

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 8; August 2026; Page No. 486-489

Received: 11-05-2026
Accepted: 15-06-2026

Indexed Journal
Peer Reviewed Journal

Factors influencing shrimp farming practices in Navsari (Gujarat)

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DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i8g.4051>

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Abstract

Shrimp farming is an important aquaculture enterprise that contributes significantly to income generation, employment, and export earnings in India. The present study was conducted to identify the factors influencing shrimp farming practices in Navsari district of Gujarat. An Ex-post-facto research design was employed for the study. Four shrimp farming districts of South Gujarat, namely Navsari, Surat, Valsad, and Bharuch, were selected, and a total of 712 shrimp farmers were surveyed, of which 204 respondents belonged to Navsari district. Data were collected through a structured interview schedule and analyzed using frequency and percentage. The findings revealed that all respondents considered water source and quality, tidal characteristics, environmental conditions, and soil suitability as the major ecological factors influencing shrimp farming. Among biological factors, less predators, less vegetation, and competition were reported by all respondents, whereas only 27.0 per cent considered seed resources as an important factor. Regarding socio-economic factors, availability of land and use of land and nearby water were reported by all respondents, followed by social and political factors (98.0%), accessibility (96.1%), and availability of manpower (84.3%). Semi-intensive farming (99.5%) and monoculture (97.5%) were the dominant farming practices. Monodon was the most preferred shrimp species (69.1%), and easy availability of seed was the primary reason for species selection. Most farmers (72.1%) cultivated one crop annually. The study concludes that ecological suitability, land and water resources, and scientific farming practices are the major factors influencing shrimp farming in Navsari district.

Keywords: Shrimp farming, influencing factor, Navsari, aquaculture, farming practices

1. Introduction

Shrimp farming has emerged as one of the most important aquaculture enterprises due to its significant contribution to income generation, employment generation, food security, and export earnings. Globally, aquaculture has become one of the fastest-growing food production sectors, with shrimp culture contributing substantially to seafood trade and rural livelihoods (FAO, 2022; Naylor *et al.*, 2000) ^[3]. India is one of the leading shrimp-producing and exporting countries in the world, and Gujarat has gained prominence as an important shrimp-producing state because of its extensive coastline, favourable climatic conditions, and availability of brackish water resources.

Navsari district of South Gujarat possesses suitable conditions for shrimp farming, including good-quality seawater, favourable tidal characteristics, and clayey soils. These ecological factors provide an ideal environment for shrimp growth and production. In addition, biological factors such as quality seed availability, disease resistance, and reduced predator incidence play a vital role in ensuring successful shrimp culture (Lightner, 2011; MPEDA, 2020) ^[5, 6].

Socio-economic factors such as availability of land, labour, accessibility, market opportunities, and institutional support also influence farmers' decisions to adopt shrimp farming. Furthermore, farming systems, species selection, cropping

intensity, and nutrient management practices significantly affect farm productivity and sustainability (Vadher & Manoj, 2014; MPEDA, 2022) ^[9, 7].

With the growing importance of shrimp aquaculture, adoption of scientific farming practices and sustainable resource management has become essential for improving production and profitability. Therefore, understanding the factors influencing shrimp farming practices is crucial for promoting sustainable aquaculture development in the region. Hence, the present study was undertaken to study the factors influencing shrimp farming practices in Navsari district of Gujarat.

Furthermore, operational factors such as farming systems, culture practices, species selection, cropping intensity, and nutrient management significantly influence shrimp production and profitability. Semi-intensive farming systems, monoculture practices, and the cultivation of commercially important species have become increasingly popular due to their economic viability and production efficiency (MPEDA, 2022) ^[7]. Therefore, identifying and understanding the factors influencing shrimp farming practices is essential for developing effective extension strategies, improving farm productivity, and ensuring the sustainable growth of the shrimp farming sector. Hence, the present study was undertaken to study the factors influencing shrimp farming practices in Navsari district of Gujarat.

2. Materials and Methods

2.1 Study Area

The present study was conducted in South Gujarat, covering four major shrimp farming districts, namely Navsari, Surat, Valsad, and Bharuch. These districts were selected through a simple random sampling procedure due to their substantial concentration of shrimp farming activities and their importance in regional aquaculture production.

2.2 Research Design and Sampling Procedure

An ex-post-facto research design was adopted for the study. A total of 712 shrimp farmers were selected through random sampling from the identified study area. Among them, 204 respondents belonged to Navsari district and constituted the sample for the present investigation.

2.3 Data Collection

Primary data were collected using a structured and pre-tested

interview schedule. Personal interviews were conducted with the selected shrimp farmers to obtain comprehensive information regarding the ecological, biological, socio-economic, and operational factors influencing shrimp farming practices. The interview method ensured accurate and reliable data collection while allowing respondents to provide detailed information based on their farming experience.

