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Socio-economic profile of ornamental fish traders in Punjab state

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Abstract

The present study was conducted in four zones of Punjab, namely Malwa, Majha, Doaba, and Powadh, to examine the socio-economic profile of ornamental fish traders. A baseline survey was conducted in selected districts. A total of 105 ornamental fish traders were surveyed. The socioeconomic analysis revealed that 97.14% of traders involved were male, of whom almost 36.19% and 34.29% were in the 40-49 and 30-39 age groups, respectively. 87.62% of traders were from the general category, while 72% had a nuclear family structure. 66.67% of traders graduated, while 57.14% have their own outlet for business. 52.38% of traders have 0-10 years of experience in trading, and 95.23% list their source of income as their primary occupation. 65.71% of traders earn < 5 lakhs/annum. It was concluded that the ornamental fish business would generate sufficient returns and offer ample employment opportunities for budding entrepreneurs and investors.

Keywords: Ornamental fish, Punjab, socio-economic, zones, fish traders

1. Introduction

Globally, ornamental fish are the most valuable commodity in fisheries (Jayalal and Ramachandran 2012) ^[5]. The industry encompasses approximately 125 countries and generates an estimated USD \$20 billion annually, including revenues from aquarium equipment, aquatic plants, accessories, feed, and pharmaceutical products (Singh *et al.* 2023) ^[10]. This remarkable market valuation reflects the growing popularity of aquarium fish keeping as a hobby pursued by millions of enthusiasts worldwide (Khairnar and Kaur 2021) ^[8]. The sector has created numerous business opportunities for breeders, farmers, aquarists, and related stakeholders involved in feed, medication, and accessory manufacturing (Galib *et al.* 2013) ^[3].

India possesses a vast biodiversity of ornamental fish species, with 195 indigenous varieties documented in the North-East Region and Western Ghats, and complemented by nearly 400 varieties inhabiting marine ecosystems (Swain *et al.* 2014) ^[12]. The domestic market demonstrates a pronounced preference for goldfish among hobbyists, consequently establishing goldfish breeding as the dominant segment within India's ornamental fish sector (Shraborni *et al.* 2024) ^[9]. Besides live-bearers, breeders increasingly focus on specialized varieties including Oscars, discus, cichlids, flowerhorns, and Tetras (Sinha and Pandey 2023) ^[11]. The industry comprises over 6000 retail shops serving approximately one million aquarium enthusiasts across India (Jacob *et al.* 2021) ^[4]. The COVID-19 pandemic notably accelerated public interest in ornamental

fishkeeping, as aquariums offered aesthetic enhancement to home environments while providing stress reduction and companionship without requiring physical contact (Bhatt *et al.*, 2025) ^[1]. Besides its recreational appeal, the sector is recognized for generating employment, alleviating poverty, and boosting national income via higher foreign-exchange earnings.

In Punjab, the ornamental fish industry has experienced significant growth driven by rising enthusiasm for aquascaping and home aquariums (Khairnar and Kaur 2018) ^[7]. This emerging trend has created a lucrative and expanding ornamental fish market within the state. The Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) has conducted extensive research on commercially viable ornamental fish species, including koi carp, goldfish, mollies, guppies, platies, and swordtails. The vet varsity has undertaken comprehensive awareness initiatives through *Pashu Palan Melas* and Regional *Kisan Melas*, where developed technologies are showcased, alongside organizing training programs, workshops, academic-industry interfaces, and ornamental fish festivals. These strategic interventions aim to enhance both production capacity and quality standards, thereby boosting the industry's competitive position. The cumulative impact of these programs is evidenced by the proliferation of aquarium retail establishments across Punjab, with more than 150 ornamental fish shops now operating in the state, predominantly concentrated in four districts: Ludhiana, Mohali, Jalandhar, and Amritsar.

Despite this remarkable growth trajectory, a critical knowledge gap persists regarding the socio-economic characteristics and trading practices of ornamental fish traders in Punjab. No systematic database currently exists that documents traders' demographic profiles, economic status, business operations, or market dynamics. Given the substantial potential of the ornamental fish sector of Punjab and its demonstrated expansion, comprehensive documentation of the socio-economic profile of ornamental fish traders has become imperative. Therefore, this study was undertaken to characterize the socio-economic status and trading activities of ornamental fish traders across selected districts representing the four major agro-climatic zones of Punjab. Such baseline information is essential for evidence-based policy formulation, targeted capacity building, and sustainable development of the ornamental fish industry in the state.

