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Impact of drudgery reduction tools on the working of farm women: A study under farmers FIRST programme in Mid Hills of Uttarakhand, India

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Abstract

Farm women in the mid-hills of Uttarakhand play an indispensable role in sustaining agriculture, managing households, and preserving traditional knowledge systems. Their daily workload often exceeds 10-12 hours, involving crop cultivation, livestock care, forest resource collection, and post-harvest processing. Despite their significant contributions, they face persistent challenges, including limited access to modern agricultural technologies, gender disparities in resource ownership, and restricted decision-making power. This study, conducted under the ICAR-funded Farmer FIRST Project (FFP), surveyed 260 randomly selected beneficiaries from three villages in Bhimtal block, Nainital District. Data collection was done using a pre-tested structured interview schedule. The study revealed that most farm women work 12-16 hours daily, with 75% suffering from lower back pain due to prolonged labour. To address this, selected drudgery-reduction tools necessary for farming were provided to the project beneficiaries. Further, the results indicated significant reductions in working hours and physical strain. About 58.75% of women saved 3-5 hours per day, 23.75% saved over 5 hours, and 17.5% saved less than 3 hours. The additional time allowed them to focus on their well-being and spend quality time with family and friends. The study highlights the effectiveness of drudgery-reduction interventions in improving farm women's quality of life and emphasizes the need for broader adoption of such tools to empower rural women and enhance their socio-economic conditions.

Keywords: Farm women, drudgery reduction, gender disparities, women empowerment, hill agriculture, farmer first project

Introduction

Agriculture based livelihoods, dominant in rural areas, play a significant role in socio economic empowerment of people, especially rural women (Das, Ansari and Ghosh, 2023). Consequently, women empowerment has emerged as 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 (Rana & Ansari, 2019) [14]. Role of women in agriculture sector is therefore very critical and engaging as they are involved in almost every aspect of farming.

Farm women in the mid-hills of Uttarakhand play a crucial role in sustaining agricultural systems, managing natural resources, and ensuring household food security. Their contributions encompass diverse activities, ranging from land preparation, sowing, weeding, and harvesting to livestock care and forest resource collection (Rawat & Mehta, 2020) [15]. These women form the backbone of agricultural operations in this region, where agriculture is predominantly rainfed and reliant on traditional methods. Despite their extensive involvement, the work culture of farm women remains largely invisible in mainstream development narratives and under-represented in policy frameworks (Bora *et al*., 2019) [2].

The mid-hill region of Uttarakhand is characterized by steep terrains, small and fragmented landholdings, and a dependency on mixed farming systems. These geographical and climatic constraints significantly influence the work culture of women, who often perform labour-intensive tasks in physically challenging environments. Additionally, the outmigration of men from rural areas to urban canters for employment has further intensified women's responsibilities, leading to the phenomenon of feminization of agriculture (Negi & Joshi, 2021) [11].

As per the Annual Periodic Labour Force Survey, 2021-2022, agriculture has the highest estimated female labour force participation of 62.9 per cent. With time, as men are moving towards non-farm occupations and livestock

rearing, agriculture is becoming more "feminized" (Swaminathan, 2013) [18]. The agricultural operations usually take long working hours and intense physical load to be performed. Although, most of the intercultural operations are seasonal and depend on the type of crop that has been sown in the field but some of these activities demand great amount of energy and make the person exhausted who is responsible for performing them. The farmwomen perform agricultural tasks with the age-old traditional tools since gender friendly appropriate tools are either not available or insufficient in number or unawareness. Unsafe, hazardous, unhealthy and long hours of work with age-old traditional and cumbersome tools accelerate health related problems, especially among women farmers (Nag and Nag, 2004). In hill agricultural system, most of the time women are responsible to undertake the intercultural operations throughout the cropping season along with managing the household chores and taking the responsibility of the family members. The women drudgery in agriculture is very sensitive and important gender issue which has captured the attention of many researchers and developmental agencies in recent years. Many believe that women's involvement in agricultural tasks and large is a source of heavy burden of drudgery on them (Verma and Sinha, 1991) [19]. The long hours of work, much effort and labour spent in repetitive farm operations result in fatigue and drudgery (Borah and Kalita, 1998) [3]. Drudgery is generally conceived as physical and mental strain, agony, monotony and hardship experienced by the human beings while all of women in this regard suffer the most due to heavy burden of drudgery on them (Sharma *et al*., 2018) [16]. India is blessed with a "female economy" in terms of savings, consumption attitude, tendency to recycle and farming. Despite this, women continue to lag far behind men on several indicators like education, health, etc. (Kohali and Ruwali, 2022) [8]. Farm women face many constraints such as lack of landholding and resources, lack of identity as farmers, social barriers and technology barriers (Joshi and Chaudhary, 2021) [7]. With the feminization of agriculture, scarcity of farm labour and outmigration of male, women are forced to carry out work previously done by men (Burman *et al*, 2020) [4]. Ninety per cent of rural women in Uttarakhand contribute to up to 90% of the total work in agriculture and animal care (Prasad and Sharma, 2011) [13]. The rural women are usually employed to perform arduous field operations like sowing behind the plough, transplanting, weeding, interculture, harvesting and threshing and primary processing of agro produce (Potdar *et al*, 2018) [12]. Women in the state usually work for 16.49 hours daily, and the time consumed by agriculture-related work is 29.35% of their time (Prasad, 2011) [13]. A large number of women are confined in unpaid care-work, and they encounter more difficulties in taking up leadership positions (Aryal and Kattel, 2019) [1].

