



Constraints Faced by Farm Women in Post-harvest Grain Management Practices in Rural Jharkhand, India

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HIGHLIGHTS

- Storage insect and pest management knowledge was the foremost constraint in household grain storage.
- Moisture-temperature knowledge gaps showed the need for practical pre-storage demonstrations for farm women.
- Limited scheme reach and low training participation indicated institutional gaps in women-focused extension delivery.
- User-friendly tools and low-cost storage improvements should be linked with hands-on training.

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ABSTRACT

The study was conducted during 2023 in Deoghar district of Jharkhand to identify and rank constraints faced by farm women in post-harvest grain management. A descriptive research design was used. Mohanpur and Madhupur blocks were selected randomly; two panchayats from each block and two villages from each panchayat were selected through the lottery method. Fifteen farm women directly involved in post-harvest grain handling were selected randomly from each village, making a sample of 120 respondents. Data were collected through personal interview using a pre-tested semi-structured schedule. Nine constraints were ranked by respondents and analysed through Garrett's ranking technique. Lack of knowledge about management of storage insects and pests ranked first with a Garrett mean score of 73.13. It was followed by lack of knowledge of moisture and temperature during storage (62.82), lack of post-harvest management knowledge among women (59.43) and limited reach to government schemes (55.93). The findings indicate that technical knowledge and institutional access were more serious constraints than time scarcity. Women-centred demonstrations on storage pest diagnosis, moisture control, safe stacking, storage sanitation and scheme linkage are needed to reduce grain losses.

INTRODUCTION

Post-harvest grain management is a critical stage in smallholder farming because harvested grain becomes food, seed or saleable produce only when it is dried, cleaned, protected and stored under safe conditions. Losses after harvest commonly arise from delayed

threshing, poor drying, contamination, insect infestation, rodent damage, fungal growth and unsuitable storage structures. Evidence from grain storage studies indicates that moisture control, regular inspection, hygienic handling, hermetic storage and improved containers reduce deterioration and improve food safety (Bradford et al., 2018; Hubert et al., 2016; Kumar & Kalita, 2017; Mobolade

et al., 2019). Studies on cereals and pulses also show that harvesting, threshing and storage losses remain substantial where technical guidance and storage facilities are inadequate (Dutta et al., 2018; Hengsdijk & de Boer, 2017; Vishwakarma et al., 2019). In this context, post-harvest management is not only a technical issue but also an extension issue. Farm women play a major role in household grain handling. They are generally involved in drying, cleaning, sorting, seed selection, storage preparation, processing and periodic supervision of stored grain. However, their contribution is often less visible in formal advisory systems, although women substantially participate in farm operations and decision making (Nain & Kumar, 2010; Saikia et al., 2020). Gender-sensitive post-harvest work further shows that reduction of losses requires attention to women's access to knowledge, resources, training and decision space (Nordhagen, 2021). In Deoghar district of Jharkhand, women's involvement in grain management activities has already been documented, especially in cleaning, drying, storage and processing operations (Gupta et al., 2024). Yet involvement alone does not ensure efficient management unless women have practical knowledge and access to suitable support. Several studies have reported that limited education, weak training exposure and restricted decision participation reduce adoption of improved agricultural and post-harvest practices among rural women (Kabir et al., 2023; Kumari, 2018). Recent extension research also stresses that diagnostic tools, knowledge tests, digital learning and data-driven advisory services can improve the targeting of agricultural extension programmes (Vijayan et al., 2022; Vijayan et al., 2023; Godara et al., 2024; Kumari et al., 2024; Singh et al., 2024). Good agricultural practice principles emphasise practical and locally feasible recommendations rather than general advice (Nain & Singh, 2015). Similarly, validated knowledge and attitude instruments can help locate precise capacity gaps before designing interventions (Singh et al., 2025; Singh et al., 2026a; Singh et al., 2026b). Bibliometric and programme-awareness studies also suggest that extension planning becomes stronger when it is evidence-based and problem-specific (Tiwari et al., 2023; Roy et al., 2024). Constraint ranking is useful for this purpose because it converts field-level perceptions into an order of priorities that extension agencies can act upon. It also helps distinguish knowledge gaps from infrastructure, training and time-related barriers, which may require different extension responses. Therefore, identifying constraints perceived by farm women is necessary for designing relevant training, demonstrations and scheme-linkage interventions. The study was conducted to prioritise the constraints faced by farm women in post-harvest grain management in Deoghar district of Jharkhand.

