Dimensions of Rural Poverty in Bihar: A Village Level Study

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ICAR Research Complex for Eastern Region, Patna, NCAP, New Delhi, S.G.I.D.T., Patna

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Dimensions of Rural Poverty in Bihar: A Village Level Study

K.M.Singh[1], R.K.P.Singh[2], Abhay Kumar[3], M.S.Meena[4], A. K Jha[5] and Anjani Kumar[6]

Bihar is the second largest state in India with respect of population and eleventh largest in area. It supports 8.8 per cent of country's population with only 2.8 per cent of land mass. The state experienced unprecedented socio-economic changes during last decade. Among major states of the country, Bihar recorded the highest growth in population (25%) and population density (1102 /sq.km.) during the last decade. It is the least literate state (64%) in the country but girl's enrolment in school increased by more than two fold during last four years. Bihar received deficient rainfall in recent last three years (2009, 2010 and 2012) but there has not been much decline in agricultural production, indicating resilience in farming sector. Agriculture is an important sector since it generates about 19 per cent of State GDP but provides employment to 70 per cent of rural working force. About 69 per cent of geographical area is under cultivation but one–third area is problematic with respect to various agro-ecological reasons which includes Water logged area (0.40 million ha*.), Diara* area (0.93 million ha.), Alkaline soil (0.32 million ha), and *Tal* area (0.10 million ha.). Agricultural production showed increasing trend during last five years but agricultural productivity is still lower than corresponding national average. During 1983-94, there was almost stagnation in agriculture sector in Bihar.Net State Agriculture Domestic Product stagnated at Rs 32.5 billion during 1983-94(at 1980-81 prices) but it increased from Rs 199 billion in2000-01 to Rs 213 billion in2006-07 (at 11999-00 prices) and per capita income increased by only Rs 236; from Rs. 6535 to Rs. 6771during the period 2000-01 -2004-05 however per capita income increased by more than two fold from 7914 in 2004-05 t0 632 in 2009-10 but poverty declined by 7.0 per cent during last two decades. Performance of agriculture was also much poor in ninth five year plan (-1.4%) and tenth five year plan (0.96%) but improved in the Eleventh Five year Plan by recording annual growth of 2.6 per cent (Table 1)

[1] Principal Scientist (Ag. Econ.) and Head, Division of Socio-Economics and Extension, ICAR-RCER, Patna-14

[2] Consultant, VDSA Project, NCAP, New Delhi-12

[3] Senior Scientist (Agricultural Statistics), Division of Socio-Economics and Extension, ICAR-RCER, Patna-14

[4] Senior Scientist (Agricultural Extension), Division of Socio-Economics and Extension, ICAR-RCER, Patna-14

[5] Assistant Professor, Dairy Economics, SGIDT, Patna-14

[6] Principal Scientist (Ag. Econ.), NCAP, New Delhi – On deputation to ICRISAT, Hyderabad

Table 1: Growth in SGDP and SAgGDP in Bihar during 9th, 10th and 11th five year plans

Particulars	9th Five Year Plan (1997-2002)	10th Five Year Plan (2002-2007)	11th Five Year Plan (2oo7-2012)
SGDP	2.9	4.0	12.08
SAgGDP	(-) 1.14	.96	2.6

Despite the poor performance of agriculture during eighth, ninth and first three Years of Tenth five year plans, incidence of poverty declined sharply by more than 6 per cent during 1993-2005 in Bihar. But pace of decline in poverty has been slowed down to 0.4 per cent during 2004-5- 2009-10, because an increase of transit poverty due to one flood year (2008) and two drought years (2009 &2010) during the period.

Bihar is the second poorest state after Odisha in India. The overall incidence of rural poverty was 62.3 per cent, much above the all India level of 37.3 per cent. Incidence of rural poverty in Bihar declined from 62.3 per cent in 1993-94 to 55.7 per cent in 2004-05 and further declined to 55.3 per cent in 2009-10(Table 2) as against national level poverty levels of 37.3 per cent, 28.3 per cent and 33.8 per cent, respectively. The rural poverty gap in Bihar viz-a-viz all India level, has increased from 25 per cent in 1993 to 27.3 per cent in 2004-05 but declined to 21.5 per cent in 2009-10. Incidence of poverty has continuously declined in Bihar during last 20 years but number of rural poor persons increased from 31 million in 1993-94 to 45 million in 2004-05 to 51 million in 2009-10.

