Article

Gender role in agroforestry adoption and management in Garo ethnic community of Bangladesh

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Abstract: Agroforestry holds significant promise for offering substantial benefits to the Garo ethnic community, who are recognized as one of the primary indigenous groups in the Madhupur region with distinct cultural identities. Given the integral role of community involvement in agroforestry management, particularly in relation to gender dynamics, this study sought to analyze the gender role of Garo men and women in adopting and managing agroforestry practices. Data were gathered from 70 Garo tribal farmers (37 male and 33 female) across six villages practicing various agroforestry techniques in the Madhupur Sal forest area. Using a mixed-methods approach that incorporated semi-structured questionnaires, focus group discussions, key informant interviews, and direct observations, the study identified prevalent agroforestry practices featuring various tree-crop combinations. These included Akashmoni (*Acacia auriculiformis*) paired with Pineapple (*Ananas comosus*) and Ginger (*Zingiber officinale*), as well as other combinations such as Akashmoni-Pineapple-Turmeric, Akashmoni-Pineapple-Papaya, and Akashmoni-Pineapple-Aroid. Both men and women exhibited a moderate to high level of involvement in agroforestry programs, with decision-making processes shared between genders. However, challenges were encountered, particularly by women from ethnic minority backgrounds, including limited technical knowledge, financial resources, and labor availability. Despite these obstacles, both Garo men and women expressed a keen interest in agroforestry practices as a means to enhance their income and livelihoods, forming gender-based partnerships to address associated challenges in a changing socioeconomic landscape.

Keywords: sex-based dynamics; woodland governance; indigenous livelihoods; female empowerment; eco-friendly practices

1. Introduction

Agroforestry stands out as a sustainable land management practice, offering socioeconomic benefits crucial for farmers in Bangladesh. Traditional agroforestry methods contribute to increased species diversity, assured financial returns, and sustained livelihoods [1,2]. With 65% of Bangladesh's population residing in rural areas heavily reliant on agriculture, the pressure on cultivable land is intensifying due to urbanization and industrialization [3]. Agroforestry emerges as a solution to compensate for land losses, offering a blend of agriculture and forestry benefits.

The essence of agroforestry lies in the symbiotic relationship between trees and agriculture, encompassing various practices from trees on farms to farming in forest margins [4]. This integrated approach not only optimizes land use but also promotes

biodiversity and ecosystem resilience. Its sustainability stems from trees' multifaceted contributions, including soil stabilization, water retention, and carbon sequestration, which mitigate the impacts of climate change [5]. Particularly for smallholder farmers, agroforestry enhances food security, income, and health while providing economic, socioeconomic, and environmental advantages [6]. The diversified income streams from agroforestry products buffer farmers against market fluctuations and external shocks, thereby increasing their resilience to socio-economic challenges.

In Bangladesh, where meeting the needs of a growing population with limited resources is paramount, agroforestry offers a viable option, surpassing conventional cropping methods [7]. Notably, the involvement of women in agroforestry management is significant, underlining its potential to empower rural communities economically and socially [8]. However, successful adoption hinges on understanding farmers' context-specific knowledge, interests, and challenges.

Gender dynamics play a crucial role in agroforestry adoption and management, reflecting social and biological differences between men and women [9]. In Bangladesh, the Garo ethnic community, known for its matrilineal social structure, stands out for their unique reliance on agroforestry for sustenance [10]. With their significant contributions to Bangladesh's socioeconomic development, understanding how Garo men and women adopt and manage agroforestry becomes imperative.

Garo stands as a significant indigenous group within Bangladesh, characterized by unique ethnic traits. The traditional fabric of Garo society undergoes shifts owing to various socio-economic factors, consequently altering its social makeup and interactions. Foremost among the current hurdles confronting the Garo community is the issue of land rights. Residing in and near the central deciduous Sal (*Shorea robusta*) forests, designated as State forests, they find themselves classified as illegal occupants under the law. The prevailing Vested Enemy Property Act fails to acknowledge their rightful claims to land or land ownership [11].