2. Materials and Methods

Study Area

The study was conducted in Punjab, a state located in northwestern India between latitude 30°4'N and longitude 75°5'E. The state shares its borders with Pakistan to the west, and Jammu and Kashmir to the north, Himachal Pradesh to the northeast, and Haryana and Rajasthan to the south. The state is administratively divided into four agro-climatic zones, which formed the basis for stratified sampling in this investigation.

Baseline Survey and Database Development

A comprehensive baseline survey was undertaken to develop a systematic database of the ornamental fish trade in Punjab. The survey involved direct interviews with commercial ornamental fish traders across selected districts to assess their socio-economic status, business operations, and marketing strategies. Information on ornamental fish retail outlets was collected through primary sources, including field visits, telephonic communications, and verification from local aquarist networks. Each identified trader was contacted individually to confirm their operational status and willingness to participate in the study.

Sampling Framework and Selection Criteria

A district-specific inventory of ornamental fish outlets was prepared based on verified data. Given that ornamental fish trading activity exhibits significant spatial variation across Punjab, a purposive sampling approach was adopted. Three districts were selected from each of the four agro-climatic zones based on the concentration of ornamental fish retail establishments. The selection criterion prioritized districts with the highest number of active ornamental fish outlets, ensuring adequate representation of the trading community (Table 1).

At the time of the survey, approximately 150 registered ornamental fish traders were operating across Punjab. Of these, 105 traders (70% of the total population) were successfully interviewed during the survey period spanning (Table 1). The high response rate ensured robust representation of the ornamental fish trading community in the state.

Table 1: List of selected districts and no. of respondents

Sr. No.	Zone	Districts	No. of respondents
1.	Malwa	Ludhiana	40
		Fazilka	05
		Bathinda	03
2.	Majha	Amritsar	09
		Pathankot	07
		Gurdaspur	03
3.	Doaba	Jalandhar	07
		Kapurthala	03
		Hoshiarpur	03
4.	Powadh	Mohali	16
		Patiala	07
		Ropar	02

Data Collection

Primary data were collected through structured, pre-tested questionnaires administered via personal interviews with ornamental fish traders. The questionnaire encompassed various dimensions of traders' socio-economic profiles and business characteristics. The following socio-economic variables were documented:

- **Age:** Chronological age of the trader in completed years
- **Gender:** Sex of the trader (male/female)
- **Family type:** Nuclear or joint family structure
- **Educational status:** Formal education level attained
- **Main occupation:** Primary livelihood activity (ornamental fish trading or other)
- **Experience:** Duration of involvement in ornamental fish trade (in years)
- **Ownership pattern:** Type of business ownership (sole proprietorship, partnership, etc.)
- **Category:** Classification of traders based on operational scale or business typology

Data were collected through face-to-face interviews conducted at traders' retail outlets. Information obtained was cross-verified for accuracy and completeness before finalization.

Data Analysis

Descriptive Statistics

Collected data were systematically coded, entered into Microsoft Excel spreadsheets, and subjected to rigorous quality checks to ensure accuracy. Descriptive statistical analysis was performed to characterize the socio-economic profile of ornamental fish traders. Frequency distributions and percentage calculations were computed for categorical variables, while measures of central tendency (mean, median) and dispersion (standard deviation, range) were calculated for continuous variables.

