

Occupational Health, Socio-Economic Conditions, and Gender Dimensions of Female Workers in Polyhouse Farming in India

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ABSTRACT

Protected cultivation through polyhouses and shade-net structures has become increasingly important for agricultural diversification and climate-resilient rural development. However, the expansion of protected cultivation also raises concerns regarding women's occupational health, socio-economic security, training and gender relations. The present study examines these dimensions among female agricultural workers engaged in polyhouse/shade-net farming in selected villages of Gangapur and Vaijapur talukas of Chhatrapati Sambhajnagar district, Maharashtra.

The study is based on a primary survey of 200 women agricultural workers, conducted during July 2025 to June 2026. Data were collected through a structured interview schedule and analysed using frequencies, percentages, cross-tabulations and Pearson's Chi-square test. The findings indicate a substantial training gap: 80% of respondents had not received formal training, although 48% reported substantial skill improvement and 30% reported some improvement. Sixty-six percent considered polyhouse work easier than traditional farming, while 66% identified lack of training as a major difficulty. Low wages were reported by 20% and male dominance by 8%.

Occupational-health concerns were also evident. Eighty percent reported the absence of workplace health facilities, 46% reported daily fatigue and only 14% reported regular health check-ups. Regarding household decision-making, 60% reported joint decision-making, 28% reported husband-led decision-making and 12% reported independent female decision-making.

Pearson's Chi-square analysis showed statistically significant associations between education and technology awareness, education and reported health-insurance status, family occupation and saving pattern, and daily wage and purpose of borrowing ($p < 0.001$). These findings are interpreted as associations rather than causal relationships because the study is cross-sectional.

The study concludes that protected cultivation can provide employment and skill-development opportunities for rural women, but these benefits need to be supported by structured training, occupational-health protection, fair wages, social security, financial inclusion and gender-responsive decision-making.

Keywords: Polyhouse farming; women agricultural workers; occupational health; socio-economic conditions; gender; protected cultivation; rural development.

INTRODUCTION

Agriculture continues to be an important source of livelihood in rural India, and women constitute a significant proportion of the agricultural workforce. Women's contribution extends from crop production and post-harvest activities to agricultural labour and household livelihood management. However, women's participation in

agriculture is often accompanied by unequal access to technology, training, wages, financial resources and decision-making.

Protected cultivation through polyhouses and shade-net structures has emerged as an important agricultural technology for improving production conditions and supporting climate-resilient agriculture. Such cultivation can create new employment and skill-development opportunities for rural women. At the same time, it may involve occupational challenges such as heat, humidity, repetitive activities, prolonged standing, awkward postures and exposure to agricultural chemicals.

The occupational conditions of women agricultural workers therefore need to be examined together with their socio-economic and gender-related circumstances. The present study focuses on women workers engaged in polyhouse/shade-net farming in selected villages of Gangapur and Vaijapur talukas of Chhatrapati Sambhajinagar district.

Research Problem

The expansion of polyhouse farming creates new employment opportunities for rural women, but employment alone does not necessarily ensure occupational safety, adequate wages, social security or greater decision-making autonomy.

The present study therefore examines the occupational health, socio-economic conditions and gender dimensions of women workers engaged in protected cultivation.

Objectives of The Study

1. To examine the occupational-health conditions of female workers engaged in polyhouse/shade-net farming.
2. To assess the socio-economic conditions of women workers, particularly wages, savings and borrowing.
3. To examine women's training, skill development and awareness of agricultural technology.
4. To examine gender dimensions through household decision-making and perceived male dominance.
5. To examine selected associations between education, technology awareness, health insurance, family occupation, saving pattern, wages and borrowing.
6. To suggest appropriate policy measures for improving women's working and socio-economic conditions in protected cultivation.

REVIEW OF LITERATURE

Boserup (1970) emphasized the important economic contribution of women and the gendered division of labour in agricultural societies. Ghosh and Ghosh (2014) highlighted women's significant participation in Indian agriculture, while Mohapatra, Sahoo and Mohapatra (2019) discussed gender-based inequalities in farm activities.