Energy and time saving technological interventions are need of an hour to reduce the work burden and increase efficiency (IFAD 2014) [6]. Despite new farm tools, rural women are left to use the traditional farming tools that reduced their efficiency, low income, drudgery, and occupational health risk (Majumdar and Shah, 2017) [9]. The farm women are not aware about the improved farm technologies and machineries as much as the male farmers do and even if they are aware about these technologies and machineries, mostly they are skeptical in using them and prefer their traditional methods of performing different agricultural operations (Mehta *et al*. 2012) [10].

Farmers FIRST Programme (FFP): Since its inception in October 2016, the ICAR funded Framer FIRST (Farm Innovations Resources, Science and Technology) Programme (FFP) has a very keen interest in uplifting the farm women of mid-hills of Uttarakhand. In hill agriculture, the women labour is still highly underestimated and unrecognised by the farming community. Besides, family responsibilities, rural woman play a productive role in farming system. Most of the agricultural and household chores are done by women as women are backbone of hill agriculture in Uttarakhand.

Farmer FIRST Programme has many modules such as vegetable production, poultry production, crop production, honey production, mushroom production, drudgery reduction and processing of agricultural produce. By implementing these mandated components in hill agricultural system, FFP has created a significant difference in the livelihood of farm women in mid-hills of the state.

The main components of the FFP are:

a). Enhancing Farmer, b). Scientist Interface, c). Technology Assemblage, d). Application and Feedback, e). Partnership and Institution Building and f). Content Mobilization.

During the project implementation, the farm women have proved themselves to be equally capable as their male counterparts to take upon all physical, social and economic activities of the household along with caring for their family members.

The specific objectives of Farmer FIRST Project include the following

1. To study the basic profile of farm women
2. To find out the physical fitness of farm women involved in agriculture
3. To assess drudgery index of farm women

Importance of Drudgery Reduction in the Farmer FIRST Programme

Farm women are the backbone of agricultural production, household management, and the preservation of traditional agro-ecological knowledge systems. Their contributions span a wide range of activities, including crop cultivation, livestock management, forest resource collection, and post-harvest processing, often requiring 10 to 12 hours of labor daily. Despite their indispensable role in sustaining rural livelihoods, these women face persistent challenges, including limited access to modern agricultural technologies, gender-based disparities in resource ownership, and restricted decision-making power. Such inequities not only exacerbate their physical and mental workload but also hinder their socio-economic empowerment and overall well-being.

The physical drudgery associated with agricultural and household tasks is a significant concern for rural women, often leading to chronic health issues such as musculoskeletal disorders, particularly lower back pain. Studies have highlighted that the lack of access to labour-saving technologies further intensifies their workload,

leaving little time for rest, leisure, or self-care. Addressing these challenges requires innovative interventions that reduce drudgery, enhance productivity, and improve the quality of life for farm women.

Drudgery reduction is a crucial component of the Farmer FIRST Programme (FFP) as it directly impacts the productivity, health, and overall well-being of farm women engaged in intensive agricultural and household activities. In hilly regions like Uttarakhand, women contribute significantly to farming operations, livestock management, and household chores, often working 12–16 hours per day under physically demanding conditions. However, their contributions remain largely unrecognized and unpaid, further exacerbating gender disparities in agriculture. It includes (a): Enhancing Physical Well-being, (b): Increasing Productivity and Efficiency, (c): Promoting Gender Equity in Agriculture, (d): Improving Mental and Social Well-being, and (e). Supporting Climate Resilience and Sustainable Agriculture. Therefore, drudgery reduction in the Farmer FIRST Programme is not just about easing the workload of farm women; it is a strategic intervention for improving health, efficiency, and gender inclusivity in agriculture. Integrating labour-saving technologies and gender-sensitive policies can significantly enhance the sustainability and socio-economic status of farm women, ensuring their active participation in the agricultural transformation of Uttarakhand's mid-hills.

