POVERTY AND ITS DETERMINANTS IN TRIBAL AND NON-TRIBAL AREA

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ABSTRACT

The present investigation was undertaken to study the extent of poverty and its determinants in tribal and non-tribal areas of Central Gujarat. The data for the study were drawn from primary sources. The primary data were collected from a total of 360 respondents by applying multi-stage sampling. A fixed poverty line for rural Gujarat (Rs 1102.83) was used to examine poverty in the study area. To study the determinants of poverty, the logit regression model was used. The poverty incidence was higher in the tribal area as compared to the non-tribal region. The maximum likelihood estimation results of the logistic regression model showed that the coefficient of family size, farm size, total income, education of the decision-maker, and distance to the main road was significant and major determinants of poverty in the tribal area, whereas, in non-tribal area, they were family size, farm size, total income, distance to the regulated market, distance to main road and credit.

Keywords : *poverty extent, determinants of poverty, logit model*

INTRODUCTION

Poverty has been regarded largely as a rural issue at World level. The poverty rates are higher in the rural areas in almost all developing countries, and in aggregate terms, most people still live in rural areas (World Bank, 2008). Despite high growth rates and the third largest world economy in terms of purchasing power parity, ground-level reality makes clear that India still has a long way to go in eradicating poverty and ensuring acceptable minimum standards of living for the people (Mehta and Bhinde, 2010). According to the Planning Commission of India, 2014, the proportion of the population below the poverty line in India is 29.5 per cent.

According to the Elvin committee of 1960, the main problem of Scheduled Tribes (ST) is poverty (Parmar, 2014). More than four in five people in Scheduled Tribes (ST) are multi-dimensionally poor and approximately two-thirds of people in Other Backward Castes (OBC) and Scheduled Castes (SC) have low incomes (Poshiya *et al.,* 2020). This might be due to social and economic discrimination and consequent inequalities between those of higher and lower castes (Patel *et al.,* 2020). The drop-out and failure rates in education are higher for SC and ST students than those in other general categories, keeping poverty rates high among the lower castes (Sridhar, 2014). The Government plays a very important role for tribal farmers who are illiterate, farms are very small and having erratic rainfall. The government spends huge amounts on such poverty alleviation programmes for providing employment, rural development, livelihood survival, *etc.* It is assumed that such intervention helps the tribal farmers to earn additional income and it improves the consumption level also. Hence, it reduces the poverty among the tribal people. The factors for poverty in tribal people of Gujarat are illiteracy, a partnership of children in professional activities, backwardness in farming in terms of irrigation and technology facilities, alcoholism, the attitude of fatalism, and high birth rate (Parmar, 2014). Analysis of such determinants of poverty among the tribal is essential for preparing strategies towards efficient intervention.

OBJECTIVES

(1) To examine the poverty incidence in the tribal and non-tribal area

(2) To determine the principal factors contributing to poverty

METHODOLOGY

A multistage sampling technique applies to the study. In the first stage, out of nine districts of central Gujarat, two districts, Dahod and Anand, were selected based on having the highest tribal people *i.e.* 43.83 %, and non-tribal people *i.e.* 0.69 %, respectively.

Three talukas from each selected district were selected considering tribal and non-tribal populations. Hence, from the Dahod district, three talukas, *i.e.,* Jhalod, Dahod, and Fatepura, based on the highest Scheduled Tribal (ST) population, 26.98 %, 23.51 %, and 14.08 %, respectively were selected. And from Anand district, three talukas, *i.e.,* Anklav, Tarapur, and Sojitra, were selected based on having the lowest ST population, 1.18 %, 1.79, % and 2.57 %, respectively.

A total of three villages from each selected taluka were selected randomly. A total of nine villages were selected, from the tribal district (Dahod) and nine villages, from the non-tribal district (Anand). Thus, a total of eighteen villages chose for the study.