Table 2: Population Below Poverty Line In Rural Bihar (%)

Year	Incidence Or Poverty
1993-94	62.3
2004-05	55.7
2009-10	55.3
Decline In Rural Poverty	
1993-94 TO 2004-05	6.6
2004-05 TO 2009-10	0.4
1993-94 TO 2009-10	7.0
Annual Rate Of Decline In Rural Poverty (% Per Annum)	
1993-94 TO 2004-05	0.6
2004-05 TO 2009-10	0.1
1993-94 TO 2009-10	0.4

A comparative analysis of rural poverty among farm and agricultural labour households revealed that poverty in agricultural labour households has been much higher than incidence of poverty in farm households during last two decades (Table 3). The decline in poverty was also higher in farm households (30.4%) than corresponding decline in case of agricultural labour households(27.6%) during 1993-94 to 2009-10.It was mainly due to much increase in agricultural productivity of food grains(1505 to 1778 kg/ha) and increase in prices of principal crops (paddy price increased from Rs 320 to Rs 965/qt) whereas wages of agricultural labours could not increase in same proportion during the period(Rs 41 to 66/per/day). However decline in poverty among agricultural labour was much higher (10.9%) than poverty decline among farm households (1.2%) during 2004-05 to 2009-10, mainly due to adverse weather that is; two drought years and one flood year in Bihar during the period but the launching of MNREGA and large scale employment opportunities in construction work started by Government during the period helped increasing agricultural wages(from Rs 66 in 2004-5 to 104/per/day in 2009-10) hence the comparatively high decline in poverty among agricultural labours in the state.

Table 3: Trends In Incidence Of Poverty Among Farming And Agricultural Labour Household (%)

Year	Farming Household	Agricultural Labour
1993-94	54.7	84.2
2004-05	25.5	67.5
2009-10	24.3	56.6
Decline In Rural Poverty		
1993-94 TO 2004-05	29.2	16.7
2004-05 TO 2009-10	1.2	10.9
1993-94 TO 2009-10	30.4	27.6
Annual Rate Of Decline In Rural Poverty (% Per Annum)		
1993-94 TO 2004-05	2.7	1.5
2004-05 TO 2009-10	0.2	2.2
1993-94 TO 2009-10	1.9	1.7

There is a dearth of studies on poverty in Bihar context based on primary data.

Hence, the present study is undertaken to examine the nature, extent and severity of rural poverty across villages and different categories of households. An attempt is also made to identify the determinants of poverty in villages under study.

Data Analysis is based on data collected under the project entitled "Tracking change in rural poverty in household and village economies in Eastern India. Data

were collected from sample households through panel interview method in four villages namely; Arap, Baghakole, Inai and Susari. First two villages are located in comparatively developed district (Patna) with respect to ecological situation, agricultural development and infrastructure facility whereas last two villages are located in comparatively less developed district (Darbhanga). A sample of 40 households, 10 from each category of households i.e Labour, Small, Medium and Large were selected randomly in each of four villages, making sample size of 160 households in Bihar. Data collection was started from July, 2010. Household level data relate to 2010-11.

In the present investigation, Poor households are those whose per capita/per day income is less than USD 1.25 but the income was worked out by considering PPP between USD and Indian Currency(Rupee) i.e; 1USD=Rs 14.67. Income data obtained in Transaction schedule, Employment Schedule, Livestock Schedule and cultivation Schedule are computed to have information about per capita income of different categories of households under study.

