

RESEARCH BRIEF

Extent of Rural Livelihood Diversification: The Case of the Bodos of Assam, India

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Micro-level study on livelihood diversification provides a basis for understanding the local environment and external socio-economic and institutional forces that govern the livelihood options. Each society has some distinct socio-cultural, economic, and demographic context, which, together with the resource base, shapes the livelihood strategies chosen in society. With a unique background and varieties in needs, the rural economy is characterized by deficits in avenues for work, which leaves the bulk of the rural workforce either unemployed or in underemployed status. The difficulties in meeting the means and ends of life very often force rural households to opt for a strategy of diversified economic activities. This process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standard of living is referred to as livelihood diversification (Ellis, 1998). Livelihood is a multifarious concept referring to what people do to manage revenue for living with the assets at their disposal and what they achieve by doing it in a particular context (Niehof, 2004). It is the process through which individuals, households, or communities try to satisfy their various consumption and economic needs, grapple with uncertainties, and respond to new opportunities (Haan & Zoomers, 2005).

Tribal economies are also characterized by a lack of diversity in resources and hence, depend mainly on few resources. Many times the tribal society depend on local ecology, traditional knowledge, and organization for their livelihood. As tribal communities love to

live close to the bio-diversity rich landscape, they have acquired location-specific and unique livelihood systematic plan which is suitable for their indigenous knowledge that is passed through generations.

Suryanarayana (1983) has found that the backward tribal economy, which is characterized by an extremely low level of economic activity, could provide meager employment opportunities. Although 70% of the tribal population depends on agriculture, the sector provides livelihood hardly for four months in a year. During the off-season, they again become unemployed without any gainful employment. By and large, they try to manage livelihood through different kinds of sources like collecting minor forest produce, fishing, hunting, and cutting of firewood between two agricultural seasons.

The Bodos (Boros) are the largest tribal group of Assam. The Bodos are a branch of the Great Bodo Group of the Indo-Mongoloid family falling within the Assam-Burmese linguistic section (Bordoloi, Sharma Thakur, & Saikia, 1987). According to the 2011 population census of India, (Table A – 11 (Appendix) District-wise Scheduled Tribe Population) the Bodo population in Assam stood at 13,61,735, out of which 8,99,907 live in the four districts, namely Baksa, Chirang, Kokrajhar, and Udalguri. Although the Bodos are predominantly agriculturists, they utilize the available resources and opportunities through the skills that they have acquired over time. However, changes in their livelihood perspectives over time have been noticed.

This paper, therefore, tries to find out the intensity of livelihood diversification among the Bodos of Assam. While unearthing the intensity of livelihood diversification, the paper attempts to seek answers to two research questions: (1) if there is any relationship between the levels of livelihood and the family income and (2) whether livelihood is more diversified within the farming sector, the non-farm sector, or between the farm and non-farm sectors.

Methods

The study is done in the Bodo land Territorial Area District (BTAD) of Assam, which has been constituted under the Sixth Schedule of the Constitution of India. The jurisdiction of BTAD extends over four districts, namely Baksa, Chirang, Kokrajhar, and Udalguri. The data for the study has been collected from all these four districts. One sub-division with the highest Bodo population of each district has been selected as the sample sub-division. From each sample sub-division, one development block having the highest Bodo population is selected as sample sub-division, which in the next phase is divided into Village Council Development Committee (VCDC). Two VCDCs, based on population size, are selected from each sample sub-division. In the next stage, 50% of the villages of each sample VCDC are taken as sample villages. Finally, 25% of households are selected randomly from each sample village. Thus, a total of 1,161 households have been picked for extensive data collection through the canvassing of a structured questionnaire.

The intensity of livelihood diversification is studied by constructing an index of diversification. Different studies (Khatun & Ray, 2012; Mandal & Bezbaruah, 2013; Saha & Bahal, 2014; Saikia & Goswami 2015; Dutta & Saikia, 2016; Khan, Tabassum, & Ahmad Ansari, 2017) have attempted to measure diversification in different context by using Simpson index because of its computational simplicity, robustness, and wider applicability in quantification of the intensity of diversification.