METHODOLOGY

The study was conducted during 2023 in Deoghar district of Jharkhand using a descriptive research design. Mohanpur and Madhupur blocks were selected randomly from the district. From each selected block, two village panchayats were selected, and from each panchayat two villages were chosen through the lottery method. Thus, eight villages were covered. Fifteen farm women who were directly involved in post-harvest grain management were randomly selected from each village, forming a sample of 120

respondents. Primary data were collected through personal interview with a pre-tested semi-structured schedule. The list of constraints was prepared after reviewing literature, field observations and consultation with extension personnel and subject-matter specialists. The schedule was checked with non-sample farm women for clarity and local understanding. Nine constraints were finally retained for ranking. Each respondent ranked the constraints from most severe to least severe according to her experience in post-harvest grain handling. Garrett's ranking technique was used to convert ordinal ranks into comparable scores (Garrett & Woodworth, 1969). Its application for prioritising perceived agricultural constraints has also been demonstrated in studies involving tribal farm women and makhana growers (Bahubalendra et al., 2025; Warshini et al., 2025). Percentage position was calculated as: $100(R_{ij} - 0.5)/N_j$, where R_{ij} is the rank assigned to the i -th constraint by the j -th respondent and N_j is the number of constraints ranked by the j -th respondent. The percentage positions were converted into Garrett scores. Scores for each constraint were summed and divided by the number of respondents to obtain the Garrett mean score. Constraints were arranged in descending order of mean score, and final ranks were assigned.

RESULTS

The ranking of constraints showed a clear order of severity in post-harvest grain management among farm women (Figure 1). Garrett mean scores ranged from 73.13 to 23.08; lack of knowledge about the management of storage insects and pests and time constraint due to household duties were the most and least severe constraints, respectively. Lack of knowledge about the management of storage insects and pests ranked first with a Garrett mean score of 73.13. This indicates a critical need for practical understanding of insect identification, early symptoms of infestation, cleaning and disinfection of storage structures, segregation of damaged grain, safe stacking and periodic inspection. In household storage, infestation may be recognised only after visible damage, powder formation, grain heating or adult insect emergence; therefore, preventive management and early detection should receive priority. Lack of knowledge of moisture and temperature during storage ranked second with a mean score of 62.82. Moisture and temperature directly influence mould growth, grain heating, seed viability and insect multiplication. Although farm women commonly assess dryness through experience-based methods, such judgement may be unreliable during humid, cloudy or interrupted drying periods. Simple demonstrations on safe drying, clean drying surfaces, repeated turning, protection from night moisture, raised storage and checking grain during humid periods are therefore required. Lack of overall post-harvest management knowledge among women ranked third with a mean score of 59.43, reflecting gaps across the complete sequence of harvesting, threshing, drying, cleaning, grading, storage preparation and inspection. Limited reach to government schemes ranked fourth with a mean score of 55.93, indicating inadequate direct access to information on training, tools, storage structures, processing support and other institutional provisions. Less participation of women in extension programmes or lack of training ranked fifth with a mean score of 46.73, revealing the need for locally delivered, women-centred and practice-oriented programmes. Lack