Analytical Methods

The measures of poverty involves a) the specification of the threshold income level below which a person is considered poor (the poverty line) and b) construction of an index to measure the intensity and severity of poverty suffered by those whose income is below the poverty line. Sen(1976) has proposed several criteria that a poverty measure must satisfy to be able to assess the changes in social welfare whereas Foster et al (1984) proposed a class of poverty measures that are additively decomposable and that satisfy all the criteria for an ideal poverty measure. For this study, we used a method known as FGT index to measure the incidence of poverty (headcount ratio), intensity of poverty (poverty gap ratio) and severity of poverty (squared poverty gap ratio). To find out the determinants of poverty, affecting the probability of an individual being poor, we estimated a Probit model using poverty as a dependent factor-a binary (poor-1 and non-poor-0) and a set of agricultural and socio-economic variables as explanatory variables.

Village profile

The study is based on data collected from four sample villages that is; Arap, Baghakole, Inai and Susari. Arap and Baghakole villages are comparatively

developed whereas Inai and Susari are less developed. Developed villages are drought prone but have canal irrigation facility which does not provide regular and adequate water. Less developed villages are flood prone and dependent on ground water irrigation for crop production. All the four villages are connected with motorable road but former villages are near to national highway whereas later villages are located at a distance of more than 40 km from national highway. Education level of developed villages is higher than less developed villages (Appendix-I).Non-farm is the main source of income in less developed villages whereas one of developed villages generates more than half of income from farm sector. Per capita land is about half in less developed villages as compared to per capita land in developed villages. Per acre fertilizer consumption, seed replacement rate and number of pump set are much higher in developed villages than less developed villages.

Profile of Poor Households

Incidence of poverty is about 44 per cent in villages under study in Bihar however it declines with increase in land base of households. Average size of land holding of non-poor households (3.7 acres) is more than two and half times higher than land holding size of poor households(1.4 acres).Poor and non-poor households do not differ much with respect to size of family members but the proportion of earning members is comparatively high on non-poor households(29.5%) than poor households(24.5%).Migration is now not the domain of only poor households in Bihar but it has crossed the caste and class barrier (Singh, Paris and jouice,2004).In our study also, incidence of migration is higher on non-poor households(27.1%) than poor households(18.8%). The comparatively low migration among poor households may not be only due to low level of literacy but lack of higher level of education than non-poor households. Poor and non-poor households do not differ with respect to proportion of irrigated area also but only 14 per cent poor households own pump set whereas 57 per cent non poor households own pump set in study villages and the majority of them own more than one pump set for irrigation and hiring-out purposes. Asset poverty is also prevalent among poor households in villages under study. Poor households own two-thirds of livestock herd size, less than half of farm assets and one-third of consumer durable assets of non-poor households. Consumption level of food grains, vegetables and fruits (per capita/per annum) is comparatively low on poor households than non-poor households but consumption level of milk is much

lower on poor households (54 kg) than non - poor households (114 kg) whereas the just reverse situation is observed in case of meet, egg and fish consumption that is; higher on poor households (3.6 kg) than non-poor households (2.2 kg)

Incidence of Poverty

A conventional method to measure of poverty is to establish poverty line, considered as the threshold level of income needed to satisfy the basic minimum food and non-food requirement, and count the number of people living below poverty line. In the present study, the poverty was estimated at annual per capita income of Rs 7867.This poverty threshold income was adopted to estimate per capita income for the households under study for determining different poverty indices

Analysis of household data of villages under study revealed that the poverty level was comparatively high in Susari (73.4%) followed by Inai(55.5%),Baghakole(29..4%) and Arap(16.7%).The lower level of poverty in Arap might be due to larger size of land holdings, better road connectivity and higher level of education in the village whereas the situation is just reverse in case of Susari village. The village wise comparison shows that the socio-economic and infrastructure development are likely to have substantial positive effect on alleviation of poverty. Hence, it may be inferred that the incidence of poverty is comparatively high in less developed village (Susari) and it declines with increase in development indices of villages (Appendix-I).

