Comparative advantage of livestock component in reduction of poverty – logistic regression approach*

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ABSTRACT

A logistic model was fitted for the sample respondents to explore the determinant factors of poverty and comparative advantage of livestock component in reduction of poverty was ascertained. The primary data were collected through personal interview from randomly selected 540 sample households from six poverty prone districts using pre-tested interview schedules. Among various variables presumed to be the determinants of poverty, the variables viz., Ariyalur district dummy, cattle holding, sheep holding, family size, family dependency ratio were found to be statistically significant and rest were non-significant. The number of cattle and sheep were found to reduce the probability of fell down below the poverty line. Thus, these components may be considered while framing any poverty alleviation programmes in rural India.

Key words: Poverty – Livestock– Determinants – Logistic regression

Indian economy is a clear example of dualism. India excels in food production on one side, however on the other hand nearly 363 million people live in extreme poverty in India and face deprivation in terms of nutrient intake and access to basic services. These facts revealed that despite the country's meteoric GDP growth rate, poverty in India is still pervasive, especially in rural areas. Hence, the study of poverty is an important issue in the field of development. No development can even be thought of if any household / person in any country lives below the poverty line (Chatterjee, 2009). In this context, the present study was undertaken to fit a logistic model to explore the determinant factors of poverty and comparative advantage of livestock component in reduction of poverty.

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Six sample districts of Tamil Nadu *viz.,*Thiruvannamalai, Villupuram, Dharmapuri, Pudukottai, Ariyalur and Ramanathapuram located in southern part of India were selected based on the composite poverty indices. From each selected district, 90 respondents comprising different occupational groups were selected through multi-stage random sampling leading to the sample size of 540 sample households. The data pertaining to the objectives of the study were collected through personal interview using structured pre-tested interview schedule. The period of data collection was from August 2013 to October 2014.

A logistic model was fitted for the sample respondents to explore the determinant factors of poverty. In explaining a dichotomous dependent variable (Y_i), where '1' represents person falling below poverty line, and '0' represents above poverty line. The relationship between dependent and independent variables is non-linear, a logistic function was used to estimate the association between binary dependent variable Y_i and the independent variables (X_{ij}s). The following mathematical form of the model was used in the present study.

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_{j=1}^{k} \beta_j X_{ij} + \mu$$

Where, p_i is the probabilityofith household to fall below poverty line and X_{ij} is the jth explanatory variable of ith household. The dependent variable $\ln\left(\frac{p_i}{1-p_i}\right)$ is the log-odds ratio in favour of sample households to fall below poverty line.

The results of the logit model to assess the determinant factors of poverty are given in Table 1. On perusal of table, it could be noted that the model Chi square was 411.018, which implied that the model was statistically significant. Among 25 variables presumed to be the determinants of poverty, the variables *viz.,*Ariyalur district dummy, cattle holding, sheep holding, family size, family dependency ratio were found to be statistically significant and rest were non-significant (P>0.05). Among the significant variables, the variables cattle holding and sheep holding alone were the negative determinant factors of poverty, which indicated the negative relationship between cattle and sheep holding with the existence of poverty.

The variables namely Ariyalur district dummy, family size and family dependency ratio were found to be positive determinant factors of poverty similar to the findings of Hashmi *et al.* (2008). As the family size especially number of dependents increases, the total family income has to be shared for more number of family members which lead to decrease in per capita income. Thus the individual household might have more chance to fall below the poverty line, if the family size and number of dependents increases. In contrast, as the cattle and sheep holding provides regular and more income for the livestock farmers, these variables had negative relationship on the determinants of poverty. The results are in line with the findings of Ambika (2003).

The reliability of the usage of the logit model for the correct prediction of below poverty line and above poverty line was tested by comparing the observed and predicted values. The percentage of correct prediction by the logit model was 87.40 per cent. The model was successful in predicting the above poverty line (88.10 per cent) correctly than the below poverty line (86.60 per cent).

Thus, it could be concluded that special attention must be given to Ariyalur district so as to uplift the people from clutches of poverty. As the number of cattle and sheep were found to reduce the probability of fell down below the poverty line, these components might be considered while framing any poverty alleviation programmes in rural India.

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Table 1
Estimates of binary logistic model to explore determinants of poverty

X_i	Explanatory variables	Co-efficients	Standard error	t value	P value
X_1	Villupuram district	-0.185	0.484	0.146	0.703
X_2	Dharmapuri district	0.096	0.515	0.035	0.851
X_3	Pudukottai district	1.017	0.565	3.241	0.072
X_4	**Ariyalur district**	**1.207***	**0.571**	**4.462**	**0.035**
X_5	Ramanathapuram district	0.240	0.681	0.124	0.725
X_6	Cropping occupation	-0.140	0.505	0.077	0.781
X_7	Livestock farming occupation	-0.107	0.444	0.058	0.809
X_8	Fishing occupation	-0.164	1.053	0.024	0.877
X_9	AgriculturalLabourer occupation	19.873	5939.621	0.000	0.997
X_{10}	Non-farm occupation	0.193	0.804	0.058	0.810
X_{11}	**Number of cattle**	**-1.453****	**0.343**	**17.920**	**0.000**
X_{12}	Number of buffalo	0.220	0.682	0.104	0.748
X_{13}	**Number of sheep**	**-0.302***	**0.129**	**5.494**	**0.019**
X_{14}	Number of goat	-0.243	0.359	0.459	0.498
X_{15}	Age of the head of household	0.000	0.015	0.002	0.968
X_{16}	Gender of the head of household	0.249	0.404	0.379	0.538
X_{17}	Illiterate dummy	0.540	0.340	2.516	0.113
X_{18}	**Family size**	**0.237***	**0.100**	**5.640**	**0.018**
X_{19}	**Family dependency ratio**	**14.249****	**1.433**	**98.903**	**0.000**
X_{20}	Hindu Religion dummy	0.759	0.781	0.944	0.331
X_{21}	Christian Religion dummy	-0.072	1.000	0.005	0.943
X_{22}	Scheduled Castes (SC) dummy	0.523	0.420	1.551	0.213
X_{23}	Scheduled Tribes (ST) dummy	0.667	0.458	2.122	0.145
X_{24}	Landholdings	-0.032	0.048	0.435	0.510
X_{25}	Value of assets owned	0.000	0.000	2.021	0.155

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	Constant	**-9.895**	**1.530**	**41.843**	**0.000**
	Model Chi square	**411.018****			
	-2 Log likelihood	**333.658**			
	Nagelkerke R square	**0.712**			
	N	**540**			

*** Significant at one per cent level and * Significant at five per cent level*

Classification Table

Observed		Predicted		
		Below poverty line		Percentage correct
		Yes	No	
Below poverty line	Yes	214	33	86.6
	No	35	258	88.1
Overall percentage				**87.4**