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Gendered labour burden and socio-economic vulnerability among farm women engaged in in vegetable cultivation

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Abstract

Farm women constitute the backbone of vegetable production systems in India, yet their labour contribution is shaped by socio-economic constraints that intensify workload and occupational vulnerability. The present study examined the relationship between age, education, landholding size and income with workload perception, adoption of safe practices, task allocation and dependence on manual labour among farm women engaged in cucurbit cultivation under pandal systems. The study was conducted in Kaveliguda village of Rangareddy district, Telangana, with a purposive sample of 50 farm women. Data was collected using structured interviews and standardized workload perception scales. Chi-square tests and correlation analysis were used to examine associations between socio-economic variables and labour outcomes. Results indicated a significant association between age and perceived workload, income and dependence on manual labour and landholding size and task allocation. Lower education levels were associated with reduced adoption of safe work practices. The findings revealed that gendered labour burden is deeply embedded in socio-economic vulnerability, necessitating targeted, equity-based interventions for drudgery reduction and occupational wellbeing among farm women.

Keywords: Farm women, Socio-economic factors, Gendered labour, Workload perception, Manual labour, Pandal system

1. Introduction

Farm women globally, particularly in developing nations, are pivotal to agricultural development, yet their significant contributions often remain unrecognized, leading to heightened socioeconomic vulnerability (Nazir *et al.*, 2023; Nishi and Chowdhury, 2023) ^[16, 17]. The feminization of agriculture has become a defining feature of rural India, with women increasingly assuming responsibility for labour-intensive farm operations. Despite their critical role in crop production, farm women continue to experience disproportionate physical workload, limited access to resources and minimal decision-making power (Verma *et al.*, 2020) ^[23]. Indeed, women constitute, on average, 43% of the agricultural labour force in developing countries, often working 12-16 hours daily across on-farm, off-farm and domestic activities, yet they face significant barriers in accessing agricultural support systems available to their male counterparts (Adefila *et al.*, 2024) ^[1]. This disparity contributes to the feminization of agriculture, a phenomenon indicating an expansion of women's engagement in agricultural production, yet often without commensurate improvements in their socioeconomic status or decision-making power (Oloo *et al.*, 2023) ^[18].

Vegetable cultivation under pandal systems, widely adopted for cucurbits, is particularly demanding, requiring repetitive bending, squatting, lifting and prolonged manual engagement. While earlier research has largely focused on physiological and ergonomic aspects of women's farm work, comparatively fewer studies have examined how socio-economic variables shape labour burden and vulnerability. Ageing workforce, low educational attainment, small landholdings and low household income often restrict women's ability to adopt safe practices, access mechanization or redistribute labour. Understanding these socio-economic determinants is essential for framing gender-responsive agricultural policies and extension strategies.

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The present study aimed to analyse the association between selected socio-economic variables and labour burden indicators among farm women engaged in pandal-based cucurbit cultivation.

Objectives

1. To examine the relationship between age group and workload perception among farm women
2. To analyse the association between education level and adoption of safe work practices
3. To study the influence of landholding size on task allocation patterns
4. To assess the relationship between income category and dependence on manual labour

2. Materials and Methods

2.1 Study Area and Sample

The present study was carried out in Kaveliguda village, Rangareddy district of Telangana. For this study, a purposive sampling technique was employed to select 50 farm women. Participants were chosen based on their active engagement in cucurbit cultivation utilizing pandal systems and their age ranged from 25 to 60 years.

2.2 Variables Studied

The research investigated both independent and dependent variables. The independent variables considered for this study included the age and education level of the farm women, their landholding size and their income category. The dependent variables measured were workload perception, the adoption of safe work practices, task allocation within their work and their dependence on manual labour for cultivation activities.

2.3 Tools and techniques

A structured interview schedule was utilized to collect qualitative and quantitative information directly from the participants. Workload perception was assessed using a five-point workload perception scale. A checklist was developed to evaluate the adoption of safe work practices, ensuring a systematic observation of relevant behaviours. A task participation questionnaire was used to collect the details regarding the involvement of farm women in various cultivation tasks.

2.4 Statistical Analysis

The collected data was analysed statistically. Descriptive statistics, including frequency and percentage distributions, were used to understand the characteristics of the sample and key variables. To examine the association between categorical variables, the Chi-square test was performed. Pearson’s correlation coefficient was used to indicate relationship between variables.

3. Results and Discussion

3.1 Age Group and Workload Perception

Older farm women reported higher workload perception compared to younger women. This trend reflects age-related decline in physical capacity and cumulative exposure to manual agricultural work. The higher workload perception among older farm women reflects cumulative labour exposure combined with limited opportunities for labour substitution. Advancing age reduces physical resilience, while poverty and gendered task expectations compel continued engagement in manual agricultural work, intensifying occupational vulnerability.

