THE ROLE OF WOMEN IN THE RECONSTRUCTION OF AGRICULTURE IN DEVELOPING AREAS: THE CASE OF THE NORTHERN PROVINCE

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This paper employs the log-linear models on the data collected from farmers participating in the Farmer Support Programme in Phokwane and Ndebele areas to determine factors that can facilitate or constrain women from being commercial oriented. The results indicate that women households heads and men are more inclined towards selling than married women, however, land and credit are major constraints. With respect to married women, improvement in the ownership status seems necessary for the success of other policy instruments.

DIE ROL VAN VROUE IN DIE HEROPBOU VAN LANDBOU IN ONTWIKKELENDE GEBIEDE
Hierde referaat maak van 'n log-liniêre model gebruik om te bepaal watter faktore die beweging van vroue na meer kommersieel georiënteerde landbou beperk of fasiliteer. Die data wat gebruik is, is data verkry uit opnames onder boere wat in die Farmer Support Programme in Pokwane en Ndebele deelneem. Die resultate dui daarop dat vroulike hoofde van huishoudings en mans meer geneig is om produksie te verkoop as getroude vroue. Toegang tot grond en krediet bly egter belangrike beperkings. Met betrekking tot getroude vroue, is die verbetering van eienaarskap status nodig vir die sukses van ander beleidsinstrumente.

1. Introduction

Rural women have had to supplement the irregular migrant labour remittances by engaging in various productive activities. In the process of seeking alternative means to augment family income, agriculture has assumed this role more prominently where it now qualifies as the most important source of subsistence among rural families. Since the remittances can not be relied upon to provide the required capital for improved agriculture, and government agricultural policies do not favour black farmers, agriculture in these areas can be categorised as subsistence in character and a technologically backward sector dominated by women. The major question is whether in recognition of the role women play as current managers of this sector, future policies for reconstruction of agriculture will accord them an opportunity to access land, markets and other services. Could there be any gender specific constraints that can hinder women to transit to a commercial stage?

Log-linear models are used to determine the nature of the relationship between gender, and selected variables. The results of an ongoing study on women in agricultural development. The aim is to ultimately base the analysis on a larger sample from a broad spectrum of farmers. Section 2 presents framework that forms the basis for the focus of the paper. In the rest of the sections, log-linear models, data and the results are discussed.

2. Conceptual framework

Women have always been equated with subsistence production, since their involvement in agriculture has been perceived in relation to their role as house keepers and it has therefore not seemed necessary for them to be commercial oriented. Confining women to subsistence production places them in the non-paid or low income but labour demanding agricultural sector. Without access in the market in their own right, women are denied an opportunity to reap the benefits of their labour (Geisler, 1993). In that sense, they remain powerless dependent household members whose function is to facilitate men's access to markets by supplementing their products with their subsistence production and providing free labour.

Studies have shown that increases in income of low income wives contribute significantly to the family's cash income and therefore in providing food, clothing, education; other consumption needs of the family (Lele, 1986,and Kabeer, 1991). Using data from Ivory Cost, Haddinott and Haddad (1985) have shown that the expenditure pattern of the household turn to depend on who earns income in the family. Women turn to spend income in a socially desirable way, in that raising their cash income share result in the increase in the budget on food and turn to decrease alcohol and cigarettes share. In Brazil, Thomas (1990)[2] also found evidence indicating that the pattern of household expenditure is related to the income earner in the household. In both developing and developed countries men tend to keep a greater proportion of their income for their personal use (Kabeer, 1991). The assumption that household is a unit attempting to maximise a joint utility function does not seem to hold in this case. It does appear that household budget allocated to particular goods is determined by the intra-household distribution of income. In Bangladesh, Amin, Amhed and Chowdhury (1994) have found that participation of women in income generating projects led to increased level of contraceptive use and decreased desire to have additional children.

This means that, improving women's economic status has more multiplier effects in bringing about improved standard of living as judged by improved health and nutrition, greater control of fertility, and increased access to education by family members. It therefore means that policy interventions that do not remove barriers against women's equal participation in the market may be less successful, and could therefore result in efficiency losses.

