



Feminization of Agriculture in Nepal and its implications: Addressing Gender in Workload and Decision Making

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ABSTRACT

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The study assesses the two approaches of feminization: labor and managerial, and explores the implication of feminization in agricultural production in Gorkha and Chitwan district of Nepal. We examine the degree to which men, women or men and women jointly make agriculture-related decisions, and discuss the labor feminization and managerial feminization using five domains of the Women Empowerment in Agriculture Index (WEAI), relative to the degree to which women's decision-making power relates to the feminization of agriculture leading to women empowerment and food security. The results revealed that the average workload for women (86.50 hours/week) was more than that for men (55.52 hours/week). Workload was found significantly affected by the total cultivated area (ha), gender of household head, occupation, number of livestock holdings, number of children, number of elders and household location. All aspects of operational and strategic decision making were dominated by jointly made decisions, except in the case of income utilization where female showed dominance. The implication of feminization in agriculture is reflected by reduction in cropping cycle, lower productivity of cereals and vegetables which led to food insecurity by own production. The income from remittance was observed to be mainly used for consumption purposes to ensure food security. It appears that the feminization of agriculture leads to women playing not only important role in decision-making but also more responsibilities and heavier workloads without necessarily resulting in empowerment and improvement in well-being.

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Introduction

Women farmers play an increasingly important role in agriculture in many countries, a trend known as the feminization of agriculture (FAO, 2017). Agriculture is feminized if women make up the majority of those employed in the sector and it is feminizing if women's share of agriculture has increased significantly compared to previous years, regardless of whether women make up the majority of those employed in agriculture (World Bank, 2016). The most accepted definition of feminization is given by Lastarria-Cornhiel (2008), who defines feminization of agriculture as "women's increasing participation in the agricultural labor force, whether as independent producers or as unremunerated family workers".

Different scholars differently describe and approach feminization of agriculture. Jia-cheng et al. (2019), based on who holds the decision-making power over and which gender participated in family agricultural production, constructed three different modes of feminization: complete, incomplete feminization, and traditional mode. Gartaula et al. (2010) has described two spheres of influence as (i) labor feminization and (ii) managerial feminization, respectively. Labor feminization can be stated as a better participation of women in agriculture practices (pesticide use, milking animals, and feeding cattle, finding agricultural labors) (Gartaula et al., 2010). Managerial feminization comprises household decision-making in regions like organizing finances, crop production, market activities, and land administration.

Agriculture is clearly feminizing in many countries of Near East and North Africa (NENA), Central Asia, Latin America and in countries of South Asia (World Bank, 2016). In world's migrant population, 50% of them were female, but in Nepal, about 81.3 % of migrants are male (CBS, 2021). Various literatures examine the migratory insinuations on changing agricultural practices by different gender, stated as the feminization of agriculture in Nepal (Chapagain 2015; Gartaula et al. 2010; Lahiri-Dutt and Adhikari 2016). The female share of the economically active population in agriculture in Nepal was 35.4 %, 42.2% and 48.1% and 50% in 1980, 1995, 2010 and 2017 (FAO, 2011; Kaini, 2017), respectively.

Nepal is going through economic, infrastructural, political, demographic, and cultural transformation (Spangler and Christie, 2020). In this perspective, male out-migration is in augmenting trend. Men are pursuing foreign employment in Gulf countries and nearby countries like India and Malaysia, as a discretion and supplemental source of income to their rural means of support (Khatiwada et al. 2017; Sunam 2017, Thapa et al., 2022). Ghale (2008) stated that the decade long (1996 to 2006) armed conflicts and higher outmigration of men-folks from rural areas of Nepal are the main cause of the increasing women labor force. Due to male out-migration, female-headed households increased from 14.8% in 2001 to 25.7% in 2011 (CBS, 2011) and 31.3% in 2016 (World Bank, 2016). Along with out-migration, 25-30 % of agricultural lands have been abandoned in the last 20 years (Tamang et al., 2014).

There is drudgery for women and this is happening within the male-dominant farming system, which not only adds to the workload of women, but is also inappropriate and unfriendly to them (Tamang, 2014). According to report of the Nepal Labor Force Survey 2017/18 (NLFS, 2019), 71.7% of female were involved in work for own final use only while only 38.2% of males in the same age group were in this form of work. Women were disproportionately more involved in the unpaid activities (NLFS, 2019). Furthermore, females are facing greater restraints than their male counterparts in gaining access to public service, control over resource, social protection, employment opportunity, information, innovation and market and institution (NPC, 2020). A large number of women are detained in voluntary care-work, and they confront more exertions in taking up leadership positions (Aryal and Kattel, 2019). Female-headed households had shown a smaller size of landholding, a high dependency ratio, and lack of access to information (CBS, 2014).

Women's involvement in agriculture was not so discernable in past due to behavioral discrimination against women, the permanence of societal structure, beliefs, values, and traditional practices, lack of disaggregated data to advocate for gender equality and biased views on women's economic contribution which are as well the challenges of women empowerment (NPC, 2020). Recently, women's participation in agriculture has been recognized and put on the policy agenda, assuming a positive change for women's empowerment. The Sustainable Development Goals (SDGs) shows commitments towards promoting gender equality in agriculture by featuring, in SDG2 on zero hunger and in SDG5 on gender equality, the essence of small-scale

producer women and the exclusion of all prejudice against women and girls. In this context, the relevant issue is to understand and analyze the extent of feminization in the agricultural sector. There is, therefore, a need to study the nature and extent of women's participation in agriculture and household affairs.