A sample of twenty respondents was selected from each selected village. Thus, 180 respondents from nine selected villages of three selected talukas of the tribal district (Dahod) were selected. Then, from nine selected villages of the three talukas of the non-tribal district (Anand), selected 180 respondents. Therefore, a total of 360 respondents were finally selected to collect primary data for the year 2018-19.

Extent of Poverty

In this study, minimum consumption expenditure per person was used as a standard of measurement to examine poverty. Based on individual household minimum consumption expenditure data, classifying a given household, whether he is poor or non-poor than the standard poverty line. The poverty line is a Per Capita Consumption expenditure per person or a cut of a standard living level below which an individual is considered poor (Planning Commission of India, 2014). As per the Planning Commission of India (2014), monthly per capita consumption expenditure of Rs. 1102.83 in rural areas and Rs. 1507.06 in urban areas treated as the poverty line at the Gujarat state level. It means any individual failing to meet this consumption expenditure level *i.e.* Rs. 1102.83 in rural areas or Rs. 1507.06 in urban areas for a person can treat as a poor household. Based on the above poverty line and data from households, this study has used the headcount index which shows the percentage of the poor in central Gujarat.

Headcount index- Share of the population whose monthly per capita consumption expenditure is below the poverty line, that is, the population's share that cannot afford to buy a basic basket of goods. However, this index does not capture differences among the poor.

Logistic regression analysis to know the determinants of poverty

The main purpose of a qualitative choice model like logit is to determine the probability that an individual with a given set of attributes was fallen in one category rather than the other, *i.e.* poor /non-poor. Consider that a household is poor (Y=l) with the probability of Pi, if monthly per capita consumption expenditure is less than Rs 1102.83 in rural areas and Rs 1507.06 in urban areas or non-poor (Y=0) with the probability of 1 - Pj; if the per capita consumption expenditure shortfall is greater than Rs 1102.83 in rural areas and Rs 1507.06 in urban areas per adult equivalent per month in central Gujarat. To characterize the poor in central Gujarat, a probability falling below the poverty line is linked to households and may at the same time become poverty generating factors. These models estimate the probabilities of being poor using Maximum Likelihood Estimation (MLE) while accounting for the discrete nature of the dependent variable (Greene, 2002). The dichotomous dependent variable (poor / non-poor) is regressed on a series of household characteristics, which potentially affect the level of household poverty that is as explanatory variables can be best explained by applying the logit model.

Review of literature, in-depth discussion with the major advisor, degree of attention given by the government policy to eradicate poverty, unpublished local government, and NGOs reports was used as a source to identify the potential variables in the study area. Therefore, the following fourteen variables were used to identify the major determinants of household poverty in the study area.

X_1= Family size (No.)

X_2= Farm size (ha)

X_3= Total income (Rs/year)

X_4= Livestock owned in TLU (Tropical Livestock Unit)

X_5= Education of decision maker (Number of schooling year)

X_6=Age of decision maker (in years)

X_7= Number of adults in household (No.)

X_8= Dependency ratio

X_9= Educational level of spouse (Number of schooling year)

X_{10}=Farming experience of decision maker (years)

X_{11}=Irrigated land size (ha)

X_{12}=Distance to regulated market (km)

X_{13}=Distance from household to approach road (km)

X_{14}=Amount of credit (Rs)

Testing multicollinearity

Before estimating the logistic model, it is necessary to check if multicollinearity exists among the continuous variables. Multicollinearity in logistic regression is a result of strong correlations between independent variables. Madala (1989) described that the high inter-correlation among the variables leads to problems in conclusion. This may be the problem depend on the magnitude of the error variance and the variance of predictor variables. Multicollinearity may be induced due to poor sampling method, miss measurement, and overfitting of a model as well as improper use of dummy variables. Several statistically accepted thumb rules have been proposed for detecting multicollinearity among predictor variables. For this study, the Simple correlation test and Variance Inflation Factor (VIF) technique was employed to detect the problem of multicollinearity for continuous explanatory variables (Gujarati, 2003). Accordingly, the simple correlation was tested among different fourteen selected variables. Based on the results, correlated variables were omitted logically from the model. In the end, for more accuracy, each remained continuous variable is regressed on all the other continuous explanatory variables, and the coefficient of determination (R2) being constructed in each case. The large value of R2 is at least one of the test regression found shows a linear relationship exists among the explanatory variables. The following is the measure of multicollinearity associated with VIF defined as:

