

# Participation of rural women to rice-based farming system: A Study of North Bihar, India

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## ABSTRACT

Rural women in Bihar play a crucial role in agriculture and related activities, participating extensively in tasks from pre-harvest to post-harvest. Despite their significant contributions, these women often remain unrecognized, commonly referred to as "invisible farmers." This study was conducted in the Samastipur district of North Bihar to examine the extent of rural women's involvement in various agricultural activities. Two rice-growing blocks were randomly selected from a total of 20, with two villages chosen at random from each block, resulting in a sample of four villages. A total of 160 respondents were selected from 40 farm families in each village using a proportionate stratified random sampling technique based on landholding size. The study highlights that women's independent participation in farm and allied activities within rice-based farming systems was 50.05 percent, surpassing men's independent participation of 31.28 percent, while joint participation was recorded at 18.87 percent. This research underscores the essential yet often overlooked role of rural women in agriculture in Bihar.

**Keywords:** participation, rural women, rice-based farming system, North Bihar

## Introduction

India's rural economy is conventionally based on agriculture, livestock and household activities. Bihar is a state whose economy is primarily based on agriculture. Rice is a major staple crop in North Bihar. Farm women contribute significantly to rice-based farming systems by engaging in various tasks that create employment opportunities and generate income [1-2]. They take on multiple roles and provide valuable contributions through their work hours, generating an income that is equivalent to that of other family members. As a result, they hold various employment statuses, from unpaid family worker to paid wage earners, whether working at home, in the village, or elsewhere, offering services in exchange for goods and services [3]. In North Bihar, large-scale seasonal and long-term migration of men for employment in sectors such as services, business, construction, and agricultural labor places women as the primary managers of both agricultural activities and household responsibilities, including key decision-making at home [4-5]. Therefore, understanding the agricultural production process remains incomplete without analyzing the role and participation of women, particularly in rice-based farming systems.

## Methodology

The study was carried out in Samastipur district of North Bihar. For the research, two rice growing blocks were randomly selected from a total of 20 blocks. Two villages were randomly selected from each block, resulting a sample of four villages. Using a proportionate stratified random sampling technique based on land holdings a sample of 40 farm families was selected from each of the four chosen villages [6]. As a result, the total sample comprised 160 beneficiaries. The data were gathered using a well-structured pre-tested interview schedule that addressed various variables chosen for the study. The collected data were analysed through frequency, percentage, mean and t-test for interpretation of results.

## Results and Discussion

Since Vedic times, women have been regarded as essential contributors to Indian society, playing crucial roles that extend far beyond household responsibilities. In rural areas, women actively engage in rice-based farming systems in addition to managing household duties. This study aims to analyze the extent of women's participation in farm and allied activities related to rice-based farming. For this purpose, farm activities were divided into two main categories: crop production and livestock-related tasks [7]. Allied activities were further classified into eight groups, including fuel collection, cooking, drying and cleaning food grains, child care and management, income-generating activities, financial management, socio-religious involvement, and kitchen gardening.

### A. Work participation in farm activities

The frequency and percentage distribution of men and women participating in various rice-based farming activities are presented in Tables 1 to 6.

#### 1. Rice farming activities

Table 1 illustrates that farm women participated in all rice farming activities, either independently or in collaboration with other family members, except for the more arduous tasks of puddling and ploughing. Women predominantly performed activities such as transplanting, inter-culturing, harvesting, and post-harvesting operations. This trend is attributed to the fact that labor-intensive, tedious, hazardous, and low-prestige tasks are typically assigned to women, resulting in their higher participation in these activities compared to men.

**Table 1. Gender-wise frequency & percentage distribution of work participation levels of women in rice farming activities**