In this light, the study was carried out to assess the women's work load and decision-making power in view of the feminization of agriculture, and its implication on agriculture production and food security. We also examine the degree to which men, women or men and women jointly make agriculture-related decisions, and discuss the labor feminization and managerial feminization (operational decision, strategic decision) using five domains of the Women Empowerment in Agriculture Index (WEAI), relative to women's empowerment and the degree to which women's decision-making power relates to the feminization of agriculture leading to women empowerment and food security.

Methodology

Study Site and Data Collection

The study was carried out in Gorkha and Chitwan districts of Nepal (Figure 1). These districts mostly represent all three geographical variations- terai, mid hill and high hill, and migration patterns of the country which make them suitable for study purpose. Gorkha includes mid-hill to high hill area and is relatively less dense and rural with poor access to market in comparison with Chitwan district. The primary and secondary data were collected from various sources by using different techniques. The general technique included field survey, Focus Group Discussions (FGDs), review of the previous study, group discussion, and interview. Primary data were collected from a field survey of 120 households comprising 60 households from each district using a semi-structured questionnaire. Pretesting was done to minimize errors. Secondary data were collected from various published materials.

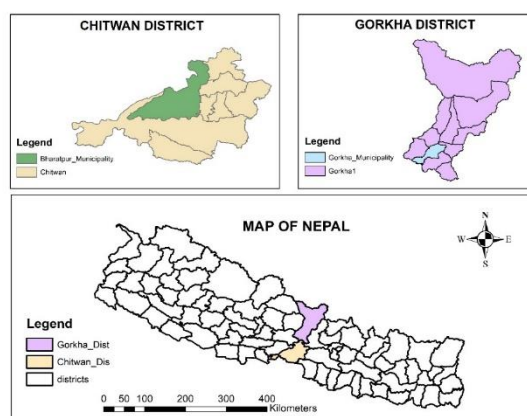


Figure 1. Map of Nepal showing the study area

From the two districts, two local bodies -- Gorkha Municipality and Bharatpur Metropolitan city were purposively selected. From both local bodies, interview schedule was done randomly i.e., Gorkha-7 and Gorkha-8 of Gorkha district and Bharatpur-8 and Bharatpur-18 of Chitwan district were selected using a simple random

sampling method. Each ward comprised 30 responding households. FGD was done in every ward for problem identification. Data were properly coded, verified, and tabulated in Excel.

Data Analysis and Interpretation

The data were extracted from Excel and for further analysis, STATA software was used. Mean, standard deviation, frequency, percentage, cross-tabulation, t-test, chi-square, were used to derive inference needed about the socio-economic characters of the household viz household and farm characteristics. Chi-square test was done for further analysis to determine whether there was a significant association among the characteristics of household based on gender class.

For the assessment of feminization of agriculture, we used the two realms of influence of feminization of agriculture as described by Gartaula et al. (2010); labor feminization and managerial feminization.

For the analysis of labor feminization in case of agriculture, the distribution of time uses for different activities (hours/week) of respondent household in the study area was done using t-test. Furthermore, regression analysis was used to express the causal relationship between the weekly workload (hours) and the explanatory variables. Multiple regression model was used to interpret the factors affecting workload (Table 1). Thus, for a response variable, Y, and a set of p explanatory variables, X_1, \dots, X_p , the multiple regression model of the following form was derived:

Total weekly workload (Y) = f (TCA, LH, CBF, EAS, SHHH, AgeHHH, GHHH, FTYP, OHHH, MIGS, ADR, TRN) where the abbreviations have their respective meanings (Table 1).

To assess the managerial feminization in agriculture, both the operational and strategic decision making were determined. The decision was categorized as (i) Strongly male dominant (ii) Male dominant (iii) Equally/Joint dominant (iv) Female dominant and (v) Strongly female dominant. In case of operational decision making the decision on varietal selection, land preparation, seed sowing/transplanting, intercultural operation, pesticide use and harvesting/threshing were assessed. For the assessment

of the strategic decision making, the variables like decision on selling of commodities, decision on buying animals, use of farm machineries, access to credit, income utilization and decision on market-oriented production plan were taken.

Furthermore, the five domains of empowerment (agricultural production, resources, income, leadership and time), as defined by the WEAI (Women Empowerment in Agriculture Index), reflect important aspects of empowerment that have been found in the literature (Haug et al., 2021). Thus, we used these domains in our study to assess the managerial feminization.

The implication of feminization of agriculture was also observed in different aspects viz cropping system, productivity of major crops, effect of remittance on household level income, women empowerment and food security.

Results and Discussion

Household and Farm Characteristics

Household and farm characteristics of the study area were progressively changing due to male out-migration. It was observed that 40 % of the households were headed by women. Two categories of households are known based on women's headship. The 25% of households were De jure female-headed (demise of husband 19%, divorce and missing 4%, disability of husband 2%) and De facto households were 75% (migrated male members 56%, traditional practice 19%).

The difference in average household size, age of the Household head (HHH), population engagement in agriculture occupation between gender classes was found statistically significant (Table 2). The average cultivated land size of the study area was 0.53 ha which is slightly less than the national scenario of 0.57 ha per household (AICC, 2017). The number of male outmigration per migrated household and number of years migrated was not found significantly different between the gender classes.

The Chi-square test showed a significant association at 1% level of significance between the cultivated land ownership and the household head gender class.