Materials and Methods

The study was undertaken in three project villages which were selected for targeted interventions under the Farmers FIRST Project. These villages (i.e. Jeoli, Syalikhet and Dogra) lie in the mid hills of Bhimtal Block, Nainital District in Kumaon Division of Uttarakhand. Besides, FFP, this area has been the focal point of various other state/ central government funded programmes.

Under Farmer FIRST Programme, targeted interventions in three modules- vegetable cultivation, livestock rearing (poultry birds) and honey bee production- were undertaken since 2017. Additionally, some drudgery reduction tools such as revolving stool, cow dung collector machine and back mounted water were also given as part of project interventions.

The study sample comprised of 260 randomly selected farm women from 3 project villages, *viz*. Jeoli, Syalikhet and Dogra villages. These 260 women (project beneficiaries) were contacted by the investigators to assess the impact through drudgery index. The information related to the basic profile of farm women and the extent of drudgery involved in agriculture was collected through a structured interview schedule. Standard statistical tools such as Frequency and percentage were used for analysing the data. However, to find out the physical fitness of selected farm women, the Drudgery Index (DI) and Body Mass Index were calculated with the following formula,

$$DI = [(x+y+z)/3] \times 100$$

x = Co - efficient pertaining to difficulty felt.
y = Co - efficient pertaining time spent in particular farm activity.
z = Co - efficient pertaining to frequency of performance.

The Body Mass Index (BMI) by Garrow (1985) [5] was used to assess the physical fitness of the farm women. The formula used for BMI is;

$$\text{BMI (kg/m}^2\text{)} = \frac{Weight\ (kg)}{Height\ (m2)}$$

BMI classification given by Garrow is;

Sl. No.	BMI classes	Presumption diagnosis
1.	<16	Chrome energy deficit grade III (Severe)
2.	16-17	Chrome energy deficit grade II (Moderate)
3.	17-18.5	Chrome energy deficit grade I (Middle)
4.	18.5-20	Low weight normal
5.	20-25	Normal
6.	25-30	Obese grade 1
7.	>30	Obese grade 2

Results and Discussion

(a) Basic Profile of farm women: As is evident from table-1, majority of farm women were middle aged (63.85%) belonging to middle income group (77.69%) and had more than ten years of farming experience (59.62%). Majority of farm women (64.62%) were responsible for various farm operations having two to four acre of land (68.85%) with legal ownership of women in only 8.46 per cent of agricultural land. More than seventy-five per cent of farm women work for 12-16 hours per day and had lower back pain issues (75.38%). After utilizing the tools given under Farmer FIRST programme it was found that 58.75 per cent of the farm women reported to save 3-5 hours/day whereas 23.75 per cent saved more than 5 hours/day and 17.5 per cent saved less than 3hours/day.

Table 1: Basic profile of farm women (n=260)

Sl. No.	Category	*f*	%
Age			
1.	Young (<30years)	55	21.15
2.	Middle age (30-50years)	166	63.85
3.	Old (>50years)	39	15.00
Family income			
1.	Lower (<Rs.15,000 per month)	38	14.62
2.	Middle (<Rs.15,000 – 45,000 per month)	202	77.69
3.	Higher (>Rs.45,000 per month)	20	7.69
Family type			
1.	Joint	219	84.23
2.	Nuclear	41	15.77
Farming experience			
1.	Less than 5 years	32	12.31
2.	5-10 years	73	28.08
3.	More than 10 year	155	59.62
Responsibility of farm operations			
1.	Girls/Women of the household	168	64.62
2.	Boys/Men of the household	70	26.92
3.	Hire labour	22	8.46
Landholding (acre)			
1.	Less than 2 acres	39	15
2.	2 – 4 acres	179	68.85
3.	More than 4 acres	42	16.15
Legal ownership agricultural land			
1.	Men	238	91.54
2.	Women	22	8.46
Working hours of farm women			
1.	<12 hours	34	13.08
2.	12-16 hours	198	76.15
3.	>16 hours	28	10.77

The above findings provide significant insights into the socio-economic profile, workload, and impact of drudgery reduction interventions on farm women in the mid-hills of Uttarakhand. The demographic analysis reveals that a majority of farm women are middle-aged (63.85%), belong to the middle-income group (77.69%), and have over ten years of farming experience (59.62%). This indicates that a substantial proportion of women in the study area have dedicated a significant part of their lives to agricultural activities, reinforcing their role as the primary workforce in farming. Further, a key observation is that 64.62% of women are responsible for multiple farm operations, despite limited land ownership rights. While 68.85% of them cultivate land holdings between 2-4 acres, only 8.46% of the agricultural land is legally owned by women. This highlights the deep-rooted gender disparity in land ownership, which limits their access to credit, decision-making authority, and participation in formal agricultural programs. Addressing this imbalance through policy interventions and legal reforms is essential for enhancing women's empowerment in agriculture.

