Original Research Article

Stylized Fact Approach to Income Distribution Pattern Among Fish Seed Producers in Jharkhand, India

Abstract

One of the serious impediments to sound policy on freshwater aquaculture is the lack of farm-level data and consistent empirical evidence, especially on income. To understand the income generation through fish seed production through the community participation approach initiative of the Directorate of fisheries, Jharkhand, we analyzed the income distribution pattern of 498 fish seed producers of Jharkhand. The data was collected from different districts of Jharkhand by DoF for the year 2017-18. The results revealed high gender disparity in fish seed production as only 2.41 per cent were found out to be women. It was observed that fish seed production has a high potential to be a very lucrative business as income showed wide variation ranging fromRs.50,000 to Rs.27,50,000. The Lorenz curve analysis showed moderate-income inequality indicating a higher concentration of income with the top 10 per cent of the population. Further investigation showed that the top 10 per cent of the population earned 60 per cent of total cumulative income which was higher than the national average which was 57 per cent while the bottom 50 per cent of the population earned just 20 per cent of total cumulative income. The income inequality from the GINI co-efficient was 0.48 which was lower than the national average which was 0.55. The study concludes that though income inequality is lower than the national average however the concentration of income with top 10 per cent was higher than the national average. A more detailed study on fish seed production is needed to understand the underlying facts for the disparity in income distribution among fish seed producers.

Keywords: Income Inequality, Lorenz curve, Gini Coefficient, Stylized Fact

1. Introduction

World Bank classifies India among lower-middle-income economies based on GNI per capita which ranges from $1046 to $4,095 [9]. Oxfam India in its 2018 annual report observed India has one of the highest wealth inequality with a Gini coefficient of 0.83. On income inequality, Oxfam stating data limitation finds that the latest data is available from India Human Development Survey (IHDS) and says it was on rising trends from 0.53 to 0.55 GINI index since 2004-05 to 2011-12 which is indicative of India having High-income inequality and was on a rising trend [7]. About 58 per cent of the Indian population in India and 70 per cent of the rural population are dependent on agriculture and allied sectors. Dalwai, 2012 says that agrarian distress can't be neglected which was due to declining productivity and growth rate from the mid-nineties [2]. India being the second most populated country and more than 50 per cent of the population dependent on agriculture which is under stress shows a very grim situation for the which has one of highest wealth Inequality and high-income inequality. The marginalized communities having subsistence livelihood are always on the edge of the receiving ends when the economy is in such bad shape. India is faced with another inequality that exists between different states, the southern states are comparatively more prosperous compared to northern states especially stakes that come under the cow belt which is also popularly known as BMRU states which includes Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

Jharkhand, which was carved out of Bihar through Bihar state reorganisation act 2000 passed in Lok Sabha and Rajya Sabha on 2 and 11 August 2000 and officially came existence on 15 November 2000 is one of the most impoverished states in the country. However, Jharkhand has been embarking on the road of development ever since its formation and various sectors like service, industries and agriculture are making strenuous efforts to elevate the socio-economic status of the people. The agriculture and allied sectors are one the most important sector as 80 per cent of the population are dependent on agriculture [8]. Niti Ayog CEO Amitab Kant lauded Jharkhand at Agriculture and Food Summit 2018 for registering a 19 per cent growth rate in the agricultural sector [1]. Such statement from the working head of India's apex economic think tank we can assume that growth in agriculture sector the economics condition of the rural population is expected to improve, however, there is a dearth of literature to vindicate this hypothesis while on the contrary Jharkhand

economic survey 2020-21 writes that Agriculture, forestry and fisheries grew only at 2.1 compound annual growth rate (CAGR). Per capita income of Jharkhand for the year 2018-19 stood at Rs.57,863 at constant price and 79,873 at the current price which was lower than the national average which was Rs.87.828 and Rs.115293 at constant and current prices [6]. Within the Agriculture and allied sectors fisheries sectors showed the highest growth rate of 12.4 per cent from 2011-12 to 2018-19 [6]. This has been possible due to the effort of Directorate fisheries, Jharkhand rolling out various schemes and training programmes to empower local communities to take fisheries and aquaculture activities for their economic empowerment resulting in accelerated fish production in the state. On such initiative taken up by the DoF, Jharkhand is fish seed production through a community based participatory approach to financially empower them. This initiative serves two purposes that to reduce the existing gap in the demand and supply of fish seed in the state and provide income sources to marginalised communities. The objective of the present study is to evaluate the income distribution pattern among fish seed producers in the state.