Table 1. Variables used in the multiple regression model

Variables	Code	Types	Remarks
Dependent variable			
Total weekly workload	Y	Continuous	Total workload in a week (hours)
Independent variables			
Total cultivated area	TCA	Continuous	Total cultivated area (ha)
Livestock holding	LH	Continuous	Livestock holding (TLU)
Children below 15 years	CBF	Continuous	No. of children below 15 years
Elder above 60 years	EAS	Continuous	No. of elder above 60 years
Schooling of HHH	SHHH	Continuous	Years of schooling of HU head
Age of HHH	AgeHHH	Continuous	Age of household head
Gender HHH	GHHH	Dummy	1=Female; 0=male
Family type	FTYP	Dummy	1=Nuclear; 0=Otherwise
Occupation of HHH	OHHH	Dummy	1=Agriculture; 0=Otherwise
Migration status	MIGS	Dummy	1 =Migration; 0=Otherwise
Location/Address	ADR	Dummy	1=Chitwan(urban); 0=Otherwise
Training	TRN	Dummy	1=Yes;0=Otherwise

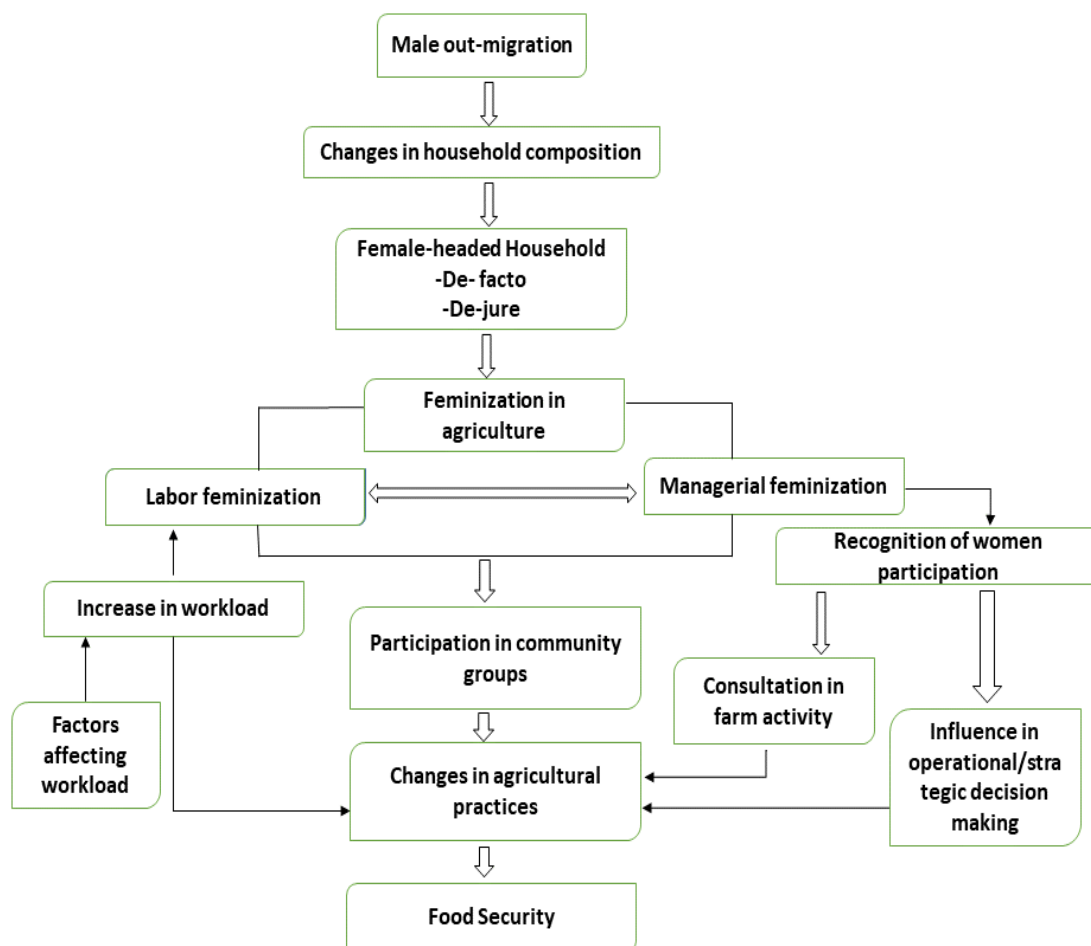


Figure 1. Theoretical framework of feminization of agriculture in Nepal

Table 2. Household characteristics of the sample household by gender class

Household characteristics	Gender class		Total	Difference	t-value
	Female	Male			
Household size	4.78	6.07	5.43	-1.29**	-3.22
Age of HHH	45.43	54.76	51.03	-9.33***	-3.91
Population engagement in agriculture/HH	2.00	2.60	2.30	0.30**	-2.32
Population migration/HH	0.67	0.70	0.68	-0.03	0.10
Male outmigration/migrated HH	1.1	1.368	1.23	-0.268	-1.27
Number of years migrated	3.01	3.06	3.04	-0.06	-0.06
Average cultivated land/HH	0.42	0.60	0.53	-0.18	-1.30

Notes: Figures in parentheses indicate percentage. *** indicates significant at 1% level

Table 3. Land ownership of sampled household in the study area by gender of household head

Cultivated land ownership	Gender class		Total
	Female	Male	
Female	19(39.6)	6(8.3)	25(20.8)
Male	24(50.0)	53(73.6)	77(64.2)
Shared	5(10.4)	13(18.1)	18(15.0)
Total	48(100)	72(100)	120(100)
Pearson Chi-square			17.12***

Notes: Figures in parentheses indicate percentage. *** indicates significant at 1% level

Assessment of feminization in agriculture

Feminization of agricultural labor is a process in which women perform more and more on-farm work, while the feminization of farm management takes place in two ways. First, when women increasingly become primary decision-makers on the farm; or second, when they gain greater access to agricultural income (Lastarria-Cornhiel, 2008).