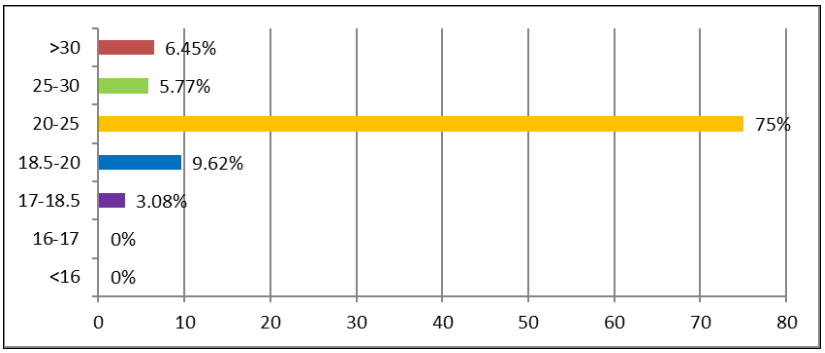
The study further underscores the intense workload borne by farm women, with over 75% working 12-16 hours per day. Such prolonged working hours contribute to severe physical strain, leading to lower back pain issues in 75.38% of respondents. These findings highlight the urgent need for ergonomic interventions and labor-saving technologies to reduce drudgery and improve the well-being of farm women. Thus, the implementation of drudgery reduction tools under the Farmer FIRST Programme has demonstrated a positive impact on time management and workload reduction. The results indicate that 58.75% of farm women saved 3-5 hours per day, while 23.75% reported savings of more than 5 hours per day, and 17.5% saved less than 3 hours per day. These findings emphasize the effectiveness of technological interventions in alleviating physical strain and creating opportunities for women to engage in alternative productive activities, self-care, and social interactions.

(b) Physical fitness of farm women: In the present study, the physical health of farm women is analysed by looking over the BMI index and physical heath of farm women.

(i) BMI of farm women: The rural farm women are very hard working and strong since childhood they have been involved in the household and agricultural farm work. The present study also shows that farm women of mid-hills were perfectly fit based on the BMI score. Seventy five percent of women had normal BMI ranging from 20-25 BMI while only 5.77 per cent and 6.54 per cent had Obese grade 1 and Obese grade 2, respectively. None of the farm women fell under the category of being chrome energy deficit grade I and II. The results indicate that the farm women are healthy.

Table 2: Distribution of farm women according to BMI

Sl. No.	BMI classes	*f*	%
1.	<16	-	-
2.	16-17	-	-
3.	17-18.5	8	3.08
4.	18.5-20	25	9.62
5.	20-25	195	75
6.	25-30	15	5.77
7.	>30	17	6.45



The above findings reaffirm the physical resilience and hard-working nature of rural farm women in the mid-hills of Uttarakhand, who have been actively engaged in both household and agricultural labour since childhood. The BMI analysis further highlights their good health status**,** with 75% of farm women having a normal BMI (20-25). This suggests that despite their physically demanding workload, their active lifestyle and traditional dietary patterns contribute to maintaining optimal body weight and fitness levels.

A minimal percentage of women were classified under Obese Grade 1 (5.77%) and Obese Grade 2 (6.54%)**,** indicating that obesity is not a significant concern in this population. Moreover, none of the farm women fell into the category of chronic energy deficiency (CED) Grades I and II**,** signifying that undernutrition is not prevalent among them. These results indicate a balanced nutritional status and an overall healthy workforce, which is crucial for sustaining agricultural productivity in the region.

(ii) Physical health of farm women: The farm women in hilly areas have a very busy schedule since morning till the night. Farm women usually have repetitive movement and very static posture while performing several agricultural operations for a long period of time which exert extreme pressure on their body. The hill women move between extreme ranges of motion from starting their day to the time when they go to sleep at night, sometimes working in awkward physical postures which exert physical burden on women. A list of physical issues experienced by farm women during farming operations was generated from literature review and experts. The respondents then ranked these issues as per their own experiences. The results are given in Table-3 below

Table 3: Physical issues faced by the farm women (n=260)

Sl. No.	Physical issues	VF (*f*) (%)	F (*f*) (%)	S (*f*) (%)	R (*f*) (%)	N (*f*) (%)
1.	Pain in joints	74 (28.46)	61 (23.46)	97 (37.31)	19 (7.31)	9 (3.46)
2.	Knee pain	56 (21.54)	55 (21.15)	78 (30.00)	49 (18.85)	22 (8.46)
3.	Issue of back or neck pain	109 (41.92)	74 (28.46)	56 (21.54)	15 (5.77)	6 (2.31)
4.	Pain in feet	56 (21.54)	79 (30.38)	88 (33.85)	18(6.92)	19 (7.31)
5.	Swelling or inflammation	70 (26.92)	88 (33.85)	44 (16.92)	56 (21.54)	2 (0.77)
6.	Pain in forearms	49 (18.85)	72 (27.69)	78 (30.00)	43 (16.54)	18 (6.92)
7.	Numbness in hands	38 (14.62)	68 (26.15)	62 (23.85)	52 (20.00)	40 (15.38)
8.	Pain in waist	111 (42.69)	36 (13.85)	39 (15.00)	48 (18.46)	26 (10.00)
9.	Frequent headaches	98 (37.69)	58 (22.31)	59 (22.69)	32 (12.31)	13 (5.00)
10.	Pain in shoulder	63 (24.23)	65 (25.00)	78 (30.00)	44 (16.92)	10 (3.85)

