Jyoti Jee and Yadawendra Singh (January 2023). Pattern of Agricultural Diversification in Bihar

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Pattern of Agricultural Diversification in Bihar

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Abstract

With more than half of the total population of the state deriving its livelihood from agriculture, it is the mainstay of the economy of Bihar. Though it provides employment to a large chunk of population but its contribution to the state's GSDP is only around 20 percent. One of the major reasons for the lower share of agriculture sector in Bihar's GSDP could be its lower productivity. In order to increase the agricultural productivity, there is a need to revolutionize the agriculture sector, which not only would help in enhancing farmer's income but would also help in alleviating poverty of the rural population and would lead to the all-round development of the state. Since pressure on land is already high in the state, the scope for further expansion of agriculture in the state is very limited and therefore agricultural diversification becomes the need of the hour. It is against this backdrop that the paper analyses the pattern of agricultural diversification in the various agro-climatic regions of Bihar. For the fulfilment of theaforementioned objective the paper utilises the NSS 77th round data (Schedule 33.1). For measuring agricultural diversification, we have used Simpson Index, whose value ranges between 0 to 1, where 0 indicates complete specialisation and 1 indicates complete diversification. The results suggested that the value of Simpson Index for Bihar was 0.59 which was significantly lower than the index value for all India which stood at 0.70. The regional analysis of agricultural diversification indicated that the value of Simpson Index varied among all the agro-climatic zones of Bihar. It was highest for North East Zone(0.59) followed by South Bihar Zone (0.54) and North West Zone (0.52). The existing literature suggest that there is a positive relationship between agricultural diversification and farmer's profit,there is a need to promote diversification in the state and the farmers must also be sensitised accordingly.

Introduction

Having attained the BIMARU tag, Bihar is among the poorest and one of the most backward states of India with around 76 percent of its population dependent on agriculture, forestry and fishing industry (Bihar Economic Survey, 2022-23). With a large chunk of population engaged in agricultural activities, the importance of the sector increases, as the development of the agricultural sector will directly affect the people absorbed in the sector. With the limited scope for getting

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employment in the secondary and tertiary sector, more and more people rely on agricultural sector for their livelihood in the state. Moreover, it must also be noted that due to increasing pressure of population on the agricultural land, the further absorption of labour force is not possible in this sector. Under such a scenario agricultural diversification may playa key role in living standard of rural households in Bihar as it acts as an important tool for enhancing income and improving livelihood options, especially in the rural areas(Birthal, Roy, & Negi, 2015; Joshi, Gulati, Birthal, & Tewari, 2004; Pingali & Rosegrant, 1995; Sen, Venkatesh, Jha, Singh, & Suresh, 2017; Singh, Kumar, & Singh, 2006). Not only this,agriculture diversification also has greater poverty reduction effect as compared to other sectors(de Janvry & Sadoulet, 2009; Ravallion & Datt, 1996).

The existing studies show that the land holding size is inversely related to the agricultural diversification anddue to continuous fragmentation of land holding, most of the farmers in Bihar are either marginal or small farmers. Therefore, the importance of agricultural diversification increases manifold for a state like Bihar. It is against this backdrop that the paper tries to examine the regional pattern of agricultural diversification in Bihar for all the agroclimatic regions of the state to assess the level of diversifications.

Agroclimatic zones of Bihar

Depending upon the climatic characteristics, topography, rainfall, humidity, soil Bihar can be divided broadly into three agroclimatic zones (Government of Bihar, 2009):

1) North-West Zone- This zone includes 13 districts which are as follows- Saran, Gopalganj, Muzaffarpur, Siwan, Darbhanga, Sheohar, West champaran , East Champaran, Sitamarhi, Vaishali, Madhubani, Samastipur, Begusarai. The zone slopes in south east direction. It has an altitude of 31- 61 metres.
2) North-East Zone- Districts like Katihar, Purnea, Khagaria, Supaul, Saharsa, Madhepura, Araria, Kishanganj come under this zone. It is a combination of the fertile alluvial plains of the Mahananda, Kosi and Ganga rivers. This zone too has a south -east slope.
3) South Bihar Zone: This zone is further divided into two categories.
    a) South-East Zone- The districts which come under the south-east zone are Munger, Lakhisarai, Banka, Sheikhpura, Bhagalpur and Jamui
    b) South-West Zone- This zone includes the districts of Rohtas, Arwal, Patna, Bhojpur, Gaya, Aurangabad, Jehanabad, Kaimur, Nalanda, Nawada and Buxar.