In this research we tried to explore Garo farmers' attitudes towards agroforestry adoption and management. We also examine the approaches used by Garo men and women in managing agroforestry and seek to identify the major challenges they encounter in agroforestry practices. This research not only sheds light on the role of agroforestry in sustainable land management but also contributes to understanding the intricate dynamics of gender and ethnicity in agricultural practices. Through a comprehensive examination of Garo agroforestry practices, valuable insights can be gained to inform policies and interventions aimed at promoting sustainable agriculture and empowering rural populations.

2. Materials and methods

2.1. Study area

The Madhupur Tract, covering an area of 45,565.2 acres, is commonly referred to as the Madhupur Sal Forest or Madhupur Garh and is situated between 23°50′ to 24°50′ North latitude and 89°54′ to 90°50′ East longitude. Locally known as "chalas," these low hills, rising 3.0–4.5 m above the surrounding fields, are characterized by plains and numerous depressions or "baid," which define the region's topography. The soil in this area consists of highly oxidized reddish-brown clay with a mildly to

strongly acidic reaction, along with low organic matter and fertility levels [12]. The region experiences an annual temperature variation between 10 °C and 34 °C, with yearly rainfall ranging from 203 to 229 cm. Additionally, as reported by Hasan et al. [13], the relative humidity fluctuates between 60% and 80%. Our research was conducted in six villages: Dokhola, Auronkhola, National Park, Gaira, Beribaid, and Makundinagar (**Figure 1**).
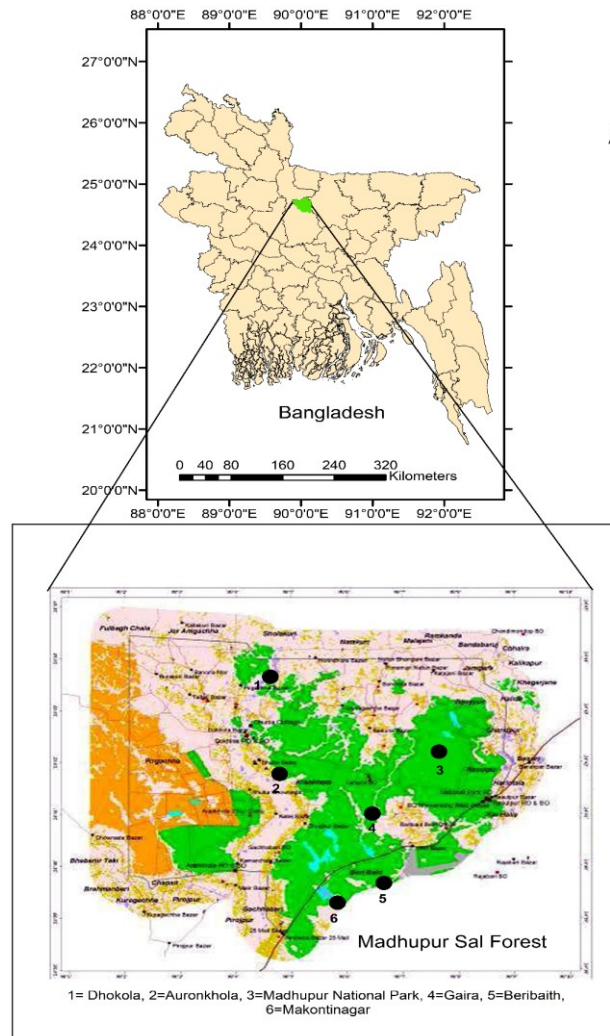
Figure 1. Map of the study area depicting Bangladesh and Madhapur Garh.

2.2. Data collection

The study area was deliberately chosen in Madhupur Upazila, Tangail district, due to the high concentration of the Garo community in this region. The Garo villages were collected from the Madhupur Upazila statistics office. The study selected seventy (70) Garo people from six villages. Data were collected by interview, a semi-structured questionnaire, focus group discussions (FGD), and direct observation from April to July 2023. Data were designed on the basis of demographic characteristics as follows:

(i)   Age;
(ii)   Education;
(iii) Family size;
(iv)   Farm size.

Additionally, the organization of data on gender roles in agroforestry practices among Garo farmers was based on the following aspects:

(i)   Perceptions of Garo men and women regarding agroforestry practices.
(ii) Gender roles in agroforestry activities within the Garo ethnic community.
(iii) Approaches adopted by the Garo community in agroforestry practices.
(iv) Sources of information accessed by Garo men and women.
(v)   Decision-making processes in agroforestry management.
(vi) Challenges faced by the Garo community in adopting agroforestry.

