

Income Inequality among Tribal Households in Assam: An Empirical Analysis using Gini Coefficient and Econometric Modelling



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ABSTRACT

This paper examines the extent and underlying determinants of income inequality among tribal households in Assam based on primary data collected from 200 households through a multistage random sampling technique in December 2020. The study employs the Gini coefficient and related inequality measures to assess the degree of income disparity, while an Ordinary Least Squares (OLS) regression model is used to identify key socio-economic factors influencing household income. The findings reveal a moderate level of inequality, with a Gini coefficient of 0.41, indicating a significant concentration of income among relatively better-off households. The econometric results demonstrate that education and non-farm income opportunities have a strong and positive impact on household income, whereas larger household size and unequal land distribution contribute to widening income disparities. The study highlights that inequality among tribal communities is structurally rooted in limited access to education, livelihood diversification, and productive assets. It emphasizes the need for policy interventions focusing on human capital development, promotion of non-farm employment, equitable resource distribution, and strengthening of rural development programmes. The paper contributes to the limited micro-level empirical literature on tribal inequality in Assam and provides important insights for designing inclusive development strategies.

1. INTRODUCTION

Income inequality has emerged as a critical concern in developing economies, particularly in regions dominated by tribal populations where economic opportunities remain limited. Tribal communities in Assam depend largely on agriculture, forest resources, and informal labour markets, resulting in uneven income distribution. The Gini coefficient is widely used to measure inequality, capturing disparities in income distribution across households.

Previous studies indicate that inequality in rural and tribal regions is shaped by structural factors such as access to education, non-farm employment, and institutional support. For instance, studies in tribal regions of India have found significant income disparities due to unequal access to resources and livelihood diversification. Therefore, this study aims to provide empirical evidence from Assam using primary data.

2. REVIEW OF LITERATURE

Empirical studies on income inequality in India have widely employed measures such as the Gini coefficient, Lorenz curve, and other inequality indices to capture disparities in income distribution across regions and social groups. Classical contributions by Amartya Sen (1997) and Anthony B. Atkinson (1970) laid the theoretical foundation for understanding inequality, emphasizing that disparities are not only economic but also linked to capabilities and access to opportunities. In the Indian context, Jean Drèze and Amartya Sen (2013) highlighted that despite economic growth, inequality persists due to uneven development in education, health, and employment opportunities.

Empirical evidence further suggests that rural inequality is strongly influenced by sectoral income differences. Mehboob Azam and Abusaleh Shariff (2011) found that agricultural income contributes significantly to overall inequality in rural India, particularly due to variations in landholding size and productivity. Similarly, studies by Meena et al. (2017, 2016) on tribal households in Jharkhand reveal high levels of income inequality, especially among wage labour-dependent households, where limited access to education and non-farm employment restricts upward mobility. These studies consistently identify education, asset ownership, and livelihood diversification as key determinants of income distribution.

Research focusing on North-East India also points to structural constraints unique to the region. Pandey et al. (2021) observed that indigenous communities face significant income disparities due to dependence on traditional agricultural practices such as shifting cultivation, low market integration, and inadequate infrastructure. Basumatary et al. (2021) further highlighted inequality in consumption patterns in the region, indicating that disparities are not limited to income but extend to basic living standards. The Economic Survey of Assam (Government of Assam, 2023) also notes that tribal populations often experience limited access to formal employment and institutional credit, which reinforces existing inequalities.

From a methodological perspective, scholars such as James Foster (1985) and François Bourguignon (2004) expanded the measurement of inequality through alternative indices like the Theil index and decomposition techniques, demonstrating that intra-group inequality is often as significant as inter-group inequality in developing economies. Angus Deaton (2003) further emphasized the link between income inequality, health, and development outcomes, suggesting that disparities in income can have broader socio-economic implications.

Despite this extensive body of literature, there remains a noticeable research gap in micro-level empirical studies focusing specifically on tribal households in Assam using primary data. Most existing studies are either regionally aggregated or focused on other states, thereby overlooking the unique socio-economic conditions of Assam's tribal communities. This study attempts to fill this gap by providing a focused analysis of income inequality using primary household-level data, along with an econometric examination of its key determinants.

3. OBJECTIVES OF THE STUDY

The study aims to measure the level of income inequality among tribal households in Assam by constructing and interpreting the Gini coefficient and related inequality indices. It further seeks to identify the socio-economic determinants of inequality using an econometric model and to suggest appropriate policy measures for reducing inequality and improving livelihoods.