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Characteristics of the Agroclimatic Regions of Bihar

Agro - climatic Zones	Districts	Soil	Ph	Annual Rainfall (cms)	Temperature Degree Celsius	
					Maximum	Minimum
North-west agro climatic zone	E. Champaran, W. Champaran, Sheohar, Sitamarhi, Gopalganj, Siwan, Saran, Muzaffarpur, Darbhanga, Vaishali, Samastipur	Sandy loam, Loam	6.5-8.4	120.6	34 -37	7 - 10
North-east agro climatic zone	Supaul,Araria, Kishanganj, Saharsa, Madhepura, Purnea, Begusarai, Khagaria, Katihar	Sandy loam, Clay loam	6.5-7.8	138.5	32 - 34	4 - 9
South-east agro climatic zone	Sheikhpura, Lakhisarai, Munger, Bhagalpur, Jamui, Banka	Clay, Clay loam, Loam, Sandy loam	6.5 - 8	110.5	34 - 38	7 - 10
South-west agro climatic zone	Buxar, Bhojpur, Patna, Kaimur, Rohtas, Arwal, Jehanabad, Nalanda, Aurangabad, Gaya, Nawada	Clay, Clay loam, Loam, Sandy loam	6.5 - 8	110.5	34 - 38	7 - 10

Source- Directorate of Statistics and Evaluation, Govt. of Bihar, 2004.

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Data and Methodology

In order to fulfil the above mentioned objective the use of NSS 77th Round Data, Schedule 33.1 has been done on Land and livestock holding of households and situation assessment of agricultural households. The data has been collected from the households in one visit. It consists of the period from July – December 2018 which is the Kharif season.

We have included crop and livestock diversification under agricultural diversification. For the measurement of diversification in agriculture, Simpson Index has been used , the formula of which is as follows-

$$SID = 1 - \sum_{i=1}^{n} P_i^2$$

Where, SID = Simpson index of diversity and P*i* is the value or the proportion of area of*i*th crop/livestock/fishery farming in the total output value. The SID has a range value of 0 to 1, in which 0 implies complete specialisation.

Results and Discussions

Before we analyse the pattern of diversification, it is important to analyse the distribution of households according to size category of operational holdings. As we can observe from Table 1, the percentage of marginal land holding is the highest across all the agroclimatic regions followed by small land holdings. Overall, 88.8 per cent of the households in Bihar are marginal as per this categorisation, which is much higher than the rest of India. Our findings are corroborated by the findings of Agricultural Census 2011, according to which percentage of marginal and small farmers in Bihar is 97 per cent.Our further perusal of the table reveals that the marginalisation is the highest in North-west zone (92.3 per cent) followed by North-east zone (90.2 per cent). Further, we can also observe from the table that the percentage of large land holdings is either absent or very negligible for all the regions of Bihar. Higher marginalisation of landholdings clearly indicates towards the heavy pressure on land in Bihar, which is going to increase further in the near future since Bihar's TFR of 3 is the highest among Indian states and much higher than the replacement level fertility (NFHS 5, 2019- 21). With smaller landholding in the state, it is very difficult to increase the agricultural yield in the state as uses of advance techniques in agriculture also require large landholdings.Therefore, agricultural diversification in this situation can be a better livelihood option in the state.

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Table 1: Distribution of households according to size category of operational holding in different agro-climatic regions of Bihar, 2018.

	North-West zone	North-East zone	South Bihar zone	Total
Marginal	92.3	90.2	83.7	88.8
Small	6.2	7.8	12	8.6
Semi-medium	1.4	1.9	3.8	2.4
Medium	0.1	0.1	0.2	0.2
Large	0	0	0.2	0.1

Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

Table 2: Distribution of households according to size category of operational holding in South Bihar region of Bihar, 2018.

	South-East Zone	South -West Zone	South Bihar Zone
Marginal	81.5	84.6	83.7
Small	13.8	11.4	12
Semi-medium	4.6	3.5	3.8
Medium	0.1	0.3	0.2
Large	0	0.3	0.2

Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

The extent of diversification is very much dependent on the land utilisation pattern, which is shown in Figure 1. The figure demonstrates that 78.3 per cent of the households in Bihar use their land for only growing crops, 17.6 per cent of the households use their land for both farming of crops and farming of animals and only 4.1 per cent of the households use their land only for farming of animals. Similar pattern is observed across all the agroclimatic zones of Bihar.The percentage of households using their land for only growing for crops is the highest in the North-west zone (92 percent), followed by South-west Bihar zone (74.9 percent). The percentage of land used only for farming of animals is quite less across all the regions; it is the highest in North-east zone with 14.6 percent. Farmland used for both farming of crops and animals is highest in South-east Bihar zone (31.2 percent) and lowest in North-west zone (7.1 percent). The findings clearly show that though some farmers are diversifying their land but majority of them are sticking to their traditional practices and are not willing to take risk or they are not capable of taking decisions to diversify.