Principal Component Analysis (PCA)

Principal Component Analysis was employed as a multivariate statistical technique to reduce the dimensionality of the socio-economic dataset while retaining maximum variance. The primary objectives of applying PCA were:

- Data compression by transforming the original correlated variables into a smaller set of uncorrelated

principal components

- Identification of the minimum number of components required to explain the substantial proportion of variance in the dataset with minimal information loss
- Examination of underlying relationships and correlation structures among socio-economic parameters

The PCA incorporated multiple socio-economic variables including age, gender, trader category, educational status, trading experience, income levels, family type, ownership pattern, and occupation. A correlation matrix was constructed to assess the interrelationships among these variables. Eigenvalues greater than 1.0 (Kaiser criterion) and scree plot analysis were used to determine the optimal number of principal components to retain. Component loadings were examined to interpret the contribution of individual variables to each principal component. Variables with absolute loading values exceeding 0.40 were considered significant contributors to a given component. All statistical analyses, including PCA, were conducted using Minitab Statistical Software version 17 (Minitab Inc., State College, PA, USA). Results were considered statistically significant at $p < 0.05$.

3. Results and Discussion

The socioeconomic characteristics of ornamental fish traders in different zones of Punjab (Malwa, Doaba, Majha,

and Powadh) are analysed using socio-economic (Table 2) variables (gender, age, category, family type, education status, main occupation, ownership, training, experience, and business type).

Gender analysis showed that only 2.86% of traders in ornamental fish trading were women, while the majority (97.14%) were men, indicating that ornamental fish trading is a male-dominated industry. The findings are consistent with Laskar *et al.* (2016) ^[6], who completed a study on the aquarium industry in Agartala, Tripura, and found that all participants (100%) were male.

An age distribution study indicates that most ornamental fish traders were in the 30-39 and 40-49 age groups across all zones. The results of the present study are in agreement with those of Yadav and Sharma (2017) ^[13], who observed that most ornamental fish producers and traders were middle-aged, falling into the age groups 31-40 and 41-50 in Mumbai and Thane. Devi *et al.* (2016) ^[2] conducted a study in Mumbai, Chennai, and Kolkata and stated that the average age of ornamental fish traders was 41-50 in all three research areas. Laskar *et al.* (2016) ^[6] found that 78.57% of participants were younger than 35, while the 36-50 age group accounted for 21.43% of respondents. The results showed less influence among people over 50. This gap may be due to their health condition, limited free time, and a lack of education in hobbies.

Table 2: Socio-economic Profile of Ornamental Fish Traders in Punjab

S. No.	Variable	Category	Malwa		Majha		Doaba		Powadh		Overall	
			Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Gender	Male	48	100.00	18	94.74	13	100.00	23	92.00	102	97.14
		Female	0	0.00	1	5.26	0	0.00	2	8.00	3	2.86
2	Age	20-29	8	16.67	1	5.26	3	23.08	5	20.00	17	16.19
		30-39	20	41.67	5	26.32	2	15.38	9	36.00	36	34.29
		40-49	16	33.33	8	42.11	6	46.15	8	32.00	38	36.19
		Above 50	4	8.33	5	26.32	2	15.38	3	12.00	14	13.33
3	Category	General	46	95.83	14	73.68	12	92.31	20	80.00	92	87.62
		SC	1	2.08	5	26.32	1	7.69	3	12.00	10	9.52
		BC	0	0.00	0	0.00	0	0.00	2	8.00	2	1.90
		Others	1	2.08	0	0.00	0	0.00	0	0.00	1	0.95
4	Family type	Joint	15	31.25	7	36.84	1	7.69	7	28.00	31	28.58
		nuclear	33	68.75	12	63.16	12	92.31	18	72.00	74	71.42
5	Education	Matric	17	35.42	5	26.32	2	15.38	5	20.00	29	27.62
		Secondary	2	4.17	2	10.53	1	7.69	1	4.00	6	5.71
		Graduate	29	60.42	12	63.16	10	76.92	19	76.00	70	66.67
6	Ownership	Owned	32	66.67	9	47.37	7	53.85	12	48.00	60	57.14
		Rented	16	33.33	10	52.63	6	46.15	13	52.00	45	42.86
7	Training attended	Yes	5	10.42	2	10.53	2	15.38	0	0.00	9	8.58
		No	43	89.58	17	89.47	11	84.62	25	100.00	96	91.42
8	Nature of business unit	Wholesaler	02	4.16	01	5.26	01	7.69	02	8.00	07	6.66
		Retailer	46	95.84	18	94.74	12	92.31	23	92	98	93.34
9	Experience	0-10	29	60.42	8	42.11	5	38.46	13	52.00	55	52.38
		11-20	14	29.17	4	21.05	7	53.85	9	36.00	34	32.38
		21-30	4	8.33	5	26.32	1	7.69	2	8.00	12	11.43
		31-40	1	2.08	2	10.53	0	0.00	1	4.00	4	3.81
10	Occupation	Primary	45	93.75	18	94.74	12	92.31	25	100.00	100	95.23
		Secondary	3	6.25	1	5.26	1	7.69	0	0.00	5	4.77
11	Income	<5 lakhs	34	70.83	11	57.89	9	69.23	15	60.00	69	65.71
		5-10 lakhs	10	20.83	8	42.11	4	30.77	10	40.00	32	30.48
		10-15 lakhs	2	4.17	0	0.00	0	0.00	0	0.00	2	1.90
		>15 lakhs	2	4.17	0	0.00	0	0.00	0	0.00	2	1.90