| Activities                           |   | Men   | Women | Jointly | Pooled |
|--------------------------------------|---|-------|-------|---------|--------|
| Rice Production tasks                |   |       |       |         |        |
| Land preparation                     | f | 65    | 61    | 34      | 160    |
|                                      | % | 40.62 | 38.12 | 21.26   | 100    |
| Ploughing & puddling                 | f | 160   | -     | -       | 160    |
|                                      | % | 100   | 0     | 0       | 100    |
| Use of High Yielding Varieties       | f | 55    | 25    | 80      | 160    |
|                                      | % | 34.37 | 15.62 | 50.0    | 100    |
| Sowing technique                     | f | 75    | 55    | 30      | 160    |
|                                      | % | 46.87 | 34.37 | 18.75   | 100    |
| Nursery bed preparation              | f | 35    | 100   | 25      | 160    |
|                                      | % | 21.87 | 62.5  | 15.62   | 100    |
| Seed treatment                       | f | -     | -     | -       | -      |
|                                      | % | -     | -     | -       | -      |
| Transplanting                        | f | 10    | 140   | 10      | 160    |
|                                      | % | 6.25  | 87.5  | 6.25    | 100    |
| Inter culturing                      | f | 13    | 130   | 17      | 160    |
|                                      | % | 8.12  | 81.25 | 10.62   | 100    |
| Water Management                     | f | 60    | 55    | 45      | 160    |
|                                      | % | 37.5  | 34.37 | 28.12   | 100    |
| Integrated nutrient management       | f | 75    | 65    | 20      | 160    |
|                                      | % | 46.87 | 40.62 | 12.5    | 100    |
| Integrated plant protection measures |   |       |       |         |        |
| a) Use of insecticides               | f | 71    | 69    | 20      | 160    |
|                                      | % | 44.37 | 43.12 | 12.50   | 100    |
| b) Use of fungicides                 | f | 68    | 65    | 27      | 160    |
|                                      | % | 42.5  | 40.62 | 16.87   | 100    |
| Harvesting                           | f | 40    | 110   | 10      | 160    |
|                                      | % | 25.00 | 68.75 | 6.25    | 100    |
| Post-harvest operations              |   |       |       |         |        |
| a) Threshing of grains               | f | 90    | 60    | 10      | 160    |
|                                      | % | 56.25 | 37.50 | 6.25    | 100    |
| b) Storage                           | f | 40    | 60    | 60      | 160    |
|                                      | % | 25.0  | 37.5  | 37.5    | 100    |
| Over all rice production activities  | f | 61.21 | 71.07 | 27.71   | 160    |
|                                      | % | 38.25 | 44.41 | 17.32   | 100    |

The analysis of gender-wise work participation in various rice farming activities revealed that women predominated in tasks such as nursery bed preparation, transplanting, inter-culturing, harvesting, and storage. In contrast, men excelled in land preparation, sowing techniques, water management, integrated nutrient management, and plant protection measures, which are arduous and complex. These demanding, prestigious, and time-sensitive activities require significant skill and knowledge, leading to higher male participation in these specific areas. Additionally, the use of high-yielding varieties and rice storage tasks were primarily performed jointly by men and women. Notably, neither men nor women participated in seed treatment operations [8-9]. The results showed that rural women are involved to varying degrees in nearly all rice production activities.

## 2. Wheat farming activities

Table 2 indicates that farm women participated in all agricultural activities related to wheat production, either independently or alongside other family members, except for the use of fungicides and ploughing. Women excelled in inter-culturing and post-harvest operations, such as sun drying and storage, while men dominated in land preparation, sowing, water management, integrated nutrient management, integrated plant protection measures, harvesting, and threshing [10-11].

The adoption of pumpsets for irrigation, wheat threshers, tractors, and wheat reapers has significantly reduced the involvement of female labor in most wheat-related operations.

**Table 2. Gender-wise frequency & percentage distribution of work participation levels of women in wheat farming activities**

| Activities                              |   | Men   | Women | Jointly | Pooled |
|---|---|-------|-------|---------|--------|
| A. Wheat Production tasks               |   |       |       |         |        |
| 1. Land preparation                     | f | 70    | 50    | 40      | 160    |
|   | % | 43.75 | 31.25 | 25.0    | 100    |
| 2. Ploughing                            | f | 160   | -     | -       | 160    |
|   | % | 100   | 0     | 0       | 100    |
| 3. Use of High Yielding Varieties       | f | 40    | 40    | 80      | 160    |
|   | % | 25.0  | 25.0  | 50.0    | 100    |
| 4. Sowing                               | f | 70    | 40    | 50      | 160    |
|   | % | 43.75 | 25.0  | 31.25   | 100    |
| 5. Inter culturing                      | f | 60    | 70    | 30      | 160    |
|   | % | 37.50 | 43.75 | 18.75   | 100    |
| 6. Seed treatment                       | f | -     | -     | -       | -      |
|   | % | -     | -     | -       | -      |
| 7. Water Management                     | f | 60    | 30    | 60      | 160    |
|   | % | 40.62 | 18.75 | 37.50   | 100    |
| 8. Integrated nutrient management       | f | 70    | 50    | 40      | 160    |
|   | % | 43.75 | 31.25 | 25.0    | 100    |
| 9. Integrated plant protection measures |   |       |       |         |        |
| a) Use of insecticides                  | f | 70    | 40    | 50      | 160    |
|   | % | 43.75 | 25.0  | 31.25   | 100    |
| b) Use of fungicides                    | f | 160   | -     | -       | 160    |
|   | % | 100   | 0     | 0       | 100    |
| 12. Harvesting                          | f | 80    | 60    | 20      | 160    |
|   | % | 50.0  | 37.50 | 12.5    | 100    |
| 11. Post-harvesting operations          |   |       |       |         |        |
| a) Threshing                            | f | 75    | 25    | 60      | 160    |
|   | % | 46.87 | 15.62 | 37.50   | 100    |
| b) Sun drying                           | f | 10    | 100   | 50      | 160    |
|   | % | 6.25  | 62.5  | 31.25   | 100    |
| c) Storage                              | f | 20    | 80    | 60      | 160    |
|   | % | 12.5  | 50.0  | 37.50   | 100    |
| Over all wheat production activities    | f | 73.07 | 45.00 | 41.53   | 160    |
|   | % | 45.68 | 28.13 | 25.97   | 100    |

