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Inequality and determinants of income among rural households in tribal dominated areas of Jharkhand

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ABSTRACT

The study was undertaken to analyse the extent, diversity, inequality and determinants of income of rural households in Jharkhand-one of the most poverty stricken state of India. The study is based on the high frequency primary data collected from 160 rural households by resident investigators under the ICAR-ICRISAT collaborative project on "Tracking Changes in Rural Poverty in Household and Village Economies in South Asia". Both descriptive and quantitative methodologies were used to analyse the above issues. Tabular analysis was used to assess the level of income among different categories of rural households. While Herfindahl-Hirschman Index was used to assess the diversity of income sources, income inequality was measured by Ginni Ratio and Lorenz curve. Further, the linear regression model was used to identify the determinants of income of rural households in tribal dominated areas of the state. The study depicted a wide variation in the level of income among different categories of households with high and pervasive income inequality among them. Though the income inequality did not exhibit a consistent relationship with farm size, the extent of inequality was found highest among labour households. Education, adoption of high yielding varieties and access to non-farm income opportunities emerged as the significant determinants of income. These findings explicitly call for sustained efforts to create rural non-farm employment opportunities, promote adoption of modern agricultural technologies and enhance education among rural households in the study area.

Key words: Income determinants, Income inequality, Jharkhand, Tribal.

Income and its sources are important measures to understand the level of households' living standard and ways to achieve that level. Income along with households' expenditures and possessions reveal aspects of income volatility and provides an additional measure of inequality. However, obtaining precise estimates of households' income is complicated as few households have regular sources of income. In agriculture incomes are irregular therefore considerable efforts are required to obtain estimates of revenue and expenditure for calculating the net income. Numerous studies have been undertaken to pinpoint contribution of different sources of income inequality in developing world (Kung and Lee 2001, Leibbrandt *et al.* 2000). It is a fact that incomes are usually not measured in developing country surveys, and rarely in India. India's 2014 Human Development Index (HDI) of 0.609 is below the average of 0.630 for countries in the medium human development group and above the average of 0.607 for countries in South Asia (Times of India, 14 December 2015). The state-wise differences are especially pronounced for rural areas and somewhat narrow for urban areas. Financial resources are insufficient to ensure health, educational attainment and gender equality within households and are frequently considered an important constraint. In Indian context, many studies have recently conducted on methodological issues for estimating income inequality, poverty and on actual measurement of these variables. In view of the studies available based on secondary data from National Sample Survey Organisation (NSSO) for depicting picture at national level the present empirical study evaluates the income diversity, income inequality and determinants in Jharkhand state may help the policy makers to identify nature and character of income inequality within a society and devise policies to improve the income distribution.

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MATERIALS AND METHODS

Present study was undertaken in Jharkhand state during 2011-12. Primary data were collected from Ranchi and Dumka districts. Two villages (Dubaliya and Hesapiri) from

Ranchi district and two villages (Durgapur and Dumariya) from Dumka district were selected. Ranchi represented socio-economically developed district while Dumka is the socio-economically backward district. Ranchi district has edge over other districts of Jharkhand with respect to education level, per capita income, health and hygiene, and infrastructure facilities. Dumka district has been inferior to majority of districts of Jharkhand (Singh *et al.* 2013). Besides simple statistical tools, Lorezecurve were plotted. Gini ratio was computed to measure the income inequality and diversification index was computed for estimating diversity of income sources. Linear regression model was employed to identify the determinants of income. The statistical tools used are as follows:

Income diversity: Herfindahl-Hirschman Index (HHI)

$$HHI_I = \Sigma S_i^2 \text{.....(Eq.1)}$$

where, HHI_I is the Herfindahl-Hirschman Index for Income and S_i is the share of source i to the total income of the household.

$$HHI_{ID} = 1\text{-}HHI_I \text{.....(Eq.2)}$$

where, HHI_{ID} is the Herfindahl-Hirschman Index for income diversity.

