

Research Article

Enhancing Rural Livelihoods and Empowering Mid-Hill Women Through Gender-Sensitive Targeted Interventions: A Study Under Farmer FIRST Project in Uttarakhand

**Mohammad Aslam Ansari^{1,*} , Kiran Rana¹ , Neha Arya¹ ,
Arpita Sharma Kandpal¹ , Anil Kumar² , Lalit Bhatt², Aman Kamboj³ **

¹Department of Agricultural Communication, Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, India

²Department of Food Science & Technology, Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, India

³Department of Vet Physiology & Biochemistry, Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, India

Abstract

In the challenging agro-ecological landscape of Uttarakhand's mid-hills, empowering rural women is essential for inclusive agricultural development and livelihood security. Despite their critical role in agriculture and household management, women face persistent challenges in these regions such as difficult terrain, fragmented landholdings, and limited access to infrastructure. This study, conducted under ICAR's Farmer FIRST Programme, evaluated the effects of gender-sensitive, context-specific interventions on 150 randomly selected women farmers across four project villages in the Bhimtal block of Nainital district under mid-hills region. The interventions included exposure visits and training in improved crop production, livestock and poultry management, fodder cultivation, and post-harvest technologies. The study investigated the impact of targeted interventions aimed at enhancing the socio-economic status and decision-making capabilities of farm women in the villages adopted under the project. Empowerment was operationalized and quantitatively assessed across three dimensions – i.e., economic, social, and political; and the study assessed the changes in women's empowerment across three dimensions. The results demonstrated a significant improvement, with more than 70% of women showing increased levels of empowerment after the targeted interventions. These outcomes highlight the transformative potential of participatory and gender-responsive models in addressing structural barriers. The study recommends wider replication and scaling up of such initiatives to ensure sustainable agricultural development and equitable growth, particularly in vulnerable and resource-constrained hill regions like Uttarakhand.

Keywords

Women Empowerment, Mid-Hills Agriculture, Rural Livelihoods, Gender Sensitive Interventions, Uttarakhand Hill Women

*Corresponding author: aslam1405@yahoo.com (Mohammad Aslam Ansari)

Received: 14 August 2025; **Accepted:** 30 August 2025; **Published:** 19 September 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

1. Introduction

Both men and women are involved in agriculture globally, although their roles and responsibilities differ significantly by region and are changing rapidly. Gender shapes access to productive resources and opportunities, with women having less access to many assets, inputs, and services across a wide range of contexts [1]. Rural women are integral to the agricultural economy and household livelihoods in India, particularly in hill regions where farming systems are highly dependent on female labour. In the mid-hills of Uttarakhand, women contribute over 60–80% of agricultural activities, yet their roles remain largely undervalued and under-supported [2]. Despite their crucial role, gender disparities persist in terms of access to productive resources, decision-making power, income control, and skill development opportunities [3].

Empowerment of rural women, therefore, is increasingly recognized as a vital strategy for inclusive rural development and poverty alleviation. Interventions that are gender-sensitive - acknowledging women's unique roles, responsibilities, and challenges - are central to transforming livelihoods in these fragile ecosystems [4]. Studies have shown that when women are provided with context-specific technologies, capacity building, and access to institutions such as Farmer Producer Organizations (FPOs), there is a significant improvement in household income, food security, and community resilience [5, 6].

Women empowerment is one of the critical issues in the development research and policy making in developing countries. It is a multidimensional concept and multifaceted process involving facilitation of women for action and involvement in social, economic and political spheres of life [7, 8]. Further, mid-hills agriculture is distinct from plains agriculture due to its topographical heterogeneity, small and fragmented landholdings, and limited access to markets and extension services. The migration of men to urban areas for employment has further feminized agriculture in these regions, transferring the burden of farm and household management almost entirely to women. Despite their critical role, women in hill agriculture often remain marginalized in terms of access to training, decision-making, credit, and appropriate technologies [9]. Most agricultural interventions continue to be gender-neutral or male-centric, overlooking women's specific needs, knowledge systems, and constraints.

Women play an indispensable role in agriculture, particularly in hilly and mountainous regions where male outmigration and geographic constraints have intensified their responsibilities [10]. In India, women constitute approximately 60% of the agricultural workforce, with rural women contributing significantly to food production, natural resource management, and household sustenance. In Uttarakhand, a predominantly hilly state in northern India, the 2011 Census reported

that out of a total female population of 4.96 million, 64% are engaged as cultivators and 84.4% as agricultural laborers [11]. This highlights the centrality of women in sustaining agricultural livelihoods, particularly in the mid-hill regions where terrain, climatic variability, and infrastructural deficits compound the challenges of farming.

Recognizing this gap, the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture & Farmers Welfare, Government of India launched the *Farmer FIRST Programme* (Farm Innovation, Resources, Science & Technology) in 2016 to reorient the agricultural research and extension with farmers as active participants rather than passive beneficiaries [12]. A key focus of the programme is to empower women by integrating them into the research-extension continuum through need-based, location-specific, and gender-sensitive interventions.

This study was conducted under the ICAR Farmer FIRST initiative to assess the impact of targeted interventions aimed at empowering mid-hill women in four selected project villages of Bhimtal block, Nainital district of Uttarakhand. Through a participatory approach, interventions were designed to address income generation, drudgery reduction, skill enhancement, and decision-making capacity across key areas such as crop production, livestock care, post-harvest technologies, and natural resource management. The research evaluates the extent to which these interventions have influenced the economic, social, and political dimensions of women's empowerment, using both baseline and post-intervention data.

By focusing on a marginalized yet vital group, i.e. hill farm women, this study contributes to the growing literature on gender and sustainable agriculture. It also offers a model for inclusive agricultural extension in fragile ecosystems, aligning with Sustainable Development Goal 5 (gender equality) and Goal 2 (zero hunger), emphasizing the need to mainstream gender considerations in development planning and agricultural innovation systems.