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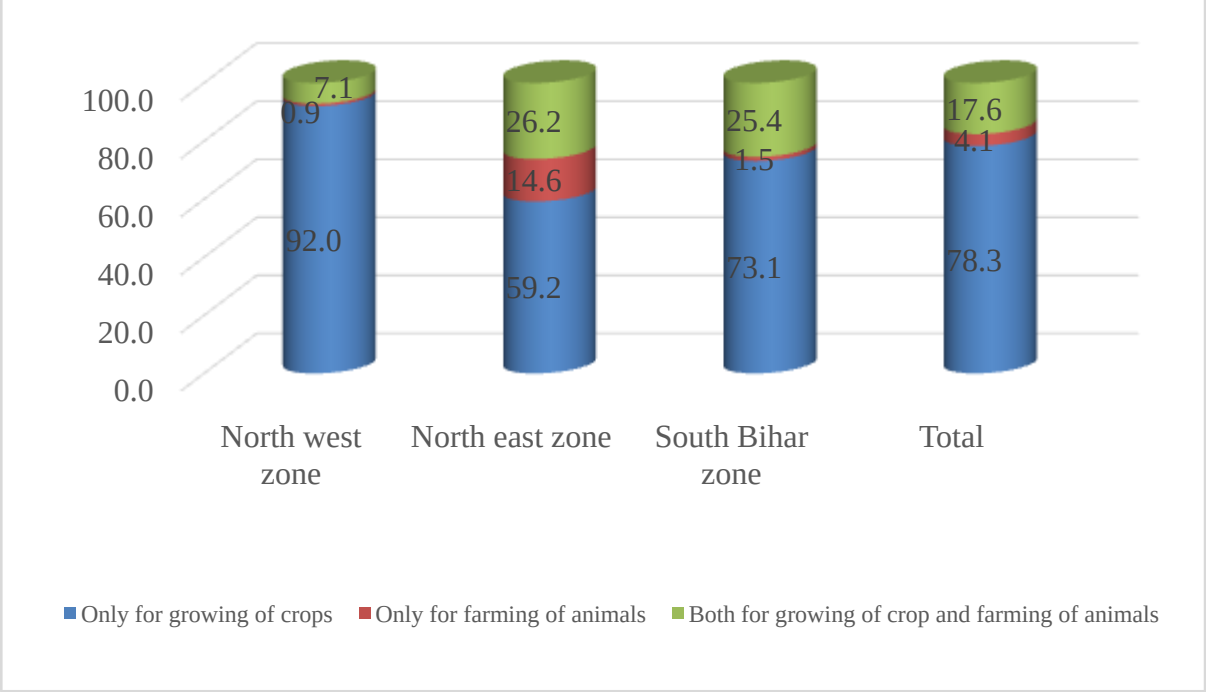
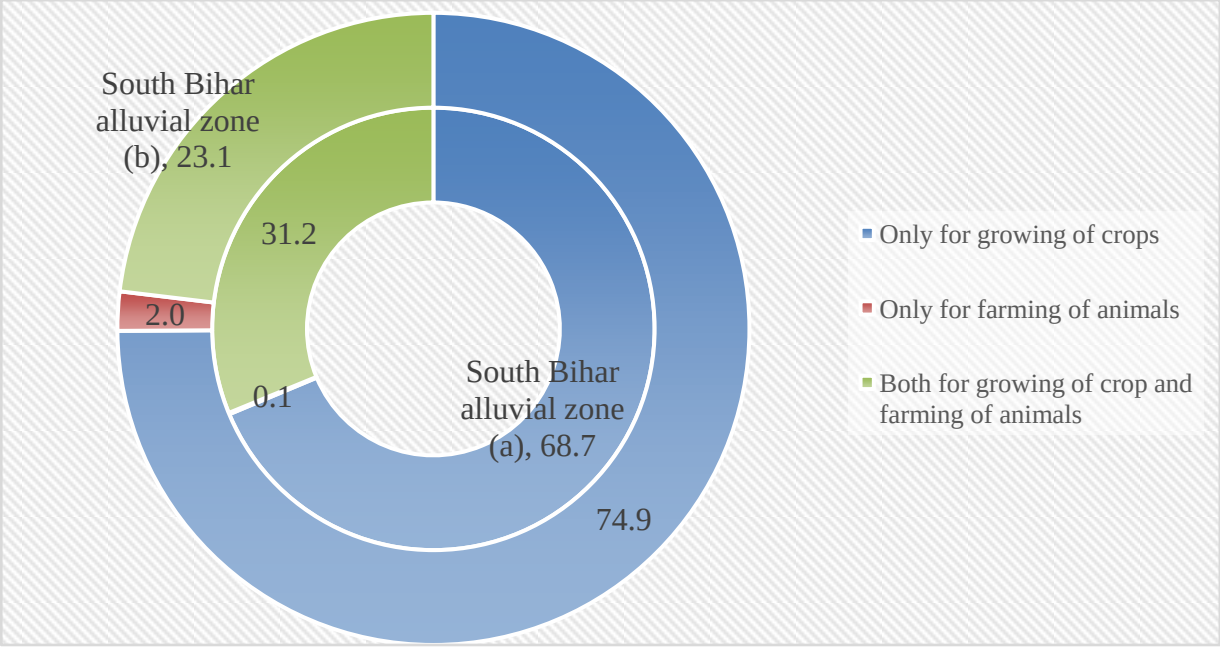
Figure 1: Major uses of land holdings in different agroclimatic regions of Bihar, 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