VIF (Xj) = (1- Rj2) -1

A rise in the value of R2 is an increase in the degree of multicollinearity and leads to an increase in the variances and standard errors of the OLS estimates. A VIF value greater than 10 (this will happen if Rj2 exceeds 0.90) is used as a signal for the existence of severe multicollinearity (Gujarati, 2003).

Interpretation of logit model based on the marginal effect

In the logistic regression analysis, we can interpret based on marginal effect and odd ratio as well. But, for getting a clear idea about results, marginal effect results were preferred. Marginal effects for explanatory continuous variables measure the instantaneous rate of change. It means they provide a good approximation to the amount of change in Y that will be produced by a one-unit change in the explanatory variable (Xi). The marginal effect in the binary regression model measures the change in probability of occurrence for a unit change in Xi at their mean value. The positive sign of marginal effect indicates that the probability of households to be poor will be increased at the mean value of continuous variables while the negative sign indicates that the probability of households to be poor will decline at their respective mean.

RESULTS AND DISCUSSION

Extent of poverty

The poverty situation in the tribal and non-tribal areas of Central Gujarat is depicted in Table 1. The headcount index (the poverty incidence) was higher in the case of tribal area (40.55%) than the non-tribal area (24.44%). This shows that poverty was higher in tribal areas than the non-tribal area.

Table 1: Poverty extent in the tribal and non-tribal area of Central Gujarat

Group of respondents	Headcount Index
Tribal area	0.40 (180)
Non-tribal area	0.24 (180)

(Figures in the parentheses are the actual number of respondents)

Determinants of poverty in the tribal and non-tribal areas of Central Gujarat

Logistic regression analysis was used to determine the factors causing poverty. In logistic regression analysis, the dependent variable is binary, usually taking on a value of 1 if the family is poor and 0 otherwise. Independent variables are variables that show a possible correlation between poverty and socio-economic characteristics.

Before the estimation of logistic regression analysis, it was necessary to check the problem of multicollinearity among the continuous explanatory variables. Accordingly, the simple correlation was tested among different fourteen selected variables for tribal and non-tribal areas. Based on the results, correlated variables were omitted from the model logically. In the analysis of the correlation between fourteen explanatory variables, two variables *viz.*, X7: Number of adult members in the family and X11: Irrigated landholdings were found highly correlated with other variables in both tribal and non-tribal areas. Hence, these two variables were omitted from the model. In the end, for more accuracy, the variance inflation factor (VIF) was also used to test the degree of multicollinearity among the remaining variables. To overcome the problem of multicollinearity, it is essential to omit the variable with a VIF value of 10 and more. The value of VIF for the remaining twelve variables was found to be less than 10. So, logistic regression was fitted with all twelve explanatory variables.

Determinants of poverty in the tribal area of Central Gujarat

The results of the logistic regression analysis and predicted classification of fitted logistic regression are depicted in Tables 2 and 3.

Table 2: Logistic model estimates of explanatory variables for tribal area (n=180)