2.3. Survey methods

The participants were chosen based on their involvement in agroforestry management within the selected villages of the study area. To identify suitable respondents for a detailed study, an initial socio-economic survey was conducted to assess key socio-economic parameters. A semi-structured questionnaire, prepared in advance and pre-tested for clarity, was used for the survey, allowing respondents to freely express their opinions on each topic.

The collected data comprised: Primary data, including respondents' identity details (name, gender, age, farm size, and annual income), along with their gender-specific roles in agroforestry activities such as land preparation, planting, fertilizing, weeding, woodlot collection, harvesting, transportation, and marketing.

(i)   Secondary data, derived from gender-related literature, with primary data obtained through direct questioning and secondary data gathered from literature reviews.

Following individual interviews with farmers, focus group discussions (FGDs) were conducted in each village, involving 8–10 farmers per group. However, interviews and discussions alone were insufficient to gather all the necessary data, as respondents sometimes provided unclear or imprecise answers. Therefore, to gain a broader understanding of the socio-economic dynamics in the target villages, close observation and active participation in their daily activities were essential. Direct engagement allowed for the collection of real-life insights beyond verbal responses.

Special care was taken during data collection to minimize errors. Additionally, selected questions specifically addressed the gender roles of Garo farmers and the challenges they faced in adopting agroforestry management systems.

2.4. Compilation of data

Upon completion of the group discussions and interviews, the data collected from the interview schedule was organized, tabulated, and analyzed based on the study's objectives. During this process, local units were converted into standard units. The responses from the interview schedules were then transferred to a master sheet to simplify the tabulation process.

2.5. Analysis of data

The data collected from the study were organized and analyzed using Microsoft Excel and R Studio. Descriptive statistics, such as percentages and means, were employed to summarize the data. For inferential analysis, the Chi-square test was used

to examine relationships between qualitative variables, while the independent t-test was applied to compare quantitative variables across different groups. These statistical methods were selected to ensure a thorough analysis and reliable interpretation of the results.

3. Results

3.1. Demographic characteristics of the farmers involved in agroforestry practices

3.1.1. Age

Age typically influences the viewpoints of the respondents. The results revealed that participants' ages varied from young to old (**Table 1**). The participants were categorized into three age groups: young (under 35 years), middle-aged (35–50 years), and old (above 50 years) (**Table 1**). Among the Garo participants, 37.2% fell into the older age group, while only 12.8% were in the young age category (*P*-value < 0.01) (**Table 1**). The findings also indicate that middle-aged individuals made up the largest proportion of participants, with 50% of the total. Age plays a significant role in farmers' likelihood of engaging in agroforestry. The results suggest that middle-aged farmers are more open to adopting agroforestry, a relatively modern production system in the study areas, compared to older farmers.

3.1.2. Education

The results indicated that a significant proportion of the Garo participants in the study area are illiterate (37.1%), with medium-level education (primary) at 22.7%, secondary education at 15.7%, and higher secondary education at 18.7%. The percentage of participants with graduate or higher education was very low, at 5.8% (*P*-value < 0.01) (**Table 1**). It is found that the participants who are graduates and above are not dependent on agroforestry for their livelihoods because they tend to government and non-government/NGOs jobs, business, nursing, etc. Despite these conditions, many Garo people are working to adopt agroforestry in an effort to improve their socioeconomic standing and develop revenue.

Table 1. Demographic characteristics of the farmers involved in agroforestry practices.

Characteristics	Respondent	
Participant's age	Number	Percent
Young (< 35)	9	12.8
Middle aged (35–50)	35	50
Old (> 50)	26	37.2
Education level	Number	Percent
Can sign only	26	37.1
Primary	16	22.7
Secondary	11	15.7
Higher secondary	13	18.7
Graduate and above	4	5.8

Table 1. (*Continued*).