2. Need-Gap Analysis

Before implementation of the project, a need-gap analysis was undertaken to contextualize the situation and fix-up the problems and constraints faced by the farm women in the project area.

a) Identified Needs in the Context of Mid-Hill Women in Uttarakhand:

The project team did extensive field work involving In-depth Interviews and focus group discussions conducted to identify the needs. The results are presented below:

Table 1. Identified Needs along with justification from Community engagement.

Need	Justification
1. Recognition and inclusion of women in agricultural planning	Women form the backbone of hill agriculture due to male outmigration, yet, they are often excluded from formal decision-making and policy processes.
2. Access to location-specific and women-friendly technologies	Traditional agricultural tools and practices are not designed for women, this resulting in high levels of drudgery and reduced productivity
3. Capacity building and skill development	Farm women lack updated knowledge and adequate training in improved agricultural practices, post-harvest technologies, value addition, and livestock management, affecting income diversification.
4. Institutional support and market linkage	Poor access to extension services, credit, and markets which hinders women's ability to scale up their farm and non-farm enterprises.
5. Gender-responsive extension and innovation systems	Existing agricultural research and extension programmes are not sufficiently gender-sensitive or participatory, especially in the fragile ecosystems like the mid-hills.

b) Gap Analysis:

The project team, after conducting the need assessment, identified the existing gaps which need to be addressed on a priority basis. The same are describe below.

Table 2. Systemic Gaps identified and their implication.

Gaps Identified	Implications
1. Limited gender integration in mainstream agricultural interventions	Despite high participation, women's roles remain informal and under-recognized in extension programmes and innovation delivery.
2. Lack of disaggregated data and indicators on women's empowerment	Monitoring and evaluation mechanisms seldom assess gender-specific impacts, making it difficult to inform evidence-based policy.
3. Poor access to formal institutions and technical knowledge	Women's access to government schemes, training programmes, cooperatives, and market infrastructure remains minimal.
4. Fragmented and under-resourced support in hill regions	Remote terrain and scattered settlements limit the outreach and effectiveness of conventional extension systems.
5. One-size-fits-all approach in agricultural technologies	Technologies are often transferred from the plains without contextual adaptation to hill-specific agro-ecological conditions.

The above need-gap analysis reveals a significant mismatch between the critical roles played by women in mid-hill agriculture and the institutional and technological support available to them. Thus, there is a compelling need for targeted, participatory, and gender-sensitive interventions that recognize the uniqueness of hill agriculture and the agency of women farmers. The Farmer FIRST Programme shall try to addresses these gaps by facilitating context-specific, inclusive innovations and capacity-building initiatives. However, further empirical assessment, such as the current study, is essential to evaluate its impact and scalability in similar agro-ecological zones.

3. Literature Review

Recent research underscores the fact that women's em-

powerment is intrinsically linked to improvements in agricultural productivity, dietary diversity, and household nutrition outcomes, positioning gender-sensitive interventions as central to sustainable food systems [13]. Further, the advances in empowerment measurement tools such as the WEAI (Women Empowerment in Agriculture Index) and pro-WEAI further enable precise tracking of women's agency and decision-making in agricultural contexts [14]. However, scholars in the South Asian hills caution that conventional approaches to climate-smart agriculture often overlook differentiated gender needs, highlighting the importance of intersectional and transformative designs [15].

Evidence from a North Himalayan Indian state of Uttarakhand confirms these insights: Farmer FIRST modules in livestock and poultry have enhanced women's livelihoods, nutritional outcomes, and decision-making authority at

household level [16, 17], while the introduction of drudgery-reduction tools significantly reduced women's physical strain and freed time for productive activities [18]. Nevertheless, entrenched patriarchal hierarchies continue to constrain women's access to land, markets, and institutional resources, despite their disproportionate share of agricultural labor [19, 20]. Furthermore, at the programmatic level, the Farmer FIRST initiative provides a robust model by explicitly integrating gender-sensitive modules that address women's drudgery, promote enterprise development, and improve nutritional security [21]. Together, these research studies highlight both the promise and the persisting gaps in strategies aimed at enhancing rural livelihoods and empowering women in the mid-hill farming systems of Uttarakhand. Further, a woman's ability to make strategic life choices can be taken as a core metric of social empowerment [22].

4. Gendered Challenges in Uttarakhand

4.1. Socio-Demographic Characteristics of Uttarakhand

Uttarakhand, a Himalayan state in northern India, has a population of about 10.1 million (Census 2011; projected ~11.7 million in 2025). The population is predominantly rural, with only about 30% urbanization, concentrated in towns such as Dehradun, Haridwar, Haldwani, and Rishikesh. The state exhibits wide intra-regional differences: the *plains* (Terai-Bhabar) are relatively urbanized and better connected, while the *hill districts* remain sparsely populated, highly dispersed, and largely dependent on subsistence or semi-commercial agriculture.

4.2. Accessibility and Infrastructure

The road network in Uttarakhand faces severe challenges due to its mountainous terrain, fragile ecology, and frequent natural disasters such as landslides, flash floods, and soil erosion. While national highways and major state highways connect district headquarters, interior/ remote villages often have limited or seasonal road access, leading to longer travel times and higher transaction costs. Public transport availability is irregular and limited in remote areas, further constraining the mobility. Accessibility to health services, markets, and educational institutions remains a critical challenge, particularly in *mid- and high-hill regions*, where walking long distances is still common.

4.3. Gendered Hierarchies in Communities

Uttarakhand's communities are characterized by deeply embedded gendered hierarchies rooted in the prevalent patriarchal norms. Women contribute substantially to agriculture, livestock management, fuel and fodder collection, and

household sustenance. Despite their high labour contribution (estimated at 60–70% of *agricultural work* in hill regions), women's roles are often undervalued and rarely reflected in ownership of land, decision-making authority, or access to institutional credit and extension services. Men often migrate for wage employment (in plains or urban centers), resulting in *feminization of agriculture*, yet women remain structurally disadvantaged in community hierarchies, with limited representation in local governance and farmer organizations.