Figure 2: Major uses of land holdings in South Bihar zone, 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

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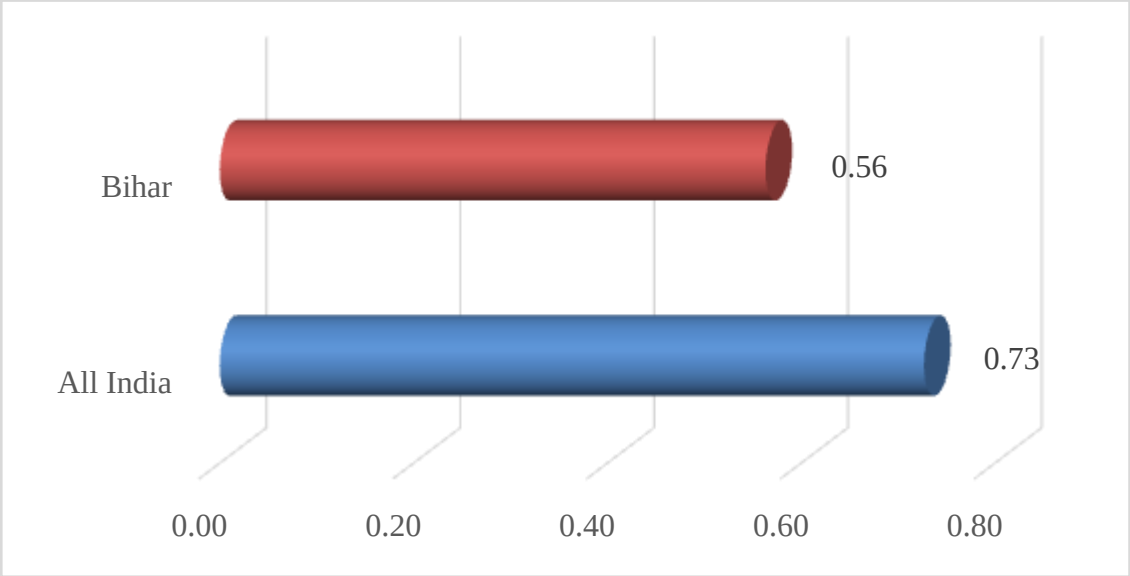
Pattern of diversification in Bihar

Extent of diversification for Bihar and all India is shown Figure 3. Our perusal of the figure indicates that the level of agricultural diversification in Bihar is very low as compared to all Indian. The index value of agricultural diversification at All India level for Kharif season was 0.73 whereas for the same period this value for Bihar was 0.56, which is much lower than the national level.

Figure 3: Simpson Index of diversification for Bihar and all India,July to December 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

If we look at the pattern of agricultural diversification across the different agroclimatic regions in Bihar, we find that it differs for all the regions and the level of diversification is also very insignificant across the regions. With this minimal level of diversification, achieving an all-round development in the agricultural sector is a very hardy task. With an index value of 0.38 North west zone tops the list, followed by South Bihar east zone which has a value of 0.33. north east zone attains a value of 0.28 and with 0.08 value South west Bihar zone stand at the bottom of the level of agricultural diversification.