2. Materials and Methods

Most of the rivers in Jharkhand are seasonal, however during the dry season when the river bed is dug it gets accumulated with ground water. DoF, Jharkhand found an innovative idea to utilize these water rich river beds for fish seed production before the on set of monsoon when the which seed is in high demand. The nursery ponds were dug and fertilized with locally prepared organic manure named “Jeva Amrit” which was a mixture of cow dung, cow urine, jaggery gram flour mixed in water. The seed was supplied to the communities by the department before the onset of the raining season so that seed get ready by onset of culture season which has also helped to reduce the dependency for fish seed from outside. The seeds were also supplied to those who have their private ponds and are interested in the fish seed production business. The Directorate of fisheries provide training to the communities on fish seed production and also evaluate the scheme by collecting feedback and collecting data on income from fish seed sale. The data for the current study was collected by the Directorate fisheries in the year 2018-19. The analytical framework like mean, percentage, annual growth rate, average annual growth rate, compound

annual growth rate, trend analysis, Lorenz curve and Gini coefficient has been employed for the present study are:

Sample size

A total of 498 fish seed producers was randomly selected and information on income from the fish seed sale was collected. Fig:1 provides the district wise sample size from selected districts.

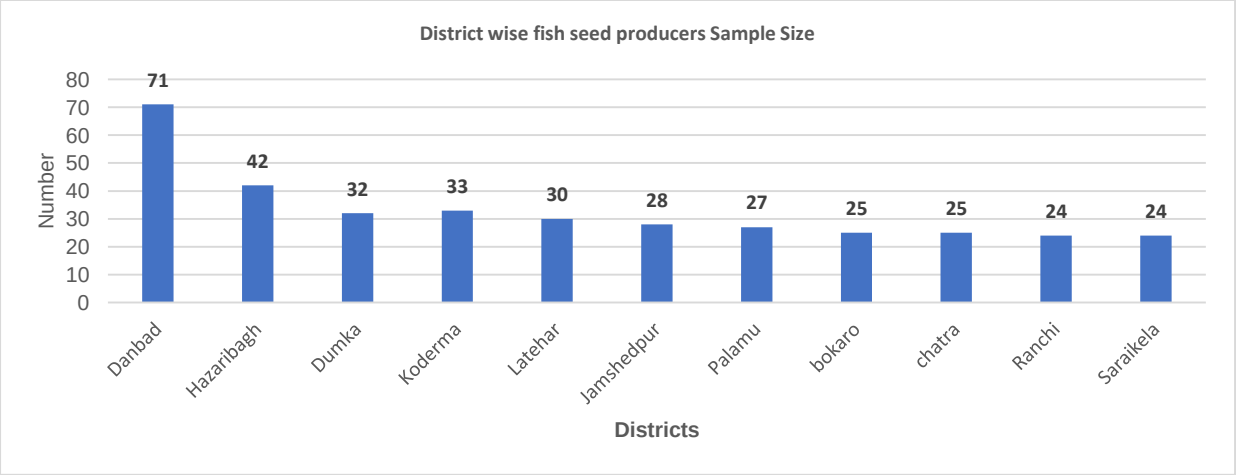


Fig:1 District wise sampled fish seed producers

Gini Concentration ratio

Gini Coefficient [5] defines as a tool measure of inequalities in the come distribution, which can be derived from the Lorenz curve. Gini coefficient is the area enclosed between the line of absolute equality and the Lorenz curve as a portion of the total area under the line of absolute equality. Thus,

Gini Coefficient = Area between Lorenz curve and diagonal/Total area under diagonal

The Gini Coefficient can take the maximum value of 1 (absolute inequality) and a minimum value of 0 (absolute equality). Empirically estimation of Gini Concentration ratio can be estimated as follows

$$L = 1 - \sum_{i=1}^{n} P_i \, (I_i + I_{i-1})$$

Where,

Pi = Cumulative proportion of farm at ith class

Ii = Cumulative proportion of total income at ith class

i = 1, 2, 3….n

n = Number of classes in the distribution.