Different socio-economic factors are affecting agricultural feminization. As defined by Cornhiel, factors affecting agricultural feminization are approached separately under two sub-heading labor and managerial feminization. Mostly, labor feminization is analyzed quantitatively while managerial feminization is described qualitatively.

Labor feminization

In our study, the workload of the household head was categorized as reproductive/domestic, productive, and social. The average workload of household head was found to be 67.93 hours/week (female 86.50 hours/week, male 55.52 hours/week). The time spent by the female for domestic/reproductive role and productive was found significantly higher at a 1% level of significance. In contrast, the time spent by males for social activities was found significantly higher at a 5% level of significance (Table 4). The workload was found even higher for those women who were engaged in off-farm activities.

According to BCEA (1997), the ordinary hours of work allowed for an employee was found to be (a) 45 hours per week. Based on BCEA classification, 74.1% (Female 97.9% and male 58.3%) household heads had been found working more ordinary hours of work. This finding was found higher than reported by Komatsu et al. (2018). While comparing with other countries like Bangladesh, Cambodia, Ghana, and Mozambique, women in Nepal have the heaviest work burdens and are more time-use poor

(Lamichhane and Dhakal, 2020), spending about 11 hours a day in total on productive and reproductive work compared to men's 8 hours/day (Komatsu et al., 2018). A report by (NLFS, 2019) revealed that male and female had a workload of 40 and 33 hours/week respectively, for productive activities (Agriculture, forestry, fishing, etc.) and a total of 36 hours per week which is similar with our report for a total workload of 34 hours per week. However, our study contrasted on the workload of male and female workers i.e., 40 hours per week of female work and 31 hours per week of male workload.

The results of the multiple regression model have been presented (Table 5). The regression revealed R^2 and adjusted R^2 value to be 0.736 and 0.707, respectively. The R squared value of 0.736 means that 73.6% of the variation in the dependent variables is explained by the selected independent variables, i.e., our model showed a better goodness of fit with the chosen explanatory variables. Here, the weekly total workload is the function of the ten explanatory socio-economic variables (Table 2).

Table 4. Distribution of time use for different activities (hours/week) of respondent household in the study area

S.N.	Activities	Gender of HHH		Total	Difference	t-value
		Female	Male			
1.	Cooking	18.66	2.72	9.10	15.94***	16.532
2.	Childcare/education	15.02	10.01	12.01	5.01***	4.939
3.	Washing/cleaning	8.09	4.61	6.00	3.47***	4.028
4.	Firewood	1.40	2.33	1.96	-0.93	-0.896
A	Domestic (1+2+3+4)	43.18	19.68	29.08	23.49***	9.67
5.	Crop production	25.37	16.65	20.14	8.72***	5.509
6.	Livestock production	9.04	10.30	9.8	-1.26	-0.998
7.	Marketing	5.41	4.00	4.56	1.40*	1.959
B	Productive (5+6+7)	39.82	30.76	34.38	9.06***	3.49
8.	Community activities ¹	3.50	5.10	4.46	-1.60**	-2.585
C	Social work (8)	3.50	5.10	4.46	-1.60**	-2.58
Total	(A+B+C)	86.50	55.52	67.93	30.95***	7.26

1: (unpaid and volunteering; expected to done in free time); Note: ***, ** and * indicate significant at 1%, 5% and 10% levels, respectively

Table 5. Regression analysis of total weekly workload on different socio-economics characteristics

Independent variable	Coefficient	Std. Error	t-value	P>t
Total cultivated area (ha)	5.726*	3.259	1.760	0.082
Household head (1=female)	27.527***	3.549	7.760	0.000
Occupation of HHH (1=Ag)	24.356***	5.153	4.730	0.000
Age of HHH	0.006	0.144	0.040	0.965
Years of schooling of HHH	0.260	0.400	0.650	0.517
Family type (1=Nuclear)	2.122	3.328	0.640	0.525
Livestock holding (TLU)	1.546***	0.519	2.980	0.004
Migration status (1=Migrated)	3.590	3.139	1.140	0.255
Children below 15 years	5.695***	1.677	3.400	0.001
Age above 60 years	-4.577**	2.067	-2.210	0.029
Location (1= Urban)	-19.973***	3.074	-6.500	0.000
Training(1=Yes)	1.215	3.091	0.390	0.695
Constant	29.110	10.323	2.820	0.006
Number of observations		120		
F (12,107)		24.93***		
Prob >F		0.000		
R-squared		0.736		
Adj R-squared		0.7070		
Root MSE		15.642		

Note: ***, ** and * indicate significant at 1%, 5% and 10% levels, respectively

The coefficients show that total weekly workload was positively associated with the total cultivated area, household head, occupation of HHH, age of HHH, year of schooling of HHH, family type, livestock holding, migration status, children below 15 years, training and constant whereas negatively associated with the number of elder age above 60 years and location of the household. With the increase in total cultivated area by 1 ha, the workload increased by 5.76 hours per week. If the gender of the household is female, the workload increased by 27.5 hours per week. Similarly, if the occupation of the household head is agriculture, the workload increased by 24.3 hours per week. With the increment of livestock holding by 1 unit, the workload increased by 1.5 hours per week. If the number of children increased by 1, the workload increased by 5.7 hours per week. In contrast, the workload decreased with the number of elder members and the level of development of concerned area. Workload decreased by 19.97 hours per week if the location is urban with greater access to market and technology than the rural areas while with additional one year of elders (>60 years) the workload of household decreased by 4.57 hours.