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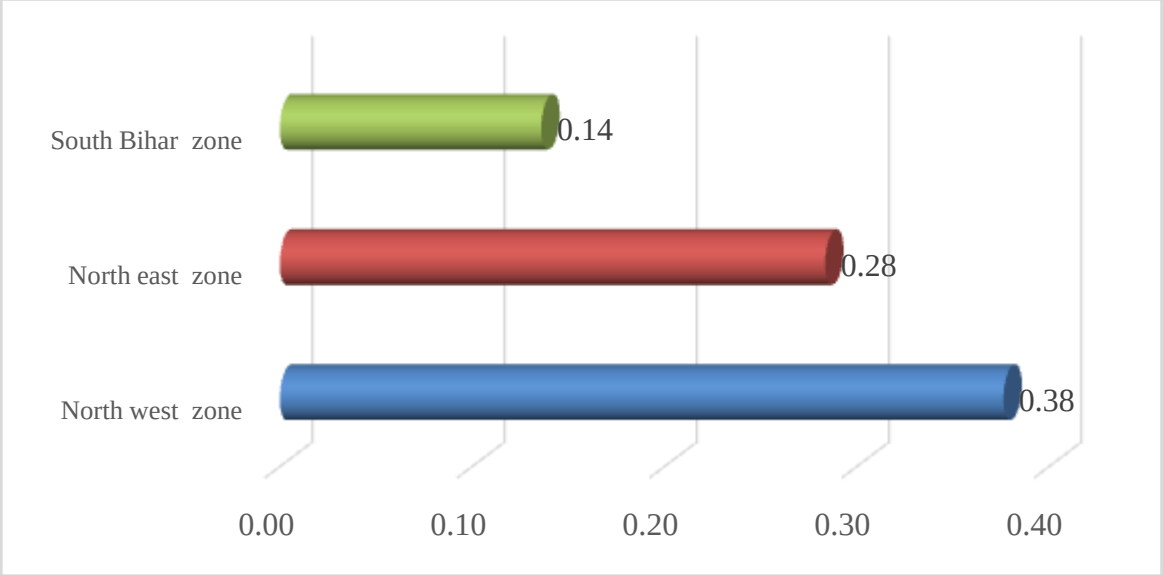
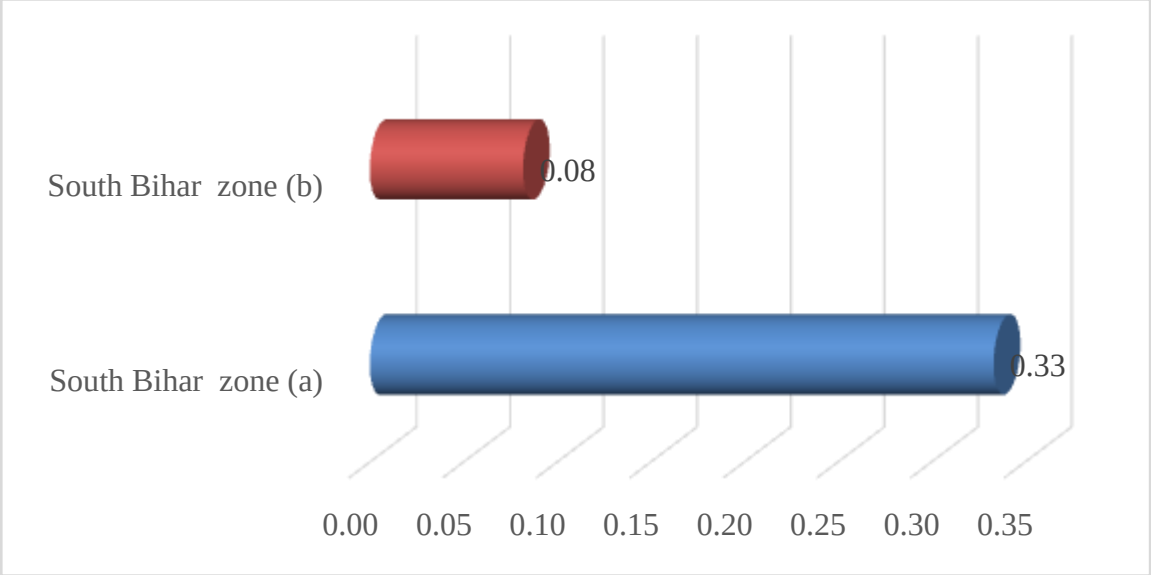
Figure 4: Agroclimatic zone wise Simpson Index of agricultural diversification In Bihar, July- December 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