VF = very frequent, F = frequent, S = sometimes, R = rarely, N = never

From the above table, it can be summarized that farm women in the mid-hills of Uttarakhand experience a variety of physical health issues due to their intensive and prolonged labor in agricultural and household activities. Among the reported problems:

- Back or neck pain (41.92%) and waist pain (42.69%) are the most prevalent, affecting nearly half of the respondents.
- Frequent headaches (37.69%) and joint pain (37.31%) are also common, indicating prolonged physical strain.
- Pain in feet (33.85%), pain in forearms (30.00%), and shoulder pain (30.00%) suggest ergonomic issues related to repetitive tasks.
- Swelling/inflammation (33.85%) and knee pain (30.00%) further highlight the stress on the lower limbs.
- Numbness in hands (26.15%) and forearm pain (27.69%) suggest possible circulation issues or nerve compression.

These findings emphasize the high prevalence of musculoskeletal disorders among farm women, likely caused by repetitive motions, prolonged standing, heavy lifting, and lack of ergonomic tools. The predominance of waist, back, and joint pain suggests that continuous bending, lifting, and working in uncomfortable postures contribute significantly to their physical discomfort. Besides, frequent headaches and numbness in hands could be linked to fatigue, dehydration, or nerve-related issues, exacerbated by long working hours without sufficient rest. Additionally, swelling and inflammation may be a result of prolonged physical exertion, inadequate recovery time, and exposure to harsh environmental conditions.

This situation can be overcome by the following recommendations: (i) Introduction of Ergonomic Tools – Distribution of drudgery-reducing equipment such as ergonomic seating, lightweight agricultural tools, and lifting aids to alleviate strain. (ii). Health Awareness and Training – Educating farm women on proper posture, stretching exercises, and pain management techniques to reduce long-term health impacts. (iii). Regular Health Check-ups – Implementing community-level health screening programs for early detection and management of musculoskeletal disorders. (iv). Time and Workload Management – Encouraging task rotation, structured rest periods, and balanced workloads to reduce excessive strain, and (v). Nutritional Support and Hydration – Promoting a balanced diet, hydration, and micronutrient intake to enhance muscle recovery and reduce fatigue-related issues.

Thus, we can conclude that the study highlights the urgent need for interventions to address the physical strain faced by farm women. By incorporating ergonomic improvements, health education, and workload management strategies, their overall well-being, productivity, and quality of life can be significantly enhanced.

C. Drudgery Index

The Drudgery Index is a quantitative measure used to assess the level of physical and mental hardship experienced by farm women due to their prolonged engagement in labour-intensive agricultural activities. It provides a structured way to evaluate the intensity of drudgery, considering multiple factors such as time spent, physical strain, health impact, and workload distribution. The Drudgery Index is an essential tool for understanding the physical stress and workload of farm women. It helps in designing targeted interventions to reduce their burden, improve productivity, and ensure a healthier and more sustainable agricultural workforce.

The study findings related to the drudgery index are as follow.

1. Time spent (hours/day) in various activities by female respondents: The study findings (Fig.-1) indicates that a sizeable portion of farm women's time is spent on household chores (6.7h/d), livestock and poultry management (4.9h/d), weeding and intercultural operations (4.8h/d) and harvesting threshing and winnowing (4.1 h/d).