Table 1: Age Group and Workload Perception (N = 50)

Age Group (years)	Low Workload	Moderate Workload	High Workload	Total
18–35	6 (40.0)	7 (46.7)	2 (13.3)	15
36–55	3 (12.0)	11 (44.0)	11 (44.0)	25
Above 55	1 (10.0)	3 (30.0)	6 (60.0)	10
Total	10	21	19	50

$\chi^2 = 9.84, df = 4, p < 0.05$ (Significant)

A Chi-square test of independence was performed to examine the association between age group and workload perception among farm women. The analysis revealed a statistically significant association ($\chi^2 = 9.84, df = 4, p < 0.05$), indicating that perceived workload varied significantly across age groups. The significant association indicates that perceived workload increases with age, highlighting older women as a high-risk group for occupational strain. This finding aligns with previous research highlighting that physically demanding tasks, such as weeding, contribute to higher drudgery and musculoskeletal disorders, particularly in older farm women who are already susceptible to age-related physiological decline (Joshi *et al.*, 2024) [6].

3.2 Education and Adoption of Safe Work Practices

Education showed a positive association with the adoption of basic safe practices such as rest breaks, posture awareness and careful tool handling. Education acts as an enabling factor, improving awareness and self-protective behaviour among farm women. However, its impact remains constrained when poverty and rigid gender roles limit the practical application of safety knowledge.

The Chi-square analysis showed a significant association between education level and adoption of safe work practices ($\chi^2 = 11.26, df = 4, p < 0.05$). Farm women with higher educational level demonstrated greater adoption of safe practices, while illiterate women exhibited minimal adoption, highlighting education as a key enabling factor in occupational safety.

Table 2: Education and Adoption of Safe Practices (N = 50)

Education Level	Low Adoption	Moderate Adoption	High Adoption	Total
Illiterate	12 (60.0)	6 (30.0)	2 (10.0)	20
Primary	5 (27.8)	9 (50.0)	4 (22.2)	18
Secondary	1 (8.3)	4 (33.3)	7 (58.4)	12
Total	18	19	13	50

$\chi^2 = 11.26, df = 4, p < 0.05$ (Significant)

This suggests that educational interventions, particularly those tailored to diverse literacy levels, are crucial for enhancing farmers' health and safety awareness, thereby mitigating occupational health risks (Mensah *et al.*, 2024; Rahman *et al.*, 2025) [10, 19]. An other research indicates that knowledge of occupational health safety strategies correlates with a higher likelihood of self-reporting health problems, suggesting that education facilitates better recognition of symptoms rather than causing more issues (Rahman *et al.*, 2025) [25].

3.3 Landholding Size and Task Allocation

Women from marginal and small landholding households performed a greater share of physically demanding tasks due to limited labour substitution options. Smaller landholdings intensify women’s labour burden through increased reliance on family labour. The Chi-square test confirmed a significant association, demonstrating that women from marginal and small

landholding households disproportionately engaged in laborious tasks, underscoring the influence of socio-economic factors on task allocation and occupational health risks (Renu, 2022) ^[20].

Table 3: Landholding Size and Task Allocation (N = 50)

Landholding Size	Women-dominated Tasks	Shared Tasks	Reduced Women Involvement	Total
Marginal	8 (72.7)	2 (18.2)	1 (9.1)	11
Small	12 (66.7)	4 (22.2)	2 (11.1)	18
Medium and Large	6 (28.6)	8 (38.1)	7 (33.3)	21
Total	26	14	10	50

$\chi^2 = 10.91$, $df = 4$, $p < 0.05$ (Significant)

This is particularly evident in contexts where women in agriculture face significant health challenges due to work patterns, undernutrition and occupational hazards. Women from such households often experience greater health hazards due to less controlled and higher-risk working conditions, emphasizing the need for targeted interventions. These interventions should address the socio-personal, economic and technical inequalities that women in citrus farming confront, including implementing time-saving technologies and promoting shared household responsibilities (Bhattacharyya *et al.*, 2025) ^[4].

3.4 Income Category and Dependence on Manual Labour

Household income strongly influenced access to mechanization and hired labour. The strong association between low income and dependence on manual labour supports the poverty dimension, wherein economic constraints restrict access to mechanization and hired labour. As a result, women in low-income households remain trapped in physically demanding labour roles, reinforcing gendered labour burden. Low-income households showed near-total dependence on manual labour, reinforcing occupational vulnerability among women. The association between income category and dependence on manual labour was found to be statistically significant ($\chi^2 = 12.47$, $df = 4$, $p < 0.05$). Low-income households showed a disproportionately higher reliance on manual labour compared to medium- and high-income households, reflecting economic constraints in accessing labour-saving technologies.

