Determinants of wellbeing among smallholders in Adjumani District, Uganda

Bernard Bashaasha[1], Michael Kidoido[1] and Esbern Friis Hansen[2]

[1] Department of Agricultural Economics and Agribusiness, Makerere University, P.O.Box 7062, Kampala. (aspsmuk@infocom.co.ug, bashaasha@agric.mak.ac.ug)
[2] Senior Researcher, Danish Institute for International Studies, Strandgade 56. DK-1401 Copenhagen, Denmark (efh@diis.dk)

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Abstract

An ordered logistic regression model was used to empirically establish the quantitative effects of community identified (local) determinants of wellbeing on the level of household wellbeing. The model was fitted to data for a sample of 200 households collected in the last quarter of 2002. The dependent variable, poverty category, has three levels namely poorest =1, Less poor =2, and Better off = 3. Fourteen independent variables are used.

Results show that households that own ³ 5 acreage of land, that are male headed, have a nonagricultural source of income and are actively involved in agricultural development activities have a higher probability (odds) of enjoying wellbeing above any given level. Land ownership seems to be the most important determinant of wellbeing in Adjumani district. Furthermore, owning livestock and having a household head with an education level of secondary school and above are also important determinants of household wellbeing in Adjumani district.

We find household wellbeing to be negatively affected by household size, age of the household head and whether any family member has had any long illness although only the age of the household is significant.

We recommend deepening of the Universal Primary Education (UPE) and initiation of Universal Secondary Education to increase the education levels of the rural people. We also recommend continued and expansion of community level agricultural development activities, strengthening of the land tenure provisions to enhance access to land and initiation of programs to enhance animal ownership among smallholder farmers in Adjumani.

Key words: Adjumani, poverty analysis, ordinal logit

I. INTRODUCTION

Adjumani district formely, East Moyo, was pronounced a district in July 1997. It lies in the West Nile region of Uganda, that is bordered by Sudan to the North and DR Congo to the West. It has a population of 200,000 persons and a population density of 66 persons/km^2 Uganda Bureau of Statistics (UBOS, 2001). 90% of the population are rural and the total refugee population is 57,567 persons.

Available evidence shows that whereas poverty may be showing a downward trend elsewhere in Uganda that's not the case for Adjumani and a few other areas.
The Ministry of Finance, Planning and Economic Development (MFPED), (2001) estimates show that 68% of the rural population of Moyo fall below the poverty line (≈ Ushs. 16,667 per person per month). Inequality is also fairly high with a Gini coefficient of 0.28 (UBOS and ILRI, 2003, 2004).

II. Objective and Hypotheses

Objective

- The general objective is to contribute to the understanding of the nature of household wellbeing in Adjumani district and the design of appropriate poverty reduction interventions.

Specifically, the study:

a) Establishes the quantitative relationship between household wellbeing and the factors (determinants of poverty) noted below.

b) Assesses differences in determinants of wellbeing among smallholder households of different wellbeing levels.

c) Draws policy recommendations and identifies entry points for interventions to enhance smallholder asset positions, increase household income diversification opportunities and improve poverty targeting.

Fourteen key factors hypothesized to influence wellbeing include:
age of household head, sex of household head, land holding, household size (proxy for family labor), education, level of household head, ownership of any livestock, possession of a non-agricultural source of income, membership in any farmer organizations, Farmer involvement in Agricultural development activities, Nationality (national / refugee), Number of crops sold over the last year, Access to agricultural extension services, Use of improved seed (for any crop), Whether any household member has suffered any long illness.

Hypotheses

We hypothesize the level of household wellbeing in Adjumani to be *positively* correlated with education level of the household head, male headship, land holding, Ugandan citizenship, participation in commodity markets, farmer involvement in agricultural development activities, access to extension services, possession of a non-agricultural source of income, usage of improved seed, livestock ownership, age of the household head and membership to farmers' organization. We further conjecture the level of household wellbeing in Adjumani district to be *negatively* associated with presence of a household member suffering / suffered from a long illness and household size.