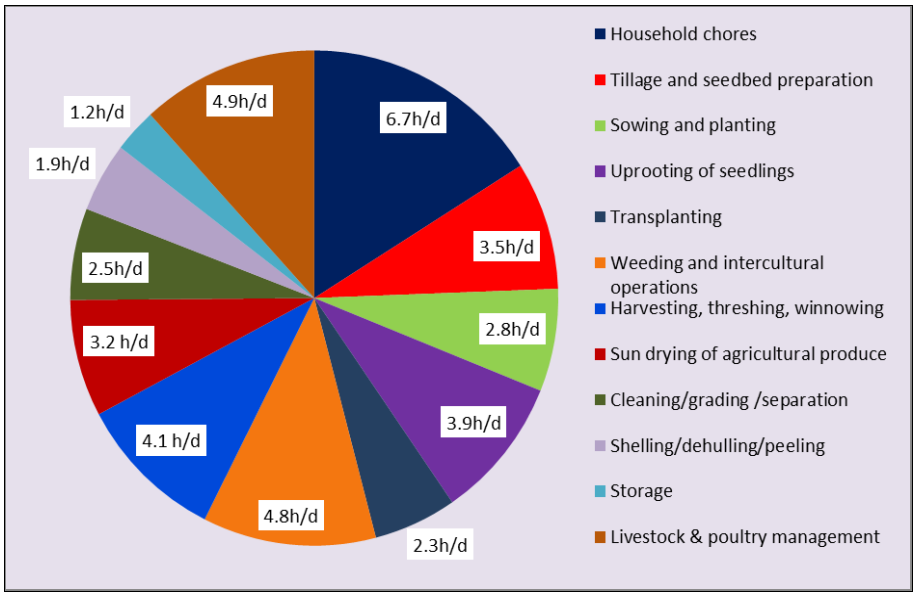


Fig 1: Time spent (hours/day) by farm women in various farming activities

The above study findings highlight the heavy workload and time-intensive responsibilities of farm women in the mid-hills of Uttarakhand. Their daily schedule is predominantly occupied by household chores (6.7 hours/day), livestock and poultry management (4.9 hours/day), weeding and intercultural operations (4.8 hours/day), and harvesting, threshing, and winnowing (4.1 hours/day). These findings reflect the dual burden of domestic and agricultural responsibilities, where farm women not only manage household tasks but also play a critical role in crop production and livestock care. The substantial time spent on weeding and intercultural operations suggests that women are heavily involved in labor-intensive farm activities, often performed manually due to limited mechanization. Similarly, harvesting, threshing, and winnowing require significant physical effort, adding to their drudgery.

2. Difficulty felt in performing the activities

The perceived difficulty felt in performance of farm activities by farm women was assessed on a five-point scale i.e. very easy (1), easy (2), neutral (3), difficult (4) and very difficult (5). The study findings (Table-4) indicate that

- More than half of the farm women perceived household chores (53.08%), tillage and seedbed preparation (51.54%), cleaning/grading /separation (55.77%) as difficult activities.
- More than sixty per cent found uprooting of seedlings as very easy activity.
- More than half of the farm women expressed that sowing and planting is easy activity.
- Majority of farm women found transplanting (61.54%), weeding and intercultural operations (63.46%) and harvesting, threshing, winnowing (72.31%) as difficult activities to perform.
- More than sixty per cent of farm women perceived Livestock & poultry management as a very difficult activity.

Table 4: Difficulty level as reported by farm women in performing the activities (n=260)

Sl. No.	Activities	Difficulty felt in performing the activities				
		Very easy	Easy	Neutral	Difficult	Very Difficult
1.	Household chores	5.38	12.69	7.69	53.08	21.15
2.	Tillage and seedbed preparation	4.62	16.54	8.85	51.54	18.46
3.	Sowing and planting	6.15	55.77	10.77	20.77	6.54
4.	Uprooting of seedlings	60.38	22.31	3.85	9.62	3.85
5.	Transplanting	4.23	10.00	6.15	61.54	18.08
6.	Weeding and intercultural operations	3.46	9.62	6.15	63.46	17.31
7.	Harvesting, threshing, winnowing	2.69	10.77	8.08	72.31	6.15
8.	Sun drying of agricultural produce	6.92	63.46	4.23	14.23	11.15
9.	Cleaning/grading /separation	9.23	9.23	3.85	55.77	21.92
10.	Shelling/dehulling/peeling	7.69	11.92	3.46	6.15	70.77
11.	Storage	7.31	43.08	11.92	21.54	16.15
12.	Livestock & poultry management	4.23	15.00	6.54	11.15	63.08

The above findings provide valuable insights into the perceived difficulty faced by farm women in performing various agricultural and household tasks. The results indicate that household chores (53.08%), tillage and seedbed preparation (51.54%), and cleaning, grading, and separation (55.77%) were perceived as difficult activities, highlighting the physical and time-consuming nature of these tasks. The involvement of women in these demanding chores contributes significantly to their overall workload and drudgery. Interestingly, uprooting of seedlings was

perceived as a very easy task by over 60% of respondents, suggesting that this activity might be less strenuous or more manageable in comparison to other tasks. Similarly, sowing and planting were considered easy by more than half of the respondents, indicating that these tasks may require less physical effort or are less stressful for the women involved. However, activities such as transplanting (61.54%), weeding and intercultural operations (63.46%), and harvesting, threshing, and winnowing (72.31%) were found to be difficult for the majority of women. These tasks are physically intense and require extended hours of labor, contributing to the high drudgery index. The finding that livestock and poultry management is perceived as very difficult by more than 60% of farm women further emphasizes the strenuous nature of animal care, including feeding, cleaning, and managing the health of livestock.