4.4. Women's Workforce Participation and Health Constraints

In Uttarakhand, women's workforce participation is relatively high in the informal and agricultural sectors, particularly due to male outmigration. However, their participation in diversified and remunerative employment is constrained by:

- 1) *Structural barriers* - lack of land ownership, restricted access to markets, extension, and finance.
- 2) *Cultural barriers* - norms restricting women's mobility and decision-making.
- 3) *Health-related challenges*: Several surveys and studies indicate *higher prevalence of chronic ailments among women*, such as anemia, musculoskeletal disorders (linked to heavy manual work), and non-communicable diseases (e.g., hypertension, diabetes). Malnutrition and high workloads contribute to early onset of chronic fatigue and disease burdens, which can hinder women's participation in formal and sustained economic activities.

While women in Uttarakhand demonstrate resilience and play a pivotal role in sustaining rural livelihoods, chronic health issues combined with socio-cultural hierarchies often prevent their full and productive integration into the workforce, thereby reinforcing cycles of vulnerability and dependence.

5. Farmers FIRST Project (FFP) of ICAR

The Farmers FIRST (Farmers' Innovation, Resources, Science, and Technology) initiative, launched by the Indian Council of Agricultural Research (ICAR) in 2016, is a participatory and decentralized programme intended to bridge the gap between agricultural research and farmers' needs. Unlike the traditional top-down extension models, this programme emphasizes farmer-centric research, capacity building, and technology customization to enhance productivity, sustainability, and rural livelihoods. The key objectives of this programme include the following:

- 1) Enhance Farmer-Scientist Interaction – Promoting direct engagement between the researchers and farmers for location-specific solutions.
- 2) Participatory Technology Development – Aims to co-create and adapt agricultural technologies based on

farmers' feedback.

- 3) Livelihood Improvement – Increase the farm income through diversified and sustainable practices.
- 4) Empower Women and Youth – Integrating gender-sensitive programme interventions and skill development.
- 5) Climate Resilience – Promote appropriate agroecological practices to combat climate variability.
- 6) Document Indigenous Knowledge – Document, validate and incorporate traditional farming wisdom into modern research.

The programme has been implemented in a phased manner. The Pilot phase (2016-2019) started with coverage of 100 villages spread across 25 ICAR institutes and State Agricultural Universities (SAUs). The key activities included: (i). Conducting baseline surveys to identify local challenges, (ii). Formation of Farmer Interest Groups (FIGs) and Farm Science Centers (Krishi Vigyan Kendras - KVKs) for participatory research, and (iii). Introduction of Integrated Farming Systems (IFS), soil health management, and water conservation techniques. The expected outcomes were: (a). Improved adoption of high-yielding, climate-resilient varieties, and (b). Increased dairy, poultry, and agroforestry integration for additional income.

Second phase included scaling up (2020 - present) in a coordinated manner and in collaborations with ICAR institutes and SAUs. It aimed at expanding coverage to 500+ villages with greater emphasis on digital agriculture, FPOs (Farmer Producer Organizations), and market linkages. Key innovations included: (i). ICT-based advisories (Kisan SMS, mobile apps), (ii). Custom Hiring Centers for farm machinery access, and (iii). Women-centric enterprises (mushroom cultivation, beekeeping, value-added products).

Thus, the Farmers FIRST program marks a paradigm shift from lab-to-farm to farm-to-lab research, ensuring location-specific, inclusive, and sustainable agricultural development. Its success lies in blending traditional wisdom with modern science, making it a model for participatory agricultural research globally. The Farmer FIRST Programme is still underway, and the end of term evaluation will be conducted later.

6. Materials and Methods

6.1. Study Area and Sampling

This study was conducted in three villages- Syalikhhet, Jeoli, and Dogra- located in the Bhimtal block of Nainital district, Uttarakhand. These villages were purposively selected as they form the operational area of the Farmer FIRST Programme (FFP), an initiative focused on enhancing agricultural productivity through participatory research and extension.

A sample of 150 farm women was selected using a simple random sampling technique, with 50 farm women drawn from each village. The sample frame consisted of a list of women

actively engaged in FFP-supported agricultural or allied activities, ensuring the respondents had direct exposure to the programme's interventions.

6.2. Research Objective and Conceptual Framework

The study's core objective was to assess the extent of women's empowerment resulting from their participation in the FFP. Empowerment was operationalized along three key dimensions- economic, social, and political- drawing on established frameworks in gender and development studies:

- (a) *Economic Empowerment*: Measured through indicators such as increased income from farm and non-farm activities, acquisition of productive assets (e.g., livestock, tools), improved access to credit and savings, and contributions to household expenditures.
- (b) *Social Empowerment*: Assessed through indicators of self-confidence, recognition and respect from family, mobility, participation in household decision-making, and improvements in agricultural knowledge and skills.
- (c) *Political Empowerment*: Evaluated based on participation in local governance (e.g., Gram Panchayat), and membership or leadership roles in self-help groups (SHGs), farmer interest groups (FIGs), and other community-based organisations.

6.3. Data Collection and Analysis

Data were collected through structured interviews using a pre-tested schedule. To provide contextual depth, three focused group discussions (one per village) were also conducted. The quantitative data were analysed using descriptive and inferential statistics, while empowerment levels were examined through frequency distributions and thematic analysis for each dimension.

7. Results and Discussion

The findings of the study are presented under the following sub-heads.

7.1. Socio-Demographic Profile of Hill Women

The socio-demographic characteristics of women, such as age, education level, marital status, family type, landholding size, caste, income level, and access to resources, serve as foundational variables that can significantly influence their participation, receptiveness, and benefit from programmes like the Farmer FIRST Programme (FFP). These characteristics not only affect the programme design & the delivery of interventions but also shape the trajectory of women empowerment outcomes in economic, social, and political dimensions. In conclusion, we can say that socio-demographic profiling of women is not merely a descriptive exercise but a strategic tool

that enhances the efficiency, equity, and impact of the programme. It ensures that programme interventions are contextually grounded, socially inclusive, and responsive to the di-

verse realities of rural women in agricultural systems. The results obtained in this regard are presented in [table 3](#) below.