Figure 5: Simpson Index of diversification for south Bihar zone, July- December 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

After analysing the overall diversification pattern, it is also important to analyse what kind of households are diversifying more. For this purpose, we have analysed the diversification pattern for different size category of operational holdings (Figure 5). As can be observed from the figure

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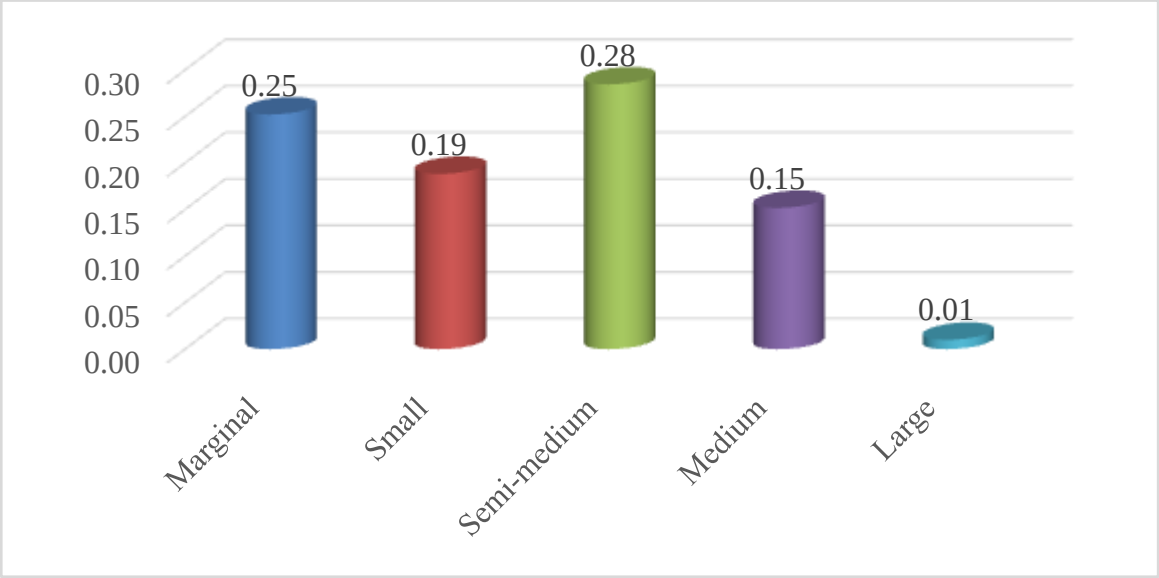
that diversification is found to be the highest for marginal households (0.28) and the least for large farmers (0.01). The obvious reason for relatively higher diversification amongmarginal/small farmers is that they do not have much option but to rely on other source of livelihood for their survival. On the other hand, large farmers have sufficient income from crop production and hence they do not need to diversify to other source of income for their livelihood.

Figure 6:Simpson Index of diversification for different size categories of operational holdings, July-December 2018



Source: *NSS 77th round (Schedule 33.1) on "Land and Livestock holding of households and situation of agricultural households", 2019*

Conclusion

The study analysed the pattern of diversification in Bihar and its different agroclimatic zones.The findings revealed that marginalisation of farmers is much higher in the state and in its different agroclimatic zones (the percentage of marginal households in the state is around 88.8 per cent). Further, we found that most of the households in the state used their land only for growing crops, which indicates towards lower diversification towards other non-farm source of income.

In order to assess diversification, we used Simpson index. The findings demonstrated that the index value was very low for Bihar and its value differed across the regions. The index value was the highest for North-west zone (0.38) and the least in South Bihar zone (0.14). finally analysing diversification for different types of households, we found that diversification was the least among large farmers (0.01) and the highest among marginal farmers (0.25).as mentioned earlier, large farmers are drawing sufficient income from farming of crops and hence they do not need to diversify. On the other hand, the income from farming of crops might not be sufficient for

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marginal/small farmers and they therefore they must diversify for their survival. It must be noted that agriculture sector in Bihar do not have much scope for further expansion and at the same time diversification offers better livelihood options. Therefore, a compact and proper policy should be formulated to boost the pace of agricultural diversification in the state as this sector plays a dynamic role in the economy of the state.

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