## 3. Maize farming activities

Table 3 presents the gender-wise frequency and percentage distribution of participation by women and men in maize production activities. It is evident from the table that hand weeding, earthing up, harvesting, and post-harvest operations—such as plucking cobs, shelling cobs, sun drying, and storage—were predominantly performed by women. Conversely, ploughing has traditionally been an exclusive task for men [12]. Additionally, Table 3 indicates that women played a significant role in land preparation, seed treatment with fungicides, sowing, use of weedicides, water management, integrated nutrient management, and integrated plant protection measures. These operations are physically demanding; however, the hard and strenuous nature of this work has been predominantly assigned to men in a male-dominated society. As a result, male participation in these activities was higher than that of women.

**Table 3. Gender-wise frequency & percentage distribution of work participation levels of women in maize farming activities**

| Activities                        |   | Men   | Women | Jointly | Pooled |
|-----------------------------------|---|-------|-------|---------|--------|
| A. Maize Production tasks         |   |       |       |         |        |
| 1. Land preparation               | f | 75    | 35    | 50      | 160    |
|                                   | % | 46.87 | 21.87 | 31.25   | 100    |
| 2. Ploughing                      | f | 160   | -     | -       | 160    |
|                                   | % | 100   | 0     | 0       | 100    |
| 3. Seed treatment with fungicides | f | -     | -     | -       | -      |
|                                   | % | -     | -     | -       | -      |
| 4. Use of High Yielding Varieties | f | 55    | 25    | 80      | 160    |
|                                   | % | 34.37 | 15.62 | 50.0    | 100    |
| 5. Sowing of seeds                | f | 90    | 40    | 30      | 160    |
|                                   | % | 56.25 | 25.0  | 18.75   | 100    |
| 6. Inter culturing                |   |       |       |         |        |
| a) Hand weeding                   | f | 20    | 100   | 40      | 160    |
|                                   | % | 12.5  | 62.5  | 25.0    | 100    |
| b) Earthing up                    | f | 30    | 90    | 40      | 160    |
|                                   | % | 18.75 | 56.25 | 25.00   | 100    |
| 7. Water Management               | f | 60    | 30    | 60      | 160    |

|     |                                      | % | 40.62 | 18.75 | 37.50 | 100 |
|-----|--------------------------------------|---|-------|-------|-------|-----|
| 8.  | Integrated nutrient management       | f | 75    | 50    | 35    | 160 |
|     |                                      | % | 46.87 | 31.25 | 21.87 | 100 |
| 9.  | Integrated plant protection measures |   |       |       |       |     |
|     | a) Use of insecticides               | f | 60    | 35    | 65    | 160 |
|     |                                      | % | 37.50 | 21.87 | 40.62 | 100 |
|     | b) Use of fungicides                 | f | 68    | 60    | 32    | 160 |
|     |                                      | % | 42.5  | 37.50 | 20.0  | 100 |
| 12. | Harvesting                           | f | 30    | 100   | 30    | 160 |
|     |                                      | % | 18.75 | 62.5  | 18.75 | 100 |
| 11. | Post-harvesting operations           |   |       |       |       |     |
|     | a) Plucking of cobs                  | f | 30    | 90    | 40    | 160 |
|     |                                      | % | 18.75 | 56.25 | 25.0  | 100 |
|     | b) Shelling of cobs                  | f | 10    | 120   | 30    | 160 |
|     |                                      | % | 6.25  | 75.0  | 18.75 | 100 |
|     | c) Sun drying                        | f | 20    | 100   | 40    | 160 |
|     |                                      | % | 12.5  | 62.5  | 25.0  | 100 |
|     | d) Storage                           | f | 30    | 90    | 40    | 160 |
|     |                                      | % | 18.75 | 56.25 | 25.0  | 100 |
|     | Over all maize production activities | f | 54.86 | 64.66 | 40.46 | 160 |
|     |                                      | % | 34.38 | 40.41 | 25.29 | 100 |

#### 4. Potato farming activities

Potato is commonly grown as an intercrop with rabi maize in the study area.