Table 4: Income Category and Dependence on Manual Labour (N = 50)

Income Category	High Dependence	Moderate Dependence	Low Dependence	Total
Low	10 (83.3)	2 (16.7)	0 (0.0)	12
Medium	13 (46.4)	11 (39.3)	4 (14.3)	28
High	2 (20.0)	4 (40.0)	4 (40.0)	10
Total	25	17	8	50

$\chi^2 = 12.47$, $df = 4$, $p < 0.05$ (Significant)

This economic disparity often compels women in these households to undertake more laborious tasks, exacerbating their occupational health risks (Mishra *et al.*, 2024) ^[12]. This reliance on manual labor, particularly with traditional tools, leads to significant drudgery and occupational health hazards, as women often lack awareness and access to improved tools and technologies (Moharana *et al.*, 2020, 2024) ^[13-14]. The intersection of these factors highlights how socio-economic status fundamentally shapes the occupational health landscape for women in agriculture, leading to gender-specific patterns of health problems (Lu, 2010) ^[8]. Women in agriculture frequently engage in physically

demanding tasks across various domains, including agriculture, housework and other activities, often from dawn till dusk, which leads to substantial responsibility and the adoption of unnatural postures that elevate cardiovascular stress and musculoskeletal disorders (Joshi *et al.*, 2024) ^[6]. This arduous workload is compounded by their limited access to improved agricultural technologies, forcing them to work in hazardous conditions that require significant physiological effort and contribute to severe time poverty (Arora and Rada, 2016; Joshi *et al.*, 2024) ^[3, 6]. This intense physical exertion, coupled with prolonged exposure to arduous tasks and lack of appropriate ergonomic tools, positions women farmers at a heightened risk for chronic health issues, ranging from musculoskeletal disorders to reproductive health complications (Verma *et al.*, 2020) ^[23]. The financial incapacity prevalent among many female farmers often prevents them from investing in large-scale farm production or acquiring modern agricultural equipment, thereby entrenching their reliance on manual, labor-intensive methods (Nishi and Chowdhury, 2023) ^[17].

3.5 Correlation Analysis

Pearson’s correlation analysis indicated a moderate positive correlation between age and workload perception ($r = 0.41$, $p < 0.05$), suggesting that workload perception increases with advancing age. This confirms that socio-economic disadvantage intensifies gendered labour burden. A significant negative correlation was observed between income level and dependence on manual labour ($r = -0.46$, $p < 0.05$), indicating that higher income levels are associated with reduced reliance on manual agricultural work. On the other hand, lower income levels correlate with a greater reliance on physically demanding tasks, which can exacerbate existing health disparities and contribute to a "double burden" of agricultural production and domestic responsibilities for women (Firman *et al.*, 2025) ^[5]. This dual burden is particularly pronounced in agricultural communities, where women's contributions are often undervalued and their physical health is frequently compromised due to the cumulative effects of strenuous labour (Firman *et al.*, 2025; Miine *et al.*, 2024) ^[5, 11]. This extensive engagement in strenuous, unmechanized tasks not only leads to elevated physical strain but also curtails their opportunities for rest and leisure, perpetuating a cycle of fatigue and diminished well-being (Firman *et al.*, 2025; Nchanji *et al.*, 2021) ^[5, 15]. The physical toll is further aggravated by the lack of access to ergonomic tools and farm technology, which could otherwise mitigate the intensity of labour and reduce the physiological cost of agricultural activities (Agaton, 2022; Tripathi *et al.*, 2021) ^[2, 22]. Such conditions often result in musculoskeletal disorders and chronic pain, particularly in the lower limbs and back, due to repetitive movements and prolonged awkward postures inherent in many agricultural tasks (Kwatra, 2017; Shin and Jeong, 2022) ^[7, 21].

4. Conclusion

The findings of the study affirm the relevance of the gender, poverty and labour in explaining the labour burden experienced by farm women engaged in pandal-based cucurbit cultivation. Gendered task expectations, compounded by poverty-related constraints and unfavourable labour conditions, result in heightened workload perception, dependence on manual labour and limited adoption of safe practices. Socio-economic disadvantages such as older age, low education, small landholdings and low income intersect to intensify occupational

vulnerability. Addressing farm women's drudgery therefore requires integrated interventions that simultaneously target gender norms, economic access and labour conditions rather than isolated technological solutions.