The socio-economic conditions of rural households in Marathwada are also important for understanding women's agricultural employment. Khairnar, Bhosale and Jadhav (2015) examined drought conditions, inadequate irrigation and agricultural distress in Marathwada. Khairnar, Kale and Kharat (2016) discussed farmers' suicides and associated problems such as low agricultural productivity, indebtedness and inadequate income. Khairnar (2017) examined socio-economic changes and identity-related concerns among rural peasants around Aurangabad. These studies provide a regional background for understanding the livelihood vulnerability of agricultural households.

Meenakshi and Panneer (2020) reviewed occupational-health issues among agricultural women workers in India and highlighted physical workload, heat, humidity, repetitive work, awkward postures and other occupational hazards. Their study also emphasized the importance of social security and welfare measures.

Pattnaik and Lahiri-Dutt (2022) examined the increasing burden of agricultural work on rural women and argued that increased participation in farming does not necessarily result in greater autonomy or decision-making power. This perspective is relevant to the present study because women's employment and household decision-making are examined together.

Prakash et al. (2021) examined protected cultivation in Maharashtra and identified education, household income, landholding and market-related factors among determinants of adoption, while investment, input costs and technical constraints remained important challenges.

Research Gap

Existing studies have largely examined women in agriculture, rural distress, occupational health, gender relations and protected cultivation separately. Comparatively limited localized evidence is available on the combined occupational, socio-economic and gender experiences of women agricultural workers engaged in polyhouse/shade-net farming in Marathwada.

The present study addresses this gap through a primary survey of 200 women workers in selected villages of Gangapur and Vaijapur talukas.

METHODOLOGY

The study adopted a descriptive cross-sectional research design. The study was conducted in selected villages of Gangapur and Vaijapur talukas of Chhatrapati Sambhajnagar district, Maharashtra.

A total of 200 women agricultural workers engaged in polyhouse/shade-net farming were included in the study. The survey was conducted during July 2025 to June 2026.

Primary information was collected through a structured interview schedule covering socio-economic characteristics, training, skill development, technology awareness, wages, workplace health facilities, fatigue, health insurance, savings, borrowing and household decision-making.

The research forms part of Ph.D. research and has received approval from the Research and Recognition Committee (RRC) of Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajnagar.

The data were analysed using frequencies, percentages and cross-tabulations. Pearson's Chi-square test was used for selected categorical variables, with $p < 0.05$ considered statistically significant. The results are interpreted as associations and not as causal relationships.

Health-related information is based on respondents' reported experiences and does not represent clinically diagnosed occupational-health conditions.

RESULTS AND FINDINGS

Training and Skill Development

Among the 200 respondents, 80% had not received formal training related to polyhouse/shade-net farming. Despite this, 48% reported substantial skill improvement and 30% reported some improvement.

This finding indicates a gap between practical skill acquisition through work experience and access to formal training.

Further, 66% of respondents considered polyhouse work easier than traditional farming. Thus, protected cultivation was perceived positively by a considerable proportion of workers despite the lack of formal training.

Major Difficulties

The major difficulties reported by respondents were:

Difficulty	Percentage
Lack of training	66%
Low wages	20%
Male dominance	8%

The findings indicate that women's difficulties in polyhouse farming are multidimensional and include technical, economic and gender-related concerns.

Occupational Health

The occupational-health findings indicate that:

- 80% reported no workplace health facilities;
- 46% reported daily physical fatigue; and
- only 14% reported regular health check-ups.

These findings suggest that occupational-health protection remains inadequate. However, because these are self-reported indicators, they should not be interpreted as clinical measures of occupational disease.

Household Decision-making

The study found that:

- 60% reported joint decision-making by husband and wife;
- 28% reported husband-led decision-making; and
- 12% reported independent female decision-making.

The findings suggest that women participate in household decision-making to varying degrees. Women's participation in paid agricultural work does not necessarily imply complete autonomy in household decisions.

Inferential Statistical Analysis

Education and Technology Awareness

The association between education and technology awareness was statistically significant:

$$\chi^2 = 103.82, df = 6, p < 0.001.$$

Higher educational groups reported comparatively greater awareness of agricultural technology. The result indicates an association between education and technology awareness but does not establish causality.

