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# Socioeconomic Status of Cage, Pen and Pond Culture Freshwater Fish Farmers in Seraikela Kharswan District, Jharkhand

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

The study was investigated to assess the livelihood of fishermen from different fish production system in Seraikela Kharswan district. It focused on the age, community, education level, family size, farming experience, source of credit etc. In cage and pen culture system the maximum percentage of people fall in the age group of 30-39 with 34.72 and 43.05 percentage. Out of the four selected communities, OBC is the predominant among them. The result of the study revealed that 19.44 percent of illiterate respondent comes under pond culture. Cage culture and pen culture has recently introduced in inland sector in India therefore in terms of experience both category respondents have less experience. In pen culture 90.28 percent of people have only 1-4 years of experience category whereas in case of pond culture 56.94 percentage of respondents have

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experience above 10 years. Newer technology comes with more active respondents therefore Cage culture and pen culture respondents were 81.94 and 72.22 percentage while the percentage was only 43.06 percentage in case of pond culture.

*Keywords: Fish production system; livelihood; fishermen; pond culture.*

## 1. INTRODUCTION

The fishing sector contributes significantly to our food supply as well as the health, resource potential, and employment prospects of rural areas by serving as a low-cost source of animal protein. The field of fishing, which is crucial to the nation's socioeconomic development has been recognized as a powerful income and employment generator [1]. To boost up the sector Government of India has allocated an amount of 2248.77 crores to the fisheries sector in the union budget 2023-24 which was 38.45 percent more than the last year budget [2]. The fishing business significantly contributes to our food supply as well as the wellbeing, resource potential, and employment opportunities of rural areas as a low-cost source of animal protein. It is common knowledge that fishing contributes significantly to the nation's employment and social development. While inland fisheries and aquaculture have increased in absolute terms, their potential has not yet been fully realised. Rivers and canals comprising 191,024 km, floodplain lakes including 1.2 million ha, ponds and tanks 2,36 million ha, reservoirs 3.54 million ha, and brackish water resources totalling 1.24 million ha [3]. There are significant potential for enhanced production, the creation of livelihoods, and the rise of economic success in the massive, underutilised resources. Studying the socioeconomic circumstances of fish farmers is crucial since, on the one hand, it affects the farming methods used by the farmers and, on the other hand, the outcome of practice performance. Since the inception of cage culture, cage aquaculture has won widespread praise as a means of subsistence for coastal fish producers [4]. This is the most popular method of fish culture due to the simple management procedures and the production of high-quality fish using the existing water bodies [5]. The ease of fish culture in cages and the better financial returns from these have drawn more farmers to this culture practise, even if at first, cage culture was not greatly acknowledged and appreciated by the fish farmers. Jharkhand is grooming up as the most promising segments in fishing and aquaculture in inland sector. This sector is essential because it provides fish protein easily and conveniently. This sector contributes

significantly to the national economy, food security, export revenue, and the achievement of several social objectives. Seraikela Kharswan district in Jharkhand is setting up new milestones in cage, pond and pen culture practices and is potent to produce more in upcoming years. Aquaculture and fisheries have a highly important role in terms of food/protein security, employment creation, and poverty alleviation in rural parts of the state, even though they are relatively minor in comparison to other industries, particularly agriculture, in terms of volume. Seraikela-Kharswan district is the leading fish producing district in the state and has highest reservoir area. The different types of fish production system farmer are mostly displaced and marginal. Therefore, keeping in view of all these reasons, the present study was an attempt to examine the socio-economic dimensions of different types of fish production systems community in freshwater aquaculture in Seraikela Kharswan district of Jharkhand.