The Simpson index is calculated by using the following formula:

$$S.I. = 1 - \sum_{i=1}^N P_i^2$$

where N is the total number of income sources, and P_i represents the proportion of income coming from the i^{th} source. Its value lies between 0 and 1. The value of the index is 0 when there is complete specialization and approaches to 1 as the level of diversification increases.

One-way ANOVA has also been used to investigate the statistical difference between the means of livelihood diversity of different groups of the selected independent variables.

Results

The nature of the occupation, apart from determining the condition of economic well-being and standard of living of a family, determines the need and possibility of livelihood diversification. Traditionally, the livelihood pattern of the Bodos is characterized by the predominance of agriculture. They are very much open to the espousal of improved techniques in production. The present study has also found agriculture as the primary occupation of most of the Bodo people of BTAD.

In this study, the main occupation of the heads of the households has been categorized into two broad types: on-farm and off-farm occupation. The former covers the economic activities related to the agriculture and allied activities found in the sample households like farming, rendering service as agricultural labor, livestock rearing, and aquaculture. The activities related to the non-agricultural sector, like salaried jobs, skilled professions, petty business, handicraft, and wage labors, are included in the non-farm category of occupation.

It has been found that 38.5% of the household heads are engaged in on-farm occupation, whereas the remaining 61.5% are in non-farm occupation. However, cultivation is the single largest occupation as 35.49% of the households are engaged in their own farming, and 1.98% heads work as agricultural labor. The Ahu crop is cultivated along with Sali paddy on a massive scale by the Bodos. The application of modern agricultural implements, along with fertilizers and pesticides, has been noticed among the Bodo agriculturists. Moreover, as a subsidiary to the cultivation of rice and vegetables, some other cash crops like jute, mustard seeds, and sugarcane have also been grown.

Households choose to pursue a supplementary occupation if the income from the main occupation does not suffice the need and aspirations. Livelihood

diversification is done as the risk-minimizing strategy, which helps people to have income support over and above the primary source of income. A number of Bodo households have diversified income portfolios engaging in multiple economic activities. It has been seen that the unemployed Bodo youths have taken diversified self-employed occupation by availing either bank finance or the government-sponsored schemes.

Distribution of the head of the households by supplementary occupation shows that 1,223 households (73.63% of the total) have chosen on-farm activities as the supplementary occupation. Within the on-farm supplementary occupation, commercial rearing of livestock like pigs, goats, buffalos, cows, fowls, and ducks is dominating. On the other hand, 48.95% of household heads have taken different non-farm activities as supplementary occupations.

Table 1

Main Occupation of the Head of the Households

| Occupation | No. of households | Percentage |
|------------------------------|-------------------|--------------|
| On-Farm | | |
| Farming | 412 | 35.49 |
| Livestock | 12 | 1.03 |
| Agricultural labor | 23 | 1.98 |
| Total | 447 | 38.50 |
| Non-Farm | | |
| Salaried job (govt./private) | 291 | 25.06 |
| Wage labor | 282 | 24.29 |
| Skilled profession | 17 | 1.46 |
| Petty business | 110 | 9.47 |
| Handicraft | 14 | 1.21 |
| Total | 714 | 61.50 |

Source: Field Survey

Table 2

Supplementary Occupation of the Head of the Households

| Occupation | No. of households | Percentage |
|----------------|-------------------|--------------|
| On-Farm | | |
| Farming | 302 | 24.69 |
| Livestock | 841 | 68.87 |
| Aquaculture | 80 | 6.54 |
| Total | 1223 | 100.0 |
| Non-Farm | | |
| Petty business | 763 | 93.85 |
| Handicraft | 50 | 6.15 |
| Total | 813 | 100.0 |

Source: Field Survey

It is, thus, seen that the Bodos have adopted a diversified strategy of livelihood. The extent of livelihood diversification has been quantified by constructing the Simpson index. The extent of diversification is almost similar in all four districts of BTAD as the index of livelihood diversification in the districts varies between 0.48 and 0.38. The highest and lowest index value has been found in Udalguri (0.48) and Baksa (0.38), whereas the other two districts Kokrajhar (0.40) and Chirang (0.39) fall in between. This reflects more or less uniform economic and infrastructural conditions confronted by the Bodos in all the four districts of BTAD. The value of the Simpson Index of diversification for the entire BTAD is 0.42, which is higher than the state level (0.39) but less than the national level (0.54) of diversification, as found by Khan et al. (2017).