Table 3: Population Below Poverty Line In Bihar (Poverty Line-1.25$) (%)

Village	Labour	Small	Medium	Large	All
Arap	42.2	5.1	20.5	0.0	16.7
Baghakole	22.2	39.1	35.1	24.8	29.4
Inai	100.0	77.6	37.9	20.3	55.5
Susari	81.4	84.7	69.1	60.5	73.4

The indices were also estimated for four groups of households that is; labour, small, medium and large which were grouped on the basis of land owned by them. About 22 to 100 per cent population of labour category of households were poor according to the headcount measure whereas none of large household was poor in Arap village but about one-fourth population of large households of Baghkole and one-fifth large household population of Inai village also belonged to poor category. It has been observed that poverty level declined with increase in land base of

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households, particularly in Susari and Inai villages under study. However the least incidence of poverty was observed among labour households in Baghakole village. Among different categories of households, the higher level of poverty was observed among Labour households and the least among large households, except in Baghakole where only 22 per cent labour households belong to below poverty line.

The head-count measure of poverty is insensitive to the distribution of income among poor households and is incapable of measuring what has been happening to the intensity and severity of poverty (Sen 1976).The poverty gap index and the squared poverty gap index are used to capture these dimensions of poverty.

Poverty gap index measures the extent to which individuals fall below the poverty line as a proportion of the poverty line and expresses it as a percentage of the poverty line .It is the mean proportionate poverty gap in the population. In study villages, the highest poverty gap index was found in Susari village (32.8%) where head count ratio was also highest. The least poverty gap index was observed in Arap village where head count ratio was the lowest. The poverty gap indices are substantially lower in more developed villages (Arap and Baghakole) than less developed villages (Inai and Susari). This observation supports the proposition that the agricultural and social development contributes to reduction in poverty (Thakur et.al 2000).

Poverty gap indices were also estimated for different categories of households of villages under study. In developed villages, intensity of poverty was lowest among large households, except in Inai village. In Arap village, incidence of poverty was much higher in labour households (42%) than medium households (21%) but intensity of poverty was comparatively low among labour households (10%) than medium households (14%).

Table 4: Poverty Gap Index In Selected Villages In Bihar (Poverty Line 1.25$)

Village	Labour	Small	Medium	Large	All
Arap	10.1	1.2	14.4	0	6.4
Baghakole	4.8	20.4	20.1	1.4	11.3
Inai	32.9	41.7	6.6	18.4	25.4
Susari	29	30.8	42.5	28.2	32.8

In Baghakole village also, intensity of poverty was comparatively low in labour households (5%) than small and medium households (20% each) but this trend does not hold true in less developed villages. In Inai village, all the persons of labour

households belong to the category of below poverty line but poverty gap index was only 33 per cent, indicating comparatively low level of poverty intensity in this category of households than even the category of small households. In Susari village also, intensity of poverty among labour households (29%) is comparable to poverty gap index of large households (28%) and lower than the poverty gap index of small (31%) and medium households (43%). The intensity of poverty was comparatively low among labour households in Susari village also.

There is no specific trend with respect to intensity of poverty across different categories of households in villages under study but the highest depth of poverty was not found among labour households in any of villages under study.

Poverty Severity Index

It measures the severity of poverty and commonly defined as the square of poverty gap, divided by the population. Poverty severity is estimated for all four categories of households in villages under study. It takes into account not only the distance separately the poor from the poverty line (poverty gap) but also the inequality among the poor, that is; higher weight is placed on those households who are further away from the poverty line. The estimated ratios are presented in Table 5

Among the villages under study, the severity of poverty was the highest in Susari village (18.1%) where incidence and depth of poverty were also comparatively high. The severity of poverty followed the same pattern observed in case of incidence and depth of poverty that is; higher the incidence and depth of poverty, higher the severity of poverty in the village (Figure-I).