## 2. METHODOLOGY

Jharkhand is called as land of forest. The state is bordered to the north by Bihar, to the northwest by Uttar Pradesh, to the west by Chhattisgarh, to the south by Odisha, and to the east by West Bengal. It covers 79,714 km<sup>2</sup> (30,778 sq mi) of land. It is the 14th most populous and the 15th largest state in terms of area [6]. The study was conducted in Seraikela Kharswan district of Jharkhand by using survey schedule and frequent interview method. The district consists of 9 blocks, out of which 4 blocks has been selected for the study purpose. The study covered socio-economic characteristics of fish farmers involved in pond, cage and pen culture in Chandil, Ichagarh, Kukru and Nimdih block of the district. Thirty six different village from four selected blocks has been chosen for study. Multistage random sampling method chosen for the present study. At second stage of sampling, Seraikela Kharswan district has been chosen as the district has highest reservoir area. Seraikela Kharswan district is also the leading fish producer in the state. In third stage, different blocks has been selected and hence the village has been chosen. The present study is based on primary data.

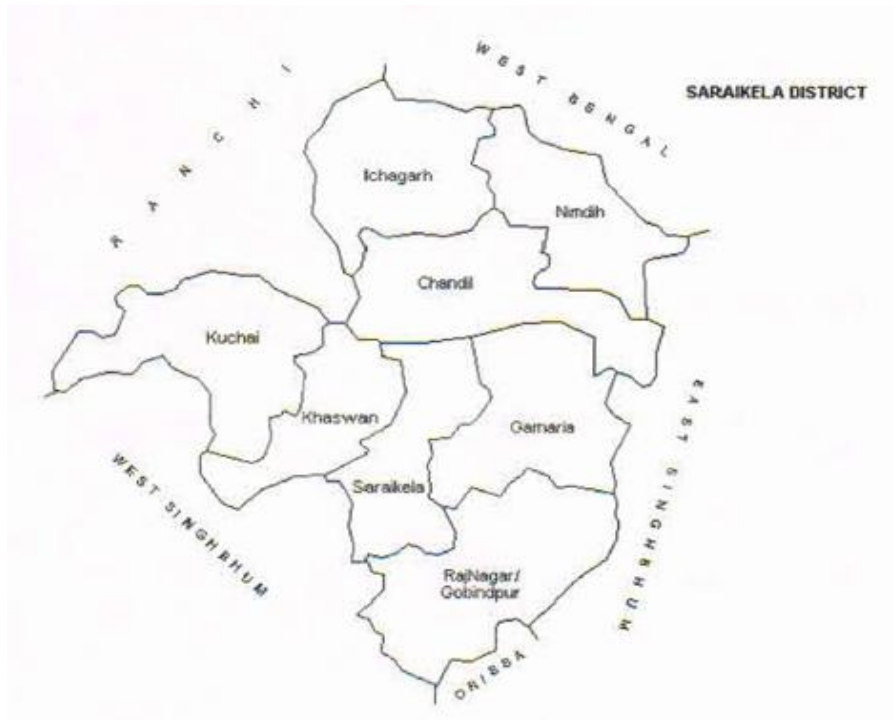


Fig. 1. District map of Seraikela Khaswan representing different blocks

### 3. RESULTS AND DISCUSSION

#### 3.1 Showed the age of the Sample Fishers

Age is an important factor which effect the decision making in any business or production process of average. Study done by (Bhutti et al.,

2022) also indicated that age played a major role in fisheries sector.

Table 1 indicates that cage culture and pen culture has maximum percentage of respondents within the age group of (30-39) 34.72 and 43.05 percentage respectively whereas in case of pond culture the 41.67 percentage (maximum) comes above the age group of 50.

Table 1. Age group of farmers from different freshwater fish production systems

Age	Pond Culture	Percentage	Cage Culture	Percentage	Pen Culture	Percentage
< 29	8	11.11	12	16.67	17	23.62
30-39	15	20.83	25	34.72	31	43.05
40-49	19	26.39	17	23.61	9	12.50
> 50	30	41.67	18	25.00	15	20.83
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

#### 3.2 Community of Fishermen

Table 2. Community of different fish producing respondents

Community	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
General	5	6.94	12	16.67	6	8.33
OBC	35	48.62	38	52.78	35	48.62
SC	8	11.11	8	11.11	5	6.94
ST	24	33.33	14	19.44	26	36.11
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

In the study area respondents were divided into 4 categories based on their community as General, OBC, SC and ST. 48.62 percentage of fishers are from Other Backward Caste category in case of cage culture which is maximum in percentage. In case of pond culture and pen culture respondents, 52.78 and 48.62 percentage are also from Other Backward Caste category. Minimum respondents fall in the General category for cage culture and pen culture as 6.94 and 8.33 percentage respectively whereas in pond culture Schedule Caste having the minimum number of respondents with 11.11 percentage.