Variables	Coefficient	Standard error	Z	P>|Z|	Marginal effect	Odd ratio
FAMS (X_1)	0.7601***	0.3083	2.46	0.014	0.1108	2.318
FARMS(X_2)	-1.6600**	0.7681	-2.16	0.031	-0.2420	0.190
INCOME(X_3)	-0.0001***	0.0000	-3.20	0.001	-0.0000	1.000
TLU(X_4)	0.1592	0.3346	0.48	0.634	0.0232	1.172
SELFEDU(X_5)	-0.3239***	0.1207	-2.68	0.007	-0.0472	0.723
AGE(X_6)	-0.0036	0.0472	-0.08	0.939	-0.0005	0.996
DR(X_8)	-0.2349	0.2820	-0.83	0.405	-0.03425	0.791
SPOUSEEDU(X_9)	-0954	0.1171	-0.82	0.415	-0.0139	0.909
FARMEXP(X_{10})	-0.0013	0.0354	-0.04	0.971	-0.0001	0.999
MARKDIS(X_{12})	0.0996	0.1460	0.68	0.495	0.0145	1.105
MAINDIS(X_{13})	0.9589***	0.2010	4.77	0.000	0.1398	2.609
CREDIT(X_{14})	-0.0000	0.0001	-0.87	0.382	-6.90e-06	1.000
Constant	-0.7145	2.4894	-0.29	0.774	-	0.489
Number of observations = 180						
LR chi^2 (12) = 159.33***						
Pseudo R^2 = 0.6555						

***, **, * Significant at 1 %, 5 % and 10 % level, respectively

Note: Dependent variable: 1 for poor and 0 for non-poor

Table 3: Predicted classification of fitted logistic regression for tribal area (n=180)

Observed		Predicted		Total sample size	Percentage correct
		Dependent			
		0	**1**		
Dependent	0	**97**	10	107	90.65
	1	7	**66**	73	90.41
Overall percentage (Count R^2)					90.56

Note: The cut value is 0.5

Under the null hypothesis, all the coefficients are simultaneously zero with the likelihood ratio (LR) statistic, which is equivalent to the F test in OLS estimation. LR statistics follow chi-square distribution with degree of freedom (df) to the total number of explanatory variables which are twelve in our case. The value of LR statistics is 159.33 which is significant at 1 per cent probability level indicating that the null hypothesis assumed that the coefficient is equal to zero is rejected.

Another measure of goodness for fit is Count R2 in logistic regression. It is the ratio of the number of correctly predicted observations using the above model divided by a total number of observations. It measures how well the model predicts the correct value of a dependent variable using the known values. Count R2 is based on the principle that if the predicted probability for an observation is greater than 0.5 then observation is classified as 1 but if less than 0.5 then it is classified that as 0. After that count number is of correct prediction concerning the total observations. In other words, ith observation is considered as poor if the computed probability is greater than or equal to 0.5 and as a non-poor otherwise. The results show the logistic regression model correctly predicted 163 out of 180 (90.56 %) of the sampled household. The correctly predicted poor and correctly predicted non-poor of the logistic model were 66 (90.41%) and 97 (90.65%) respectively. Therefore, the model predicted both the group (poor and non-poor) accurately.

The maximum likelihood estimation result of the logistic regression model showed that the coefficient of family size (X1), farm size (X2), total income (X3), education of the decision-maker (X5), and distance from households to the main road (X13) were significantly different from zero. These variables were significant and major determinants of poverty in the tribal area. The number of people in the household was found to be significant to determine household poverty. Family size (X1) revealed positive relation with household poverty which indicates the probability of being poor increases with an increase in the family size. As family size increase by one unit, ceteris paribus, the probability that a household falls into poverty increase by 11.08 per cent. Similar findings were also observed by Mehta and Bhide (2010) that increase the household size also increases the probability of prevalence of poverty. Mada and Sohan (2015) also found that as family size increases by one adult equivalent, ceteris paribus, the probability that a household falls into poverty increases by 10.1 per cent. Singh et al. (2013) found that big family size and increased dependency on agriculture would induce poverty. The coefficient of farm size (X2) was significant at 5 per cent probability level. As average farm size increases by one hectare, ceteris paribus, the probability that households fall into poverty decreased by 24.20 per cent. Mada and Sohan (2015) showed that a farm size increases by one hectare, the probability that a household falls into poverty decrease by 5.2 per cent in the Nagaur district of Rajasthan.