The categorical analysis revealed that 87.62% of ornamental fish traders are in the general category, 9.52% are from SC, 1.90% are from BC, and 0.95% are in the other categories. The trend of more people in the general category becoming ornamental fish traders appears to be driven by their socioeconomic status, which allows them to make a substantial initial investment in hobbyist-oriented businesses. However, the successful ornamental fish trader must be passionate and patient, as this occupation offers long-term returns. Furthermore, the data indicate that most traders (72%) belonged to nuclear families, while 28% belonged to joint families. Yadav and Sharma (2017) ^[13] reported findings from their study in the Mumbai and Thane regions, indicating that among traders in the surveyed area, 63.33% belonged to joint families and 36.67% to nuclear families. Devi *et al.* (2016) ^[2] also reported similar findings in Kolkata, i.e., joint families were observed as the predominant household structure. In contrast, nuclear families were found to be more prevalent in parts of Chennai and Mumbai. Compared with the studies mentioned above, the present study observed a divergence in findings, indicating a higher prevalence of ornamental fish traders from nuclear families. This discrepancy may be attributed to societal modernity and shifts in individuals' perceptions.

Educated traders are often better equipped with essential skills such as risk management, analytical thinking, and market understanding, all of which are required to make informed trading decisions. This expertise enables them to navigate the market's complexity more effectively, resulting in more profitable trading outcomes. Similarly, the results for ornamental fish traders in Punjab showed that educational attainment is associated with this business: 66.67% were graduates, 27.62% were matriculated, and the remaining 5.71% were secondary school graduates. Yadav and Sharma (2017) ^[13] reported that, in the Mumbai and Thane regions, among the 30 traders, most ornamental fish producers (63.33%) were graduates of an educational institution. The study by Devi *et al.* (2016) ^[2] in Mumbai, Chennai, and Kolkata found that Kolkata had the highest percentage of illiterate respondents (10%), followed by Chennai (2%). Similarly, Kolkata had the most significant percentage of respondents with primary education (43%), followed by Chennai (20%). Laskar *et al.* (2016) ^[6] conducted a study in Tripura, finding that most traders (64.29%) had completed only the 12th grade, followed by 28.57% with graduate degrees, and only 7.14% with postgraduate degrees. In contrast to earlier studies, the current study found a 100% literacy rate, which may be one of the factors behind the growing number of ornamental fish traders in the landlocked state of Punjab.

In Malwa, 66.67% of traders have their outlets, and the remaining 33.33% run their trade in rented shops. In Majha, 47.36% of traders own outlets, and 52.64% have rental outlets. Most traders in Doaba (53.84%) own their outlets, while 46.16% rent. In Powadh, 48% of traders own outlets, and 52% give rent. The overall analysis of the results showed that 57.14% of the total traders have their own outlets, while the remaining 42.86% have a rental outlet. According to the findings, the majority of traders in the Malwa region (91.67%) did not receive any formal training. In comparison, 8.33% had undergone training in

management aspects of ornamental fish enterprises and in running the trade. In the Majha region, 89.48% of traders have not received any training, while 10.52% have undergone training. In the Doaba region, 84.61% of traders have not received any training, while 15.39% have. In the Powadh region, it has been observed that none of the traders have received any training. Overall, it was observed that the majority of ornamental fish sellers (92.38%) had not attended any training, while a smaller proportion (7.62%) undertook training.