III. Conceptual discussion and Methodology

Rural households are endowed with assets that establish their capabilities and condition how they determine their livelihood strategies. In turn, the levels of wellbeing they will achieve with these assets depend on the opportunities and constraints offered by the context in which they operate. Behaviour in using assets may be individual, or it may be collective depending on the perceived costs and benefits. One major purpose of rural development is to change the capabilities (assets) and the opportunities and constraints (context) that determine the wellbeing outcome. Understanding the actors and how they define their livelihood strategies, individually and collectively, is one of the cornerstones for the formulation of any approach to poverty alleviation.

A related cornerstone is an explicit understanding of the household's asset portfolio and how this determines its capability in generating income and how that income is used. Household assets are multidimensional, implying both complementarities among assets and a multiplicity of entry points for interventions aimed at increasing asset positions.

3.1 The Model

Since the dependent variable, the level of poverty, is of an ordinal nature an ordinal logit model, a variant of the ordered probit (Zavoina and McElvey, 1975), was used for the analysis of the polychotomous wellbeing level.

For the ordinal logit model we let,

$$Y_i^* = \beta' x_i + \varepsilon_i \text{ ----------} \quad \textbf{(1)}$$

Where Y_i^* is the underlying latent variable that indexes the level of well being that a household experiences, x_i is a vector of explanatory variables, β is a column vector of parameters to be estimated, and ε_i is the stochastic error term. The latent variable exhibits itself in ordinal categories, which could be coded as 1, 2, 3 .....J. The probability for each of the observed ordinal response, which in our case had only three categories (1, 2, 3) for "poorest", "less-poor" and "better-off" households will be given as;

$$P(Y=1) = P(Y^* \leq 1) = P(\beta'x + \varepsilon \leq 1) = F(-\beta'x)$$

$$P(Y=2) = F(\delta_2 - \beta'x) - F(-\beta'x) \quad \text{----------(2)}$$

$$P(Y=3) = 1 - F(\delta_2 - \beta'x)$$

Where F is the cumulative distribution function (CDF) for the stochastic error term ε.

The assumptions about the functional form of F will determine whether a logit (logistic CDF), probit (standard normal CDF) or other model is used. Following Occam's razor, we use the logistic specification in this study. Although we expect the predicted probabilities to be similar to those of a probit model within the broad range of the data except at the tails (see Maddala, 1983; Aldrich and Nelson, 1984).

3.2 Data and Sources

The data used for this study come from a study carried out in 2002 – 2003 in Adjumani district. Fieldwork undertaken during October-November 2002 comprised four components: (i) a participatory qualitative well-being ranking exercises, (ii) development, pre-testing and implementing a structured questionnaire to a random sample of households, and (iii) Focus Group Discussions (FGD) and (iv) Key

Informant Interviews (KIs). A wellbeing ranking was carried out in selected national and refugee communities using the card sorting method. In constructing the characteristics of poverty, well-being is seen as an antithesis (exact opposite) of poverty. The information obtained was used to construct a wellbeing index that was used to disaggregate households into 3 poverty categories namely poor, less poor and better-off used in the present analysis (see H.M. Ravnborg, 1999 for details of this process).

3.3 Data Analysis / Model Implementation

We undertook a quantitative analysis of the linkages between household poverty and the identified determinants of poverty including household and community level characteristics. The quantitative analysis of the relationship between household wellbeing and 14 determinants of poverty was implemented using an ***ordered Logit model with the 3 poverty categories as the dependent variable*** (an ordinal dependent variable). The analysis was undertaken in the STATA econometrics program using data from 201 households.

IV. Empirical Results

Results of the ordered logit estimation of determinants of wellbeing in Adjumani district are presented in Table 1. The signs of most of the estimated parameters conform to our expectations with the exception of age of household head and membership to a farmers' organization. The likelihood ratio goodness of fit test show a good fit for the model (significant at $P<0.001$ level). The model also met the parallelism assumption that requires that parameters in the subsequent equations are the same. The link test also revealed that the model was correctly specified. A brief discussion of the results follows.