Total income (X3) was negative and highly significant at 1 per cent probability level. The marginal effect indicates that other things being constant, the probability of household to be poor decrease by insignificant amount as household earn one rupee. But the probability that household fall into poverty decrease by 0.1 per cent as family income increase by one lakh rupees, ceteris paribus. The higher annual income increases the probability of being non-poor. Similar findings were observed by Radhakrishna et al. (2007) that the probability of a household falling into poverty at both rural and urban decreases as income (household expenditure) increases. Education of decision-makers (X5) was negatively related to poverty. The coefficient of decision-maker education was statistically significant at 1 per cent level of significance. As decision-maker education increases by one unit, ceteris paribus, the probability that a household falls into poverty decrease by 4.72 per cent. This result is coinciding with Hashmi et al. (2008) that the basic education of the household head had a negative relationship with poverty. This showed that education was an important factor to get rid of poverty for a household. Mada and Sohan (2015) also found that decision-maker education measured by years of schooling increased by one unit, the probability that a household fell into poverty will decrease by 4.8 per cent. Main road distance (X13) represents the household access to the approach road and it is significant at 1 per cent probability level. As main road distance increase by one kilometer, ceteris paribus, the probability that a household falls into poverty increase by 13.98 per cent. The main road distance is the important factor for poverty in the tribal area as scattered households' pattern was observed during survey work. Gachassin et al. (2010) found that access to roads is only one factor contributing to poverty reduction. Fan et al. (1998) in their study also found that government spending on productivity-enhancing investments such as agricultural R&D, irrigation, rural infrastructure (including roads, electricity), and rural development targeted directly on the rural poor. These all investments have contributed to reductions in rural poverty.

Determinants of poverty in the non-tribal area of Central Gujarat

An attempt has been made to analyze the contributing factors to poverty in the non-tribal area. Accordingly, the results of the logistic regression analysis and predicted classification of fitted logistic regression are depicted in Tables 4 and 5.

Table 4 : Logistic model estimates of explanatory variables for non-tribal area (n=180)

Variables	Coefficient	Standard error	Z	P>∣Z∣	Marginal effect	Odd ratio
FAMS (X_1)	1.1327***	0.2701	4.19	0.000	0.0433	3.104
FARMS(X_2)	-2.2420***	0.6219	-3.61	0.000	-0.0857	0.1062
INCOME(X_3)	-0.0000***	0.0000	-3.31	0.001	-1.31e-06	0.9999
TLU(X_4)	0.2027	0.2345	0.86	0.387	0.0077	1.2247
SELFEDU(X_5)	-0.0286	0.0919	-0.31	0.756	-0.0011	0.9718
AGE(X_6)	-0.0147	0.2793	-0.52	0.600	-0.0006	0.9854
DR(X_8)	-0.2938	0.3156	-0.93	0.352	-0.0112	0.7454

Variables	Coefficient	Standard error	Z	P>∣Z∣	Marginal effect	Odd ratio
SPOUSEEDU(X_9)	-0.0802	0.0857	-0.94	0.350	-0.0031	0.9229
FARMEXP(X_{10})	-0.0191	0.0211	-0.90	0.367	-0.0007	0.9811
MARKDIS(X_{12})	0.1491**	0.0693	2.15	0.031	0.0057	1.1608
MAINDIS(X_{13})	0.2909**	0.1148	2.53	0.011	0.0111	1.3376
CREDIT(X_{14})	-0.0000**	8.73e-06	-1.88	0.060	-6.27e-27	0.9999
Constant	-2.4444	1.6400	-1.49	0.136	-	-
Number of observation = 180						
LR chi2 (12) = 96.23***						
Pseudo R^2 = 0.4806						

***, **, * Significant at 1 %, 5 % and 10 % level, respectively

Note: Dependent variable: 1 for poor and 0 for non-poor

Table 5: Predicted classification of fitted logit regression for non-tribal area (n=180)

Observed		Predicted Dependent 0	Predicted Dependent 1	Total sample size	Percentage correct
Dependent	0	**131**	5	136	96.32
	1	15	**29**	44	65.91
Overall percentage (Count R^2)					88.89

Note: The cut value is 0.5

The value of LR statistics is 96.23 which is significant at 1 per cent probability level indicating that the null hypothesis assumed that the coefficient is equal to zero is rejected.