L = Gini Coefficient

Gini coefficient has been evaluated to determine the pattern of income distribution among the sampled respondents

Lorenz curve

The Lorenz curve is brought into utility for evaluating the extent of existing disparity in income distribution among the population. It is obtained by plotting the cumulative percentage of total income against the cumulative percentage of the total income of recipients, starting with the small income recipients. The percentage of groups of individuals is taken on the x-axis while on the Y-axis percentage of total income is taken. A point on the Lorenz curves shows the percentage of the population that accounts for the percentage of income total income. The Lorenz curve overlaps the line of equality (45^0 line), when there is equal distribution of income to the recipients. For example, 20 per cent of the population have a 20 per cent of share in total income. The extent to which the Lorenz curve deviates from the line of equality (also known as an equalitarian line) indicates the degree of income inequality with the sample population. The area enclosed between the egalitarian line and Lorenz curve is called an area of concentration and is an indicator of the concentration of income.

3. Results and Discussion

Trend analysis

The trend analysis for fish seed distributed by DoF to the communities has been analyzed and presented in the Fig:2

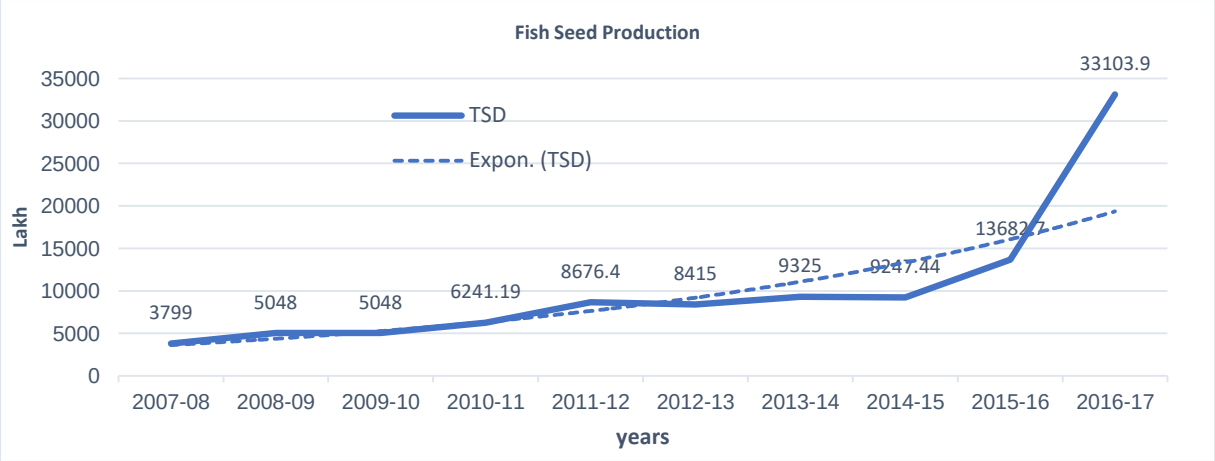


Fig:2 Fish seed production trend in Jharkhand

The Fig:2 shows that fish seed production showed an exponential growth trend from 3799 lakhs in 2007-08 to 33,103 lakhs in the year 2016-17 showing 8.71 fold increase in fish seed distribution by DoF to marginalized communities. This has been possible as over the overs the directorate of fisheries, Jharkhand has increased the capacity to cater to the fish seed demand.