Landownership. The amount of land owned (LAND) seems to be the most important determinant of wellbeing in Adjumani district. The larger the amount of land owned the higher the probability of enjoying wellbeing above any fixed level. The odds ratio of 7.08 on the LAND variable suggests that *ceteris paribus*, the odds that the wellbeing of a particular household will be above any given level will be 7.08 times higher for households owning 5 and above acres of land than for households owning less than 5 acres of land. This underscores the importance of not only access to land but also the amount of land accessed in poverty alleviation strategies and interventions.

Sex of household head. The odds ratio of 2.98 associated with the relationship between sex of household head and wellbeing levels implied that *ceteris paribus*, the odds that the wellbeing of a particular household will be above any given level will be 2.98 times higher for a male headed household than for a female headed household. This can be explained by the fact that culturally in rural Uganda, men own and have more access to resources than women.

Non-agricultural income. Access to a non-agricultural source of income is also an important determinant of wellbeing in Adjumani district. For a given level of other regressors, the odds that the household's wellbeing will be above any fixed level is 2.97 times higher for household with access to a non agricultural source of income than for households lacking a non-agricultural source of income. Non agricultural activities complement agricultural sources of income by availing the household additional resources for both consumption and investment. Investment in turn enhances asset accumulation and opens up additional escape routes out of poverty. Whereas much of non agricultural sources of income have to do with education, opportunities exist to design strategies to stimulate low and semi skilled types of non farm employment opportunities in the rural areas as escape routes out of poverty.

Agricultural Development Activities. Farmer involvement in agricultural development activities also seem to be highly associated with a higher level of wellbeing. Households where the household head is active in development activities seem to have a higher probability of attaining a higher level of wellbeing. For a given level of other regressors (*ceteris paribus*), the odds that a household's wellbeing will be above any fixed level is 2.58 times higher for those households that have been involved in agricultural development activities than for those who have not. Carefully designed and delivered, agricultural development activities impact new skills and also enhance or sharpen farming skills of the farmer leading to improved production and marketing activities and higher chances of escaping out of poverty.

Education. The education level in relation to wellbeing levels revealed that any unit increase in the educational level of the household head significantly increased the

odds of the household attaining a higher level of wellbeing by 2.54 times. The household head being more educated significantly enhances on household well-being (P = 0.006) at the 1 percent level of significance. This is probably because education provides more productive ideas and enhances opportunities for employment. Education also enhances reception to new farming ideas.

Livestock. Empirical evidence abounds regarding the importance of livestock (including cattle, small ruminants and all kinds of poultry) among smallholders. What is not clear though is whether livestock is the cause or result of improved wellbeing. Aside from the economic value associated with investment, livestock has important social – cultural values as well. We found ownership of livestock by a household to be an important determinant of wellbeing in Adjumani district. The significant (at 10% level) odds ratio of 2.4 on this variable suggests that, *ceteris paribus*, the odds that the wellbeing of a particular household will be above any given level will be 2.4 times higher for households owning livestock than those households owning no livestock.

Age of Household head. Wellbeing is negatively affected by age of the household head. The probability that the level of wellbeing will be below any fixed level also increases (though not significantly) with household size and whether any household member suffers from a long illness.

The results for household size and long illness are in line with earlier empirical work (see Kraybill and Bashaasha (2004)). However, it is less clear why the probability that the level of wellbeing will be below any fixed level should increase significantly (5%) with age. Age (to a limit) is expected to be associated with skills enhancement

(experience), accumulation of resources, extensive social capital and others that ought to contribute positively to wellbeing. It's possible that the positive contribution of age (to a limit) to wellbeing is more than offset by household size with attendant increased responsibilities. Although the absence or presence of a prolonged sickness was not found to significantly affect wellbeing levels (P = 0.109), a more definitive likelihood-ratio test (lrtest) revealed that with 1-degree of freedom, generating P = 0.000, the effect of length of sickness would be significant at the 1% level.