Determinants of income

$$\text{Ln } Yi = \boldsymbol{Xi'\beta} + \varepsilon i, \quad i = 1,\ldots,$$

where, Yi = Per capita household income, Xi = Vector of HH and farm characteristics.

Income inequality

$$G = Cov(y,F(y))2/y$$

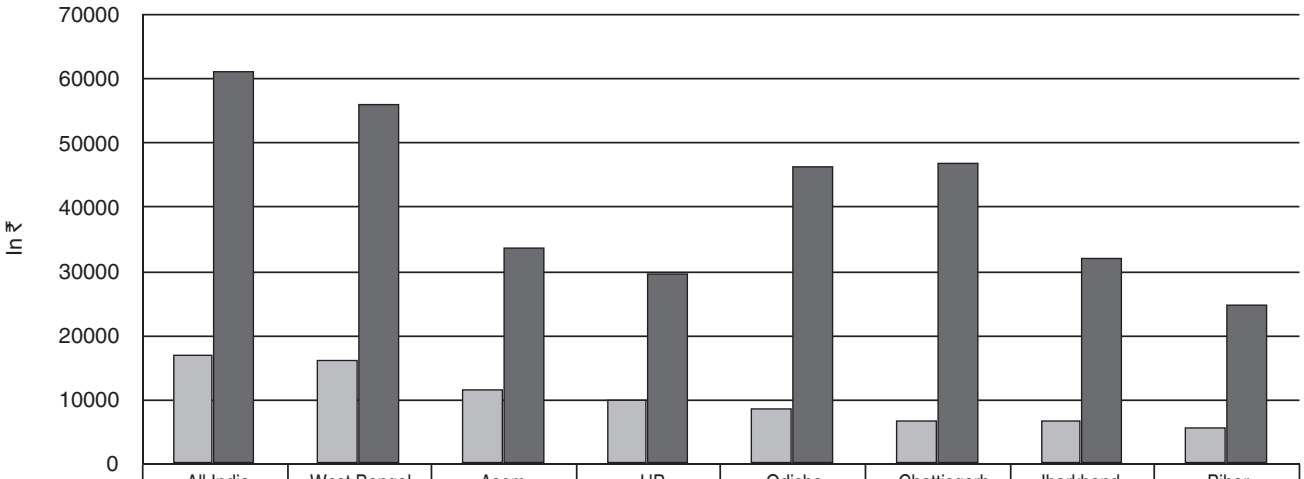
where, G= Gini ratio, Cov= Covariance between income levels y and cumulative distribution of same income F(y), y (bar) = average income.

RESULTS AND DISCUSSION

Average per capita income

Per capita income reflects purchasing power and living standards of people. For inclusive growth, it is indispensable for states to put in efforts to raise income attributable to each person. The estimates of Triennium Ending (TE) in respect to per capita income in Jharkhand shows 1993-94 as ₹ 16 024 which are higher from national average (₹ 15 653). TE for 2004-05 depicts a decreasing trend (₹ 15 617) while escalating trend was found in national level (₹ 23 235). During TE 2009-10, income of Jharkhand and national level increased drastically. It is evident that compound annual growth rate of Jharkhand during 1993 to 2004-05 was negative (-0.3) while national growth was observed at 3.9%. From 2004-05 to 2009-10, growth of Jharkhand was encouraging (2.7%) while national growth was much higher (6.7%). For whole period (1993-94 to 2009-10) growth of Jharkhand state was positive (1.5%) but much less from national growth (4.8%). Per capita Gross Domestic Product (GDP) in eastern states including Jharkhand can be evaluated from Fig 1.