3. Frequency of performance: The results obtained regarding frequency of performing various activities was collected on five-point continuum, namely daily, alternate day, weekly, fortnightly, seasonal scoring 5, 4, 3, 2 and 1, respectively. The study findings (Table-5) indicate that

- All the farm women (100%) perform household chores and livestock & poultry management on daily basis.
- More than seventy per cent of farm women perform weeding and intercultural operations in their farm fields fortnightly.
- Other agricultural activities such as tillage and seedbed preparation (82.69%), uprooting of seedlings (76.54%), Harvesting, threshing, winnowing (54.23%), Sun drying of agricultural produce (51.54%), Cleaning/grading /separation (62.31%), Shelling/dehulling/peeling (64.23%) and Storage (66.15) are seasonal activities.

Table 5: Frequency of performance by the farm women in performing the activities (n=260)

Sl. No.	Activities	Frequency of performance				
		Daily	Alternate Day	Weekly	Fortnightly	Seasonal
1.	Household chores	100.00	0.00	0.00	0.00	0.00
2.	Tillage and seedbed preparation	0.00	0.00	2.31	15.00	82.69
3.	Sowing and planting	0.00	0.00	0.00	0.00	100.00
4.	Uprooting of seedlings	0.00	0.00	2.31	21.15	76.54
5.	Transplanting	0.00	0.00	0.00	0.00	100.00
6.	Weeding and intercultural operations	0.00	6.15	21.15	72.69	0.00
7.	Harvesting, threshing, winnowing	0.00	3.85	16.54	25.38	54.23
8.	Sun drying of agricultural produce	0.00	11.92	15.77	20.77	51.54
9.	Cleaning/grading /separation	0.00	0.00	11.15	26.54	62.31
10.	Shelling/dehulling/peeling	0.00	0.00	11.54	24.23	64.23
11.	Storage	0.00	3.08	15.77	15.00	66.15
12.	Livestock & poultry management	100.00	0.00	0.00	0.00	0.00

The results obtained provides an insightful analysis of the frequency of various farm activities performed by women in the study area. The findings reveal that household chores and livestock & poultry management are performed on a daily basis by all farm women, emphasizing the constant and demanding nature of these tasks. This suggests that the daily routine of farm women is highly labour-intensive, with a consistent engagement in essential household and livestock care duties. Interestingly, weeding and intercultural operations are typically carried out on a fortnightly basis by more than 70% of farm women. This reflects the seasonal or cyclic nature of these tasks, indicating that they are linked to specific growth stages of crops and may not require daily attention. Similarly, other agricultural tasks such as tillage and seedbed preparation (82.69%), uprooting of seedlings (76.54%), and harvesting, threshing, and winnowing (54.23%) are classified as seasonal activities, which aligns with the typical agricultural calendar. The seasonal nature of these activities suggests that farm women face intense peak labor demands during certain times of the year, particularly during planting and harvest seasons. Other tasks like sun drying of agricultural produce (51.54%), cleaning/grading/separation (62.31%), shelling/dehulling/peeling (64.23%), and storage (66.15%) are also primarily performed during specific seasons. This indicates that while these activities are important, their frequency is closely tied to crop cycles and harvest periods.

Drudgery Index: Finally, the Drudgery Index was calculated with the help of Frequency coefficient, Difficulty coefficient and Time spent coefficient, The results (Table-6) reveals that:

- On the basis of Drudgery Index score, Livestock & poultry management was ranked first followed by household chores (2^{nd} rank), weeding and intercultural operations (3^{rd} rank), transplanting (4^{th} rank) and harvesting, threshing, winnowing (5^{th} rank).
- The activities such as Storage (12^{th} rank) and uprooting of seedlings (11^{th} rank) were ranked least on the basis of Drudgery Index score.

Table 6: Frequency of performance by farm women in performing various farming activities (n=260)

Sl. No.	Farming Activities	FC	DC	TC	DI	Rank
1.	Household chores	0.49	0.55	0.79	61.00	II
2.	Tillage and seedbed preparation	0.44	0.39	0.49	44.00	IX
3.	Sowing and planting	0.49	0.47	0.33	43.00	X
4.	Uprooting of seedlings	0.41	0.33	0.45	39.67	XI
5.	Transplanting	0.58	0.77	0.39	58.00	IV
6.	Weeding and intercultural operations	0.58	0.79	0.42	59.67	III
7.	Harvesting, threshing, winnowing	0.55	0.44	0.59	52.67	V
8.	Sun drying of agricultural produce	0.58	0.49	0.41	49.33	VI
9.	Cleaning/grading /separation	0.51	0.57	0.33	47.00	VII
10.	Shelling/dehulling/peeling	0.81	0.29	0.27	45.67	VIII
11.	Storage	0.46	0.22	0.33	33.67	XII
12.	Livestock & poultry management	0.57	0.68	0.76	67.00	I