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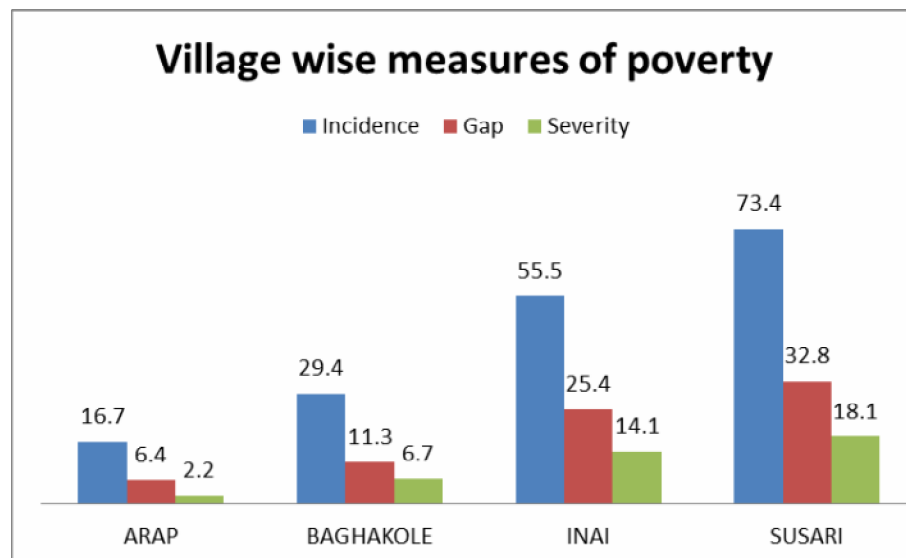
In general, the comparatively low level of severity of poverty was observed among large and medium households in all villages under study but the severity of poverty was not the highest for labour households in any of the village under study.

Table 5: Severity Of Poverty (Squared Poverty Gap) In Selected Villages In Bihar Poverty Line -1.25 $)

Village	Labour	Small	Medium	Large	All
Arap	2.3	0.1	6.4	0	2.2
Baghakole	1.4	13.8	12.9	0.1	6.7
Inai	12.8	29.5	1.3	13.2	14.1
Susari	13.9	13.7	26.6	17.8	18.1

It has been observed that the severity of poverty is the highest among medium households in Arap and Susari and in small households in Baghakole and Inai.

Determinants of Poverty

Poverty was traditionally measured uni-dimensionally in terms of inadequate income but it has now recognized as multi-dimensional (income and non- income poverty) in terms of deprivation of capability to fulfil essential functions in human life. These functions concern not only the possibility to adequately feed and clothe oneself, and to have a shelter (income poverty) but also the possibility to have access to education, health and rural institutions (Tilak, 1993, Benerji, 2000, Janaiah et.al., 2000 and Kumari and Singh, 2009).Hence, an Ordered Probit Model has been estimated using specified variables to find out the determinants of poverty. The dependent variable(y) being a binary variable, to determine probability the poor family is coded as one (1) and non-poor as zero (0). The probit procedure computes maximum likelihood estimates of the parameters. The positive sign of estimate means a direct relationship with the dependent variable while negative sign shows an inverse relationship. Table presents the generated co-efficient of the probit model.

Table: 6: Probit Coefficient and Standard Error of Different Factors Determining Poverty Level in Study Villages

Dependent Variable (Poor Household - 1, Non-Poor Household – 0)				
	Probit Regression			
Explanatory Variable	Coefficient	Standard Error		
Average Education (Years)	-0.1692***	0.0507		
Family Size (No.)	0.0952**	0.0473		
Own Land (Acre)	-0.0790	0.0574		
Earning Member (No.)	-0.4130**	0.1666		
Farm Asset Value (Rs.)	0.0000	0.0000		
Share Of Farm Income (%)	0.0023	0.0025		
Constant	0.9827**	0.4382		
No. Of Observation	130			
Pseudo R Square	0.1877			
Prob > Chi Square	0.0000			
Log Likelihood	-72.5836			

*** Significant At 1 Per Cent Level, ** Significant At 5 Per Cent Level, * Significant At 10 Per Cent Level

It has been observed that the average education has significant inverse relationship to poverty. The negative sign of education level suggests that with more educated members in the household, the probability of the household to move away from poverty is greater. This implies that education enhances the skill, chances of getting remunerative employment and increasing labour productivity which lead to higher income and decline in poverty. Hence, it confirms the findings of earlier studies that investment for improving the quality of human capital would contribute positively to poverty alleviation by increasing labour skill. It may also be observed that the probability of experiencing poverty is more in large households as indicated by the coefficient of family size in the model. This implies that increasing population pressure would significantly hamper poverty alleviation efforts in rural areas. This calls for an effective population control in rural area apart from development efforts to eradicate rural poverty in Bihar. The presence of more earning member has an inverse relationship to poverty. This implies that probability of being poor is less when there is larger proportion of earning member in the family. Hence, the imparting training for skill development would increase the proportion of earning members in the family. It calls for establishing rural training institutes for skill development in rural area.