The increased workload upon increase in the total cultivated area is due to the increase in time allocation for productive activities like crop production, livestock production and marketing. Similarly, in case of female headed household the relative increase in weekly workload could be attributed to 30.95 hours of more weekly workload for female compared to males (Table 4). Likewise, the household with agriculture as main occupation having more weekly workload could be due to higher share of agricultural activities (productive activities) i.e., 50.6% (34.38 hours out of total 67.93 hours) of total weekly workload (Table 4). The higher workload with increase in the livestock holding could be due to increased workload for feeding, shed management, milking, sanitation and other activities. Furthermore, the increased workload due to increase in number of children below 15

years could be due to increase in domestic workload (childcare, education, etc.). Unlike other characters, the increase in number of family member above 60 years of age showed decrease in total weekly workload. This could be due to relief of some domestic workload like childcare, cooking by the elder people. The location of the household also played a significant role in decreasing the weekly workload if it was an urban area. This could be attributed to the reduction in time for activities like cooking, firewood collection, marketing, transportation, communication, etc. compared to the rural areas.

Managerial feminization

The assessment of managerial feminization in agriculture was done using two approaches:

Operational and Strategic decision-making approach

The distribution of decision-making roles of household head in case of operational decision is shown (Figure 2). The increment in women mobility and participation in community activities is mostly limited to the extent of operating the farm activities. The decision-making pattern for variety selection, land preparation, seed sowing, intercultural operation, pesticide use, and harvesting/threshing, marketing was bell-shaped (Figure 2). The distribution pattern in most of the agricultural activities follows the normal distribution but slightly skewed at the right showing female dominance at the operational level. In contrast with pesticide use slight female dominance was observed in rest of the operation of agriculture activities.

The distribution of strategic decision-making roles of household head is shown below (Figure 2). The distribution of strategic decision-making roles of household head in agricultural production was bell-shaped (Figure 3). The distribution pattern of buying and selling of agricultural products showed slightly female dominance while the distribution of decision on the use of farm machinery was left skewed, showing a slightly male dominant decision.

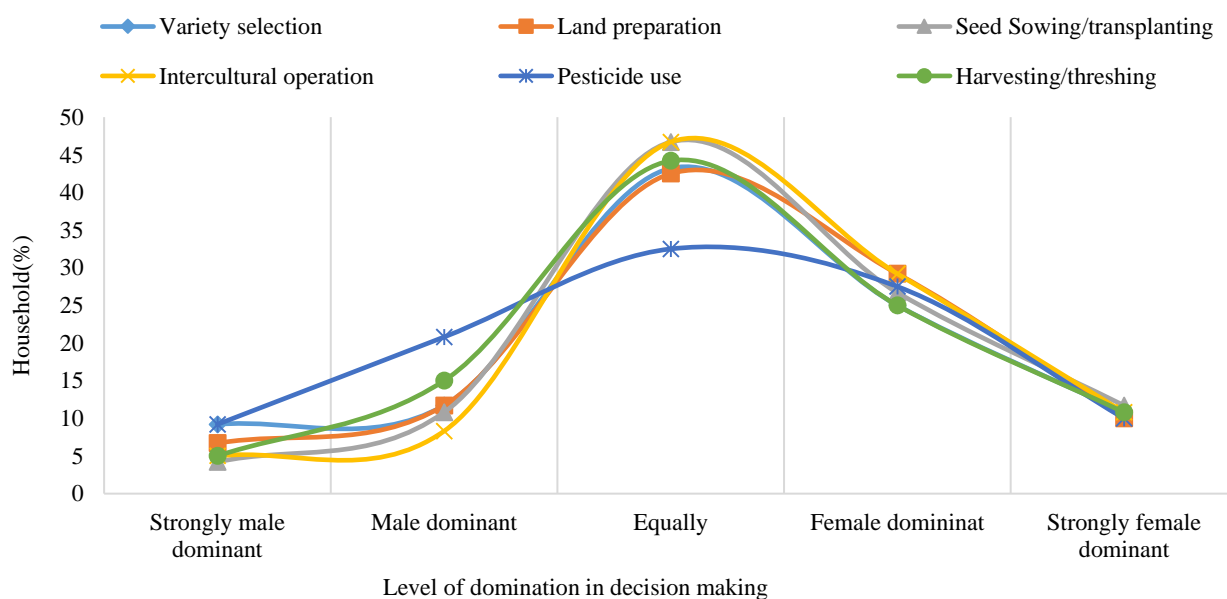


Figure 2. Distribution of decision-making roles of household head while operating farm activities