To examine the intensity of livelihood diversification at the unit level of study, the sample households have been classified based on the level of diversification into six categories: not diversified, least diversified, less diversified, moderately diversified, highly diversified, and fully diversified. The first and the last categories will have the minimum and the maximum values that the Simpson index can assume. The remaining four categories are obtained by applying the mean (\bar{x}) and the standard deviation (σ) of the household level diversification index value.

From the Table 3, it is apparent that 7.06% of households are not diversified and pursue only

one source of income. On the other hand, 2.41% of households are found to be fully diversified with diversification index value of 1.

The paper seeks to answer the research question of whether there is any relationship between the levels of livelihood and the family income. It has been found that the average annual income is the highest among the households that have not diversified their livelihood at all. On the other hand, the mean annual income is the lowest among those households that have fully diversified their livelihood. The mean level of income is found to have moved reversely with the intensity of livelihood diversity. As the index of livelihood diversification scales up, the mean level of annual income has gone down.

To test whether the difference among the mean annual incomes of the households with different diversity indexes is statistically significant or not, analysis of variance (ANOVA) was made. The F-value (i.e., 66.16) is significant at 0.01 level, which signifies that the difference among the mean annual incomes is statistically significant. Furthermore, the Carl Pearson correlation coefficient between income and the value of the Simpson index is found to be negative (i.e., -0.374) and significant at 1% level of significance. Thus, there is a negative relationship between the levels of livelihood diversity and family income.

The poor people, in particular, normally diversify their sources of livelihood to overcome a risk-prone and uncertain world. In low-income societies

Table 3

Status of Livelihood Diversification of the Sample Households

| Basis of classification | Index value | Status of diversification | No. of Households | Percentage |
|---------------------------------|--------------|---------------------------|-------------------|------------|
| Minimum Value | 0 | Not diversified | 82 | 7.06 |
| $\bar{x} - \sigma$ to >0 | 0.23 to >0 | Least diversified | 99 | 8.53 |
| \bar{x} to $\bar{x} - \sigma$ | 0.41 to 0.24 | Less diversified | 280 | 24.12 |
| \bar{x} to $\bar{x} + \sigma$ | 0.42 to 0.60 | Moderately diversified | 530 | 45.65 |
| $\bar{x} + \sigma$ to <1 | 0.61 to <1 | Highly diversified | 142 | 12.23 |
| Maximum Value | 1 | Fully diversified | 28 | 2.41 |

$\bar{x} = 0.42, \sigma = 0.18$

Source: Field Survey

Table 4*Status of Diversification and Level of Income of the Sample Households*

| Status of diversification | No. of Households | Percentage | Mean No. of income sources | Mean income | F-value |
|---------------------------|-------------------|------------|----------------------------|-------------|------------------------------------|
| Not diversified | 82 | 7.06 | 1 | 326571 | |
| Least diversified | 99 | 8.53 | 3.12 | 321879 | |
| Less diversified | 280 | 24.12 | 2.86 | 198844 | 66.16 (p<0.01) |
| Moderately diversified | 530 | 45.65 | 2.87 | 136869 | |
| Highly diversified | 142 | 12.23 | 2.88 | 132758 | |
| Fully diversified | 28 | 2.41 | 3.33 | 93943 | |

Source: Field Survey

characterized by the predominance of agriculture as the primary source of livelihood, people tend to diversify the livelihood options. The seasonal nature of farming, due largely to the absence of irrigation facility, makes those who are engaged in farming either unemployed or underemployed for a part of the year. Households in farming can, therefore, utilize family labor and increase the family income by diversifying the livelihood. Moreover, farm income is often uncertain on account of crop failure and volatility of market conditions for farm products. Therefore, as a risk averting strategy, persons engaged mainly in farming simultaneously undertake either other farm-sector activities or non-farm sector activities as a supplementary source of income. Diversification provides important livelihoods by providing flexible sources of income when primary activities fail to provide the livelihood. On the contrary, non-farm economic activities are subject to less uncertainty. Consequently, households having a main occupation in the non-farm sector are less prone to livelihood diversification. Therefore, an attempt is

made to examine whether livelihood is more diversified within the farm sector, within the non-farm sector, or between the farm and non-farm sectors.