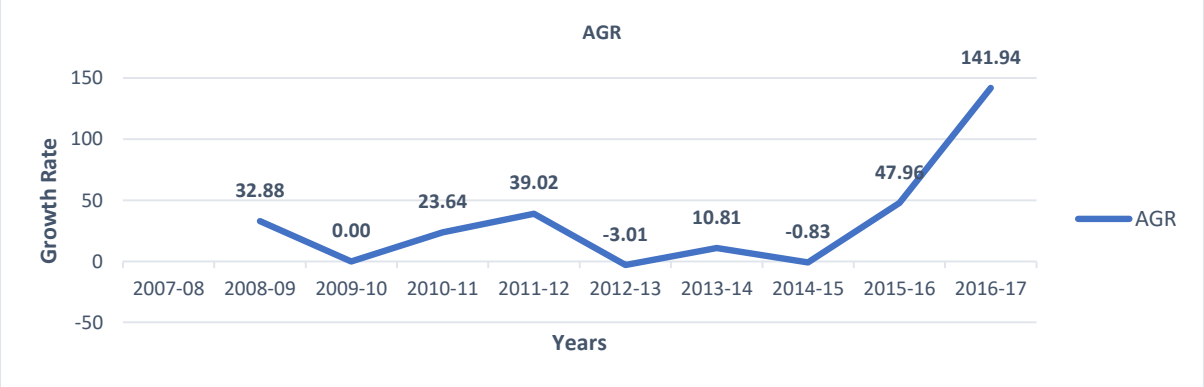


Fig:3 Fish seed production annual growth trend in Jharkhand

The Fig:3 shows the annual growth rate trends in fish seed production where it can be seen the annual growth rate has been dynamic due to fluctuating growth rate, however significant growth can be observed that from the year 2014-15, when the growth rate has shot up to registered an annual growth rate of 141.94 per cent in the year 2016-17. Overall the fish seed distribution registered an average annual growth rate (AAGR) and Compound Annual growth rate of 32.49 and 27.19 per cent which is very high and encouraging.

The trend analysis for fish production has also been analyzed and presented in the Fig:4

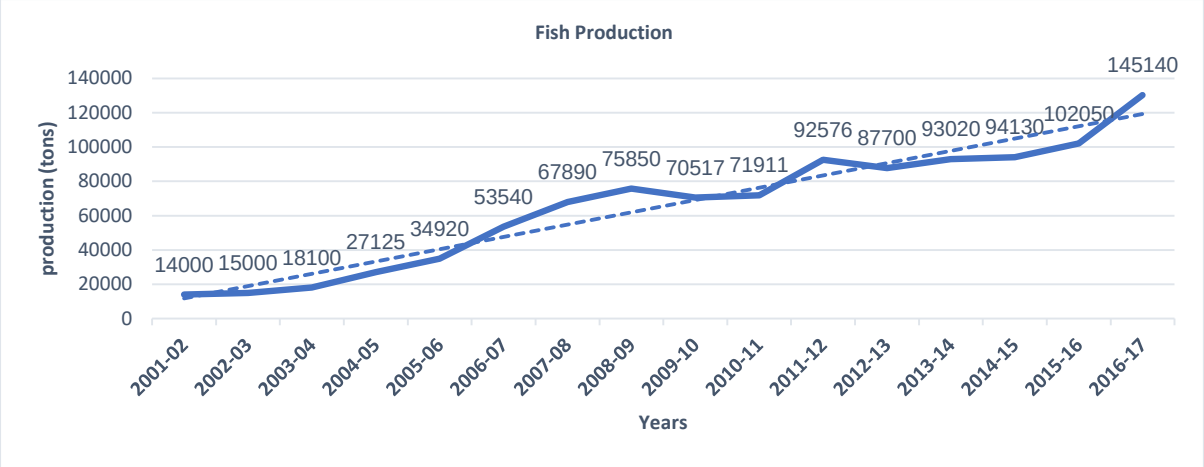


Fig:4 Fish Production trend in Jharkhand

The fig:4 indicate that over the years since the inception of Jharkhand there is a consistent increase in fish production from 14000 tons in the year 2001-02 to 145140 tons by the year 2016-17 witnessing 10.37 fold increase. The consistent increase in fish production has been possible due to various schemes introduced by DoF, Jharkhand which include both state and centrally funded schemes and fish seed production involving local communities was one such initiative.