Other factors such as nationality, number of crops sold in the previous year, access to extension services, being a member of a farmers' organization or using improved seed did not seem to significantly affect the wellbeing status of the household in any significant way. There is by and large equitable access to resources culminating in similar wellbeing levels among nationals and refugees. Adjumani is a poor district with few gainful commodity marketing opportunities. That is probably one of the reasons why the number of crops sold by the household has no significant impact on wellbeing. Extension is also weak (Adjumani is not a NAADS district yet) and farmers organizations are largely still at budding stage with no apparent impact on household wellbeing. Profitability of improved seed can only be guaranteed by a vibrant market for agricultural commodities which is still lacking in Adjumani.

V. Conclusion

This study provides results on factors that influence / drive household wellbeing in Adjumani district. It is based on data collected by a multidisciplinary team of researchers using diverse tools and techniques to achieve adequate triangulation of information for enhanced accuracy. The team used a combination of participatory qualitative methods, a formal questionnaire, focused group discussions and key

informant interviews in addition to expert field observations. The present report focuses on the results of a quantitative ordered probit analysis to estimate the probability (odds) of a specific household achieving a higher / lower level of wellbeing given key variables hypothesized to influence wellbeing. The conclusions emanating from this analysis are illustrated in the following paragraphs.

First, asset ownership, notably land and livestock, have been demonstrated as the most important determinants of wellbeing in Adjumani district. Policies that ignore or even assume these factors away are likely to be ineffective. This underscores the need for inter and intra – household equitable access to land (a key asset) as a necessary basis for improved household wellbeing. Policies that enhance / promote livestock ownership are likely to have a positive impact on household wellbeing. Livestock acts as a secure form of investment. Livestock is a highly liquid asset in a rural setting, it is also highly mobile as insurance against location specific natural hazards like drought, floods, and civil strife. Credit schemes and in kind schemes such as Heifer Project International, Send a Cow and others ought to be facilitated to initiate activities in Adjumani. This region can also make good use of small initiatives like Send a goat, a sheep or even a chicken.

Second, the characteristics of the household head, notably gender of the household head, education level of the household head and farmers' involvement in agricultural development activities are also important determinants of wellbeing. Whereas there are few policy options to impact on the gender of the household head the attendant education level is within policy reach. It is our submission that higher education levels for female household heads could easily more than compensate for the benefits of a household being male headed. Adult education programs targeting female

household heads would be a reasonable intervention as the country awaits the benefits of Universal Primary Education and hopefully Universal Secondary education sooner than later.

The fact that we find farmer involvement in agricultural development activities to be an important determinant of wellbeing underscores the importance of extension services and farmer mobilization. Extension services should not be for only those who can demand it. There must be policy efforts aimed at stimulating and creating demand among those currently perceived as not demanding extension services. This calls for farmer mobilization efforts alongside provision of quality extension services. We are convinced that current NGOs active in the area have a comparative advantage over say NAADS and others and should be facilitated to deepen current activities and even venture into new areas notably farmer mobilization.

Third, the role of non-agricultural sources of income has been further underscored in this study. Poverty reduction policies that ignore this factor are bound to have limited impact. The rural areas of Uganda are a delicate balance of both agricultural and non-agricultural activities. Development interventions ought to recognize this fact. Over focusing on agriculture may be as detrimental as not focusing on it all. We recommend that the current public policy of supporting the private sector be extended to the rural areas of Uganda. Profitable rural based private activities ought to be identified and supported with policy, credit services, technical support, etc to enable them play their complementary role in poverty reduction.

Fourth, we have found that household size, and long illness among household members negatively impact on wellbeing. This result points to the need to deepen

both maternity and general health care of households. Policies that ignore these household health factors are bound to have limited impact. Once maternity health improves there will be both improved child survival and better access to birth control technologies resulting in smaller family sizes.