Table 5 shows that there is a substantial difference in the means of the Simpson index of diversity across the sectors. The mean livelihood diversification index is the highest within the farm sector, whereas the diversification is the least within the non-farm sector. To know whether or not the difference between the mean diversity indexes across the sectors is statistically significant, analysis of variance (ANOVA) is made. The F-value (i.e., 13.95) being significant at 0.01 level, it can be said that the difference among the means is statistically significant. These results suggest that households with the main occupation in the farm sector tend to diversify the livelihood more than those with the main occupation in the non-farm sector.

The explanation for a lower level of livelihood diversification within the non-farm sector and higher within the farm sector livelihood sources can be found in the levels of the annual income of the households

Table 5*Livelihood Strategy and Index of Livelihood Diversity*

| Sectoral Livelihood strategy | No. of households | Percentage | Mean diversity index | F-value |
|----------------------------------|-------------------|------------|----------------------|--------------------------|
| Within farm sector | 28 | 2.59 | 0.52 | 13.95 (p<0.01) |
| Within non-farm sector | 33 | 3.06 | 0.33 | |
| Between farm and non-farm sector | 1018 | 94.35 | 0.45 | |

Source: Field Survey

Table 6*Livelihood Strategy and Level of Income of the Sample Households*

| Livelihood strategy | No. of households | Mean No. of income sources | Mean income | F-value |
|----------------------------------|--------------------------|-----------------------------------|--------------------|-------------------------|
| Within farm sector | 28 | 2.00 | 103000 | 5.63 (p<0.01) |
| Within non-farm sector | 33 | 2.00 | 264000 | |
| Between farm and non-farm sector | 1018 | 2.94 | 176000 | |

Source: Field Survey

having diversified their livelihood within the farm sector, within the non-farm sector, and between the two sectors. The mean number of income sources of the households diversifying livelihood within the farm sector and within the non-farm sector is 2, whereas that for the households that have diversified the livelihood between the farm and non-farm sector activities is 2.94. The average annual household income is the highest for those households which have diversified livelihood within the non-farm sector and lowest among the households diversifying livelihood within the farm sector. The F-value (i.e., 5.63) obtained from the analysis of variance being significant at 0.01 level, it can be said that the difference among the means is statistically significant. These findings suggest that households having farming as the main livelihood source tend to diversify the livelihood as they have a low level of income, whereas the households having main livelihood source in the non-farm sector diversify less their livelihood as they have a high level of income.

Conclusion

The study finds that, although agriculture is the primary occupation of most of the Bodo people of Assam, they have adopted a diversified strategy of livelihood. The extent of livelihood diversification, measured in terms of the Simpson index of diversity, is found to be 0.45, which is greater than the state level (0.39) but less than the national level (0.54) of livelihood diversification. Only a small percentage (i.e., 2.41) of the sample households are fully diversified, whereas the majority of the households (i.e., 45.65%) are moderately diversified. A negative relationship between the levels of livelihood diversity

and the family income is found, implying that as the mean level of annual income accelerates, the index of livelihood diversification moves down.

The mean livelihood diversification index is the highest within the farm sector, whereas the diversification is the least within the non-farm sector. It indicates that households having farming as the main livelihood source tend to diversify the livelihood as they have a low level of income, whereas households having main livelihood source in the non-farm sector diversify less their livelihood as they have a high level of income. The reason for the sectoral difference in the extent of livelihood diversity is the differential in the levels of income. The farm income is subject to uncertainty due to the seasonal nature of farming, crop failure, and volatility of market conditions for farm products. Therefore, as a risk averting strategy, households engaged mainly in farming are likely to diversify their livelihood to utilize the family labor and increase the family income.

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Declaration of ownership

This report is our original work.

Conflict of interest

None.

Ethical clearance

This study was approved by the institution.