Characteristics	Respondent	
Family Size	Number	Percent
Small (up to 4)	8	11.4
Medium (5–8)	53	75.8
Large (9 and above)	9	12.8
Farm Size	Number	Percent
Marginal (0.02–0.2 ha)	-	-
Small (0.21–1 ha)	47	67.2
Medium (1–3 ha)	21	30
Large (above 3 ha)	2	2.8

3.1.3. Family size

Regarding family size, the results clearly show that the family sizes of Garo participants are varied greatly, with (75.8%) of households having 5–8 individuals, indicating that the majority of the families are medium in size in terms of family members (**Table 1**). Only approximately (12.8%) live in large families having 9 or more individuals and (11.4%) are in small families having up to 4 individuals (*P*-value < 0.01) (**Table 1**). It was found that family size has the least impact on their livelihood choices because most individuals depend on agroforestry practices for their livelihood, regardless of how large or small their family is.

3.1.4. Farm size

The Garo participants were categorized into four groups based on their farm size. The results revealed that 30% of participants fell into the medium category, with farm sizes ranging from 1–3 hectares, while only 2.8% were in the large category with farms exceeding 3 hectares (**Table 1**). The majority of participants (67.2%) owned small land holdings, ranging from 0.21 hectares (*P*-value < 0.01) (**Table 1**). It was also observed that participants with small and medium-sized farms were more active and engaged in various agroforestry practices, such as tree planting, management activities, and fruit-based agroforestry.

3.2. Agroforestry practiced by the Garo community

The study found that fast-growing trees such as *Acacia auriculiformis* (Akashmoni), *Eucalyptus camaldulensis* (Eucalyptus), and *Azadirachta indica* (Neem), when paired with shade-loving crops like pineapple, aroid, turmeric, and ginger, were the most common agroforestry practices in both the Madhupur Sal forest and the study area. Additionally, the local Sal (*Shorea robusta*), Mahogany (*Swietenia mahogoni*), and Teak (*Tectona grandis*) trees, combined with shade-loving crops, were also observed in the study area (**Figure 2**).

Figure 2. Agroforestry practice by the Garo community.

3.3. Gender role in agroforestry management

The division of tasks between women and men reflected gender roles within the community. The study revealed that both genders were involved in the adoption and management of agroforestry. The gender distribution of respondents was 52.8% male and 47.2% female. According to the study's findings, agroforestry management activities such as land preparation, planting, fertilizing, and transportation were predominantly carried out by men. In contrast, women not only handled household duties but also participated in various agroforestry tasks, including pruning, weeding, mulching, and woodlot collection. Garo women have historically played a significant role in agricultural production, and as trees are part of this process, they manage and utilize them. The study also showed that Garo men and women often engaged in agroforestry practices together, performing tasks simultaneously.

3.4. Perceptions of Garo men and women in agroforestry practices

The study found a slight difference in the perceptions of males and females regarding agroforestry programs. The survey also explored how men and women prioritize agroforestry activities in their daily routines. The results showed that both genders placed a moderate to high level of importance on agroforestry (**Table 2**).

Table 2. Agroforestry program and its priority among Garo men and women.

Priority level	Male ($n = 37$)		Female ($n = 33$)	
	Number	Percentage	Number	Percentage
High	32	86.4	26	78.8
Moderate	5	13.6	7	21.2
Low	-	-	-	-

As shown in **Table 2**, among male respondents (37), 86.4% were categorized in the high-priority level, while 13.6% fell into the moderate category. In contrast, among female respondents (33), 78.8% were in the high-priority category, and 21.2% in the moderate category (P-value = 0.59). Notably, neither males nor females considered agroforestry a low priority. However, female respondents showed less interest in

adopting agroforestry compared to their male counterparts, mainly due to limited access to inputs and technical knowledge.

In the focus group discussions (FGDs) held in the selected villages, both men and women expressed a desire to expand agroforestry practices, likely because the system was perceived as highly profitable. Participants utilized a variety of agricultural and tree species. Women preferred forest trees like Akashmoni (*Acacia auriculiformis*), a native timber species known for its fast growth and usefulness as fuelwood and fodder. In neighboring areas, this species provided better merchantable height and diameter, making it more profitable to sell. Meanwhile, men showed more interest in cultivating a wider range of crops. They preferred growing pineapple, followed by ginger, turmeric, and aroid, for short-term income.