Table 3. Distribution of respondents according to socio-demographic profile characteristics (n=150).

Sl. No.	Characteristic	Category	f	%
1.	Age	Young (<30 years)	10	6.6
		Middle (31-46 years)	132	88
		Old (>47 years)	08	5.3
2.	Education	Illiterate	30	20
		Primary school	50	33.33
		Middle school	45	30
		High school	15	10
3.	Religion	Intermediate	10	6.6
		Hindu	110	73.33
		Muslim	15	10
		Sikh	25	16.66
4.	Caste	Scheduled Caste/ Tribe	70	46.66
		Backward	45	30
		Forward	35	23.33
5.	Family size	Small (1-4 members)	30	20
		Medium (4-6 members)	40	26.66
		Large (More than 6)	80	53.33
6.	Woman's Occupation	Housewife	130	86.66
		Daily farm labour	20	13.33
		Low (Upto Rs. 25,588)	30	20
7.	Annual Income	Medium (Rs. 25,589 to 43,641)	110	73.33
		High (Rs. 43,642 and above)	10	6.6
8.	Training Exposure	Training not received	100	66.66
		Training received	50	33.33

Understanding and analysing the socio-demographic characteristics of rural women is essential for interpreting their level of participation in and benefit from development programmes like the Farmer FIRST Programme (FFP). The findings of the present study are found to be consistent with trends observed in similar studies across India and offer significant insights into designing inclusive, responsive, and impactful interventions for women's empowerment in rural hill areas.

1) *Age-wise Distribution:* The study found that a large proportion (88%) of the respondents belonged to the

middle-age category (31–46 years) which aligns well with earlier studies and suggest that women in this age group are typically more active in household and farming activities. According to [23], middle-aged rural women are more likely to participate in community-based agricultural programmes, owing to their established family responsibilities and decision-making roles. The limited representation of younger (<30 years) and older (>47 years) women may be attributed to migration for education or marriage and physical limitations, respectively.

- 2) *Educational Status*: The prevalence of basic literacy among the majority of respondents (80% had at least primary education) reflects gradual improvements in educational access for rural women. However, the fact that 20% were illiterate still poses a grave challenge. This is consistent with findings of [24], who observed that low education levels among rural women in Uttarakhand restrict their access to agricultural information, training, and formal extension services. Hence, programme strategies must incorporate participatory learning tools that are suitable for semi-literate and illiterate women.
- 3) *Religion*: Majority of respondents being Hindu (73.33%) reflects the regional religious demography of Nainital district. Religious identity can influence women's participation in public life, mobility, and training attendance. Pandey et al. [25] emphasized the importance of culturally sensitive approaches while engaging rural women in development programmes, especially in areas with religious and ethnic diversity.
- 4) *Caste Composition*: A significant finding of this study is high proportion (46.66%) of respondents belonging to *Scheduled Castes or Scheduled Tribes (SC/ST)*. This is consistent with Ministry of Agriculture & Farmers Welfare report [26] which noted that SC/ST women often represent a substantial portion of the agricultural workforce in hilly and tribal regions. However, they also face structural disadvantages in terms of land ownership, market access, and representation in local institutions [27]. Thus, the representation of SC/ST women in the sample indicates the programme's inclusive outreach in the project area, but also underscores the need for equity-focused support.
- 5) *Family Size*: More than half of the respondents (53.33%) came from *large families*, a typical pattern in rural India. We understand that large families often translate into higher dependency ratios, increasing the burden on women for caregiving and domestic tasks. According to Singh and Mishra [28], large household sizes may reduce women's ability to participate in training and group-based activities unless flexible scheduling and community childcare solutions are offered.
- 6) *Occupation*: A sizeable proportion of women (86.66%) reported being *housewives*, although this term often obscures their contribution to family farming and livestock rearing. As observed by FAO [10], rural women engage significantly in unpaid agricultural labour and household management, despite not being formally recognized as workers. The relatively low proportion (13.33%) of daily wage farm labourers indicates that many women are primarily engaged in subsistence activities, underscoring the need to valorize and enhance their roles through structured income-generating programmes.
- 7) *Annual Income*: The fact that 73.33% of respondents belonged to the *medium-income group* (Rs. 25,589–43,641) is in line with the typical income levels of small and marginal farmers prevalent in hill regions, as documented by the Uttarakhand Economic Survey (2020–21). Only a small proportion (6.6%) reported high income, suggesting limited upward mobility and market access. This highlights the necessity of strengthening value chains and promoting collective marketing to improve income levels, particularly for women [29].
- 8) *Training Exposure*: The most striking gap identified is that 66.66% of women had not received any formal training. This is a common issue in many rural development programmes and also noted by many researchers. Sulaiman and Hall [30] observed that low training coverage for women is often due to structural barriers such as mobility restrictions, household responsibilities, and limited awareness. Lack of training also correlates with reduced innovation adoption and empowerment outcomes [31]. Therefore, expanding outreach and designing gender-sensitive, localized training modules are critical for the success of FFGP interventions.

Therefore, we can conclude that the socio-demographic profile of respondents presents a detailed picture of rural women's status in the project area (i.e., Bhimtal block of Nainital district, Uttarakhand). Predominantly middle-aged, moderately educated, and from socially marginalized backgrounds, these women are actively involved in household as well as agricultural activities, yet face significant barriers in accessing training and income opportunities. The findings are consistent with broader rural development literature and emphasize the importance of integrating socio-demographic considerations into programme design for more inclusive and impactful outcomes. Special attention must be given to illiterate women, women from SC/ST communities, and those with limited training exposure to ensure equitable participation and benefits under the FFP framework.