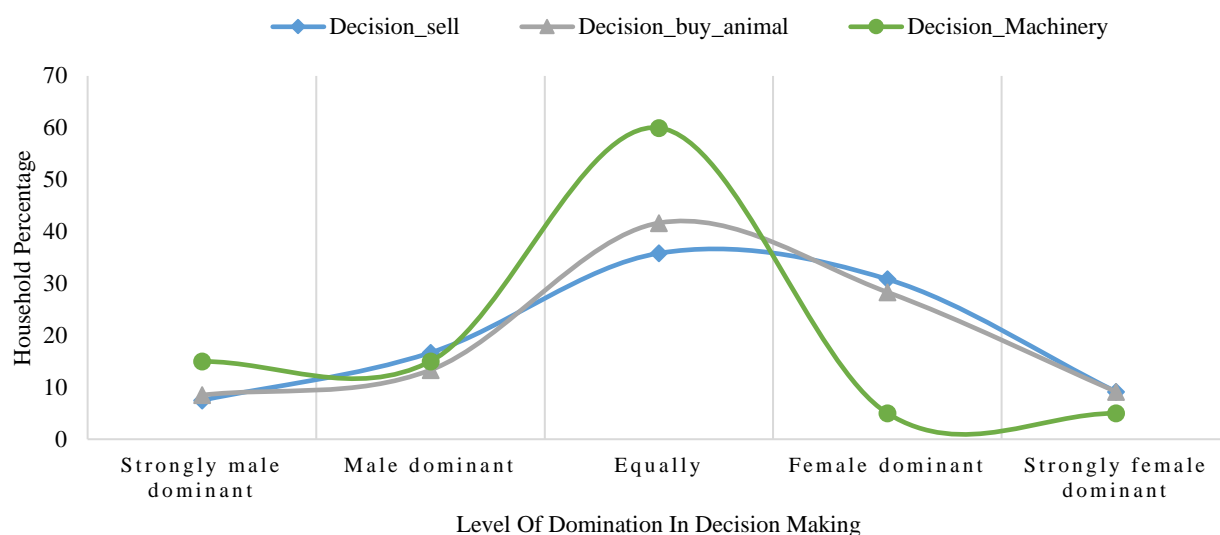


Figure 3. Distribution of strategic decision-making roles of household head in agricultural production

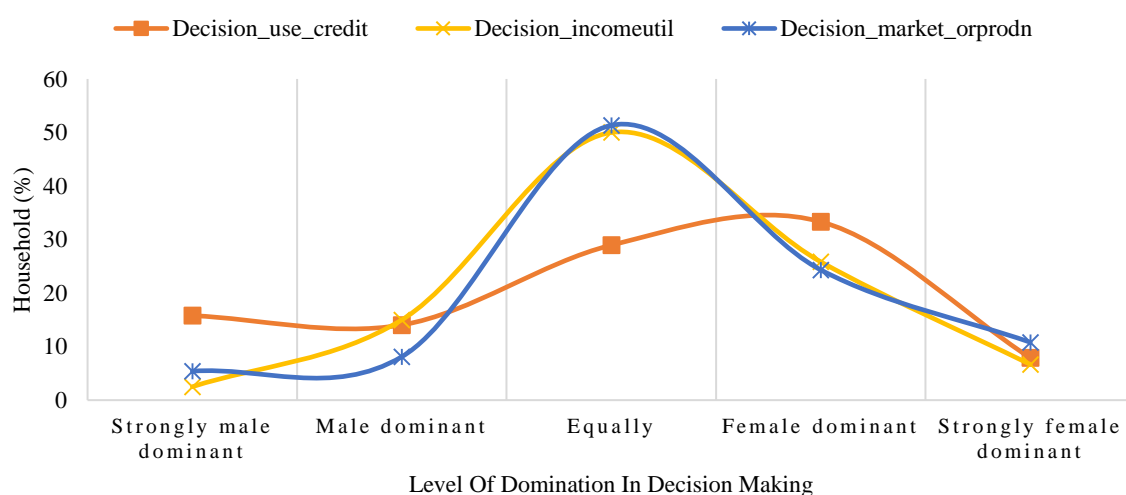


Figure 4. Distribution of strategic decision-making roles of household head over use of resources, income and leadership domain

The distribution of strategic decision-making roles of household head over use of resources, use of income and market-oriented production plan was bell-shaped (Figure 4). The distribution pattern of income utilization and market-oriented production planning was slightly skewed towards the right showing the slight dominance of female in the decision making whereas the distribution of decision on use of credit was highly skewed towards the right showing dominance of female in the decision making.

WEAI (Women Empowerment in Agriculture Index) approach

Decision regarding agricultural production: The production sphere in the WEAI includes the role of women in decision-making concerning agricultural production and signifies the sole or joint decision-making in productive activities of agriculture (Malapit et al., 2019). From figure 2, it is observed that there is high proportion of joint decision making in intercultural operation (47% of Household) followed by seed sowing (46%), harvesting (44%), land preparation (42%) and pesticide (33%). From

figure 3, it is observed that there is high proportion of joint decision making in use of machinery (60%), followed by decision on purchase of agricultural inputs (42%) and selling of agricultural products (36%).

Decision over use of resources: In the resource domain, decision-making power over access and use of credit are pointers of empowerment (Alkire et al., 2013). From figure 4, it is observed that 33.33% of women are the sole decision makers for the access and use of credit in the household compared to joint decision making (29%). Thus, women appear to be reasonably empowered in case of decision over access and use of credit.

Decision over utilization of income and market-oriented production: Decision-making relative to the utilization of farm income is an imperative display of empowerment in WEAI and encompasses the third sphere of the index (Alkire et al., 2013). From figure 4, it is observed that there is highest proportion of joint decision making in case of market-oriented production (51%) followed by utilization of income (50%).

Leadership domain: To assess decision-making in relation to WEAI's leadership domain, we use the percent of members from male and female headed household participating in different organizations. From figure 5, it can be asserted that the female headed household had higher percentage of participants in Female groups (*Aama Samuha*) while the male headed household had higher percentage of participants in Community Forest Users Group (CFUG), cooperatives and agricultural groups. The results show that in case of female headed households, there is relatively lower participation in social groups and organizations.

Gurung (2008) also found similar trend of female participation in agriculture production and decision making. Women's autonomy in decision making is positively associated with their age, employment and number of living children. Women from rural area and Terai region have less autonomy in decision making. Women from rural area and Terai region needs specific empowerment program to enable them to be more autonomous in the household decision making (Acharya et al., 2014). Along with agriculture activities, women have broadened and deepened their involvement in society which had been providing exposure for their empowerment. It is evident from the time allocation and the decision-making data that women play a major role in agricultural production; both as laborers and as managers of the production process.