The now defunct homelands system attempted to address the needs of black farmers. However, these efforts failed to increase the incomes in the rural areas and to generate commercial farmers (Vink, 1986 in Makhura, 1995). The objective of the current government is to redress the inequality in the access to resources and services by black

farmers in order to transform them into commercial entrepreneurs (Department of Agriculture, 1995). Facilitating commercial orientation among black farmers is important because subsistence production does not go a long way towards improving families welfare, especially for those families which are full time farmers. The desire or the need to sell arises in order to enable the households to buy goods they cannot produce (Makhura, 1994), thus ensuring food security. This is the reason why women should also be included in this process.

Agriculture in the Northern Province former homelands is still generally being regarded as below potential. However, of all the agricultural development programs undertaken since the institution of the Bantustans, Farmer Support Programme (FSP) in Lebowa has been hailed as a success (Kirsten *et al*, 1995) in improving food security among the small scale farmers.[3] It is important to note that agriculture in the Lebowa FSP areas is dominated by women. These women were already engaged in agriculture prior to the FSP, although it was unproductive as is mostly the case in other developing areas of South Africa (SA). If through the transfer of technology by training, financing and provision of technical services women have been able to improve subsistence level, could it not be possible therefore to facilitate the transition of women from subsistence production to commercial production, given that they have shown that they are receptive of innovations? Commercial farming will enable women to have greater control over incomes thus improving their economic status.

3. Data and variables

The data was obtained from survey of 120 farmers from 10 villages in Phokwane and Ndebele areas, and 103 questionnaires were usable. In order to identify factors that determined tendency to sell and constraints faced by women, several variables were constructed for analysis. Log linear models were employed in order to ascertain whether association exits between gender, sales of maize and other variables. In this section the Log linear model will be briefly explained. This will be followed by explanation of variables.

3.1 Developing Log-linear Models of Women in Agriculture

The chi-square analysis is generally used to test independence between two factors. The null hypothesis is rejected when there is association. However, the test does not give any information about the source of interaction or association between the factors. Also, it is not applicable when there are more than 2 x 2 contingency tables. The log-linear models do not have some of these limitations. The log-linear models are used for the advanced analysis of categorical data.

In a log-linear model, all variables which are used for classification are independent variables (factors), and the frequencies in a cross-tabulation cell is a dependent variable. Therefore, for a cross-tabulation table with i rows and j columns, the multiplicative model is used to express frequencies in each cell f_{ij} as a function of the controlling factors as follows:

$$f_{ij} = \eta\ \lambda_i^A\ \lambda_j^B \lambda_{ij}^{AB}.$$

This formulation represents the relationships in a two-way contingency table, which can be generalised to a multi-dimensional table. This model is simplified by transforming it into linear by taking the natural logarithms as follows:

$$\text{Ln}(f_{ij}) = \eta + \lambda_i^A + \lambda_j^B + \lambda_{ij}^{AB},$$

Where η is the mean effect, λ_i^A and λ_j^B represents the effects of factors A and B, and these are the main effects, and λ_{ij}^{AB} represents the interaction (first order) effects indicating the existence of association between factors A and B. The constraints imposed are that the sum of the effects over a row (i), column (j), and across (ij) are zero. As such, because of the linearity between main effects and between interaction effects there are 1 + (I-1) + (J-1) + (I-1)(J-1) = IJ unknown parameters (η and λ's). The model is referred to as saturated log-linear model.

The model is selected by testing the null hypothesis that the interaction effects are zero, since we apply the hierarchical modelling, the lower order effects and main effect are always included in a selected model (SPSS Manual, 1988).

3.2 Explanation of variables

Based on the preliminary statistics, several variables were constructed for the estimation of the models. The following are the variables and their categories:

i) Gender: this variable has three categories: (1) women operators (married women), (2) women farmers (household heads) and 3) male farmers.

ii) Area: has two categories. (1) small areas, and (2) large areas. The dividing line is the mean area, which is 2 ha.

iii) Credit: (1) did not use credit (no); (2) used credit (yes).

iv) Sale : (1) do not sell (no); and (2) sell (yes).