The results show the logistic regression model correctly predicted 160 out of 180 (88.89 %) of the sampled household. The correctly predicted poor and correctly predicted non-poor of logit model is 29 (65.91%) and 131 (96.32%) respectively. Therefore, the model predicted both the group (poor and non-poor) accurately. The maximum likelihood estimation result of the logistic regression model showed that the coefficient of family size (X1), farm size (X2), total income (X3), distance to regulated market (X12), distance to the main road (X13), and credit (X14) were significantly different from zero. These variables were significant and major determinants of poverty in the non-tribal area. Household size represents the total number of family members who live and consume together. As the family size (X1) increases by one unit, *ceteris paribus*, the probability that a household falls into poverty increase by 4.33 per cent. It shows that family size is a higher contributor to poverty in the tribal area compared to the non-tribal area. This might be due to a lack of literacy; family planning and moral restrain in the tribal area. Similar findings were also reported by Singh *et al.* (2013) and found that big family size and increased dependency on agriculture would induce poverty and it is therefore imperative that family planning policies and alternative non-farm employment programme should receive due priority in any poverty alleviation programme in the state. Dutta (2013) also found that more children will reduce the per-capita availability of income of the household and it will divert the labour from productive economic activity to unproductive ones and therefore lower-income and lower asset generation. The farm size (X2) is negatively associated and significant at 1 per cent probability level. As average farm size increases by one hectare, *ceteris paribus*, the probability that households fall into poverty decreased by 8.57 per cent. This means large cultivated land produces more for household consumption and which generates more income. The result is consistent with the finding of Kumar *et al.* (2011) that agricultural productivity, an indicator of real agricultural growth, has played an important role in poverty reduction in rural areas as indicated by its higher elasticity for poverty reduction. With 1 per cent growth in per capita agricultural output, poverty would be reduced by 0.97 per cent. Similar findings were also observed by Mavi and Kaur (2014) that there was an inverse relationship between the population below the poverty line and farm size. Hashmi *et al.* (2008) also found that the household assets such as land ownership, the value of livestock reduced the chance of being poor, while the household operating 0.5 acres and more are also less poor. Total income (X3) was negative and highly significantly associated with household poverty. But, as income increase by one rupee, *ceteris paribus*, the probability of a household falling into poverty is almost zero. However, if income increases by one lakh rupees, *ceteris paribus*, the probability of households falling into poverty decrease by 0.01 per cent. Similar results were observed by Mada and Kumar (2016) that the probability a household falls into poverty decreases by 0.03 per cent, as family income increases by one lakh rupees. A positive association was observed between access to the nearest regulated market and poverty. As regulated market distance (X12) increases by one kilometer, *ceteris paribus,* the probability that a household falls into poverty increase by 0.05 per cent. It means that a well-connected road to the regulated market improves the farmer's marketing by reducing the cost of production and transportation cost. As the main road distance (X13) increases by one kilometer, *ceteris paribus*, the probability that a household falls into poverty increase by 1.11 per cent. Fan *et al.* (1998) in their study also found that government spending on productivity-enhancing investments such as agricultural R&D, irrigation, rural infrastructure (including roads, electricity), and rural development targeted directly on the rural poor. These all investments have contributed to reductions in rural poverty.

High access to credit (X14) facilities and other financial services build the capacity of households in the production process with the adoption of improved technology. With an increase in credit by one rupee, *ceteris paribus*, the probability that a household falls into poverty is almost negligible in non-tribal areas.

CONCLUSION

The study revealed that poverty was higher in tribal areas than the non-tribal area. The results of maximum likelihood estimation of the logistic regression model showed the coefficient of family size (X1), farm size (X2), total income (X3), education of the decision-maker (X5), and distance to the main road (X13) were significantly different from zero. These variables were significant and major determinants of poverty in the tribal area. The major determinants of poverty in the non-tribal area were family size (X1), farm size (X2), total income (X3), distance to the regulated market (X12), distance to the main road (X13), and credit (X14).

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