In the absence of male, females are executing operational decisions but they had to consult with males or in-laws for taking a strategic decision. For various reasons, the male laborers who now work outside of the country, do not completely abandon their control over agricultural production and rely on their own past agricultural experiences to remote control the farm by arranging or inferring with the agricultural and decision-making processes of the women left behind. Two dynamics related to the household structure are particularly important for time use and decision-making in Nepal: the role of the mother-in-law and male out-migration (Gurung, 2008;

Gartaula et al., 2010). Meanwhile, the female laborers who stay behind are only responsible for executing local agricultural operations according to the instruction of the male which do not necessarily help to empower them.

Women empowerment and workload: The fifth realm in WEAI is time, which comprises allocation of time to productive and domestic tasks (Alkire et al., 2013). Women were much involved in the different domestic and productive agricultural tasks than male whereas male are more involved in social work than female (Table 4). Due to higher workload of women in domestic and productive activities, they have fewer leisure/free time for doing the social activities.

From the time allocation and decision-making data, it is evident that women play a major role in agricultural production; both as laborers and as production process managers. In our study, although females played a crucial role in agricultural decision making, their contributions are yet to be recognized. The feudal social system and skewed power relations in society have severely undermined the meaningful participation of women in decision making (Ghale, 2008). Despite an increase in participation and decision-making process, there is no consistent conclusion regarding the effect of feminization as women empowerment. The consequences of feminization differ greatly in literature. Upreti et al. (2018) stated that women participation in social affairs, engagement in specialized platforms like producers' groups, leadership structures in community associations, access to financial resources and political spaces, enhanced income generation capacities have contributed to women's empowerment. In contrast, Kelkar (2009) reported that female participation in agricultural decision making does not necessarily lead towards women empowerment. Women empowerment is affected by the social, demographic, economic and cultural settings of society (Kelkar, 2009). Gartaula et al. (2010) and Kelkar et al. (2009) stated that, in order to understand the feminization of Nepalese agriculture it was important to know the women's position in a cultural environment characterized by patrilineality and patriarchy.

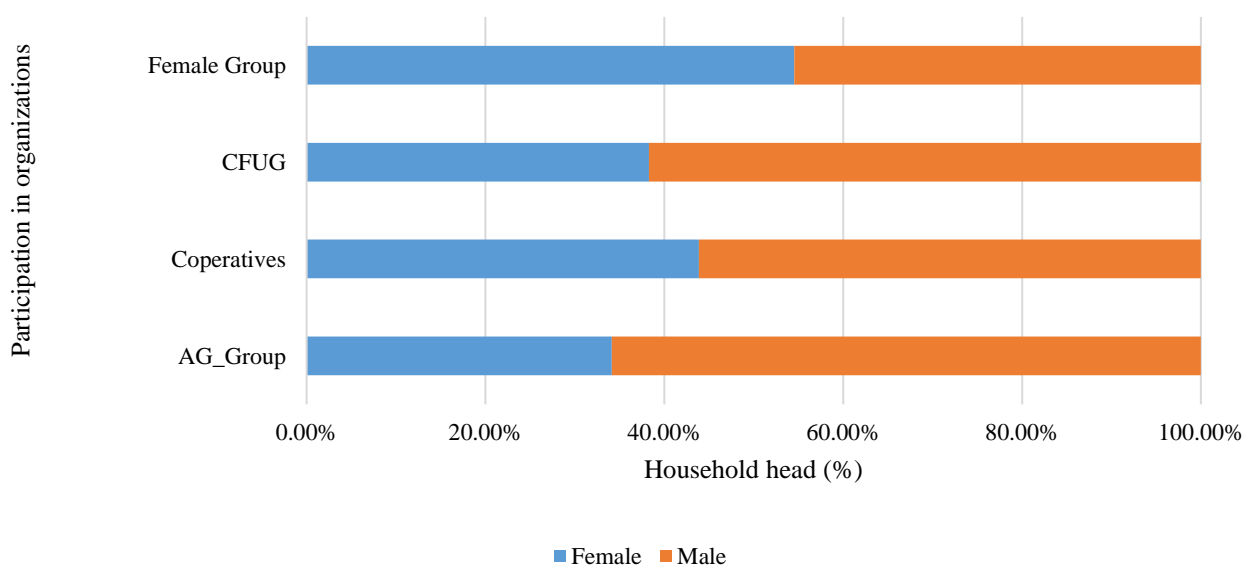


Figure 5. Percent of male and female participation in different organizations from different gender class of households