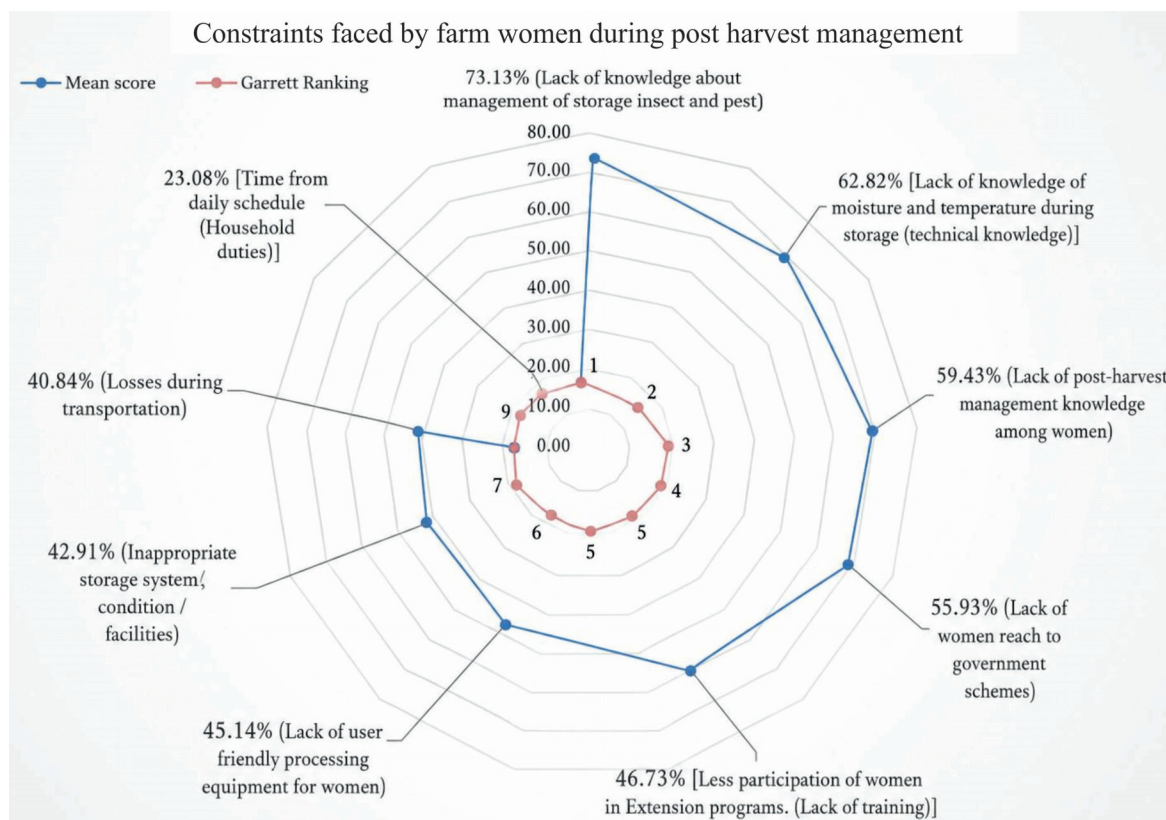


Figure 1. Garrett mean score-based ranking of constraints in post-harvest grain management

of user-friendly processing equipment ranked sixth with a mean score of 45.14; this may reflect limited local availability of affordable, lightweight and easily operable tools suited to women's work conditions. Inappropriate storage systems, conditions or facilities ranked seventh with a mean score of 42.91, pointing to limitations related to storage sanitation, elevation, ventilation, capacity and protection from insects, rodents and moisture. Losses during transportation ranked eighth with a mean score of 40.84, suggesting the need for improved handling, packaging and safe movement of grain from field to household storage or local markets. Time constraint due to household duties ranked ninth and was the least severe constraint, with a mean score of 23.08. Its lower rank should not be interpreted as an absence of household workload; rather, respondents considered technical knowledge, training, scheme access and institutional support to be more immediate and actionable barriers. Thus, the ranking does not imply that lower-ranked constraints are unimportant, but it provides a relative order for planning extension interventions.