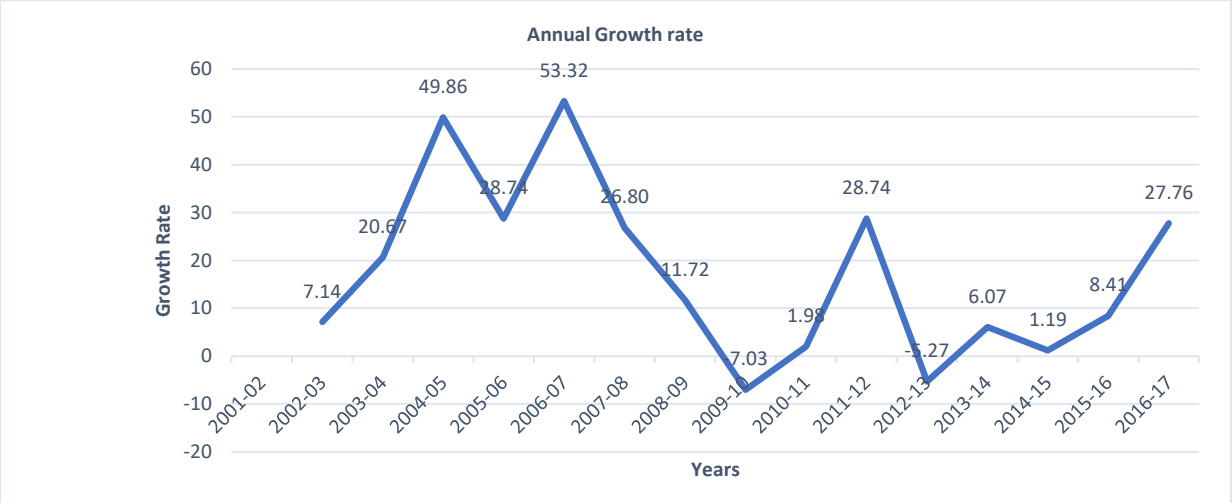


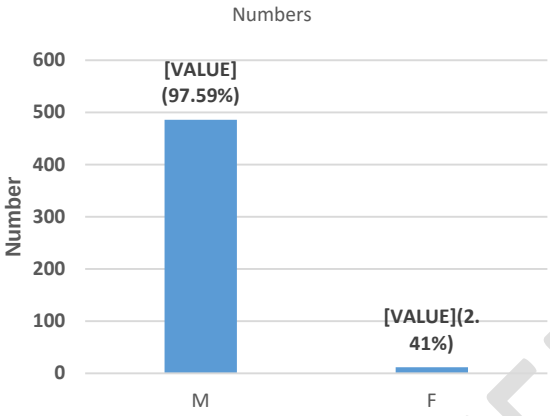
Fig:5 Fish production growth trend in Jharkhand

The trend in annual growth rate has also been studied to analyse how the fish production has each year and presented through Fig:5. Analysis of Fig:5 shows that the growth rate was been highly volatile with sharp dips and rises. The highest growth rate was observed for the year 2006-07 by registering a 53.32 per cent annual growth rate and the lowest growth rate was observed in the year 2009-10 with minus 7.03 per cent. The sharp dip in the growth rate can be attributed to the severe drought spells that occurred during that period and it was interesting to note at the same

time its mother state Bihar was hit with a flood. Nevertheless the overall fish production in Jharkhand observed a high growth rate with an Average annual growth rate of 17.34 and a compound annual growth rate of 16.04 which was more the Jharkhand economic survey report which pegged the growth rate at 12.4 per cent for the year 2011-12 to 2018-19 [6]..

Gender and caste profile of fish seed producers

Gender and caste composition of fish seed producers has been studied understand the gender and caste participation in fish seed production in Jharkhand.