References

- Agyeman, B. A. S. (2014). Determinants of income diversification of farm households in Western Region of Ghana. *Quarterly Journal of International Agriculture*, 53(1), 55-72. Retrieved from <https://ideas.repec.org/a/ags/qjiage/195729.html>
- Babatunde, O.R., & M. Qaim (2009). Patterns of Income diversification in Rural Nigeria: Determinants and impacts. *Quarterly Journal of International Agriculture*, 48(4), 305-320. Retrieved from https://www.researchgate.net/publication/287634427_
- Bordoloi, B.N., Sharma Thakur, G.C., & Saikia, M.C. (1987). *Tribes of Assam: Part I*. Assam: Tribal Research Institute. Retrieved from <https://www.abebooks.com/Tribes-Assam-Part-Bordoloi-Thakur-G.C/1051373888/bd>
- Davendra, G., Smale, M., Maxted, N., Cole, M., Sthapit, B.R., Jarvis, D., & Updhyay, M.P. (2005). Socioeconomic and agroecological determinants of conserving diversity on-farm: The case of rice genetic in Nepal. *Agricultural Research Journal*, 6, 1-10. Retrieved from <https://www.nepjol.info/index.php/NARJ/article/view/3370>
- Dutta, A. R., & Saikia, S. (2016). Crop diversification in Assam: Extent, nature and determinants. *Man & Development*, 38(2), 21-33. Retrieved from <http://www.crrid.res.in/journal/?cat=46>
- Ellis, F. (1998). Household strategies and rural livelihood diversification. *The Journal of Development Studies*, 35(1), 1-38. Retrieved from <http://www.sciepub.com/reference/188153>
- de Haan, L., & Zoomers, A. (2005). Exploring the frontier of livelihoods research. *Development and Change*, 36(1), 27-47. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.470.846&rep=rep1&type=pdf>
- Khan, W., Tabassum, S., & Ahmad Ansari, S. (2017). Can diversification of livelihood sources increase income of farm households? A case study in Uttar Pradesh. *Agricultural Economics Research Review*, 30, 27-34. Retrieved https://www.researchgate.net/publication/321163449_Can_Diversification_of_Livelihood_Sources_Increase_Income_of_Farm_Households_-_A_Case_Study_in_Uttar_Pradesh
- Khatun, D., & Ray, B.C. (2012). Rural livelihood diversification in West Bengal: Determinants and constraints. *Agricultural Economic Research Review*, 25(1), 115-124. Retrieved from <https://pdfs.semanticscholar.org/64a9/393053dd52f20b8cf6a9a3e6f6b54419c461.pdf>
- Mandal, R., & Bezbaruah, M.P. (2013). Diversification of cropping pattern: Its determinants and role in flood affected agriculture of Assam plains. *Indian Journal of Agricultural Economics*, 68(2), 168-175. Retrieved from <https://econpapers.repec.org/RePEc:ags:inijae:206329>
- Niehof, A. (2004). The significance of diversification for rural livelihood systems. *Food Policy*, 29(4), 321-338. Retrieved from <https://econpapers.repec.org/RePEc:ee:e:jfpoli:v:29:y:2004:i:4:p:321-338>
- Saha, B., & Bahal, R. (2012). Constraints impeding livelihood diversification of farmers in West Bengal. *Indian Research Journal of Extension Education*, 12(2), 59-63. Retrieved from <https://www.seea.org.in/vol12-2-2012/12.pdf>
- Saha, B., & Bahal, R. (2014). Livelihood diversification pattern among the farmers of West Bengal. *Economic Affairs*, 59(3), 321-334. Retrieved from <http://ndpublisher.in/admin/issues/EAV59N3a.pdf>
- Saikia, K. K., & Goswami, C. (2015). Nature and extent of income diversification. *International Journal of Economics, Commerce and Research*, 5(5), 41-53. Retrieved from <https://tinyurl.com/v2h416t>
- Schwarze, S., & Zeller, M. (2005). Income diversification of rural households in Central Sulawesi, Indonesia. *Quarterly Journal of International Agriculture*, 44(1), 61-73. Retrieved from <https://tinyurl.com/wwct7eg>
- Suryanarayana, C. (1983). Achievements of integrated tribal development programme. *Kurukshetra*, 31(9), 17-18. Retrieved from <https://tinyurl.com/wf2udsm>