**Table 4. Gender-wise frequency & percentage distribution of work participation levels of women in potato farming activities**

|     | Activities                            |   | Men   | Women | Jointly | Pooled |
|-----|---------------------------------------|---|-------|-------|---------|--------|
| A.  | Potato Production tasks               |   |       |       |         |        |
| 1.  | Land preparation                      | f | 70    | 50    | 40      | 160    |
|     |                                       | % | 43.75 | 31.25 | 25.0    | 100    |
| 2.  | Ploughing                             | f | 160   | -     | -       | 160    |
|     |                                       | % | 100   | 0     | 0       | 100    |
| 3.  | Use of HighYieldingVarieties          | f | 50    | 30    | 80      | 160    |
|     |                                       | % | 31.25 | 18.75 | 50.0    | 100    |
| 4.  | Seed rate                             | f | 60    | 40    | 60      | 160    |
|     |                                       | % | 37.50 | 25.0  | 37.50   | 100    |
| 5.  | Inter cropping with maize             | f | 40    | 80    | 40      | 160    |
|     |                                       | % | 25.0  | 25.0  | 50.0    | 100    |
| 6.  | Inter culturing                       | f | 40    | 80    | 40      | 160    |
|     |                                       | % | 25.0  | 50.0  | 25.0    | 100    |
| 7.  | Water Management                      | f | 70    | 20    | 70      | 160    |
|     |                                       | % | 43.75 | 12.5  | 43.75   | 100    |
| 8.  | Integrated nutrient management        | f | 70    | 40    | 50      | 160    |
|     |                                       | % | 43.75 | 25.0  | 31.25   | 100    |
| 9.  | Integrated plant protection measures  |   |       |       |         |        |
|     | a) Use of insecticides                | f | 65    | 35    | 60      | 160    |
|     |                                       | % | 40.62 | 21.87 | 37.50   | 100    |
|     | b) Use of fungicides                  | f | 60    | 40    | 60      | 160    |
|     |                                       | % | 37.50 | 25.0  | 37.50   | 100    |
| 10. | Harvesting                            |   |       |       |         |        |
|     | a) Cutting of haulms                  | f | 20    | 90    | 50      | 160    |
|     |                                       | % | 12.5  | 56.25 | 31.25   | 100    |
|     | b) Digging of potato tubers           | f | 25    | 80    | 55      | 160    |
|     |                                       | % | 15.62 | 50.0  | 34.37   | 100    |
| 11. | Post-harvesting operations            |   |       |       |         |        |
|     | a) Storage                            | f | 40    | 100   | 20      | 160    |
|     |                                       | % | 25.00 | 62.50 | 12.50   | 100    |
|     | b) Preparation of potato chips        | f | 25    | 105   | 30      | 160    |
|     |                                       | % | 15.62 | 65.62 | 18.75   | 100    |
|     | Over all potato production activities | f | 56.78 | 53.57 | 49.64   | 160    |
|     |                                       | % | 35.49 | 33.48 | 31.02   | 100    |

Table 4 illustrates that farm women participated in all agricultural activities related to potato production, either independently or alongside other family members. Women excelled in inter-culturing, hand weeding, earthing up, harvesting (including cutting of haulms and digging of potato tubers), and post-harvest operations such as culling, storage, and preparation of potato chips. Conversely, ploughing has traditionally been an exclusive task for men, and men also dominated in land preparation, seed rate determination, water management, integrated nutrient management, and plant protection measures, particularly in the use of insecticides and fungicides [13].

#### 5. Moong farming activities

A quick glance at Table 5 reveals that farm women participated in all moong farming activities, either independently or in collaboration with other family members, except for ploughing. This operation is both physically demanding and subject to taboos within the rural community, leading to its exclusive performance by men [14].

