming to perform any soil improvement is slightly less than what was seen for soil conservation among households at the two lower poverty levels (Table 8). However, still almost half of all households and 1/3 of the poorest households are involved in some kind of soil improvement. Manuring, composting, and incorporation of crop residues in the soil are the most commonly performed soil improvement measures. Fallowing is less frequently mentioned, and use of chemical fertilizers virtually non existent, except among the better off households.

All six categories of soil improvement practices presented here are performed by significantly more of the better off households, followed by the less poor, and fewest among the poorest households.

Crop sales

Agricultural incomes or crop sales were not frequently mentioned as indicators of poverty or wellbeing in the well-being rankings, as for example non-agricultural incomes were. Agricultural incomes, therefore are not one of the indicators making up the household poverty index.

However, increased agricultural incomes are a main objective of the PMA, as a means to reduce poverty, and it is necessary for IARD crop research to relate to the development of agricultural incomes and crop sales by poverty levels and livelihoods. Due to the unreliability of income figures obtained through questionnaire surveys, instead the proportions of the households at a certain poverty level, who sell one or more crops, are taken as proxy measures for the importance and composition of agricultural incomes in different household strategies.

Table 10 shows the overall picture for the three poverty levels in the five districts. Maize, beans, coffee, and cassava, are sold by the most households, in that order, and by more than 20% of all households. Maize and beans are grown and sold in all districts, while other crops like coffee and cotton are geographically concentrated. The distribution is significantly skewed against the poorest households for all crops, except coffee.

More (33%) of the poorest households sell no crops at all, against only 22-23% for the other two levels. Against the common description of small scale agriculture in Uganda as dominated by subsistence agriculture, it is interesting to note, however, that it means that even among the poorest, 2/3 of the households are involved in the market to sell some crops!

Table 6. Animal ownership

	% of households				
Animals owned	Kabarole (390)	Masaka (399)	Pallisa (400)	Rakai (396)	Tororo (388)
Includes cattle	30	28	38	21	42
Smallstock only	48	48	49	58	45
None	21	24	13	21	13
Total	100	100	100	100	100

Significant correlation at 0.05 level (Pearson chi-square test)

Table 7. Households performing soil conservation

Percent households performing per poverty level				
	Poverty level			All
Types of soil conservation practiced	better-off (n=615)	less poor (n=778)	poorest (n=605)	poverty levels (n=1998)
Contour ploughing **	11	10	6	9
Mulching*	18	12	6	12
Made grass strips or trash lines^{ns}	18	20	16	18
Terraces and other earthworks*	42	36	31	36
Any soil-conservation* (any of the above)	60	55	47	54

**Correlation is significant at 0.01 level, **Correlation significant at 0.05 level, ^{ns} No significant correlation (Pearson chi-square)*

Table 8. Households performing soil improvement

Percent households performing by poverty level				
	Poverty level			All
Soil improvement measures used	better-off (n=615)	less poor (n=778)	poorest (n=605)	poverty levels (n=1998)
Incorporate residues without burning*	26	18	13	19
Animal manure*	28	21	10	20
Fertilizers*	6	2	1	3
Compost*	25	20	13	19
Green manure **	7	5	4	5
Fallow*	19	13	7	13
Any soil improvement* (any of the above)	60	47	33	47

**Correlation is significant at 0.01 level (Pearson chi-square), **Correlation is significant at 0.05 level (Pearson chi-square)*

Table 10 Households selling different crops

Percent households selling by poverty level –crops mentioned are those sold by more than 10%

Crop sold	Poverty level			All
	better-off (n=629)	less poor (n=774)	poorest (n=595)	poverty levels (n=1998)
Maize*	41	38	29	36
Beans*	37	31	25	31
Coffee ^{ns}	26	25	20	24
Casava**	23	21	15	20
Cotton*	17	22	14	18
Bananas*	23	17	12	18
Groundnuts*	15	15	8	13
Fingermillet**	12	12	6	10
No crop sales*	23	22	33	26

**Correlation is significant at 0.01 level, **Correlation significant at 0.05 level, ^{ns} No significant correlation (Pearson chi-square)*

Conclusion

Often times development practitioners make blanket technology recommendations. The results of this study underscore the need for prior poverty analysis and targeted technology interventions. This is expected to improve adoption, improve incomes and reduce poverty, since it was unequivocally demonstrated that the farming population in Ugandan districts is heterogenous in terms of poverty and that poverty is a multifaceted phenomenon. Furthermore, some agricultural activities vary widely between poverty groups, while others are much more commonly performed (but may vary according to ecological zones, e.g. coffee growing).

The research has also demonstrated the importance of non-agricultural sources of income in poverty reduction. This then underpins the need for a blend of interventions, both agricultural and non-agricultural, to alleviate poverty. It is also noted that even the poorest household participate in agricultural markets, at least as commodity sellers. Increased participation in the market and access to non farm income sources are some of the possible pathways out of poverty that should be further investigated and supported.

Poverty and its measurement are complex issues. Only the poor know clearly how it feels to be poor and as much as possible they should be involved in poverty assessment. Furthermore, poverty analysis needs to be increasingly multidisciplinary for it to be complete and useful. Thus poverty analysis and measurement goes beyond academic curiosity and interest. They are powerful guides to agricultural and rural development interventions.

Development and dissemination of agricultural innovations needs to be targeted accordingly, and more specifically, IARD aimed at addressing "the needs and opportunities of the poor" needs to identify and target the relevant farming systems. However, to define farming systems, for which to design agricultural innovations, based only on ecological zones, possibly complemented with cultural differences, is not sufficient. These criteria should be complemented with poverty analysis, to find out whether the IARD's applicability is sensitive also to economic differentiation.

For this purpose the poverty analysis methodology developed has not only been used to find out what farmers do and how their different activities are correlated as in the ASPS study, but has also in smaller studies proved useful to relate their perceived reasons to levels of poverty.

For example in a poverty study in Rubaya sub-county, the first and second most prevalent reasons given by farmers not practising soil fertility improvement, were lack of money to buy inputs and of knowledge about what to do (about 40% and 35% across poverty levels). However, an even more common reason given among the better off farmers only, was that soil fertility is not a problem (Boesen & Miiro, 2004). It can be added that in the same area a broadly promoted agricultural innovation for commercialisation for poverty reduction is improved varieties of Irish potatoes, whereas our study shoved that 50% of the better off farmers sell Irish potatoes against only 19% of the poorest group – not really a poor farmers crop.

In order to target IARD at the needs and opportunities of the poor, a questionnaire based poverty analysis as proposed here can go some way towards explaining *who*

are the poor, *what* are their livelihood activities, assets and capabilities, and *which* reasons and needs do they perceive. Poverty oriented IARD can often be adapted to this. In some cases, however, IARD needs to be adapted not only to *what* the poor do and think, but also to *why* they do it, which may require much more qualitative study of the processes and social structures through which farmers adopt agricultural innovations. This includes both the functioning of the agricultural advisory system, the markets, and even the civil society institutions, pertaining to different poverty levels.

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