References

1. Adefila AO, Ajayi OO, Toromade AS, Sam-Bulya NJ. A sociological review of gender equity in agricultural development: global trends and lessons for U.S. policy. *Int J Appl Res Soc Sci*. 2024;6(11):2658.
2. Agaton C. Sustainable development in Asia Pacific and the role of mapping for women. In: *Sustainable development goals series*. Cham: Springer; 2022. p. 261.
3. Arora D, Rada C. A gendered model of the peasant household: time poverty and farm production in rural Mozambique. *Fem Econ*. 2016;23(2):93–118.
4. Bhattacharyya S, Lal D, Roy A, Lal P, Roy P, Sikdar S, Dutta S, Bardhan T. The unsung women of citriculture: bridging science and society through macro and micro analysis for improved technology adoption in citrus value chain. *Front Sociol*. 2025;10:1656780.
5. Firman A, Latief F, Yusriadi Y, Asniwati, Surianto. Everyday agrarian labor as physical activity: gender, health, and community cohesion in rural Indonesia. *Retos*. 2025;72:1115–1124.
6. Joshi P, Mahra GS, Jethi R, Satyapriya, Singh R, Bishnoi S, Sahu S, Barua S, Sarkar S, Burman RR. Ergonomics assessment of drudgery in rice–wheat production system in India: a case study of women farmers. *Front Sustain Food Syst*. 2024;8:1346980.
7. Kwatra POS. Comparative ergonomic assessment of the male and female farm workers involved in rice cultivation. *Int J Curr Microbiol Appl Sci*. 2017;6(9):3439–3446.
8. Lu JL. Gender analysis of women in the Philippine agriculture and their occupational issues. *J Int Womens Stud*. 2010;11(4):73–82.
9. Meenakshi JR, Panneer S. Occupational health of agricultural women workers in India. *Indian J Community Med*. 2020;45(4):546–551.
10. Mensah A, Adams F, Nimoh F, Frimpong F, Onumah EE, Nartekie NB. Safeguarding sustainability: exploring safety practice adherence among urban vegetable farmers in Ghana. *J Agribus Rural Dev*. 2024;71(1):1–12.
11. Miine LK, Akorsu AD, Boampong O, Bukari S. Digital agriculture and decent working conditions of smallholder farmers and farmworkers in Ghana. *Discov Food*. 2024;4(1):1–12.
12. Mishra S, Bhagat D, Borah S. Ergonomic studies on occupational health of women workers involved in agricultural industries: a systematic review. *Res World Agric Econ*. 2024;5(4):110–125.
13. Moharana G, Babu N, Mhatre CS, Rout P, Panda RS. Occupational health hazards of farm women engaged in mango and cashew nut orchards. *Int J Curr Microbiol Appl Sci*. 2020;9(9):3455–3462.
14. Moharana G, Bal SK, Sharma P, Sandhya. Technological need of women workers involved in turmeric cultivation: an exploratory study. *Int J Res Agron*. 2024;7:130–138.
15. Nchanji EB, Mutua M, Odhiambo C, Nchanji YK, Karanja D. Deconstructing leisure time and workload: case of women bean producers in Kenya. *Agric Food Secur*. 2021;10(1):1–14.
16. Nazir S, Khan IA, Maan AA, Shahbaz B. An analysis of socio-economic vulnerability of women waged labourers in agriculture sector in Punjab, Pakistan. *J Educ Soc Stud*. 2023;4(2):283–292.
17. Nishi M, Chowdhury K. Exploring the struggles of unrecognized female farmers: a gender analysis at Kaunia upazila, Rangpur. *Res Agric Livest Fish*. 2023;10(1):9–20.
18. Oloo S, Galié A, Teufel N. Is agricultural labour feminizing in South and South-East Asia: analysis of demographic and health survey data on women and work. *Front Sustain Food Syst*. 2023;7:1114503.
19. Rahman MM, Hasan MS, Islam MR, Shohag MB, Rouf MA, Debnath S, Rahman MM, Alam E, Islam MK. Factors affecting self-reported occupational health-related problems: a case study on improved traditional shrimp farmers in Bangladesh. *BMC Public Health*. 2025;25(1):23923.
20. Renu R. Inequality and determinants of female workforce participation in agriculture of Uttar Pradesh, India. *Res Square*. 2022:1–28.
21. Shin DS, Jeong BY. Older female farmers and modeling of occupational hazards, wellbeing and sleep-related problems on musculoskeletal pains. *Int J Environ Res Public Health*. 2022;19(12):7274.
22. Tripathi SP, Somvanshi SPS, Singh SRK, Mishra A. Ergonomic evaluation of occupational hazards of Indian agriculture farm and allied activities. In: *IntechOpen eBooks*. London: IntechOpen; 2021.
23. Verma N, Singh M, Nath A, Kashyap P, Singh SP, Panwar AS. Feminine farm operational methods, involvement, hardships and sensitivity in farming systems analysis. *Indian J Agric Sci*. 2020;90(1):96–102.