7.2. Women Empowerment

Women's empowerment in the study was examined across three dimensions: economic, social, and political. The economic dimension included improvements in material assets, income-generating capabilities, and access to financial resources. The social dimension was assessed through indicators such as increased self-esteem, enhanced recognition within the family, active involvement in household decision-making, and improved interpersonal agency. The political dimension included participation in community-based organizations, engagement with local governance structures such as the village panchayat, and assuming leadership roles or memberships in groups working for the welfare of women in hill areas. Collectively, these dimensions offered a comprehensive understanding of the transformative impact of the Farmer FIRST interventions on the lives of mid-hill women in

Uttarakhand.

7.2.1. Economic Empowerment

In the context of this study, economic empowerment refers to the process by which mid-hill women of Uttarakhand, through targeted interventions under the ICAR Farmer FIRST Programme, gained greater control over income-generating activities, material assets, and financial decision-making. It involves improved access to livelihood opportunities, enhanced financial autonomy, participation in self-help groups, and increased economic security through diversified income sources. This empowerment enables women to contribute

meaningfully to household income and reduces their economic vulnerability, thereby fostering greater self-reliance and financial resilience.

Under this study, economic empowerment focused to find out the economic benefits derived by the respondents (women) as a result of their becoming the member of FFP. The respondents were asked about the major material possessions (household assets) before and after initiation of the FFP. The percentage increase was taken as an indicator of their economic empowerment. The results obtained are presented in the Table 4.

Table 4. Distribution of respondents according to their Economic Empowerment (n=150).

Sl. No.	Activity	Before FFP		After FFP		Increase %
	Economic	f	%	f	%	
A.	Income	66	44.00	150	100	100
B.	Material Possession					
1.	TV	146	97.33	150	100	2.6
2.	Radio	128	85.33	140	93.33	8.0
3.	Fan	40	26.66	145	96.66	70
4.	Chula	140	93.33	150	100	6.6
5.	Table / Chairs	68	45.33	147	98	52.66
6.	Other household items (bicycle)	98	65.33	149	99.33	34
C.	Livestock Possession					
1.	Cow	139	92.66	150	100	7.3
2.	Buffalo	130	86.66	150	100	13.33
3.	Sheep	30	20	40	26.66	6.66
4.	Goat	70	46.66	140	93.33	46.66
5.	Poultry	36	24	145	96.33	72.66
D.	House Repairs/ Renovations					
	Kachcha	136	90.66	58	38.66	52 (decrease)
	Pucca	40	26.66	145	96.33	70

The above findings clearly indicate that a substantial improvement in the economic empowerment of women participants following their involvement in the Farmer FIRST Programme (FFP). One of the most significant indicators of this empowerment is the *universal increase in income*, where all 150 respondents (100%) reported income generation, post-FFP interventions, as compared to only 44% before. This remarkable shift underscores the effectiveness of FFP interventions in enhancing livelihood opportunities for women in

mid-hill regions of Uttarakhand. Similar outcomes were reported by Kaur et al. (2021), who found that structured livelihood interventions in hill areas led to significant increases in household income and women's financial autonomy.

Further, in terms of *material possessions*, notable increases were observed in household items such as fans (from 26.66% to 96.66%), table/chairs (from 45.33% to 98%), and other household assets like bicycles (from 65.33% to 99.33%). These materialistic gains reflect not only improved economic condi-

tions but also a shift in the standard of living and domestic comfort. Access to such assets is often considered as a tangible marker of economic progress [32]. The increase in ownership of basic appliances like TV and radios, although marginal (2.6% and 8%, respectively), indicates near-saturation, as most respondents already possessed these items prior to the intervention.

Livestock ownership, a key livelihood source in hill region, also showed remarkable enhancement. Ownership of goats increased from 46.66% to 93.33%, and poultry from 24% to 96.33%, highlighting the role of FFP in promoting small-scale animal husbandry as a viable income-generating activity. These results resonate with the findings of Devi and Singh [14], who emphasized that backyard poultry and small ruminants serve as crucial assets for income diversification among hill women. Additionally, the universal ownership of cows and buffaloes' post-intervention (100% each) signifies strengthened household nutrition security and enhanced

dairy-based incomes.

A particularly notable shift was observed in *housing conditions*, where the percentage of rural families living in *pucca* (permanent) houses increased dramatically from 26.66% to 96.33%, accompanied by a corresponding decrease in *kachcha* (temporary) dwellings. This transition suggests not only improved income and savings but also the prioritization of secure and resilient living spaces, - an aspect often associated with economic and psychological well-being [33].

These findings validate the notion that when provided with access to relevant resources, capacity building interventions, and technical guidance, women in rural hill areas can become economically empowered, contributing significantly to their households and communities. They also support the integrated approach of the Farmer FIRST Programme, which combines livelihood support with skill enhancement, infrastructure improvement, and socio-economic resilience.

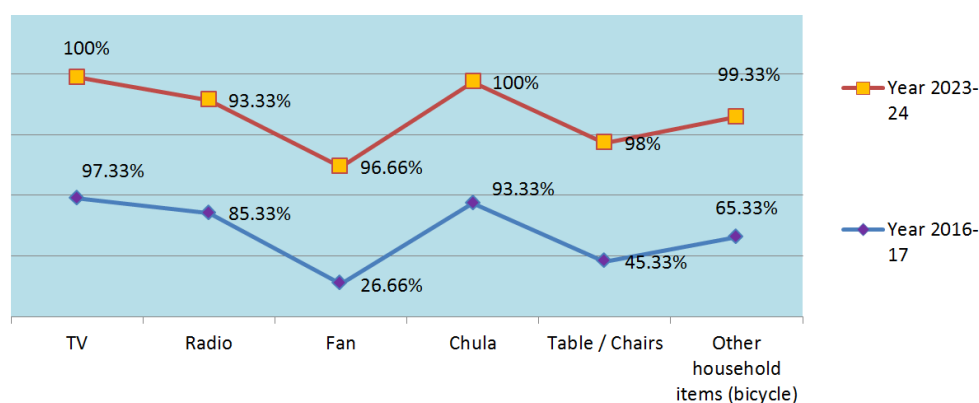


Figure 1. Trends of changes in household assets -A comparison.