4. SAMPLE DESIGN AND METHODOLOGY

The study is based on primary data collected in December 2020 from 200 tribal households selected through a multistage random sampling method from selected districts of Assam.

Data were collected on:

- Household income (farm and non-farm)
- Education level
- Landholding size
- Occupation
- Access to government schemes

MEASUREMENT OF INEQUALITY

The Gini coefficient is used as the primary measure of inequality:

$$G = \frac{\sum_{i=1}^n \sum_{j=1}^n |Y_i - Y_j|}{2n^2 \bar{Y}}$$

Where:

Y_i = income of household

n = number of households

\bar{Y} = mean income

The value of G ranges between 0 (perfect equality) and 1 (perfect inequality).

5. Findings and Discussion

The analysis of the collected data provides important insights into the nature and extent of income inequality among the sampled households. The average annual household income is estimated at ₹1,25,000, which indicates a relatively low-income base and reflects the limited earning opportunities available to a large section of the population. However, the distribution of this income is not uniform across households. The estimated Gini coefficient of 0.41 suggests a moderate level of inequality, implying that income is unevenly distributed, with a noticeable gap between lower-income and higher-income households.

Further examination shows that nearly 30% of the households fall below the median income level. This indicates that a significant proportion of households earn substantially less than the central tendency of the distribution, while a relatively smaller group of households controls a larger share of total income. Such a pattern clearly points towards income concentration among better-off households, thereby widening economic disparities within the community.

The Lorenz curve further reinforces this observation by showing a distinct deviation from the line of perfect equality. The greater the deviation, the higher the degree of inequality, and in this case, the curve reflects a clear imbalance in income distribution. This suggests that the benefits of economic activities are not equitably shared among all households.

The underlying causes of this inequality can be traced to several structural factors. Households with access to non-farm income sources, such as small businesses, wage employment, or government jobs, tend to earn higher and more stable incomes compared to those solely dependent on agriculture. Similarly, differences in educational attainment play a crucial role, as better-educated individuals are more likely to access diversified and higher-paying employment opportunities. Land ownership also emerges as a key determinant, where households with larger or more productive landholdings are in a stronger economic position than landless or marginal farmers.

Overall, these findings highlight that income inequality in the study area is not merely a result of individual effort but is deeply rooted in structural constraints such as limited access to resources, inadequate education, and lack of livelihood diversification. The results are consistent with earlier empirical studies conducted in similar tribal regions, which also emphasize that persistent inequality is driven by restricted economic opportunities and socio-economic disadvantages. These insights underline the need for targeted policy interventions focusing on education, skill development, and expansion of non-farm employment opportunities to reduce inequality and promote inclusive growth.

6. Econometric Model and Results

To identify determinants of income, the following OLS regression model is used:

$$\ln(Y_i) = \beta_0 + \beta_1 Edu_i + \beta_2 Land_i + \beta_3 NFI_i + \beta_4 HHsize_i + \epsilon_i$$

Where:

- Y_i = household income
- Edu = years of education
- $Land$ = landholding size
- NFI = non-farm income (dummy)
- $HHsize$ = household size

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Results

Variable	Coefficient	Significance
Education	+0.32	Significant
Landholding	+0.27	Significant
Non-farm income	+0.41	Highly significant
Household size	-0.18	Significant

Source: Author's Calculation Based on Primary Data Collected from the Surveyed Households.

The estimated results of the model reveal that education has a positive and statistically significant effect on household income, indicating that an increase in years of schooling leads to a proportionate rise in income levels among tribal households. This suggests that educated individuals are more capable of accessing better employment opportunities, adopting improved agricultural practices, and participating in non-traditional income-generating activities. Therefore, education not only enhances earning capacity but also reduces vulnerability to low-income traps, thereby playing a crucial role in minimizing income inequality.

The coefficient of non-farm income emerges as the highest and highly significant among all explanatory variables, clearly indicating that households engaged in non-agricultural activities such as small businesses, wage employment, or services earn substantially higher incomes compared to those solely dependent on agriculture. This highlights the importance of livelihood diversification in tribal areas, where dependence on traditional agriculture often yields low and uncertain returns. As a result, non-farm opportunities act as a major equalizing force by providing additional and more stable income sources.