2.4 Data Analysis

The collected data were compiled, coded, tabulated, and analysed using appropriate descriptive statistical techniques. Frequency and percentage analyses were employed to summarize and interpret the responses of the respondents. The analysed data were presented in tabular form for better understanding and interpretation of the findings.

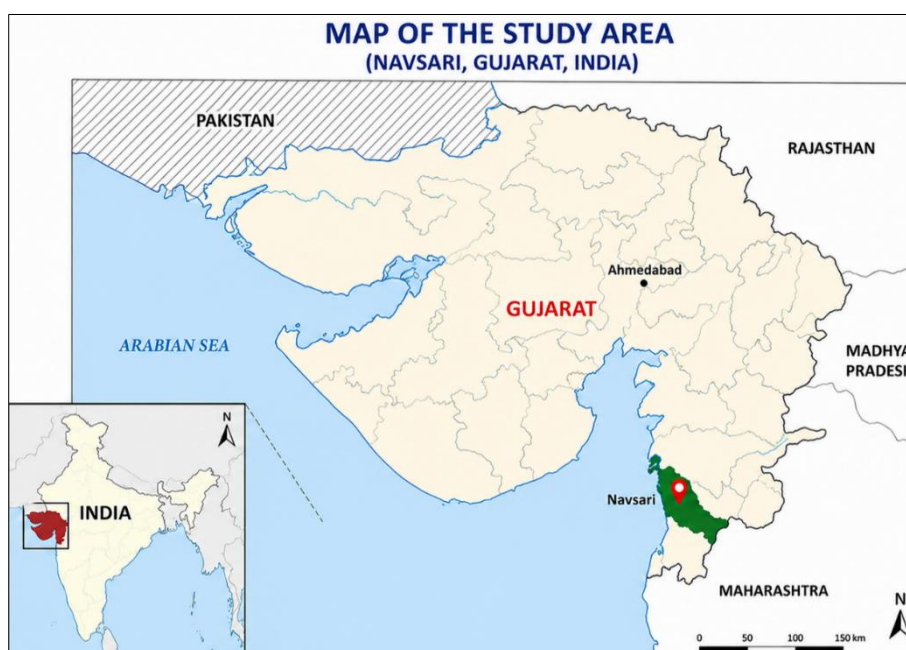


Fig 1: Map of the study area (Navsari, Gujarat)

3. Results and Discussion

3.1 Ecological Factors Influencing Shrimp Farming

The data presented in the table 1 revealed that all the respondents (100.0%) considered water source and quality, tidal characteristics, environmental conditions, and soil suitability as important ecological factors influencing shrimp farming in Navsari district. The findings indicate that the availability of good-quality seawater, favourable tidal conditions, suitable environmental parameters, and clayey soil play a crucial role in the successful establishment and operation of shrimp farms. These ecological factors provide an ideal environment for shrimp growth, survival, and productivity, thereby making Navsari district highly suitable for shrimp aquaculture. The present findings are in agreement with Boyd and Tucker (2012) [2], who reported that water quality, soil characteristics, and environmental conditions are the fundamental determinants of successful pond aquaculture. The findings are also supported by Bhatt *et al.* (2021) [1], who highlighted that the coastal areas of South Gujarat possess suitable soil and water salinity profiles that

favour shrimp farming development.

Table 1: Ecological factors influencing shrimp farming practices in Navsari (n-204)

Sr. No.	Particulars	Navsari
1	Water source & quality	204 (100)
2	Tidal characteristics	204 (100)
3	Environmental conditions	204 (100)
4	Soil suitability	204 (100)

(Values in parentheses is percentages of respondents)

3.2 Biological Factors Influencing Shrimp Farming

The data presented in the table 2 revealed that in biological factors, all the respondents (100.0%) reported less predators, less vegetation, and competition as important factors influencing shrimp farming. However, only 27.0 per cent of the respondents considered seed resources as a major factor. The findings suggest that the relatively low incidence of predators and unwanted vegetation in shrimp ponds

contributes significantly to efficient farm management and higher shrimp survival rates. Availability of seed resources was considered less influential, possibly due to the easy access to hatchery-produced seed through commercial supply networks. The present findings are supported by Lightner (2011) ^[5], who emphasized that biological factors such as predators, disease organisms, and pond ecology significantly influence shrimp survival and productivity. Similar observations were reported by MPEDA (2020) ^[6], which highlighted the importance of quality seed and proper biological management for successful shrimp culture.