FC= Frequency coefficient, DC=Difficulty coefficient, TC=Time spent coefficient, DI=Drudgery Index

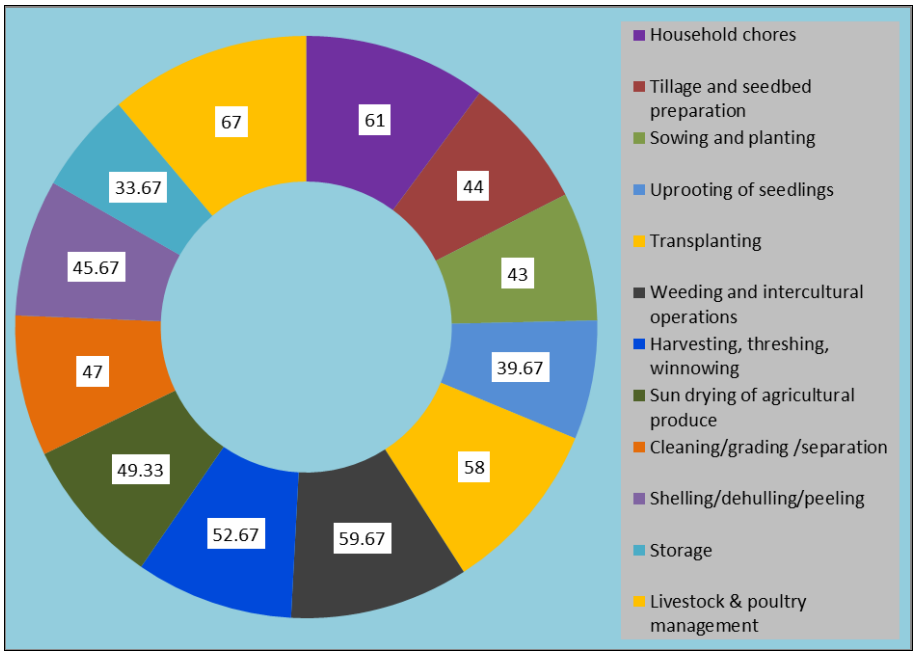


Fig 2: Frequency of performance of farming activities

The Drudgery Index scores in this study obtained and presented above provide a valuable measure of the physical strain involved in various tasks performed by farm women. The study findings reveal that livestock and poultry management ranked first in terms of drudgery, followed by household chores in the second place. These activities are not only physically demanding but also require consistent attention and labor, often throughout the day. Further, the heavy involvement of women in animal care - from feeding to cleaning - reflects the intensity and time commitment required to manage livestock and poultry. Further, other tasks such as weeding and intercultural operations (ranked 3rd), transplanting (4th), and harvesting, threshing, and winnowing (5th) also ranked high on the Drudgery Index, indicating their physically strenuous nature. These activities often involve manual labor and extended working hours, contributing significantly to the overall workload of farm women. The intensity of these tasks, especially during peak agricultural seasons, may lead to issues such as musculoskeletal pain and physical fatigue, which can impact the health and well-being of women.

Interestingly, storage (ranked 12th) and uprooting of seedlings (ranked 11th) were identified as tasks with the least drudgery, suggesting that these activities require relatively less physical exertion compared to other farm operations. This indicates that while still important, these tasks are not as physically demanding or time-consuming, providing farm women some relief from the more labor-intensive activities. Thus, we can conclude that the Drudgery Index highlights the strenuous nature of many tasks farm women undertake and points to specific areas where interventions could alleviate physical strain and improve overall productivity.

Conclusion

The study reiterates the multifaceted role of farm women in the mid-hills of Uttarakhand, illustrating their critical contributions to agriculture, household management, and livestock care. It also highlighted that farm women face a range of physical challenges due to the labour-intensive nature of their work, with livestock and poultry management and household chores being the most physically demanding. Drudgery in various farm activities is prevalent, with tasks such as weeding, transplanting, and harvesting also identified as strenuous.

Thus, we can conclude that drudgery of farm women is common in agriculture. Although most of the farm women

had normal the BMI index but many of them are facing problems with their physical fitness. Occurrence of pain in back/neck, waist and headaches while performing their day-to-day activities due to heavy workload was very much pronounced in middle aged farm women. Other physical issues that the farm women facing were joint pain, knee pain, pain in feet, swelling or inflammation, pain in forearms, numbness in hands and pain in shoulder. It was also observed that as the farm activities required more time and energy of the workers, majority of the respondents perceived farm activities either difficult or 'very difficult'. These activities are mostly seasonal in nature and require longer hours to complete them. During the season, women work long hours in their agricultural field as well as look after the household chores without any physical rest.

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