Expansion and support of general health care probably through schemes such as community medicine are likely to reduce adult mortality, increase household level farm labour availability and activity and contribute to poverty reduction. Reduced adult mortality is also likely to lead to reduced family sizes as parents get assurances that their children will live longer.

References

Aldrich, J.H. and N.D. Nelson (1984) *Linear probability, logit and probit models.* Sage Publications.

Kraybill, David S. and Bernard Bashaasha. "Regression-Based Simulation of Anti-Poverty Policies for Uganda," selected paper presented at annual meeting of the American Agricultural Economics Association, Providence, Rhode Island, USA, July 24-27, 2005.

Maddala, G.S. (1983) *Limited-dependent and qualitative variables in econometrics.* Cambridge University Press, Cambridge.

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), 2000. *National Agricultural Advisory Services Programme (NAADS), Master Document Of The NAADS Task Force and Joint Donor Groups.*

Ministry of Agriculture, Animal Industry and Fisheries / Ministry of Finance, Planning and Economic Development (MAAIF/MFPED), August 2000. *Plan For Modernisation Of Agriculture: Eradicating Poverty In Uganda, Government Strategy and Operational Framework.*

Ministry of Finance, Planning and Economic Development (MFPED), (2001). Poverty Indicators in Uganda. Discussion paper Number 4 (June).

Ravnborg, Helle Munk, with the collabouration of R.M. Escolan, M.P. Guerrero, M.A. Mendez, F.Mendoza, E.M. de Paez and F. Motta. 1999. *Developing Regional Poverty Profiles based on Local Perceptions* (also available in Spanish). CIAT publication.

Shiferaw, B. and Holden, S.T(1998). "Resource Degradation and Adoption of Land Conservation Technologies in Ethiopian Highlands: A case Study in Andit Tid North Shewa Agricultural Economics 18: 233 – 247.

Uganda Bureau of Statistics (UBOS) and International Livestock Research Institute (ILRI) (2003,2004). Where are the poor? Mapping Patterns of Well-Being in Uganda.

Uganda Bureau of Statistics (UBOS), June 2001. *Statistical Abstract.*

Zavoina, R. and W. McElvey (1975) A statistical model for analysis of ordinal leve dependent variables. *Journal of Mathematical Sociology* pp. 103 – 120.

Table 1: Ordered Logit results for determinants of wellbeing in Adjumani

Variables	Coef.	Std. Err.	Wald Chi-Sq Stat.	P<0.05	0dds ratio
SEXHEAD	1.0915210	0.5641496	3.74*	0.053	2.98
EDUCATE	0.9316168	0.3367681	7.65***	0.006	2.54
HHSIZE	-0.0575986	0.0521459	1.22	0.269	0.94
LAND	1.9569880	0.4827573	16.43***	0.000	7.08
NATION	0.5459956	0.4185954	1.70	0.192	1.73
CROPSELL	0.0243327	0.1163842	0.04	0.834	1.03
AGEHH	-0.0341037	0.0138567	6.06**	0.014	0.97
FARMACT	0.9465649	0.3610984	6.87***	0.009	2.58
EXT-ACCES	0.2889156	0.4871197	0.35	0.553	1.34
NONAGRIC	1.0889140	0.4462314	5.95**	0.015	2.97
SEED	0.3304092	0.4586495	0.52	0.471	1.39
DISEASE	-0.5437475	0.3396616	2.56	0.109	0.58
MEMB	0.0099496	0.3642074	0.00	0.978	1.01
ANIMAL	0.8735377	0.3675316	5.56**	0.017	2.40
a_1	0.85				
a_2	4.58				
-2 log likelihood	149***			0.000	
Mc Fadden's adjusted R2	0.19				

***, **, *** Refer to significance at 10, 5 and 1 percent level, respectively.**