Jharkhand state is growing at a frenetic pace in terms of their per capita income. A study on States performance in per capita income highlighted that Jharkhand state registered 16.6% growth with per capita income of ₹ 14 990 (ASSOCHAM ECO Pulse 2008). Table 1 recites per capita income per annum in the villages under study. Respondents registered highest (₹ 16 814) annual per capita income among small households of Dubaliya village followed by medium (₹ 11 194) and large category (₹ 18 569). While in Dumariya and Hesapiri village, labour households had highest income, i.e., ₹ 15 470 and ₹ 12 788, respectively. Overall per capita annual income in sample village was highest in Dubaliya



	All India	West Bengal	Asom	UP	Odisha	Chattisgarh	Jharkhand	Bihar
2001	16707	16072	11357	9721	8547	6692	6651	5446
2011-12	60972	55864	33633	29417	46150	46573	31982	24681

Source: CSO various issues and Prabhat Khabar, 4 Nov. 2012 Patna edition.

Fig 1 Per capita gross domestic product in Eastern states of India (on current price).

Table 1 Average annual income of households (in ₹) in Jharkhand, India (N=160)

Village	Categories of households				
	Labour	Small	Medium	Large	All
Dubaliya	12701	16814	11194	18569	14871
Hesapiri	12788	7364	7306	9346	9066
Dumariya	15470	7636	7222	9760	9885
Durgapur	6279	4031	6905	8367	6378

Source: Primary data

village (₹ 14 871) followed by Dumariya (₹ 9 885), Hesapiri (₹ 9 066) and Durgapur (₹ 6 378).

Income composition

Table 2 shows the sources of income in sample households consisted of crop, livestock, farm labour, non-farm work, salaried job, caste occupation, business, remittance and pension. Income from the crop production was highest in Dumariya (31.36%) village followed by Hesapiri and Durgapur villages. In Dubaliya village, crop production showed negative income (-2.04%). The income from livestock was only 4.51% in Hesapiri while it was nearly 4% in Dubaliya and Durgapur each. Farm labour contributed very less income in Durgapur village while negligible in other three sample village. Non-farm activity was the prominent source of income of all the villages followed by non-farm activity and salaried job. In Dubaliya, its contribution was 38.27% followed by Dumariya (24.09%) and Durgapur (9.71%). Caste occupation (*Jajmani system*) was still prevalent in Jharkhand. Nearly one-tenth income of Dumariya village was accumulating from *Jajmani system* followed by Durgapur (6.91%). Business activity was only reported in Durgapur village (16.31%). Remittances as a source of income contributed 8.87% in Dubaliya village, whereas 4.59% in Durgapur village. A lesser amount of income was contributed through pension source. Households obtained 48.54% average income from non-farm activity followed by salaried job (18.50%), crop production (14.66%), and business (8.05%). Less than 5% were getting through caste occupation, remittances, farm laobur, pension and livestock.

Income diversity

Diversification of income is a long practiced strategy by many livelihoods in order to reduce risk of external shocks since different sources of income are likely to be affected differently by external shocks. Income diversification is a key for risk management. It helps vulnerable households to meet the consumption, social and labour needs. Income diversification opportunities include both on and off-farm strategies. In sampled villages, maximum number of income sources was observed to be 9. The maximum income diversity sources were found to be 3.5 in Durgapur and Dumariya village (Table 3). However, it was less in labour category while prominent in all other categories of households (small, medium and large) irrespective of villages. Table 4 elaborates diversification indices of incomes in Jharkhand state. Across village, Dumariya had higher diversification index (0.50) followed by Durgapur (0.43), Hesapiri (0.40) and Dubaliya (0.28).The higher diversification index in Dumariya village indicates higher diversity in caste system.Higher diversity indices were observed among large (0.40-0.60) and small household category (0.30-0.59) in all sampled villages. The indices were least among labour category as they had limited land (leased in) and options for diversification.