**Table 5 presents the gender-wise frequency and percentage distribution of work participation levels of women in moong farming activities.**

|     | Activities                           |   | Men   | Women | Jointly | Pooled |
|-----|--------------------------------------|---|-------|-------|---------|--------|
| A.  | Moong Production tasks               |   |       |       |         |        |
| 1.  | Land preparation                     | f | 70    | 50    | 40      | 160    |
|     |                                      | % | 43.75 | 31.25 | 25.0    | 100    |
| 2.  | Ploughing                            | f | 160   | -     | -       | 160    |
|     |                                      | % | 100   | -     | -       | 100    |
| 3.  | Seed treatment                       | f | -     | -     | -       | -      |
|     |                                      | % | -     | -     | -       | -      |
| 4.  | Use of HighYieldingVarieties         | f | 50    | 30    | 80      | 160    |
|     |                                      | % | 31.25 | 18.75 | 50.0    | 100    |
| 5.  | Sowing of moong                      | f | 80    | 40    | 40      | 160    |
|     |                                      | % | 50.0  | 25.0  | 25.0    | 100    |
| 6.  | Interculturing                       | f | 20    | 120   | 20      | 160    |
|     |                                      | % | 12.5  | 75.0  | 12.5    | 100    |
| 7.  | Water Management                     | f | 70    | 55    | 35      | 160    |
|     |                                      | % | 43.75 | 34.37 | 21.87   | 100    |
| 8.  | Integrated nutrient management       | f | 70    | 55    | 35      | 160    |
|     |                                      | % | 43.75 | 34.37 | 21.87   | 100    |
| 9.  | Plant protection measures            |   |       |       |         |        |
|     | a) Use of insecticides               | f | 65    | 30    | 65      | 160    |
|     |                                      | % | 40.62 | 18.75 | 40.62   | 100    |
|     | b) Use of fungicides                 | f | 68    | 65    | 27      | 160    |
|     |                                      | % | 42.5  | 40.62 | 16.87   | 100    |
| 12. | Harvesting                           | f | 20    | 100   | 40      | 160    |
|     |                                      | % | 12.5  | 62.5  | 25.0    | 100    |
| 11. | Post-harvesting operations           |   |       |       |         |        |
|     | a) Plucking of cobs                  | f | 90    | 50    | 20      | 160    |
|     |                                      | % | 56.25 | 31.25 | 12.5    | 100    |
|     | b) Sun drying                        | f | 50    | 90    | 20      | 160    |
|     |                                      | % | 31.25 | 56.25 | 12.5    | 100    |
|     | c) Storage                           | f | 40    | 80    | 40      | 160    |
|     |                                      | % | 25.0  | 50.0  | 25.0    | 100    |
|     | d) Preparation of papad              | f | 20    | 100   | 40      | 160    |
|     |                                      | % | 12.5  | 62.5  | 25.0    | 100    |
|     | e) Preparation of moong dal          | f | -     | 140   | 20      | 160    |
|     |                                      | % | -     | 87.5  | 12.5    | 100    |
|     | Over all moong production activities | f | 58.20 | 65.66 | 36.13   | 160    |
|     |                                      | % | 36.38 | 41.04 | 22.58   | 100    |

The analysis of gender-wise work participation in various moong farming activities revealed that women predominantly engaged in inter-culturing, harvesting, and post-harvest operations, including sun drying, storage, and the preparation of papad and moong dal. In contrast, men had a dominant role in land preparation, sowing of moong, water management, integrated nutrient management, and plant protection measures, such as the use of insecticides and seed treatment with fungicides, as well as threshing activities. Ploughing, however, was exclusively performed by men [15-17]. In the rural community, the more demanding and strenuous tasks have traditionally been assigned to men, resulting in higher male participation in ploughing, sowing, water management, integrated nutrient management, and plant protection measures compared to women.

#### 6. Rice-based farming activities

Table 6 indicates that farm women participated in all rice-based farming activities, either independently or in collaboration with family members, except for the arduous tasks of puddling and ploughing. Women predominantly engaged in transplanting, nursery bed preparation, inter-culturing, harvesting, and post-harvest operations. Labor-intensive, tedious, hazardous, and

low-prestige tasks are typically assigned to women, resulting in their higher participation in these activities compared to men.

The analysis of gender-based work participation in various rice-based farming activities revealed that women mainly engaged in transplanting, nursery bed preparation, inter-culturing, harvesting, and post-harvest operations. In contrast, men took the lead in more physically demanding and complex tasks, such as land preparation, sowing, water management, integrated nutrient management, and plant protection measures [18]. These demanding, prestigious, and time-sensitive tasks require significant skill and knowledge, which are predominantly designated to men. Consequently, men's involvement in these specific areas was greater than that of women.