4. Survey results

4.1 Farm labour utilisation

The survey results (Table 1) show that women are not only dominant as managers in the FSP, but they are also as a source of labour in major field operations like hoeing, harvesting and threshing. On average, 96.5 days per ha of human labour was engaged in cropped area per hectare on the three major field operations. Table 1 indicates that women provided up to 70 percent of required labour. Furthermore, men made up to only 7 percent of hired labour, the rest being provided by women. This shows that men are usually reluctant to engage in low paying operations, it will always be women performing most tasks at low levels of remuneration.

Where production is primarily subsistence, family labour tends to dominate (close to 80 percent in this sample) because the output is usually not sufficient to hire labour. As a result, those families with higher family sizes will tend to dominate[4]. This is usually families of older women as the data indicates that the majority of the farmers are above 50 years old. Younger women will usually be constraint by labour requirements as most of their time is spent in raising children and in performing other equally important household activities.

Table 1: Average number of workers used and mandays spent on varous field operations per ha

Category	Hoeing		Harvesting		Threshing		Total	
Family	No[1]	Days[2]	No	Days 2.4	No	Days	No	Days
Female	2.4	15.3	12.7		2.8	20.0	7.6	48
	(.66)[3]	(.81)	(.66)	(1.1)	(.6)	(.9)		
Male	1.5	9.8	1.4	6.9	1.7	12.1	4.6	28.8
	(1.0)	(1.3)	(1.0)	(1.2)	(1.0)	(1.1)		
Hired								
Female	1.6	7.8	1.6	7.2	.5	3.3	3.7	18.4
	(.2)	(1.0)	(1.8)	(1.8)	(2.5)	(2.8)		
Male	.2	.97	.1	.2	.02	.08	.32	1.3
	(5.8)	(6.4)	(4.3)	(4.7)	(7.5)	(6.7)		
Total								
Female	4.0	23.1	4.0	19.8	3.3	23.3	11.3	66.4
Male	1.7	10.77	1.6	7.1	1.72	12.1	5.03	30.1
TOTAL	5.7	33.8	5.6	27.1	5.0	35.6	16.3	96.5

1. Number of workers,
2. number of days used in a field operations. Children's labour was converted to mandays by assuming that child labour is half adult's labour.
3. numbers in brackets represent coefficient of variation.

Table 2: Observed frequencies generated by the log-linear model

		MODEL 1 CREDIT		MODEL 2 AREA	
GENDER	SALE	No	Yes	Small	Large
Woperator[1]	No	24	15	30	9
	Yes	7	9	5	11
Wfarmer[2]	No	12	2	5	9
	Yes	5	7	4	8
Male	No	6	4	4	6
	Yes	5	7	6	6

1. Women Operator (married women)
2. Women Farmer (owners)

4.2 Log-Linear Model Results

Two models involving three-way interactions were fitted using the above variables. These are more parsimonious and also size of the sample was too small to get good information from higher order interactions. Table 2 presents the frequencies generated by the log-linear model.

In model 1, the fitted model involved gender (G), credit (C) and sale (S). The idea was to determine the type of farmers who are likely to sell, and whether credit does influence of farmers to sell or not.

Using the likelihood ratio chi-square statistics, the saturated model was not significant. This indicates that in this data, there is no strong interaction among the three factors. However, two way interactions were significant. According to the significance of the coefficients as presented in Table 3, the log linear model that best fits the data can be expressed as follows.

$$Ln(f_{ij}) = \lambda_i^G + \lambda_j^C + \lambda_k^S + \lambda_{ik}^{GS} + \lambda_{jk}^{CS}$$

This model shows that, of the two-way effects, gender by credit (GC) is not significant. The main effects coefficients show that only gender is significant, and it indicates that women operators (married women) are dominating the sample, whereas number of women and male farmers is significantly small. This is also reflected by the generated frequencies in table 2. The insignificance of credit and sale main effects show that there is no significant difference between the number of farmers in both categories of the variables.

The gender by sale effects coefficients indicate that women operators are less likely to sell regardless of whether they used credit or not. Whereas male and women farmers are more likely to sell regardless of whether they received credit. Interaction between credit and sale, indicates that holding gender constant, farmers who did not receive credit are less likely to sell compared to those who received credit. The reason could be that farmers who received credit may need to sell even if there is not enough surplus because they have to pay the loan, or it could be that they are able to use technology appropriately and thus generate surplus for sale. However, there is an indication that even those who are inclined to sell maybe constraint by credit.