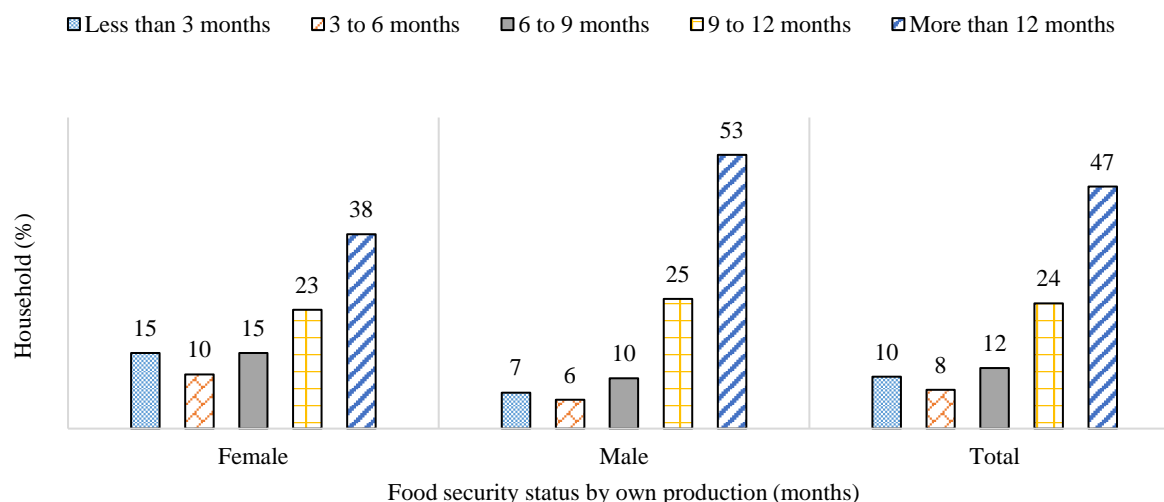


Figure 6. Status of food security of respondent HH in study site

Implication of Feminization in Agriculture

The consequences of the feminization of agriculture are multi-dimensional. It shifts gender roles and responsibility and affects the cropping system, crop production, household income, and household level food security.

Cropping system

The cropping system of farm was analyzed for the last five years. The cropping pattern of the study area was observed to have been changed. This was observed particularly in the cultivation of field crops such as millet, wheat, black gram, soya bean, and cowpea. There was reduction in cropping cycle by 36%. A similar result was obtained by Tamang et al. (2014), in which 74% of the respondent household reduced their cropping cycle. Though cropping intensity of the study area was 157 % there is increasing trend of fallow land, especially in hilly area. Through FGD, the major reasons for fallow land were found to be due to labor shortage, lack of irrigation, lack of improved technology, and low level of mechanization. By geographical location, fallow land was found more in Gorkha (0.245 ha/HH) than Chitwan district (0.041 ha/HH).

Productivity of major crops

Higher productivity of rice, maize, wheat, and vegetables was observed in the male-headed household while higher productivity of millet, oilseeds, legumes, and fruits was seen in case of the female-headed household. The average productivity of rice (female 3.52mt/ha, male 3.76 mt/ha), maize (female 2.42 mt/ha, male 2.63 mt/ha) wheat (female 2.08 mt/ha, male 2.62 mt/ha) and vegetables (female 13.78 mt/ha which is lower than the forecasted value by Thapa et al. (2022), male 19.42 mt/ha) were found lower in female-headed household. The lower production was due to smaller farm size, lower level of technology adoption, lower labor supply (male 2.6 person/HH, female 2.0 person/HH). The feminization of agricultural labor was found to be location specific. This problem is severe in the hilly area like Gorkha, where lots of agricultural activities (like bund making, plowing, and transporting, threshing, and storing agricultural harvest) are heavily dependent upon manual labor.

Effect of remittance on household level income

The results showed that agriculture, comprising crops and livestock production, accounted for 40.6 percent of total annual household income (female 34.3 percent, male 44.4 percent). Remittance accounted for 22 percent (33.5 percent for females, 15.0 percent for males). Other sectors such as services (salaries and wages), business, insurance, and social security accounted for 20.3%, 12.3%, 4.2%, and 0.8%, respectively. Crop production accounted for 16.2% and 27.2%, whereas remittance contributed 33.5% and 15%, in the female and male-headed household, respectively. This finding revealed that remittance accounted for a greater share compared to crop production in case of female households. Furthermore, the income from remittance was observed to be mainly used for consumption purposes so as to ensure food security. A similar result was observed in a study in Nepal where more than 70 percent of remittance was used for food, health and education (Tamang et al., 2014).

Food security

The female-headed households in our study had a lower level of food security than male-headed household (Figure 6). Lower productivity of agriculture and food insecurity in women-headed households could be attributed to smaller landholding sizes, scarcity of labor and lower land ownership. This finding is in line with the result obtained from Bhadra and Shah (2007) and Harun (2014), in which a large proportion of females fell below the poverty line as compared to the male-headed households due to gender discrimination in access to and control over productive resources and other economic and political opportunities. Given the lower agriculture production, remittances have helped to improve the household's food security, especially of female-headed households. Food security is not only the problem of female headed household. Despite, one-third of GDP and two-thirds of the population depend upon the agriculture sector and cereal has been growing on 80% of the cultivated land, 15.7% of households are still reported to have insufficiency for consumption (MoAD, 2016) and the country continues to suffer serious food insecurity and malnutrition although some progress has been made in agriculture production (WFP, 2020).

Conclusion

This study aimed to assess the two approaches of feminization in context of decision making to understand its meaning for empowerment to apprise policy and to develop schemes that could contribute towards achieving gender equality as highlighted in the SDG5. The findings indicated a higher weekly workload for female household head compared to male. The workload was found to be significantly associated with total cultivated area, gender of the household head, occupation of the household head, livestock holding, number of children (<15 years), members with age >60 years and location of the household. All aspects of operational and strategic decision making tend to be dominated by jointly made decisions, except in the case of income utilization where female showed dominance. The implication of feminization in agriculture is reflected by the reduction in cropping cycle, lower productivity of cereals and vegetables which led to food insecurity by own production. The income from remittance was observed to be mainly used for consumption purposes to ensure food security. However, irrespective of the degree to which women direct the agricultural decision-making, women farmers were not apparently empowered or enjoying gender equality relative to the workload. Feminization of agriculture seems to lead to women portraying a more important role in decision-making but also to more obligations and heavier workloads without necessarily leading to improvements in well-being. The difference in the extent of two approaches of feminization should be immediately considered while developing agricultural policy and plan. The multi-dimensional aspect of feminization should also be considered in policies and strategies for adopting measures to address the challenges brought about by the feminization in the agriculture sector.

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