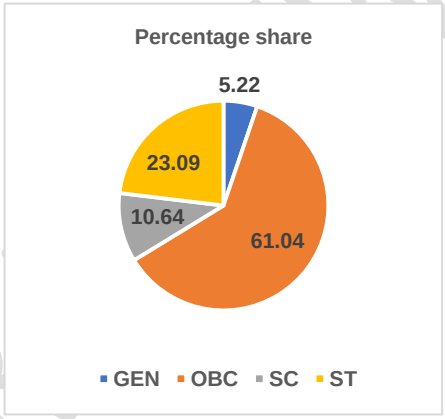


Fig:6 Gender profile of fish seed producers

Fig:7 Caste profile of fish seed producers

The Fig:6 shows the gender composition of fish seed producers which reveals that women participation is extremely low about 2.41 per cent, whereas men constitute 97.59 per cent. A similar picture was observed by gawa, 2015 in trout culture in Kashmir where women participation was less than 3 per cent [4]. Jharkhand has 48.68 per cent of women population which is almost close to 50 per cent with 1.61 crores out the total population of 3.30 crores (2011 census), therefore women participation is very necessary involve the excluded remaing half of the population in productive economic activities which will ultimately help to lift the economy. Hence, effort should be directed towards women participation which will also make them financially empowered. The Fig:7 shows the caste composition of fish seed producers and it showed OBC from the largest group which was 61.04 per cent followed by ST which was 23.09 per cent. SC and Gen formed the least group with 10.64 and 5.22 per cent respectively.

Income distribution of fish seed producers

The minimum income was found to be Rs.50,000 while the highest income was registered to be Rs.27,50,000 having a staggering range of Rs.27,00,000. To have more information on income levels, the fish seed producers were classified into 5 income groups viz Rs.50,000-Rs.1lakh, Rs.1lakh-1.5lakh, Rs.1.5lakh-Rs.2lakh, Rs.2Lakh-Rs.lakh and >Rs.2.5 lakh and results have been presented in Fig:8.

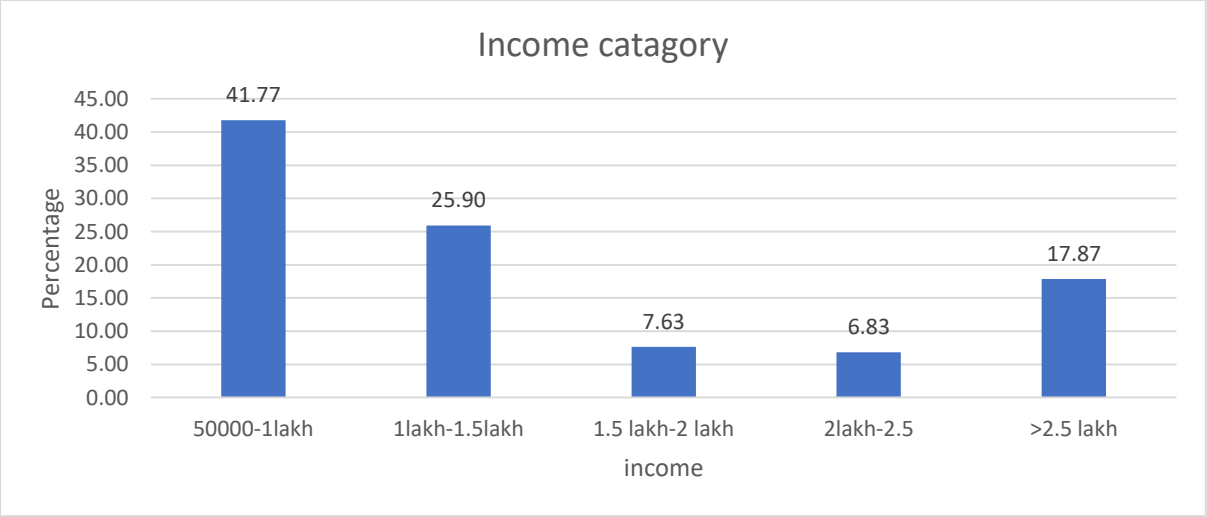


Fig:8 Fish seed producer's income category

From Fig:8 we can visualize that largest income group is Rs.50,000-Rs.1lakh accounting for about 41.77 per cent of fish producers. Second major income group was Rs.1lkah-1.5 lakh with 25.90 percent followed by >Rs.2.5lakh (17.87%), Rs.1.5 lakh-2 lakh (7.63%) and Rs.2lakh-2.5lakh (6.83%) respectively. When compared with state per capita income which was Rs.79,873 it was found that 28.11 per cent of fish growers were having lower income levels, while 68.98 per cent were having income lower national per capita income (Rs.1,15,293) both were calculated at current prices [6]. To investigate the disparity in income distribution among the fish seed producers Lorenz curve and GINI coefficient was estimated. The Fig:9 shows the Lorenz curve which gives us a visual picture of income inequality among fish seed producers.

