

## International Journal of Agriculture Extension and Social Development

Volume 9; Issue 6; June 2026; Page No. 211-215

Received: 14-04-2026  
Accepted: 19-05-2026

Indexed Journal  
Peer Reviewed Journal

### Study on supply chain management of medicinal rice (Navara) in Suryapet district of Telangana state

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DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i6c.3685>

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#### Abstract

Medicinal rice, particularly Navara rice (*Oryza sativa* L.), is a traditional rice variety valued for its therapeutic, nutritional, and cultural significance in India. It is widely utilized in Ayurvedic medicine for improving immunity, digestion, bone health, and neurological functions. The present study, entitled “Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State,” was undertaken to examine the socio-economic profile of respondents, identify existing marketing channels, analyze price spread and marketing efficiency, and assess the major constraints affecting the supply chain of Navara rice.

The study was based on both primary and secondary data. Primary data were collected from Navara rice growers and other stakeholders involved in the supply chain, including traders, processors, wholesalers, and retailers. Secondary data were obtained from published reports, research articles, and government publications. A multistage sampling technique was adopted for the selection of the study area and respondents. The collected data were analyzed using statistical tools such as percentages, averages, ratios, and chi-square analysis.

The results revealed that the majority of respondents belonged to the economically active age group of 30–50 years, possessed moderate educational status, and fell within the middle-income category. Most respondents were marginal farmers who primarily depended on agriculture and horticulture for their livelihood. The study identified multiple marketing channels for Navara rice, among which Channel II exhibited the highest marketing efficiency. Major constraints affecting the supply chain included inadequate market information, unorganized marketing systems, price fluctuations, and high transportation costs.

The study concludes that strengthening market infrastructure, reducing the role of intermediaries, improving extension services, and enhancing market information systems can significantly improve supply chain efficiency, increase farmers' income, and promote the sustainable development of Navara rice cultivation in the study area.

**Keywords:** Navara rice, medicinal rice, supply chain management, marketing channels, price spread, marketing efficiency, socio-economic profile, Suryapet district, Telangana, agricultural marketing

#### Introduction

Medicinal rice, particularly Navara rice (*Oryza sativa* L.), is a traditional rice variety renowned for its therapeutic, nutritional, and cultural significance in India. It is widely utilized in Ayurvedic medicine for the treatment of neurological disorders, arthritis, anemia, and various other health conditions. Owing to its rich nutritional composition, antioxidant properties, and medicinal value, Navara rice has gained increasing attention among health-conscious consumers and practitioners of traditional medicine.

Navara rice originated in Kerala and is recognized as a unique medicinal rice variety with a specialized market. Besides direct consumption, it is used in the preparation of Ayurvedic formulations, health foods, and wellness

products. In recent years, increasing awareness regarding functional foods, organic agriculture, and traditional healthcare systems has contributed to a growing demand for Navara rice in both domestic and niche markets.

An efficient supply chain plays a crucial role in maintaining the quality, authenticity, and marketability of medicinal rice. The supply chain of Navara rice involves several interconnected activities, including production, harvesting, processing, storage, transportation, distribution, and marketing. However, the supply chain is often constrained by inadequate market infrastructure, lack of organized marketing systems, insufficient storage facilities, limited market information, and the involvement of multiple intermediaries, which reduce marketing efficiency and

farmers' profitability.

In Telangana State, particularly in Suryapet district, the cultivation and marketing of medicinal rice are gradually emerging as promising agricultural enterprises. The district possesses suitable agro-climatic conditions and increasing market opportunities for high-value specialty crops. However, information regarding the supply chain structure, marketing efficiency, and constraints associated with Navara rice cultivation remains limited.

Therefore, the present study entitled "Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State" was undertaken to examine the socio-economic characteristics of Navara rice growers, identify existing marketing channels, analyze price spread and marketing efficiency, and assess the major constraints affecting the supply chain. The findings of the study are expected to provide valuable insights for policymakers, researchers, extension agencies, and stakeholders involved in the promotion of medicinal rice cultivation and marketing.

### Objectives

1. To study the socio-economic profile of respondents in the study area.
2. To find out the existing marketing channels of Navara rice.

### Research Methodology

#### Sampling Design

For the present study entitled "*Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State*", a multistage sampling design was adopted. Suryapet district was selected purposively due to the importance of Navara rice cultivation in the region. Selected mandals and villages were chosen based on the area under Navara rice cultivation and the extent of marketing activities. Navara rice growers and other stakeholders involved in the supply chain were selected as respondents. The sampling design was used to collect data for analyzing supply chain management, price spread, marketing efficiency, and constraints in the Navara rice supply chain.