7.2.2. Social Empowerment

In the context of this research under the ICAR Farmer FIRST Project in mid-hills of Uttarakhand, social empowerment was conceptualized as the enhancement of women's self-confidence, social status, and decision-making roles within their families and communities. It involves increased recognition and respect of women in the household, greater freedom of expression, and active involvement in family and social matters such as education, health, and financial decisions. The Farmer FIRST Project

interventions were designed to contribute towards strengthening women's social networks, improving their mobility, and promoting participation in community activities such as self-help groups and village meetings. These changes reflect a shift from traditional gender norms toward more equitable social roles, aligning with empowerment frameworks that emphasize women's agency, access to social resources, and the ability to influence both private and public life.

The results obtained in respect of social empowerment are presented in Table 5.

Table 5. Distribution of respondents according to their Social Empowerment (n=150).

Sl. No.	Social benefits	Before FFP		After FFP		Increase %
		f	%	f	%	
1.	Recognition by family members	36	24	150	100	76
2.	Increase in self confidence	34	22.66	150	100	77.33

Sl. No.	Social benefits	Before FFP		After FFP		Increase %
		<i>f</i>	%	<i>f</i>	%	
3.	Participation in fair/ festival Within/outside the village	80	53.33	148	98.66	45.33

The study findings present compelling evidence of significant social empowerment among mid-hill women of Uttarakhand as a result of the targeted interventions implemented under the ICAR Farmer FIRST Programme (FFP). A key indicator of this transformation is the dramatic increase in *recognition by family members*, which rose from just 24% before the intervention to a full 100% afterward. This shift suggests a deep transformation in familial dynamics, where women are now acknowledged as valuable contributors to the household, both economically and socially. This outcome aligns with the observations of Kabeer (1999), who emphasized that empowerment involves not only access to resources but also the ability to exercise agency and gain respect within one's social context. Similarly, *self-confidence among women* showed a remarkable increase, from 22.66% to 100%, reflecting the impact of skill-building, exposure visits, and participation in decision-making processes encouraged by the FFP. This growth in self-assurance is critical in enabling women to express opinions, challenge social norms, and assume leadership roles in their families and communities. Choudhary et al. [34] reported similar outcomes in rural development programmes, noting that confidence gained through exposure and training significantly enhances women's participation in both household and public domains.

Further, the study also found a substantial increase in *women's participation in fairs and festivals*, from 53.33% to 98.66%. This marks a shift in traditional gender roles that often limit women's mobility and social presence. By facilitating greater community engagement, the FFP interventions contributed to breaking socio-cultural barriers and encouraging women's visibility and voice in public life. According to [35], increased social participation helps build stronger peer networks, fosters a sense of belonging, and amplifies women's roles as active community members.

Collectively, these results demonstrate that social empowerment, as experienced by the women in this study, goes beyond individual confidence to encompass broader shifts in familial relationships, social norms, and community involvement. The findings affirm that well-structured participatory extension programmes, such as the FFP, can significantly contribute to transforming the social status of rural women, enabling them to lead more empowered and fulfilling lives.

7.2.3. Political Empowerment

In the context of current research perspective, political empowerment of women refers to their enhanced participation in decision-making structures, governance institutions, and community-based organisations. The programme (FFP) enabled the women to gain greater awareness of their rights, actively engaged with local governance mechanisms such as village panchayats, and become members or office bearers of groups working toward women's welfare. This shift signifies a move from passive beneficiaries to active stakeholders in the rural development process.

Through capacity-building initiatives, exposure visits, and collective mobilization, the FFP interventions provided women with the confidence and skills needed to assert their voices in public affairs. This form of women empowerment supports the broader framework of gender equity by facilitating women's leadership, advocacy, and representation in formal decision-making spaces. Malhotra et al. [36] observed that political empowerment is a key dimension of overall empowerment, ensuring that the women not only participate in but also influence development outcomes in their communities.

The respondents (farm women) were probed deeper about the benefits (as given in the table below) derived by them during/ after implementation of the FFP. The results obtained are given in the Table 6.

Table 6. Distribution of respondents according to their Political Empowerment (n=150).

S. No.	Political Benefits	Before FFP		After FFP		Increase %
		<i>f</i>	%	<i>f</i>	%	
1.	Member of Gram Panchayat	2	1.33	40	26.66	25.33
2.	Member of Zilla Panchayat	00	00	-	-	-
3.	Member of club	25	16.66	98	49.49	48.66
4.	Member of co- operative society	20	13.33	140	70.70	80.00

S. No.	Political Benefits	Before FFP		After FFP		Increase %
		<i>f</i>	%	<i>f</i>	%	
5.	Others	-	-	-	-	-

The study findings given above clearly demonstrate a substantial shift in the political empowerment of women following the implementation of the Farmer FIRST Programme (FFP) in mid-hills of Uttarakhand. One of the most notable outcomes of FFP project is the increase in women's participation as members of Gram Panchayats, which rose from a mere 1.33% to 26.66%. This increase signifies a major breakthrough in women's involvement in local self-governance, traditionally dominated by men in rural hill societies. Such involvement provides women with the platform to influence decisions on local resource allocation, development priorities, and social issues, thereby reinforcing the idea proposed by Agarwal [37] that participation in governance leads to transformative empowerment by increasing women's bargaining power and visibility in public spaces.

Similarly, a sharp increase is seen in membership in clubs and cooperative societies, from 16.66% to 49.49% and 13.33% to 70.70% respectively. This indicates an expanded role for women in community-based and economic institutions. Cooperative societies and clubs not only promote financial inclusion and livelihood development but also offer spaces for collective action, leadership training, and civic engagement. These findings echo the work of Desai and Joshi [38], who reported that participation in community groups significantly enhances women's leadership qualities and awareness of rights, which are crucial for political empowerment.