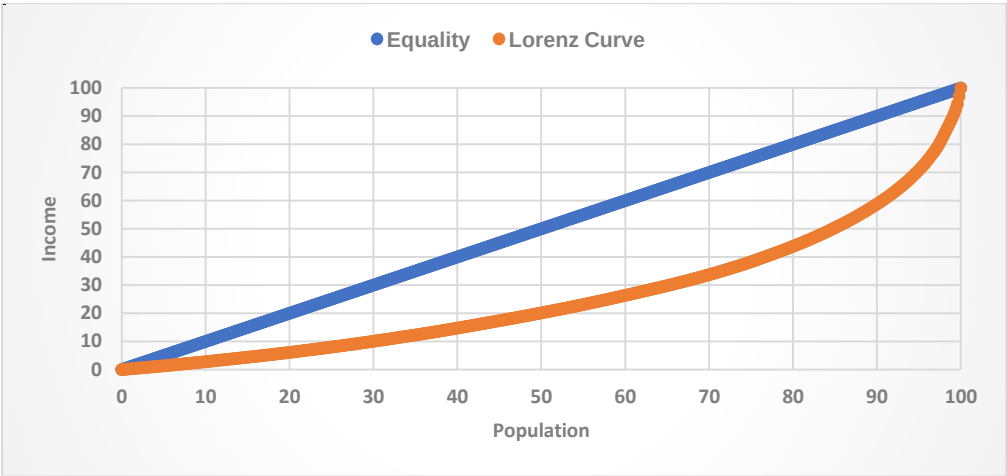


Fig:9 Lorenz curve of fish seed producers

Analysis of the Lorenz curve showed that 10 per cent of the population earn 60 per cent of total cumulative income which was higher than the national average where top 10 per cent hold 57 per cent of national income [3]. We analyzed the state of the bottom strata of the income category it was observed that the bottom 50 per cent of the fish seed producers earn mare 20 per cent of total cumulative income indicating high inequality. Hence, it can be concluded from the Lorenz curve study showed there exist a moderate level of income inequality among fish seed producers which was validated from the GINI coefficient of 0.48. The GINI coefficient for income inequality when compared with national-level latest data available for the year 2011-12 found to be lower as the national average was pegged at 0.55 [7]. Therefore, from the study of the Lorenz curve and Gini coefficient we can conclude that overall the income inequality was lower than the national average however at the same time higher concentration of income with the top ten per cent was observed compared to the national average.

4. Conclusion

The fish seed production is a short period high return business where returns range from Rs.50,000 to Rs.27,50,000. The wide range could be due to the scale of operation and varying number of production cycle which needs further investigation. The women participitation in fish seed production was negligible with less than 3 per cent, therefore was a need to bring gender parity to involve women which almost form 50 per cent of the population. The maximum of the fish producers seems to be small scale producers as the maximum of the fish seed producers falls in the lowest income group of Rs.50,000 to Rs.1lakh. It was observed that there was a higher concentration of income with the top 10 per cent which earn 60 per cent of

cumulative income which is higher than the national average which was 57 per cent. However, from the Gini coefficient, we found that overall income inequality was lower than the nation average. Nevertheless, efforts should be directed towards reducing income inequality and facilitating inequitable distribution of income among the beneficiaries.

Disclaimer

The products used for the research are commonly and predominatly used products in area of reaseach and country. There is absolutely no conflict of interest between authors and producers of the product because we do not intend to use these products as an avenue for litigation but for the advancement of knowledge. Aslo, the research was not funded by the producing company rather it was funded by personal effort of the authors.

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