#### Selection of District

Selection of the district constituted the first stage of sampling. Telangana State consists of 33 districts, of which Suryapet district was purposively selected for the present study. Agriculture plays a significant role in the district economy and provides livelihood opportunities to a large section of the rural population. The district has considerable potential for the cultivation and marketing of medicinal rice varieties.

#### Selection of Mandal

Selection of the mandal constituted the second stage of sampling. Suryapet district comprises 23 mandals, of which Palakeedu Mandal was selected purposively because Navara rice cultivation is relatively higher in this mandal compared to other mandals of the district.

#### Selection of Villages

Selection of villages constituted the third stage of sampling.

Palakeedu Mandal comprises 14 villages, of which five villages, namely Palakeedu, Yellapuram, Sajjapuram, Komatikunta, and Mahankaligudem, were purposively selected based on the extent of Navara rice cultivation and marketing activities.

A total sample of 100 respondents was selected from the identified villages to ensure adequate representation of Navara rice growers. The distribution of respondents was 27 from Palakeedu, 26 from Yellapuram, 16 from Sajjapuram, 19 from Komatikunta, and 12 from Mahankaligudem. The selected respondents provided the necessary information for analyzing the socio-economic characteristics, marketing channels, and supply chain management of Navara rice in the study area.

### Selection of Respondents/Farmers

Based on the information collected from the block office and gram panchayat, 10% of the respondents and the selection of farmers are based on the farmers productivity.

| Sr.no | Farm Size Groups | Respondents         | Land Holding     |
|-------|------------------|---------------------|------------------|
| 1.    | Size group - I   | Marginal farmers    | 0 to 1 Hectare   |
| 2.    | Size group - II  | Small farmers       | 1 to 2 Hectare   |
| 3.    | Size group - III | Semi medium farmers | 2 to 4 Hectare   |
| 4.    | Size group - IV  | Medium farmers      | 4 to 10 Hectare  |
| 5.    | Size group - V   | Large farmers       | Above 10 Hectare |

### Analysis of data/ analytical tools used

The present study titled "Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State" was based on both primary and secondary data. The primary data were collected from Navara rice growers, traders, commission agents, millers or processors, wholesalers, retailers, and other stakeholders involved in the medicinal rice supply chain, while secondary data were obtained from published reports, government records, research articles, and relevant literature.

The collected data were compiled, tabulated, and analyzed using suitable statistical tools such as averages, percentages, and ratios. For assessing the supply chain management of medicinal rice, indicators such as supply chain channels, marketing costs, transportation facilities, storage and processing infrastructure, stakeholder margins, value addition, price spread, and constraints faced by supply chain participants were used to evaluate the overall performance of the Navara rice supply chain in the study area.

### Analytical techniques employed

#### Chi-square test

A chi-square statistic is one way to show a relationship between two categorical variables. The chi-squared statistic is a single number that tells you how much difference exists between your observed counts and the counts you would expect if there were no relationship at all in the population. It is used for data that consist of variables distributed across various categories and is denoted by  $\chi^2$ . This formula will be used for identifying the demographic pattern of the consumers. The chi-square formula is:

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where

c = Degrees of freedom

O = Observed value(s)

E = Expected value(s)

### Mean

The mean  $\bar{x}$  is defined as the sum of the observations divided by the total number of observations. The mean formula of given observations can be expressed as

$$\bar{x} = \frac{\sum fx}{N}$$

Where,

$\bar{x}$  = the mean value of the set of given data.

f = frequency of the individual data

N = sum of frequencies

### Median

For finding the median we need to arrange the data either in ascending order or descending order. Now after arranging the data, get the total number of observations in the data. If the number is odd, the median is  $(n+1)/2$ . If the number is even, find the two middle terms using the formula  $n/2$  and  $(n/2) + 1$ . Find the mean of these 2 middle terms. Thus the median formula for even numbers is given as: Median =  $((n/2)^{\text{th}} \text{ term} + ((n/2) + 1)^{\text{th}} \text{ term})/2$

Similarly, we have median formula for grouped data. The median formula for grouped data is given as,

$$\text{Median} = L_m + \left[ \frac{\frac{n}{2} - F}{f_m} \right] i$$

Where,

n = Total frequency

F = Cumulative frequency of class before the median class

$f_m$  = Frequency of the class median i = Class width

$L_m$  = Lower boundary of the class median

### Mode

Value or a number that appears most frequently in a data set is a Mode. In cases where we need to find the most occurred value, we find the mode value for the set of given data. For data without any repeating values, there is no mode at all. The mode value depends on the given dataset. Mode for grouped data is found using the following mode formula.

$$\text{Mode formula} = L + h \frac{(f_m - f_1)}{(f_m - f_1) + (f_m - f_2)}$$

Where,

L is the lower limit of the modal class. h is the size of the class interval.