In all four zones, most traders are involved in retail activities (>90%). In the Malwa zone, 95.84% of traders were engaged in retail activities, while wholesalers accounted for 4.16%. In the Majha zone, too, the majority of traders (94.74%) were involved in retail activities, while a smaller proportion (5.26%) were engaged in wholesale activities. Similarly, in the Doaba and Powadh zones, around 92.31% and 92% of traders were involved in retail activities, while 7.69% and 8% were engaged in wholesale business. The survey's overall findings indicated that a majority of participants (93.34%) were engaged in the retail industry, while a smaller proportion (6.66%) worked as wholesalers. Laskar *et al.* (2016) ^[6] conducted a study in Tripura and identified four wholesalers cum retailer traders who had purchased both land and constructed shops for doing business. Of the ten retailers reported in the study area, 30% of them had not invested in land and buildings, and they either rented shops or converted a portion of their own house into an ornamental fish shop.

In the Malwa region, 93.75% of traders engaged in aquarium keeping as their primary occupation, while 6.25% did so as a secondary occupation. In the Majha region, the majority of traders (94.73%) are involved in primary occupations of aquarium keeping, while a smaller proportion (5.27%) is involved in secondary occupations. In the Doaba region, 92.30% of traders engaged in aquarium keeping as their primary business, while the remaining 7.70% did so as their secondary business. In the Powadh region, it was observed that all the traders engage in aquarium keeping as their primary source of earning. The overall data revealed that most traders (95.23%) were primarily involved in aquarium keeping. At the same time, 4.77% had aquarium keeping as their secondary occupation. In Malwa, the majority (60.42%) of the traders have 0–10 years of experience, followed by 29.17% of traders have 11–20 years of experience, 8.33% of traders have 21–30 years of experience, and only 2.08% of traders have 31–40 years of experience. 42.10% of Majha traders have 0–10 years of professional experience, followed by 26.32% with 21 to 30 years, 21.05% with 11 to 20 years, and 10.53% with 31 to 40 years. In Doaba, 53.84% of traders have 11–20 years of experience, 38.46% have 0–10 years, and 7.70% have 21–30 years. In Powadh, 52% of traders have 0–10 years of experience, followed by 36% with 11–20 years of experience, 4% with 31–40 years of experience, and 8% with 21–30 years of experience. The overall results of the study indicated that the majority (52.38%) of the traders have 0–10 years of experience, 32.48% have 11–20 years, and 11.43% have 21–30 years, while the remaining 3.81% of traders have 31–40 years of experience. Yadav and Sharma (2017) ^[13] reported that 60% of farmers in Mumbai and Thane had 5–8 years of experience. Only 20.00% of

farmers had 0–4 years of experience, while 13.33% had 9–12 years. Devi *et al.* (2016) [2] found a link between ornamental fisheries growth, commerce, and experience in Mumbai, Chennai, and Kolkata, in which 45% of Kolkata respondents had 11–20 years of business experience, 6 to 10 years of experience for 44% of Chennai business owners. Laskar *et al.* (2016) [6] observed that 35.71% of traders had operated for 5 to 10 years, and 21.43% for less than 5 years. In Malwa, 70.83% of traders earn 5 lakhs per annum from ornamental fish trading, 20.83% earn 5 to 10 lakhs per annum, and 4.17% earn 15 lakhs or more per annum. In Majha, 57.89% of people earn five lakhs per annum, while the remaining 42.11% earn 5–10 lakhs per annum. In Doaba, 69.23% of traders earn less than 5 lakhs, followed by 30.77% with a yearly income of 5–10 lakhs. In Powadh, 60% of traders earn 5 lakhs per annum, while 40% earn 5–10 lakhs per annum from ornamental fish trading. Overall, the study found that 65.71% of traders earn less than 5 lakhs per annum, 30.48% earn 5–10 lakhs per annum, 1.90% earn 10–15 lakhs per annum, and 15 lakhs per

annum. Laskar *et al.* (2016) [6] found positive net returns in all ornamental fish trade situations, where wholesaler cum retail traders made 3.49 lakhs, while retail traders made 1.14 lakhs per annum.