The use of high-yielding varieties in the rice-based farming system was primarily performed jointly by men and women. Notably, neither men nor women participated in seed treatment operations.

Additionally, the table 6 highlighted that 37.68 % of tasks were carried out by men and over 40 % were performed by women and remaining tasks were jointly handled by both men and women.

**Table 6. Gender-wise frequency & percentage distribution of work participation levels of women in rice-based farming activities**

| Activities                                | Men     | Women | Jointly | Pooled |
|---|---------|-------|---------|--------|
| <b>A. Rice-based Production tasks</b>     |         |       |         |        |
| 1. Land preparation                       | f 70    | 49.2  | 40.8    | 160    |
|   | % 43.75 | 30.75 | 25.5    | 100    |
| 2. Ploughing & puddling                   | f 160   | -     | -       | 160    |
|   | % 100   | -     | -       | 100    |
| 3. Seed treatment                         | f -     | -     | -       | -      |
|   | % -     | -     | -       | -      |
| 4. Use of HYVs                            | f 50    | 30    | 80      | 160    |
|   | % 31.25 | 18.75 | 50.0    | 100    |
| 5. Sowing                                 | f 75    | 43    | 42      | 160    |
|   | % 46.87 | 26.87 | 26.25   | 100    |
| 6. Preparation of nursery bed             | f 35    | 100   | 25      | 160    |
|   | % 21.87 | 62.5  | 15.62   | 100    |
| 7. Transplanting                          | f 10    | 140   | 10      | 160    |
|   | % 6.25  | 87.5  | 6.25    | 100    |
| 8. Inter culturing                        | f 31.6  | 99    | 29.4    | 160    |
|   | % 41.87 | 24.37 | 33.75   | 100    |
| 9. Water Management                       | f 67    | 39    | 54      | 160    |
|   | % 41.87 | 24.37 | 33.75   | 100    |
| 10. Integrated nutrient management        | f 72    | 52    | 36      | 160    |
|   | % 45.0  | 32.5  | 22.5    | 100    |
| 11. Integrated plant protection measures  | f 75.5  | 43.9  | 40.6    | 160    |
|   | % 47.18 | 27.43 | 25.37   | 100    |
| 12. Harvesting                            | f 38.5  | 91    | 30.5    | 160    |
|   | % 24.06 | 56.87 | 19.06   | 100    |
| 13. Post-harvest operations               | f 39.0  | 84.56 | 36.44   | 160    |
|   | % 24.37 | 52.85 | 22.77   | 100    |
| Over all rice-based production activities | f 60.30 | 64.30 | 35.39   | 160    |
|   | % 37.68 | 40.19 | 22.13   | 100    |

## B. Participation in livestock management

Table 7 presents the gender-wise frequency and percentage of work participation in livestock management activities.

From the table, it is evident that women's participation in livestock-related tasks was nearly equal to that of men; however, women predominated in fodder collection, which was solely their responsibility. In other livestock-related tasks—such as feeding, breeding, health care, selling milk and milk products, and marketing—men showed greater dominance, with their participation exceeding 39% of the total livestock-related tasks [19].

Livestock management is a key agricultural activity in which rural women contribute significantly. Working harmoniously alongside male members, they perform at par with their counterparts.

**Table 7. Gender-wise work participation levels of women in livestock related activities.**

| Activities                                       | Men     | Women | Jointly | Pooled |
|--|---------|-------|---------|--------|
| 1. Feeding of animals                            | f 65    | 5     | 45      | 160    |
|  | % 40.62 | 31.25 | 28.12   | 100    |
| 2. Green fodder production and Management        | f -     | 160   | -       | 160    |
|  | % -     | 100   | -       | 100    |
| 3. Breeding of animals (Artificial Insemination) | f 120   | 5     | 35      | 160    |
|  | % 75.0  | 3.12  | 21.87   | 100    |
| 4. Management of animals                         |         |       |         |        |
| a) Maintenance of livestock                      | f 67    | 68    | 25      | 160    |
|  | % 41.87 | 42.50 | 15.62   | 100    |
| b) Cleaning of animal sheds                      | f 62    | 63    | 35      | 160    |
|  | % 39.0  | 39.37 | 21.87   | 100    |
| c) Treatment of sick animals                     | f 61    | 61    | 38      | 160    |
|  | % 38.12 | 38.12 | 23.75   | 100    |
| 5. Health care                                   | f 68    | 61    | 38      | 160    |
|  | % 42.5  | 39.0  | 18.75   | 100    |
| 6. Selling of milk and milk products             | f 62    | 50    | 48      | 160    |
|  | % 39.0  | 31.25 | 30.0    | 100    |
| 7. Marketing                                     | f 65    | 50    | 45      | 160    |
|  | % 40.62 | 31.25 | 28.12   | 100    |
| Overall livestock related activities             | f 63.33 | 63.22 | 33.44   | 160    |
|  | % 39.58 | 39.51 | 20.9    | 100    |

These findings may be influenced by several factors, such as the lower participation of women from higher economic strata and forward castes, along with the general trend that women tend to be physically less strong than men.