### 3.3 Education Level

Table 3 indicates the study area respondents are divided into 5 different categories based on their education level. In both cage culture and pond culture 33.33 percent as highest percentage of respondents have education up to matriculation respectively whereas in case of pen culture 31.93 percentage of respondent have education up to college. Most illiterate falls in the category of pond culture as 19.44 percentage.

**Table 3. Showed the education level of different freshwater fish producing farmers**

Education	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Illiterate	7	9.72	14	19.44	9	12.50
Primary Education	6	8.33	8	11.11	4	5.56
Matriculation	24	33.33	24	33.33	19	26.39
Matric to college	20	27.78	20	27.78	23	31.93
Graduation and above	15	20.83	6	8.33	17	23.62
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

**Table 4. House type of respondents**

House Type	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Kuccha	33	45.83	27	37.50	37	51.39
Pucca	39	54.17	45	62.50	35	48.61
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

**Table 5. Farming experience of respondents (in years)**

Experience	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Up to 5 years	18	25.00	7	9.72	15	20.83
6 to 10	21	29.17	10	13.89	16	22.22
11 to 20	16	22.22	15	20.83	25	34.72
21 to 40	15	20.83	30	41.67	12	16.67
41 and above	2	2.78	10	13.89	4	5.56
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

### 3.4 House Type

The pond culture respondents have maximum percentage of respondent living in Pucca house and has 62.50 percentage of population whereas pen culture respondent having the maximum number in Kuccha house as 51.39 percentage. Sen and Roy, [7] in his study found that farmer's house structures tend to be of the kachha type (54.7%), followed by semi-pucca (23.8%) and pucca houses (21.5%), showing their less-than-luxurious living conditions (Table 4).

### 3.5 Farming Experience (In Years)

Table 5 indicates the farming experience of respondents in years. The table showed that the highest percentage of Cage culture farmers is maximum in 6-10 years of experience is 29.17 percent whereas in case of pond culture and pen culture 41.67 and 34.72 percent falls in the experience group of 21-40 years and 11-20 years respectively. Experience above 41 years and more is minimum in case of cage culture and stands with 2.38 percentage.

### 3.6 Family Size

**Table 6. Family size of different types of freshwater fish farmers**

Family Size	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Up to 5 members	27	37.50	20	27.78	24	33.33
6-10	35	48.61	32	44.44	38	52.78
11 and above	10	13.88	20	27.78	10	13.89
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

Table 6 explained the family size of different respondents group. In all the production systems maximum percentage of family size falls under 6-10 members i.e. 48.61, 44.44 and 52.78 percentage respectively. In pond culture. The family size of 11 and above is maximum in pond culture i.e. 27.78 percentage. According to [8], 52% of fish farmers had 4-5 family members, and 20% had >6 family members, in Rajshahi district of Bangladesh which is more or less consistent with the current data.

### 3.7 Land Holding

Table 7 shows the land holding of different freshwater fish farmer respondents. In cage culture and pen culture, the percentage of marginal farmers are 47.22 and 44.44 percentage respectively. In case of pond culture, maximum percentage of farmers in small group i.e. 31.94 percentage. Highest percentage of landless also found in cage culture and pen culture 23.61 percentage and 25.00 percentage respectively. Pond culture respondents are also

in highest in large category farmers among all the three production systems.

### 3.8 Source of Credit

Table 8 shows the source of credit. In pen culture highest percentage of respondent i.e. 47.22 percentage started the operation with their own money. While highest percentage of cage culture and pond culture respondents arrange the credit from other source i.e. 43.05 percentage respectively. According to [9] only 34% of farmers who cultivate fish received bank loans, whereas 53% of farmers fund their own expenses.

### 3.9 Awareness about Govt. Schemes

Table 9 shows that about the awareness about the govt scheme. As cage culture and pen culture is comparatively newer to the area therefore the percentage of more people is aware about the govt scheme i.e. 80.55 and 63.88 percentage.