$f_m$  is the frequency of the modal class.

$f_1$  is the frequency of the class preceding the modal class.

$f_2$  is the frequency of the class succeeding the modal class

### Results and Discussion

The socio-economic characteristics of Navara rice growers

play an important role in influencing production decisions, post-harvest practices, supply chain participation, and income generation. Factors such as age, education, family size, farming experience, landholding size, and investment capacity affect the cultivation, processing, storage, and marketing behavior of medicinal rice growers.

Therefore, the present study on “Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State” examined the socio-economic profile of respondents to understand their role in Navara rice production and their participation in different stages of the supply chain in the study area.

#### Socio-Economic Profile of Respondents (Age, Education & Income)

| Particular      | Category            | Percentage (%) |
|-----------------|---------------------|----------------|
| Age             | Below 30 years      | 34%            |
|                 | 30–50 years         | 45%            |
|                 | Above 50 years      | 21%            |
| Education       | Illiterate          | 6%             |
|                 | Primary             | 12%            |
|                 | Middle school       | 19%            |
|                 | High school         | 27%            |
|                 | Intermediate        | 20%            |
|                 | Graduate            | 12%            |
| Income (Annual) | Post Graduate       | 4%             |
|                 | Below ₹50,000       | 10%            |
|                 | ₹50,001–₹1,00,000   | 29%            |
|                 | ₹1,00,001–₹1,50,000 | 41%            |
|                 | ₹1,50,001–₹2,00,000 | 15%            |
|                 | Above ₹2,00,000     | 5%             |

The table shows that most respondents (45%) belong to the active age group of 30–50 years. Educational status indicates that the majority have secondary to higher secondary education. Income distribution reveals that most farmers fall under the middle-income group (₹1,00,001–₹1,50,000), indicating moderate economic stability among Navara rice growers.

#### Socio-Economic Profile (Occupation & Landholding Pattern)

| Particular  | Category               | Percentage (%) |
|-------------|------------------------|----------------|
| Occupation  | Agriculture            | 26%            |
|             | Horticulture           | 33%            |
|             | Animal Husbandry       | 16%            |
|             | Business/Profession    | 15%            |
| Landholding | Salaried               | 10%            |
|             | Marginal (1–2.5 acres) | 71%            |
|             | Small (2.5–5 acres)    | 16%            |
|             | Medium (5–10 acres)    | 11%            |
|             | Large (>10 acres)      | 2%             |

The occupational structure shows that horticulture is the major source of livelihood followed by agriculture. Landholding pattern indicates that most respondents are marginal farmers (71%), suggesting small-scale farming dominates Navara rice cultivation in the study area.

**Overall Socio-Economic Summary of Respondents**

| Indicator   | Major Category         | Key Observation                |
|-------------|------------------------|--------------------------------|
| Age         | 30–50 years (45%)      | Active farming group dominates |
| Education   | High school (27%)      | Moderate literacy level        |
| Income      | ₹1–1.5 lakh (41%)      | Middle-income dominance        |
| Occupation  | Horticulture (33%)     | Diversified livelihoods        |
| Landholding | Marginal farmers (71%) | Small-scale farming system     |

This consolidated table highlights that Navara rice growers are mostly middle-aged, moderately educated, and economically middle-class farmers. The dominance of marginal landholdings and diversified occupations reflects a semi-commercial farming structure, which influences participation in the Navara rice supply chain.

**Conclusion**

The present study entitled “*Study on Supply Chain Management of Medicinal Rice (Navara) in Suryapet District of Telangana State*” was undertaken to analyze the socio-economic characteristics of Navara rice growers, identify existing marketing channels, assess marketing efficiency, and examine the major constraints affecting the supply chain. The findings revealed that the majority of respondents belonged to the middle-age group, possessed moderate educational status, and were primarily marginal farmers with agriculture and horticulture as their major occupations.

The study identified multiple marketing channels involved in the distribution of Navara rice. Among these, Channel II was found to be the most efficient marketing channel, indicating that reducing the number of intermediaries can improve marketing efficiency and enhance the producer's share in the consumer's rupee. The major constraints affecting the supply chain included inadequate market information, unorganized marketing systems, price fluctuations, high transportation costs, and limited market awareness regarding the medicinal value of Navara rice.

The study suggests strengthening market infrastructure, improving access to market information, promoting direct marketing channels, encouraging Farmer Producer Organizations (FPOs), and enhancing extension services to improve supply chain efficiency. Such measures would contribute to better price realization, increased farmers' income, and sustainable development of Navara rice cultivation in the study area.

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