Although no respondents reported being members of Zilla Panchayats or other higher-tier political bodies, the marked increase at the village level reflects a foundational shift. According to Panda [37], political empowerment often begins at the grassroots through local institutions, which act as stepping stones for broader participation in governance. The active inclusion of women in such bodies indicates their growing agency and suggests that sustained support, training, and institutional facilitation—such as that provided by the FFP—can effectively dismantle longstanding barriers to women's political involvement in rural and remote areas.

These results re-affirm the role of participatory agricultural programmes not only in improving livelihood outcomes but also in transforming gendered power relations by fostering women's political inclusion, leadership, and voice in rural governance systems.

8. Conclusion

The present study provides compelling evidence of the significant strides made in empowering rural women across

economic, social, and political domains as a result of targeted programmatic interventions. By focusing on grassroots-level interventions in the project villages (i.e., Syalikhhet, Jeoli, and Dogra villages) in the mid-hills of Uttarakhand, the FFP programme succeeded in improving women's income, enhancing material and livestock assets, and fostering greater social recognition, confidence, and decision-making participation. Further, increased representation in Gram Panchayats, clubs, and cooperative societies illustrates an encouraging trend toward political engagement among rural women who were previously underrepresented in formal governance systems. The socio-demographic analysis of the respondents further enriched the study, revealing that women from middle age groups, large families, and socially disadvantaged backgrounds are particularly responsive to well-structured, participatory interventions. The limited prior exposure to training among the majority highlights the transformative potential of capacity-building programmes in catalyzing empowerment.

Thus, the Farmer FIRST Programme has demonstrated that a comprehensive, inclusive, and context-sensitive approach can significantly advance women's empowerment in rural and hilly areas. The study underscores the critical role of targeted institutional support, training, and community engagement in fostering self-reliance, leadership, and agency among rural women. These findings offer a replicable model for gender-inclusive rural development and call for policy frameworks that sustain and scale such initiatives to other underserved regions.

Some policy recommendations that emerge from the study findings are as follows:

- 1) *Strengthen Institutional Support for Women's Collectives*: Support the formation and functioning of women-led SHGs, cooperatives, and clubs, as they serve as vital platforms and connecting link among the rural women for economic activities, peer learning, and leadership development.
- 2) *Expand Capacity-Building and Leadership Training*: Customized training programmes on governance, entrepreneurship, and digital literacy for rural women to prepare them for active participation in Gram Panchayats and development committees.
- 3) *Ensure Gender-Inclusive Policy Design*: Government and development programmes should incorporate gender-focused impact assessments and ensure that the voices of rural women are integrated into planning and implementation stages.
- 4) *Promote Women's Access to Productive Resources*:

Policies must facilitate easier access to credit, land, markets, and agricultural technologies for women to sustain and scale their economic activities.

- 5) *Institutionalize Success Stories through Replication Models*: The Farmer FIRST Programme model should be replicated in other marginal and hill regions to systematically empower rural women, using context-specific approaches that respect local knowledge and culture.

Hence, it can be inferred that women's empowerment is not only a matter of equity but a cornerstone for sustainable rural development in India. Programmes like FFP demonstrate that with the right support and participatory approach, the rural women can become powerful agents of economic growth, social cohesion, and grassroots democracy.

Abbreviations

FFP	Farmer FIRST Project
FIRST	Farm Innovations Resources Science and Technology
WEAI	Women Empowerment in Agriculture Index

Acknowledgments

The authors gratefully acknowledge the support by Indian Council of Agriculture Research (ICAR), Ministry of Agriculture & Farmers Welfare, New Delhi under their flagship programme – Farmers FIRST Project- being implemented since 2016 across the country.

Author Contributions

Mohammad Aslam Ansari: Project administration, Conceptualization, Finalizing the draft, resources, Project administration & Supervision.

Kiran Rana: Data curation, Formal analysis, writing first draft of the paper, Planning and supervising project interventions.

Arpita Sharma Kandpal: Supervision of field interventions planning, Review of first draft.

Neha Arya: Field data collection, Data curation, Writing first draft, Resource planning.

Lalit Bhatt: Field Planning and facilitation, Editing/ Review of draft.

Anil Kumar: Field Planning and facilitation, Editing/ Proof reading of final draft.

Aman Kamboj: Proof reading and review of final draft.

Funding

The study was supported by Farmer FIRST Project of Indian Council of Agriculture Research (ICAR), Ministry of Agriculture & Farmers Welfare, New Delhi.

Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Quisumbing, A. R., Meinzen-Dick, R., Raney, T. L., Croppenstedt, A., Behrman, J. A., & Peterman, A. Gender in agriculture: Closing the knowledge gap. Netherlands Springer, 2014. <https://doi.org/10.1007/978-94-017-8616-4>
- [2] Rawat, M., Sharma, G., & Tiwari, L. Gender Dynamics in Mid-Hill Agriculture: Challenges and Prospects. Indian Journal of Rural Studies. 2023, 1(2).
- [3] Singh, R. K., et al. *Gender and Agriculture: Revisiting Policy and Practice*. Indian Journal of Agricultural Extension. 2021, 59(3).
- [4] Ghosh, M., & Dey, P. Gender-Sensitive Extension Approaches for Sustainable Agriculture. Indian Journal of Gender and Development. 2022, 14(1), 34-47.
- [5] Kumar, A., Rawat, R., & Singh, N. *FPOs and Women's Livelihood Empowerment in Hills of North India*. Agricultural Economics Research Review. 2022, 36(3).
- [6] Meena, M. S., et al. Women Empowerment through Technological Interventions: An ICAR Experience. Journal of Community Mobilization & Sustainable Development. 2020, 15(1), 90-95.
- [7] Rana, K. and Ansari, M. A. Self Help Groups & Women Empowerment: A Study on Some Selected SHGs in Dehradun District, Uttarakhand. International Journal of Current Science and Technology. 2017, 5(12), 536-540.
- [8] Rana, K. and Ansari, M. A. Women Empowerment through Self Help Groups: A Study in North Himalayan State of India. Journal of Community Mobilization and Sustainable Development. 2019, 14(3), 389-396.
- [9] Agarwal, B. "Gender and land rights revisited: Exploring new prospects via the state, family and market". Journal of Agrarian Change. 2003, 3(1-2), 184-224. <https://doi.org/10.1111/1471-0366.00054>
- [10] FAO. *The State of Food and Agriculture: Women in Agriculture - Closing the Gender Gap for Development*. Rome: FAO, 2011.
- [11] Census of India. The Registrar General and Census Commissioner, Government of India, New Delhi, 2011.
- [12] ICAR (Indian Council of Agriculture Research). Ministry of Agriculture and Farmers' Welfare, Government of India, New Delhi. Farmer FIRST Project Document, 2016.