Table 3 Income diversity in Jharkhand, India (N=160)

Village	Labour	Small	Medium	Large	All
Dubaliya	2.3	3.5	2.9	3.9	3.2
Hesapiri	2.7	3.6	3.6	3.5	3.4
Dumariya	2.9	3.8	3.8	3.5	3.5
Durgapur	3.3	3.8	3.4	3.4	3.5

Source: Primary data

Table 4 Diversification indices of income sources in Jharkhand, India (N=160)

Village	Labour	Small	Medium	Large	All
Dubaliya	0.09	0.30	0.31	0.40	0.28
Hesapiri	0.18	0.41	0.51	0.48	0.40
Dumariya	0.30	0.59	0.51	0.60	0.50
Durgapur	0.39	0.52	0.28	0.52	0.43

Source: Primary data

Table 2 Composition of income in Jharkhand (%), India (N=160)

Village	Crop	Livestock	Farm labour	Non-farm worker	Salaried job	Caste occupation	Business	Remittance	Pension
Dubaliya	-2.04	3.99	0.00	45.54	38.27	0.00	3.48	8.87	1.89
Hesapiri	23.48	4.51	0.46	63.37	1.94	0.16	5.98	0.00	0.08
Dumariya	31.36	-11.65	0.78	37.19	24.09	11.20	6.46	0.00	0.57
Durgapur	5.84	3.86	4.80	47.92	9.71	6.91	16.31	4.59	0.07
Overall average incomes	14.66	0.17	1.5	48.54	18.5	4.56	8.05	3.36	0.65

Note: The negative contribution/income was deducted from positive income and divided by no. of villages for overall average.
Source: Primary data

Determinants of income

The variables of respondents, i.e. education, size of households, share of non-farm income, and adoption of high yielding varieties had significant impact on households' income (Table 5). Education had a positive and significant impact on income of households. Higher levels of education quality increased a country's rate of technological progress (Jamison, *et al.* 2006). Higher levels of education quality increased growth rates of national income. Asadullah and Rahman (2005) demonstrated that basic litreacy and numeracy in farmers leads to an increased ability to process agricultural information and take advantage of available technologies. Similarly, size of households had negative relationship with income of households. Analysis confirms that less number of households have more income with those had more family members. Non-farm income had significant impact on income of households. Dissemination of HYVs has been gradually penetrating and had significant and positive impact on livelihoods of households. However, other variables, i.e. own land, value of farm asset, members' earning, total land use and migration did not illustrate any relationship with income of respondents. The estimated coefficient of determination (R^2) for variability in data found to be 0.5418 which explains 54% variations due to variables under the study.

Table 5 Coefficients and corresponding standard error of variables for determining income in Jharkhand, India

Variables	't' value	Standard error	Pr >|t|
(X1) Age (in years)	1.21	0.28354	0.2327
(X2) Education (in years)	2.93	0.11241	0.0053***
(X3) Household size (in number)	-2.06	0.31736	0.0453**
(X4) Land (in acre)	-0.63	0.09196	0.5329
(X5) Farm asset value (in ₹)	1.49	0.04704	0.1443
(X6) Earning member (in number)	1.35	0.24846	0.1838
(X7) Livestock (in numbers)	0.94	0.14162	0.3514
(X8) Share of non-farm income (in%)	-4.22	0.17347	0.0001***
(X9) Migration (yes-1; no=0)	0.68	0.21754	0.4973
(X10) High yielding varieties (in %)	2.07	0.11426	0.0448**

** Significant at 5% of probability, *** Significant at 1% of probability.

Income inequality

Income variation lies almost wholly within variation observed among developing economies. The principal fact to be explained is not inequality variations within India, but enormous gap in inequality between developed and developing countries. Regional variations within India in income levels are more substantial. The higher income states have three to four times the income per capita as the lower income states, nevertheless, state differences in income levels account for only 9% of national income inequality (Vanneman and Dubey 2010). Between 2004-05 and 2009-10, inequality (Gini Coefficient) in rural India has marginally increased from 0.264 to 0.274 (ASSOCHAM 2012). This must have been direct result of fact that growth in lower Monthly Per Capita Expenditure (MPCE) class average consumption has been much lower than that experienced in higher MPCE classes.