Education and Health Insurance

The association between education and reported health-insurance status was statistically significant:

$$\chi^2 = 68.83, df = 9, p < 0.001.$$

Higher educational groups reported comparatively greater insurance coverage. However, some expected cell frequencies are relatively small, so this result should be interpreted cautiously.

Family Occupation and Saving Pattern

The relationship between family occupation and saving pattern was statistically significant:

$$\chi^2 = 129.92, df = 6, p < 0.001.$$

Farming households showed comparatively greater bank-based savings, while wage-labour households reported a higher proportion of no regular savings.

Daily Wage and Purpose of Borrowing

The relationship between daily wage and borrowing purpose was statistically significant:

$$\chi^2 = 63.38, df = 6, p < 0.001.$$

Lower-wage groups reported borrowing more frequently, particularly for agricultural and marriage-related purposes, while the ₹600 wage group had a comparatively greater proportion reporting no loan.

These findings demonstrate statistical associations within the surveyed sample and should not be interpreted as causal relationships.

DISCUSSION

The findings indicate that polyhouse farming provides both opportunities and challenges for women agricultural workers. The relatively high proportion reporting skill improvement and the perception that polyhouse work is easier than traditional farming suggest potential benefits of protected cultivation.

However, the fact that 80% of workers had not received formal training and 66% identified lack of training as a major difficulty demonstrates the need for institutional capacity building.

The occupational-health findings are particularly important. The absence of workplace health facilities reported by 80% of respondents and daily fatigue reported by 46% indicate that expansion of protected cultivation should be accompanied by occupational-health safeguards.

The significant association between education and technology awareness highlights the importance of accessible training and technology-extension programmes. Similarly, the associations involving health insurance, savings and borrowing indicate differences in socio-economic security among occupational and educational groups. The gender findings indicate that joint decision-making is relatively common, but independent female decision-making remains limited. This supports the broader literature suggesting that women's participation in agricultural work does not automatically result in equal decision-making power.

The findings are also relevant to the socio-economic context of Marathwada, where drought, agricultural vulnerability and financial insecurity have historically affected rural livelihoods.

Policy Implications

Based on the findings, the following measures are recommended:

1. Women-centred training: Regular practical training should be provided in polyhouse technology and workplace safety.
2. Occupational-health facilities: Basic health, first-aid, sanitation, drinking-water and rest facilities should be provided at worksites.
3. Heat and ergonomic protection: Work-rest arrangements and appropriate tools should be promoted.
4. Fair wages: Transparent wage systems and equal remuneration for comparable work should be ensured.
5. Health insurance: Women workers should be linked with appropriate government and social-security schemes.
6. Financial inclusion: Women should be encouraged to use formal savings, self-help groups and institutional credit.
7. Gender-responsive interventions: Women should be encouraged to participate in household and agricultural decision-making.
8. Monitoring: Protected-cultivation programmes should include gender-sensitive indicators related to training, wages, occupational health and social security.

Limitations of the Study

The study is based on 200 women agricultural workers from selected villages of Gangapur and Vaijapur talukas and therefore cannot be generalized to all women agricultural workers in India.

The cross-sectional design permits identification of associations but not causal relationships. Health information is self-reported and does not represent clinical diagnosis or direct occupational-exposure measurements.

Future research may use larger samples and multivariate statistical techniques to identify the independent determinants of technology awareness, insurance coverage, saving behaviour and decision-making.

CONCLUSION

The study demonstrates that protected cultivation provides important employment and skill-development opportunities for rural women, but significant challenges remain in training, occupational health, wages, social protection and gender equality.

Although 78% of respondents reported substantial or some skill improvement and 66% considered polyhouse work easier than traditional farming, formal training remains limited. Similarly, the high proportion reporting absence of workplace health facilities and daily fatigue indicates the need for stronger occupational-health measures.

The significant associations identified between education, technology awareness, health insurance, family occupation, savings, wages and borrowing further demonstrate that women's experiences in protected cultivation are closely connected with their broader socio-economic conditions.

The study therefore recommends a women-centred and gender-responsive approach to protected cultivation, combining agricultural technology with occupational safety, skill development, fair wages, social security, financial inclusion and women's participation in decision-making.

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