## C. Participation in allied activities

Table 8 presents gender-wise frequency & percentage of work participation in allied activities.

**Table 8. Gender-wise frequency & percentage of work participation of farm women in allied activities**

| Activities  | Men     | Women | Jointly | Pooled |
|---|---------|-------|---------|--------|
| 1. Collecting fuel                                  | f -     | 160   | -       | 160    |
|   | % -     | 100   | -       | 100    |
| 2. Cooking (including pre-cooking and post-cooking) | f -     | 80    | 80      | 160    |
|   | % -     | 50    | 50      | 100    |
| 3. Drying and cleaning of grains                    | f 10    | 150   | -       | 160    |
|   | % 6.25  | 93.75 | -       | 100    |
| 4. Child care and management                        | f -     | 85    | 75      | 160    |
|   | % -     | 53.12 | 46.87   | 100    |
| 5. Income generating activities                     |         |       |         |        |
| a) Agricultural wage labourer                       | f 90    | 60    | 10      | 160    |
|   | % 56.25 | 37.50 | 6.25    | 100    |
| b) Food preservation                                | f -     | 160   | -       | 160    |
|   | % -     | 100   | -       | 100    |
| c) Processing of dairy products                     | f 60    | 80    | 20      | 160    |
|   | % 37.50 | 50    | 21.5    | 100    |
| d) Rope, mat and basket making activities           | f 40    | 110   | 10      | 160    |
|   | % 25.0  | 68.75 | 6.25    | 100    |
| e) Sewing   | f 50    | 110   | -       | 160    |
|   | % 31.25 | 68.75 | -       | 100    |
| 6. Money management                                 | f 70    | 67    | 23      | 160    |
|   | % 43.75 | 41.87 | 14.37   | 100    |
| 7. Socio-religious activities                       | f 65    | 68    | 27      | 160    |
|   | % 40.62 | 42.5  | 16.87   | 100    |
| 8. Kitchen gardening                                | f 72    | 70    | 18      | 160    |
|   | % 45.0  | 45.0  | 11.25   | 100    |
| Overall allied activities                           | f 37.91 | 100   | 21.91   | 160    |
|   | % 23.69 | 62.5  | 13.69   | 100    |

Table 8 clearly indicates that women were more active than men in various tasks, including fuel collection, grain drying and cleaning, food preservation, rope making, mat making, and basket making. Gender-wise participation in these allied activities revealed that rural women engaged more in meal preparation, food processing, cleaning and drying grains, several income-generating activities, and socio-religious events compared to men. Conversely, men were more involved in kitchen gardening and money management than women.

Some home-related tasks, particularly childcare, cooking, socio-religious activities, and financial management, were often carried out collaboratively [20-21].

In income-generating activities, rural women's participation as agricultural wage laborers was lower than that of men. Men were often engaged in various off-farm income-generating activities to supplement their family income.

Regarding money management, women typically managed the family's finances independently. In socio-religious activities, women were significantly more involved than men, with a notable majority observing fasts during religious occasions.

Furthermore, Table 8 indicates that women handled over 62% of the tasks, while men performed 23.69% of the tasks, with the remaining tasks being carried out jointly by both men and women.

These findings could be attributed to many several factors, One of which is that women may feel more at ease and confident when engaging in home-related allied activities. Additionally, their natural ability often allow them to carry out such tasks more quickly and efficiently than men. Another reason could be that most outside work was typically done by men, who were often involved in various off – farm income generating activities to support their families. As a results, women generally had ample free time to handle home related tasks, with only a few exceptions.

### Overall, the extent of work participation among farm women in rice-based farming and allied activities is significant.

Table 9 and fig1 present the data on overall work participation in farm and allied activities.