Table 6 Income inequality (Giniratio) in Jharkhand, India (N=160)

Village	Labour	Small	Medium	Large	All
Dubaliya	0.24	0.34	0.20	0.50	0.36
Hesapiri	0.48	0.29	0.35	0.26	0.38
Dumariya	0.55	0.25	0.37	0.22	0.43
Durgapur	0.30	0.20	0.31	0.36	0.34

The calculated Gini Coefficient for Bihar including Jharkhand state indicates that income inequalities have increased by 4.9%. The village study in Jharkhand shows that among labour category, Gini ratio ranges from 0.24 to 0.55. The income inequality is highest (0.55) in Dumariya village while more equality was found in Dubaliya village (0.24). Among small category, there is less variation (0.20 to 0.34) than labour class. In medium class, trend is almost alike (0.20 to 0.37). The larger farmers have more inequality with higher Gini Ratio (0.22 to 0.50). Overall highest inequality was found in Dumariya village (0.43) followed by Hesapiri (0.38), Dubaliya (0.36) and Durgapur (0.34). When considering category of farmers, highest inequality was found among labour class (0.55), followed by large (0.50), medium (0.37) and small (0.34) category.

Sources of income inequality

Distribution of total income may change with change in individual components of income and/or changes in income share of components. If additional income is derived from a relatively equally distributed sources, income distribution will improve. Conversely, if faster growing sources of income are more unequally distributed, inequality in distribution of income will worsen. Economic position of a household depends on per capita income rather than on income from an individual component. A marginal increase in agriculture and salaried income leads to increase in inequality, however, a marginal increase in labour income leads to reduction in income inequality (Azam and Shariff 2011). Thakur *et al.* (2000) reported that in Bihar the income from rice cultivation (Gini, 0.37) and other agricultural activities (0.29) are less unequally distributed than income from non-agricultural activities (Gini, 0.46). The most unequally distributed sources of income are services (Gini, 0.54) and trade and business (Gini, 0.45). However, household access to these sources of income depends on endowment of physical and human capital and state of infrastructure development of area. Obviously high income

households with educated members and favourable access to finance and credit are in better position to take advantage of employment opportunities in services and trade sector compared with low-income households get a larger share of income from these sources.

The concentration of income from non-agricultural labour (processing, transport and construction activities), although positive, is less than that of income from crop production activities. Since, major source of households incomes come from non-agricultural activities and income from these sources are more unequally distributed. More than two-third of concentration of household incomes are on account of non-farm activities. In less developed villages, contribution of rice cultivation (6% of total households' income) was marginal because it was a low-profit economic activity. While in technologically developed villages, it contributes to an augmenting of its share to 16%. The most favourable effect is on account of labour-based occupations-construction and processing activities and transport operations. The relatively less unequal distribution of incomes in developed villages was mostly on account of non-agricultural activities. It has been observed that per capita income and level of education are significant sources of income inequality. An increase in per capita income is likely to increase income inequality but increase in level of education level increase income equality in villages under study in Jharkhand.

POLICY IMPLICATIONS

Income dynamics in Jharkhand shows a huge difference (₹ 8493) in per capita income among households per annum. Out of many income sources, non-farm activity dominated among all villages (37.19% to 63.67%). The caste occupation (*Jajmani system)* still prevalent which shows that income diversification is a long practiced strategy by many livelihoods in order to reduce risk from external shocks. Livestock system being an integral part of livelihoods; contributes negligible. There is great need to enhance productivity of livestock sector through technological intervention. Education, size of households, share of non-farming income, and adoption of high yielding varieties being main determining factors, had a significant impact on households' income. Gini ratio ranged from 0.33 to 0.43 indicating the income inequality. Highest inequality was observed among labour class (0.55) followed by large (0.50), medium (0.37) and small (0.34) category. Income inequality was higher across villages and households. Per capita income and education level were significant sources of income inequality. Hence, there is dire need at government level to generate the non-farm labour opportunities through public works which may lead to better infrastructure facilities and rural livelihoods. Providing labour opportunities outside the agricultural activities can reduce income inequalities among rural poor. It also works as safety mesh for income shocks. It will assist in reducing unemployment and underemployment in rural area. An increase in per capita income is likely to increase income inequality. However, increase in level of education level may increase income equality in the villages. Hence, education could be one of the instruments for reducing the inequality among the rural poor.

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