Conclusions

Despite annual growth of more than 10 per cent in Bihar's economy, poverty remained the same during 2004-05-2009-10.Incidence of poverty was double among agricultural labours than that of farm households and the poverty gap between farm and agricultural labour households increased during last two decades. The decline in poverty has been also higher among farm households than the decline observed among agricultural labour households during last two decades however the decline in poverty was comparatively high among agricultural households than farm households during 2004-05-2009-10, mainly due to adverse weather at one hand and increase in wages of agricultural labour at another during the period.

The comparatively high poverty incidence, gap and severity are observed in less developed village than developed villages in Bihar. Hence it may inferred that the level of development has direct influence on poverty alleviation that is; higher the development, lower the level of poverty in rural area. In villages, land is the main income generating asset hence the poverty incidence, gap and severity level are comparatively low in case of large households but the observation does not hold true in case of medium and small households because their land base is very low in Bihar. The highest poverty incidence, gap and severity are not found among labour households. It is only due to larger proportion of earning members and the majority of them are employed in non-farm activities on comparatively high wage whereas family member of households with even small piece of land do not prefer to work as labour, resulting less income flow and higher level of poverty among them.

Various agro-economic and social factors are responsible for poverty. The three key determinants that help the household in keeping away from poverty are education, number of earning and family size. The education enhances the skill, chances of getting remunerative employment and increasing labour productivity which lead to higher income and decline in poverty. Larger proportion of earning members in the household also helps increasing income flow whereas smaller size of family leads to comparatively less expenses and more income to the household hence low level of poverty.

These findings of poverty determinants call for establishment of effective educational and training infrastructure and streamlining of their functioning in rural area. The family welfare programme needs to be strengthened for population control since smaller family is likely to be away from poverty.

References

Janaiah,A.;Manik,L. Bose And **Agarwal, A**,G(2000).Poverty And Income Distribution In Rainfed And Irrigated Ecosystem: Village Studied In Chhattisgarh, *Economic And Political Weekly*.35(10):4664-69

Benerji, R (2000). Poverty and Primary Schooling: Field Studies from Mumbai and Delhi, *Economic and Political Weekly*, 35:795-802

Singh,R.K.P.,Thelma,R. Paris(2004) Impact Of Labour Out-Migration On Rice Based Household Economy And Gender Roles In Bihar; Rau & Irri(Philippines, Collaborative Project,Rajendra Agricultural University,Pusa,Samastipur,Bihar

Kumari, V and Singh, R.K.P. (2009).Fragile Human Capital Causes Poverty in North Bihar: Empiriocal Evidences, *Agricultural Economics Research Review*, 22(1):99-108

Tilak,J.B.G(1989).Education And Its Relation To Economic Growth, Poverty And Income Distribution, World Bank Comparative Studies, Research Paper No. 3,The World Bank

Foster, James, Greer, J And Eric Thorbeek (1984). A class of Decomposable Poverty Measures, Econometrica, 52(3):761-765

Sen, Amartya (1976). Poverty: An Ordinal Approach to Measurement, Econometrica, 46:437-446

Thakur,J, Bose,Manik L,Hussain,M And Janaiah,A (2000).Rural Income Distribution And Poverty In Bihar: Insights From Village Studies, Economic And Political Weekly,35(10):4657-4663

Agro-Economic Characteristics Of Sample Villages , In Bihar				
Particulars	Arap	Baghakole	Inai	Susari
Av.Size of family (in no.)	7	7.5	6.8	8.1
Education Level(% Literacy)	82	86	72	72
Size of Landholding	115.1	153.38	62.19	82.9
Per capita Land	0.41	0.51	0.23	0.26
Per pumpset cultivated area(acre)	4.8	3	3.7	20.7
Fertilizer (N+P) consumption(kg/acre)	39	75.7	18.81	25
Proportion of hh purchased seeds (%)	95	98	35	2
Electrified households	88	80	5	30