**Table 9. Gender-wise overall work participation levels in rice – based farming and allied activities.**

| Activities |                                       | Men      | Women | Jointly | Pooled |     |
|------------|---------------------------------------|----------|-------|---------|--------|-----|
| 1.         | Rice-based production activities      | <i>f</i> | 60.30 | 64.40   | 35.39  | 160 |
|            |                                       | %        | 37.68 | 40.19   | 22.13  | 100 |
| 2.         | Livestock related practises           | <i>f</i> | 63.33 | 63.22   | 33.54  | 160 |
|            |                                       | %        | 39.58 | 39.51   | 20.9   | 100 |
| 3.         | All farm related tasks                | <i>f</i> | 61.81 | 63.76   | 34.51  | 160 |
|            |                                       | %        | 38.63 | 39.85   | 21.50  | 100 |
| 4.         | All allied tasks (Agril. + household) | <i>f</i> | 38.01 | 100     | 22.01  | 160 |
|            |                                       | %        | 23.69 | 62.5    | 13.69  | 100 |
|            | All farm and allied task              | <i>f</i> | 49.86 | 81.88   | 28.16  | 160 |
|            |                                       | %        | 31.16 | 51.17   | 18.67  | 100 |

It is evident from Table 9 that women's work participation in rice-based crop production activities was greater than that of men. However, a significant number of activities related to rice production were also performed jointly. Men and women had nearly equal participation in livestock-related tasks. In allied activities, women outperformed men, completing 62.5% of tasks independently compared to 23.69% by men, with 13.69% of activities being carried out jointly.

Overall, women's participation in all farm and allied activities was notably higher, at 51.17%, compared to men's 31.16%, while joint participation accounted for 18.69%. In the rice-based farming systems of North Bihar, women were involved in an average of 51.17% of the activities. Meanwhile, men were often engaged in various off-farm activities, sometimes traveling to distant locations in search of jobs to supplement family income. Consequently, the workload for women in rural society was significantly higher than that of men.

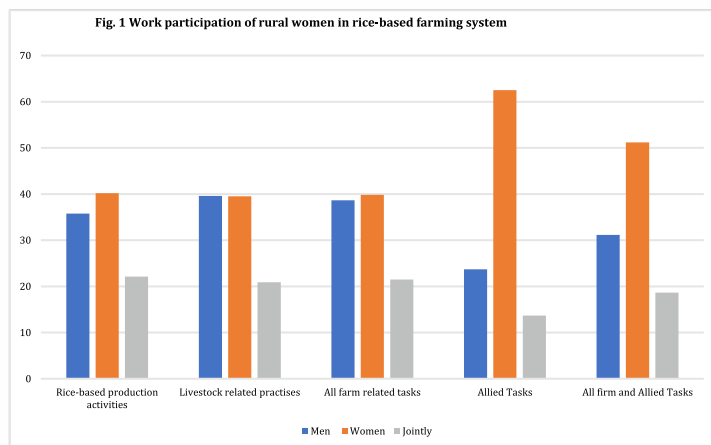


Table 10 presents the mean participation scores of men and women in different rice-based farm and allied activities and calculated t-values.

**Table 10. Mean participation scores of men and women in rice-based farm and allied activities and calculated value of 't'.**

| Sl. No. | Types of activities                     | Mean scores |       | Mean diff | Values of 't' |
|---------|---|-------------|-------|-----------|---------------|
|         |   | Men         | Women |           |               |
| 1.      | Rice – based crop production activities | 24.37       | 31.25 | 6.88      | 18.91*        |
| 2.      | Livestock related practises             | 4.37        | 4.18  | 0.19      | 1.29 NS       |
| 3.      | Allied activities (Agril. + Household)  | 6.25        | 9.37  | 3.12      | 23.37**       |

\*Significant at 0.05 level  
\*\*Significant at 0.01 level  
NS – Non significant

Table 10 indicates that the calculated t-value for participation scores of men and women in all farm activities—along with women's participation in both farm and allied activities—was significant, except for livestock-related tasks. This finding suggests a notable difference in participation levels between men and women across most farm and allied activities. Specifically, women exhibited significantly higher mean participation scores than men in two areas: rice-based crop production tasks and allied activities, highlighting their greater involvement in these domains. However, no significant differences were found in the participation of men and women in livestock-related activities.

### Conclusion

The findings reveal that men's independent work participation in all farm and allied activities was 31.28%, whereas women's independent participation was notably higher at 50.05%. Additionally, joint participation between men and women accounted for 18.87%. These results underscore the critical role women play in agricultural practices and highlight the significant contributions they make to farm and allied activities, emphasizing the need for recognition and support of their efforts within rural communities.

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