**Table 7. Land holding of respondents from different freshwater fish production system**

Land holding	Cage Culture	Percentage	Pond Culture	Percentage	Pen culture	Percentage
Marginal	34	47.22	17	23.61	32	44.44
Small	15	20.83	23	31.94	11	15.28
Medium	5	6.44	17	23.61	11	15.28
Large	1	1.38	11	15.28	3	4.17
landless	17	23.61	4	5.56	18	25.00
<b>total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

**Table 8. Sources of credit for the respondents**

Particulars	Cage culture	percentage	Pond Culture	percentage	Pen culture	percentage
Own money	31	43.05	29	40.28	34	47.22
Loan from Bank	10	13.90	12	16.67	9	12.50
Other source	31	43.05	31	43.05	29	40.28
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

**Table 9. Awareness about the government scheme**

Govt Scheme	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Yes	58	80.55	34	47.22	46	63.88
No	14	19.45	38	52.78	26	36.11
total	72	100	72	100	72	100

### 3.10 Economic Status

**Table 10. Economic status of the respondents**

	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Below BPL	39	54.17	17	23.61	38	52.78
Above BPL	33	46.83	55	76.39	34	47.22
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

Table 10 suggests that the above BPL population is 76.39 percent in Pond culture respondents whereas maximum BPL responds found in cage culture i.e. 54.17 percentage.

whereas 12.50 per cent had income level Rs 2,000-3,000. Only 7.50 per cent fish farmers had monthly income of Rs 1,000-2000.

### 3.11 Income per Annum

Table 11 shows that Income per annum of different freshwater fish production systems. Highest income group i.e. 100k and above are highest in pond culture and having 37.50 percentage. Pen culture respondents are maximum in number and income group i.e. 37.50 percentage. For a better understanding of the socioeconomic circumstances of fisherman, income is the most crucial component [10]. A study done by [11] revealed that 77.50 per cent had monthly income level above Rs 3, 000,

### 3.12 Experience in Cage, Pond and Pen Culture

Cage culture and pen culture has recently introduced in India therefore in terms of experience both category respondents have less experience. In pen culture 90.28 percent of people have only 1-4 years of experience category whereas in case of pond culture 56.94 percentage of respondents have experience above 10 years. In cage culture and pen culture 5.56 and 9.72 percent of respondents having no experience (Table 12).

**Table 11. Income level of different category farmers**

Income Per Year	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Up to Rs 50000	21	29.17	14	19.44	27	37.50
Rs 51000-75000	27	37.50	14	19.44	19	26.39
RS 75000-100000	12	16.67	17	23.62	15	20.83
More than 100000	12	16.66	27	37.50	11	15.28
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

**Table 12. Experience in cage, pond and pen culture of respondents (in years)**

	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
No experience	4	5.56	0	0.00	7	9.72
1-4 years	41	56.94	13	18.06	65	90.28
5-7 years	26	36.11	17	23.61	0	0.00
7-10 years	1	1.39	1	1.39	0	0.00
>10 years	0	0.00	41	56.94	0	0.00
<b>Total</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>	<b>72</b>	<b>100</b>

### 3.13 Awareness about Fish Disease

**Table 13. Awareness about the fish disease**

	Cage Culture	Percentage	Pond Culture	Percentage	Pen Culture	Percentage
Yes	59	81.94	31	43.06	52	72.22
No	13	18.06	41	56.94	20	27.78
total	72	100.00	72	100.00	72	100.00

Fish disease is an important factor in fish production. Without proper knowledge of fish disease, one has to bear a huge loss. Newer technology comes with more active respondents therefore Cage culture and pen culture respondents are 81.94 and 72.22 percentage in number while the percentage is only 43.06 percentage in case of pond culture.

#### 4. SUMMARY AND CONCLUSION

It is clear from the above study that cage culture and pen culture practicing farmers are younger than pond culture farmers. On the other hand pond culture farmers has more land holding. The education level of cage culture and pen culture farmers is much higher than that of pond culture and involved in higher studies (Graduation and above).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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