Table 2: Biological factors influencing shrimp farming practices in Navsari (n-204)

Sr. No.	Particulars	Navsari
5	Seed resources	55 (27.0)
6	Less predators	204 (100)
7	Less vegetation	204 (100)
8	Competition	204 (100)

(Values in parentheses is percentages of respondents)

3.3 Socio-economic Factors Influencing Shrimp Farming

The data presented in the table 3 revealed that in availability of land and use of land and nearby water were the most important socio-economic factors, each reported by all respondents (100.0%). This was followed by social and political factors (98.0%), accessibility (96.1%), availability of manpower (84.3%), marketing outlets (50.5%), and land cost (41.2%). None of the respondents considered technical assistance as an influencing factor. These findings suggest that suitable land resources, water availability, favourable socio-political conditions, and accessibility are the major determinants encouraging shrimp farming in Navsari district. The findings are in line with Vadher and Manoj (2014) ^[9], who reported that land availability, accessibility, and labour resources significantly influence shrimp farming development in Gujarat. The findings are also supported by Nagothul *et al.* (2012) ^[8], who observed that socio-economic and institutional factors play a major role in farmers' participation in shrimp aquaculture enterprises.

Table 3: Socio-economic factors influencing shrimp farming in Navsari (n-204)

Sr. No.	Particulars	Navsari
9	Availability of land	204 (100)
10	Land cost	84 (41.2)
11	Accessibility	196 (96.1)
12	Availability of manpower	172 (84.3)
13	Marketing outlets	103 (50.5)
14	Social & political factors	200 (98.0)
15	Technical assistance	0 (0)
16	Use of land & nearby water	204 (100)

(Values in parentheses is percentages of respondents)

3.4 Farming Practices Influencing Shrimp Farming

The data presented in the table 4 revealed that semi-intensive farming was the dominant production system, adopted by 99.5 per cent of the respondents, while only 0.5 per cent practiced intensive farming. Similarly, mono culture was followed by 97.5 per cent of the farmers, whereas only 2.5 per cent adopted mixed culture systems. Among the shrimp species cultured, Monodon was the most preferred species

(69.1%), followed by both *Monodon* and *Penaeus Vannamei* (16.2%) and *P. Vannamei* alone (14.7%). Regarding species selection, easy availability of seed was reported by all respondents (100.0%), followed by disease resistance (78.4%) and economic benefits (45.1%). The majority of farmers (72.1%) cultivated one crop annually, while 27.9 per cent cultivated two crops per year. All respondents reported clay soil as the predominant soil type and adopted a combination of chemical and organic fertilizers for pond management. The present findings are in agreement with MPEDA (2022) ^[7], which reported that semi-intensive monoculture systems are the most widely adopted shrimp farming systems in India due to their economic viability and manageable production risks. Similar findings were reported by Lekshmi *et al.* (2005) ^[4], who observed that species selection, culture practices, and input management significantly influence shrimp farm productivity and profitability.

Table 4: Other factors influencing shrimp farming practices in Navsari (n-204)

Sr. No.	Particulars	Navsari
IV.	Farming Characteristics	
17	Semi-intensive farming	203 (99.5)
18	Intensive farming	5 (0.5)
19	Mono culture	199 (97.5)
20	Mix culture	5 (2.5)
V.	Species Cultured	
21	Monodon	141 (69.1)
22	P. Vannamei	30 (14.7)
23	Both species	33 (16.2)
VI.	Species Selection Reasons	
24	Easy availability of seed	204 (100)
25	Disease resistance	160 (78.4)
26	Economic benefits	92 (45.1)
VII.	Crops per Year	
27	One crop	147 (72.1)
28	Two crops	57 (27.9)
VIII.	Type of soil	
29	Clay	204 (100)
IX.	Fertilizer Application	
30	Chemical + Organic (Both)	204 (100)

4. Conclusion

The study concluded that shrimp farming in Navsari district is primarily influenced by ecological, biological, socio-economic, and operational factors. Favourable ecological conditions such as good-quality water, suitable tidal characteristics, favourable environmental conditions, and clayey soil were identified as the most important factors supporting shrimp farming. Among biological factors, less predator incidence, less vegetation, and competition played a significant role in successful shrimp culture. Availability of land, nearby water resources, accessibility, manpower availability, and favourable social and political conditions emerged as the major socio-economic factors influencing shrimp farming. The study further revealed that semi-intensive monoculture farming was the predominant production system, with *Penaeus monodon* being the most preferred shrimp species. Easy availability of seed, disease resistance, and economic benefits were the major reasons for species selection. Overall, the findings indicate that the favourable resource base and adoption of scientific farming

practices have significantly contributed to the growth and sustainability of shrimp farming in Navsari district.

Competing Interests

Authors have declared that no competing interests exist.

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