In contrast, household size shows a negative and significant relationship with income, implying that as the number of family members increases, the per capita availability of income declines. This is mainly due to the higher dependency ratio, where a larger proportion of household members may be non-earning dependents such as children or elderly individuals. Consequently, even if total household income increases slightly, it gets distributed among more members, leading to lower per capita income and thereby contributing to economic strain.

Landholding size is found to have a positive and significant effect on income, indicating that households with larger land assets are able to generate higher agricultural output and income. However, the unequal distribution of land among households intensifies income inequality, as a small proportion of households control larger and more productive land resources, while the majority possess marginal or no land. This structural imbalance leads to concentration of income among land-rich households and limits the earning potential of land-poor families.

Overall, the results clearly demonstrate that while factors such as education, landholding, and non-farm income contribute positively to income generation, their unequal distribution across households is a major source of income inequality. Among these, non-farm income and education emerge as the most influential determinants, suggesting that policies aimed at improving access to education and promoting non-farm employment opportunities can significantly reduce inequality and enhance livelihood security in tribal regions of Assam.

7. Policy Suggestions

Promotion of non-farm employment through skill development: There is a strong need to expand skill development programmes tailored to the local context of tribal areas, focusing on activities such as handicrafts, food processing, eco-tourism, and small-scale enterprises. Since the results show that non-farm income has the highest positive impact on household earnings, improving access to training, market linkages, and credit support can significantly enhance income diversification and reduce dependence on low-return agriculture.

Improvement of educational access and quality: Given the significant role of education in increasing income levels, policies should focus not only on increasing school enrolment but also on improving the quality of education in tribal regions. This includes better infrastructure, trained teachers, vocational education, and scholarships for higher studies, which can equip individuals with skills required for better-paying jobs and long-term economic mobility.

Equitable land distribution and land productivity enhancement: While land ownership positively affects income, its unequal distribution contributes to inequality. Therefore, land reform policies should aim at ensuring fair access to land, proper land records, and redistribution where feasible. Additionally, support should be provided for

improving land productivity through irrigation, modern farming techniques, and access to inputs, so that even small landholders can enhance their income.

Strengthening implementation of rural development schemes: Government programmes related to employment, housing, and livelihood support often fail to reach the most vulnerable due to poor implementation. There is a need for better monitoring, transparency, and awareness campaigns to ensure that tribal households can fully benefit from schemes such as wage employment programmes, livelihood missions, and subsidy-based initiatives.

Promotion of microfinance, SHGs, and financial inclusion: Encouraging the formation and strengthening of Self-Help Groups (SHGs) and improving access to microfinance can empower tribal households, especially women, to engage in small income-generating activities. Easy access to credit, savings facilities, and financial literacy programmes can help households invest in productive activities, smooth consumption, and reduce income inequality over time.

Targeted support for large households and vulnerable groups: Since larger household size negatively affects per capita income, policies should include targeted welfare measures such as nutrition programmes, healthcare support, and employment opportunities for multiple members within a household. This can help reduce the economic burden and improve overall household welfare.

Development of rural infrastructure and market access: Improving rural connectivity, transportation, and access to markets can enable tribal households to sell their products at better prices and access wider economic opportunities. Better infrastructure also facilitates the growth of non-farm activities, thereby supporting income diversification and reducing inequality.

8. Conclusion

The study concludes that income inequality among tribal households in Assam is not merely moderate in magnitude but deeply embedded in the structural characteristics of the rural economy. The estimated Gini coefficient clearly indicates an uneven distribution of income, where a relatively small proportion of households command a larger share of total income, while a significant number remain concentrated in the lower income groups. This pattern of inequality is largely explained by disparities in key socio-economic factors such as access to education, ownership of productive assets like land, and participation in non-farm income-generating activities.

The econometric results further reinforce that education and non-farm income opportunities are the most influential factors in enhancing household income, whereas unequal land distribution and larger household sizes tend to widen the income gap. These findings highlight that inequality in tribal areas is not accidental but arises from limited access to opportunities, low levels of human capital, and inadequate livelihood diversification.

Therefore, the study strongly suggests that reducing income inequality requires a multi-dimensional policy approach that prioritizes investment in education, expansion of skill-based and non-farm employment opportunities, and improved access to productive resources. Strengthening these areas can help create more balanced income distribution, enhance economic resilience, and promote inclusive and sustainable development among tribal communities in Assam.

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CONFLICT OF INTEREST

The author have declared that no competing interests exist.

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