- [13] Njuki, J., Eissler, S., Malapit, H., Meinzen-Dick, R., Bryan, E., & Quisumbing, A. (2022). A review of evidence on gender equality, women's empowerment, and food systems. *Global Food Security*, 33, 100622.
- [14] Quisumbing, A. R., Heckert, J., Malapit, H. J., & Yount, K. M. (2023). Measuring women's empowerment in agriculture: Innovations and evidence. *Global Food Security*, 39, 100713.
- [15] Lipper, L., & co-authors (2025). Gender, intersectionality and climate-smart agriculture in South Asia. *PLOS Climate*, 4(2), 482.
- [16] Sharma, M., Sharma, A., & Singh, R. (2022). Empowering hill women through Farmer FIRST (Animal Husbandry Module). *Indian Farming*, 72(03), 20-23.
- [17] Rana, K., Ansari, M. A., Chaudhary, S. and Gangwar, R. R. (2021). Poultry farming intervention through Uttara fowl: A new avenue of entrepreneurship under Farmer FIRST in Uttarakhand. *Indian Journal of Pure & Applied Biosciences*, 9(1), 135-141.
- [18] Ansari, M. A., Rana, K., Arya, N., Kandpal, A. S., Kumar, A., Bhatt, L., & Kamboj, A. (2025). Impact of drudgery-reduction tools on the working of farm women: A study under Farmers FIRST programme in mid-hills of Uttarakhand, India. *International Journal of Agriculture Extension & Social Development*, 8(3), 42-50. <https://doi.org/10.33545/26180723.2025.v8.i3a.1678>
- [19] Shah, R., Singh, A. K., and Saryam, M. (2019). Profile and opinion of women farmers towards farming as an enterprise in Uttarakhand. *International Journal of Current Microbiology and Applied Sciences*, 8(1), 1384-1392.
- [20] Joshi, P., Chandra, N., & Jethi, R. (2014). Conditions and consequences of involvement of farm-women in agriculture and off-farm activities in mountain region of Uttarakhand. *Journal of Ergonomics*, 4(2), 127. <https://doi.org/10.4172/2165-7556.1000127>
- [21] De, L. C. (2021). Farmers FIRST programme - An overview. *Vigyan Varta*, 2(1), 19-23.
- [22] Kabeer, N. (2020). Women's Empowerment and Economic Development: A Feminist Critique of Storytelling Practices in "Randomista" Economics. *Feminist Economics*, 26(2), 1-26.
- [23] Singh, K., Meena, M. S., & Meena, B. S. "Factors influencing participation of farm women in agricultural activities." *Journal of Rural and Agricultural Research*. 2017, 17(1), 32-36.
- [24] Devi, L. S., & Singh, A. K. "Economic Empowerment of Rural Women through Livestock-Based Interventions in Hill Areas." *Indian Journal of Extension Education*, 2015, 55(3), 1-6.
- [25] Pandey, S., Joshi, M., & Rawat, M. "Socio-cultural barriers in adoption of agricultural innovations among rural women in Uttarakhand." *Journal of Extension Systems*. 2020, 36(1), 15-21.
- [26] Ministry of Agriculture and Farmers Welfare. Annual Report 2018-19. Government of India, New Delhi, 2019.
- [27] Singh, R. P., & Mishra, P. K. "Household size and its impact on women's participation in rural development." *International Journal of Rural Studies*. 2018, 25(2), 9-14.
- [28] Bansal, S., & Meena, M. S. 2019. "Empowerment of rural women through agricultural training." *Journal of Community Mobilization and Sustainable Development*. 2019, 14(2), 337-341.
- [29] Sulaiman, R. V., & Hall, A. "Beyond technology dissemination: Reinventing agricultural extension." *Outlook on Agriculture*. 2002, 31(4), 225-233.
- [30] Meena, M. S., Singh, K. M., & Meena, H. R. "Gender participation in agricultural training programmes: Implications for future extension." *Indian Journal of Extension Education*. 2012, 48(3&4): 1-5.
- [31] Agarwal, B. Gender and Green Governance: The Political Economy of Women's Presence Within and Beyond Community Forestry. London: Oxford University Press, 2018.
- [32] Narayan, D., Chambers, R., Shah, M. K., & Petesch, P. Voices of the Poor: Crying Out for Change. World Bank, 2000.
- [33] Choudhary, S., Kumar, A., & Singh, R. "Impact of rural development programmes on women's empowerment in India." *Journal of Rural Development*. 2018, 37(1), 89-102.
- [34] Sharma, R., & Rani, V. "Social capital and women's empowerment through community engagement." *Indian Journal of Social Work*. 2020, 81(2), 165-180.
- [35] Agarwal, B. Power and inequality in agricultural research and development: a gender perspective. In *Gender and the development process*. Anne Coles, Leslie Gray, and Janet Momsen (Eds.), New York/ London: The Routledge Handbook of Gender and Development, 2010.
- [36] Desai, R. M., & Joshi, S. "Collective action and community development: Evidence from self-help groups in rural India." *World Bank Economic Review*. 2013, 28(3), 492-524.
- [37] Panda, S. M. "Engendering governance institutions: A case study of Orissa, India." *IDS Bulletin*. 2008, 39(5), 59-66.
- [38] Kabeer, N. "Resources, agency, achievements: Reflections on the measurement of women's empowerment." *Development and Change*. 1999, 30(3), 435-464.