PCA Analysis of Socio-Economic Profile of the Ornamental Fish Traders

This PCA was conducted to investigate the relationship between various regions of Punjab and socioeconomic parameters. The first and second components accounted for 99.8% of the variables. Results revealed that selected parameters in Malwa and Powadh were significantly different, whereas those in Majha and Doaba were not (Table 4 & Fig. 1).

Correlation of Socio-Economic Parameters

It was observed that all metrics had positive correlations with one another. The factors in proximity showed a strong correlation, whereas those farther apart did not show a significant relationship (Fig. 2).

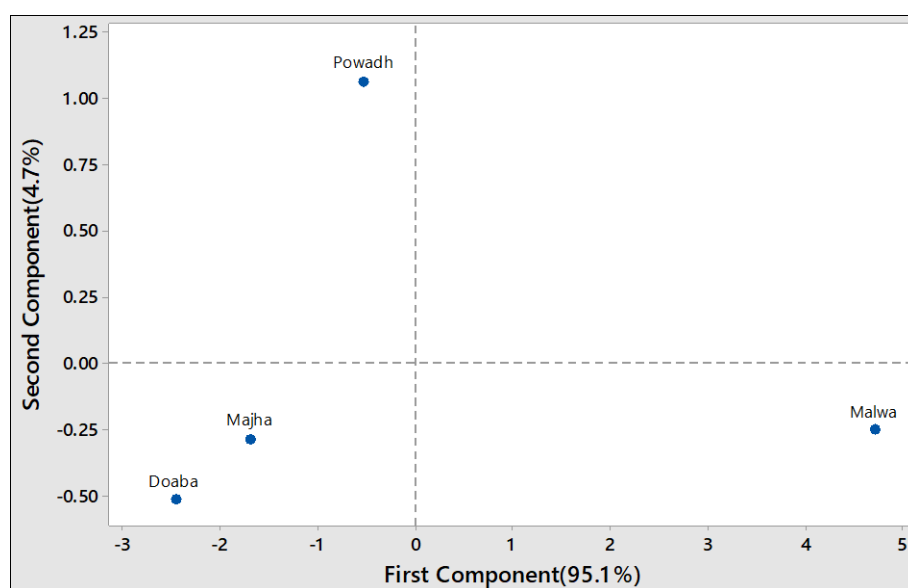


Fig 1: Significance of Socio-Economic Profile of the Traders

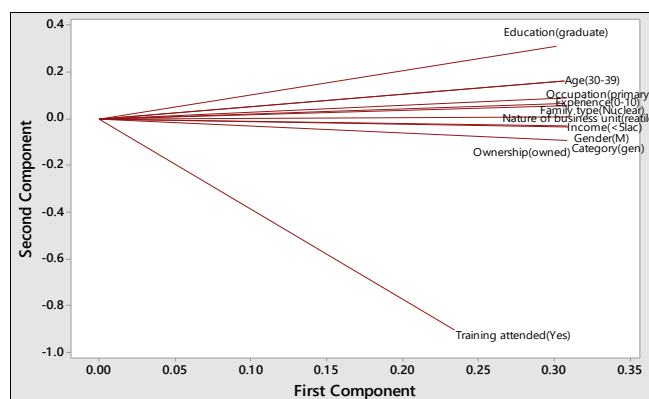


Fig 2: Correlation between Different Socio-Economic Parameters

Conclusion

The socio-economic analysis of ornamental fish traders in Punjab helps us conclude that ornamental fish trading is a male-dominated business, with most traders from the general category actively involved. Most of them fall into

the 30–39 and 40–49 age groups, and they have a nuclear family structure. Most of the traders are educated, have completed their graduation, have a shop/outlet, and are mainly engaged in retail business activities. Many of the traders have 0–10 years of trading experience and have their primary occupation as their source of income, generally earning less than 5 lakhs per annum from ornamental fish trading. The study's findings will certainly help government agencies, various stakeholders, and entrepreneurs who are willing to come forward and are actively involved in this business.

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Disclaimers

The views and conclusions expressed in this article are

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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