In Model 2, the fitted model involved Gender (G) by Area (A) by Sale (S). The question was whether the size of area could constrain certain farmers from selling. The saturated model was significant reflecting that both size of land and

Table 3: Results of the log-linear models

Model 1				Model 2			
Factor			Coefficient	Factor			Coefficient
Main Effects				Main Effects			
Gender:	Woperator[1]	1	0.52*	Gender: Woperator		1	0.41*
	Wfarmer[2]	2	-0.25***		Wfarmer	2	-0.15
	Male	3	-0.27**		Male	3	-0.27**
Credit	No	1	0.13	Area	Small	1	-0.10
	Yes	2	-0.13		Large	2	0.10
Sale	No	1	0.08	Sale	No	1	0.12
	Yes	2	-0.08		Yes	2	-0.12
First Order Effects				First Order Effects			
Gender*Credit		1	-0.08	Gender*Area		1	0.21***
		2	0.20			2	-0.20
		3	-0.12			3	-0.01
Gender*Sale		1	0.33*	Gender*Sale		1	0.26**
		2	-0.16			2	-0.04
		3	-0.17			3	-0.22**
Credit*Sale		1	0.27**	Area*Sale		1	0.14
		2	-0.27**			2	-0.14
				Second Order Effects			
				Gen*Area*Sale		1	0.34**
						2	-0.11
						3	-0.23***

* = 1% ** = 5% and *** 10% level of significance

1. Women operators (married women)
2. Women farmers

gender affects tendency to sell. Based on the significance of the coefficients the model that fits the data can be expressed as follows:

$$Ln(f_{ij}) = \lambda_i^G + \lambda_j^A + \lambda_k^S + \lambda_{ik}^{GS} + \lambda_{ijk}^{GAS}$$

The results of the second order effects indicate that women operators, in small areas are less likely to sell compared to those in larger areas. The reason could be that married women are either not inclined towards selling or that they do not have any surplus to sell. It must be noted that some farmers in this programme prefer to keep maize in storage even if there was surplus, the indication is that some would rather not plant the following year if there was surplus. On the other hand, men are more likely to sell regardless of size of the area.

Although the interaction involving women farmers is less significant, the sign of the coefficient indicates that they are more likely to behave like male farmers. The two way interactions (gender by sale) also indicates that, regardless area, women operators are less likely to sell whereas farmers with full ownership status are more likely to sell. Furthermore, the frequency table (Table 2) indicates that greater proportion of farmers in large areas sell compared to those in small areas, especially women farmers and men. This could be an indication that, land is yet another constraint.

5. Conclusions

The results are based on a small sample taken from a fairly homogeneous group of farmers, in terms of the crop type and access to essential services. Some relationship that do not seem significant are expected to change with large sample size taken from a less homogeneous group. The results, however show that women are not a homogeneous group, as such they could be faced with a different set of problems. There is an indication that besides credit and land, ownership status of major assets like land do determine whether farmers are inclined towards selling or not. The results show that when women enjoy full responsibility regarding the decisions on the disposal of the produce they will turn to be more market oriented. Thus, with respect to married women, without improvement in the ownership status, they may not be very responsive to any other policy interventions which encourage commercialisation. Without commercialisation, credit may not be an effective instrument for sustained agricultural production. This is because it may not be easy for farmers to repay their loans and to access other products they do not produce, especially those who do not have other sources of income.

On the other hand, women who are household heads (and men) are more inclined towards selling, other factors like land (which maybe partly overcome by encouraging less

land extensive but high value farm enterprises) and credit could be major constraints. The constraint that could be imposed by education and technology has been overcome by the services of the FSP in this area. There is also an indication that, both family and hired labour used in the major field operations is mainly provided by women.

Notes:

1. Quoted by Haddinott & Haddad (1995).

2. Although we regard this to be a qualified success because the program replacd the intercropping system which should have been improved in order to add variety in the diets of the household. Maize without any other ocmplimentary products does not improve the nutrition status especially when most families do not have enough surplus to acquire other products. Hence the incidence of malnutrition still prevail in this areas despite increased maize production.

3. This seems to be the case with these farmers because the average size of the family in this survey was approximately 7.

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