DISCUSSION

The findings demonstrate that post-harvest grain management is a knowledge-intensive and gender-sensitive extension domain. The first three constraints concerned storage insects, moisture-temperature management and overall post-harvest knowledge. Bradford et al. (2018), Hengsdijk and de Boer (2017), Kumar and Kalita (2017), and Mobolade et al. (2019) similarly identified moisture, insects, fungal development and unsuitable storage

conditions as major causes of grain deterioration. Dutta et al. (2018), Muthukumar et al. (2020) and Vishwakarma et al. (2019) also reported that harvesting, threshing, drying and storage losses persist when practical guidance and improved handling practices are inadequate. The highest rank assigned to storage insect and pest management indicates that extension messages must be specific, demonstrable and operational. Generic advice on safe storage is insufficient unless farm women can accurately identify infestation symptoms, thoroughly clean storage spaces, promptly segregate damaged grain and systematically inspect stored stocks at regular intervals. Hubert et al. (2016) showed that hermetic and improved storage technologies are effective only when users understand the conditions required for their correct use. Bradford et al. (2018) likewise emphasised moisture control as a central component of the dry-chain approach in humid climates. Accordingly, village-level demonstrations should use actual grain samples, damaged kernels, locally available containers and simple storage layouts rather than relying mainly on lecture-based communication. The middle-ranked institutional constraints also require focused attention. Limited reach to government schemes (55.93) and low participation in extension programmes or training (46.73) indicate that women are not always contacted directly by advisory systems. Godara et al. (2024), Kumari et al. (2024), Singh et al. (2024) and Tiwari et al. (2023) have highlighted the value of accessible advisory services, relevant training and effective programme communication. Knowledge-test research further shows that systematic diagnosis can identify precise capacity-building needs among extension personnel and

farmers (Singh et al., 2026a; Singh et al., 2026b; Vijayan et al., 2022; Vijayan et al., 2023). A similar diagnostic approach can be developed specifically for household grain management. The lower-middle ranks assigned to user-friendly processing equipment (45.14), inappropriate storage facilities (42.91) and transportation losses (40.84) show that physical and logistical barriers remain relevant, although respondents perceived them as less severe than knowledge and institutional deficiencies. These constraints can be addressed through group-based access to lightweight tools, low-cost storage improvements, safer packaging and locally coordinated transport support. The lowest rank assigned to time constraint (23.08) requires cautious interpretation. Farm women continue to carry substantial household responsibilities, but their responses indicate that information, skills and institutional access were perceived as more immediate barriers. This interpretation is consistent with the work of Kabir et al. (2023), Kumari (2018), Nain and Kumar (2010), Nordhagen (2021) and Saikia et al. (2020), who emphasised that women's agricultural contribution should be supported through decision space, appropriate training and access to resources. Nain and Singh (2015) also stressed that good agricultural practices should be practical and locally feasible. Roy et al. (2024) and Singh et al. (2025) further demonstrate the value of evidence-based measurement and problem-specific extension planning. Therefore, women-focused post-harvest extension should integrate pest and moisture demonstrations, direct scheme linkage, group access to suitable tools and affordable improvements in household storage.

CONCLUSION

The study identified technical knowledge and institutional access as the major constraints faced by farm women in post-harvest grain management. Storage insect and pest management was the top-ranked constraint, followed by moisture-temperature management, general post-harvest knowledge and limited reach to government schemes. Time constraint received the lowest rank, indicating that women considered knowledge, training and support services more critical than household duties alone. Extension agencies should organise village-level demonstrations on insect identification, safe drying, storage sanitation, raised stacking and periodic inspection. Scheme information should be communicated directly to women through self-help groups, women farmer groups and local institutions. User-friendly processing equipment and low-cost storage improvements should be promoted with training on proper use and maintenance. Such a focused approach can improve grain quality, seed safety and household food security while strengthening recognition of women's contribution in post-harvest management.

DECLARATIONS

Ethical approval and consent to participate: The study involved no invasive procedure on human participants as such the committee of Department of Agricultural Extension, BHU, Varanasi, Uttar Pradesh, India waived the ethical approval. Informed consent was obtained from all respondents before data collection. The respondents were informed about the purpose of the study, and their participation was voluntary.

Data availability statement: Data is available upon reasonable request from the first author as well as corresponding author.

Consent for publication: Consent was obtained for using the collected information for academic analysis and publication. No personal or identifiable information of the respondents has been disclosed.

Competing interests: The authors declare that they have no competing interests.

Conflict of interest: The authors declare that there is no conflict of interest regarding the publication of this manuscript. All authors have critically reviewed, revised and approved the final version of the manuscript and take full responsibility for its content.

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