3.5. Gender role in agroforestry activities of the Garo ethnic community

Table 3 presents details on the division of gender roles between men and women in crop and agroforestry production. According to both genders, many farming tasks are shared between men and women.

Women's participation in agroforestry activities is higher than men's in tasks such as weeding and collecting non-wood forest products, while men are more involved in activities like laying out the farm (95%), ploughing (78.8%) (*P*-value = 0.02), planting trees (78.8%), fertilizing (83.7%), and pruning (86.5%) (**Table 3**. According to male respondents, weeding (100%) and non-wood forest product collection (100%) are solely carried out by Garo women. In contrast, female respondents indicated that non-wood forest product collection is a shared task, with 15.2% done by both genders and 84.8% by women. Notably, a significant number of both men (51.4%) and women (69.6%) reported that packaging and marketing are joint activities, despite these tasks being considered challenging for women. However, weeding (100%) and non-wood forest product collection (84.8%) were generally seen as tasks predominantly handled by women (according to both genders) (**Table 3**). Women are also responsible for gathering fuelwood for daily cooking. Focus group discussions revealed that poultry raising, typically done by women, does not require much time from either gender. Although both men and women are actively involved in agroforestry, the survey and focus group discussions highlighted distinct roles for each gender in their participation.

Table 3. Gender roles of Garo men and women in agroforestry activities.

Activities	% reported by male			% reported by female		
	Male	**Female**	**Both**	**Male**	**Female**	**Both**
Land Preparation	95	-	5	87.8	-	12.2
Ploughing	67.5	13.5	18.9	78.8	15.2	6
Planting Trees	72.9	-	27.1	78.8	12.2	9
Fertilizing	83.7	-	16.3	81.8	12.2	9
Pruning	86.5	-	13.5	84.8	9.1	6.1
Weeding	-	100	-	-	100	-
NWFP	-	100	-	-	84.8	15.2
Packing and Marketing	48.6	-	51.4	15.2	15.2	69.6

3.6. Garo community approaches to agroforestry practices

The Garo community used various methods while practicing agroforestry. In **Table 4**, the most preferable approach was traditional knowledge (100%) (reported by both genders). Meanwhile, technical knowledge is more commonly used by male respondents (45.9%) compared to female respondents (6.1%). In the selected villages, some non-governmental organizations (NGOs) i.e., CARITAS, BRAC are actively working and implementing microcredit as well as other development programs. These NGOs programs usually focus on the agroforestry activities of men (89.2%) and women (69.6%), especially to build up their skills through training (**Table 4**). But women (30.4%) have less accessibility in the market, whereas men (94.6%) have more.

Table 4. Approaches by the Garo community in executing agroforestry practices.

Approaches	% According to male ($n = 37$)		% According to female ($n = 33$)	
	yes	no	yes	no
Traditional Knowledge	100	-	100	-
Technical Knowledge	45.9	54.1	6.1	93.9
Training (NGOs)	89.2	10.8	69.6	30.4
Market Access	94.6	5.4	30.4	69.6

3.7. Sources of information for Garo men and women

As illustrated in **Table 5**, training was the primary source of information on farming and tree management, with men (91.8%) and women (81.1%) participating actively. Additionally, focus group discussions (FGDs) served as another information source, with men (48.6%) using it more frequently than women (27.2%) (*P*-value = 0.43).

The data of **Table 5**, showed that Garo men and women rarely seek information from neighbors regarding agroforestry practices. Extension staff provide a lot of useful information; only 9.1% of women attended, and 16.2% were men. This clearly shows that both men and women in the study site have little exposure due to their low educational level, especially for women with a lack of technical knowledge.

Table 5. Sources of information for Garo men and women.

Sources	male ($n = 37$)				female ($n = 33$)			
	Yes	Per (%)	no	Per (%)	yes	Per (%)	No	Per (%)
Extensional Staff	6	16.2	31	83.8	3	9.1	30	90.9
Training	34	91.8	3	8.2	27	81.8	6	18.2
FGD	18	48.6	19	52.4	9	27.2	24	72.8
Neighbors	12	32.4	25	67.6	15	45.4	18	54.6

3.8. Decision-making in agroforestry management practices

Garo is traditionally a matrilineal indigenous community, with Garo women dominating the household based on their culture's decision-making. Although women have traditionally led the family, this trend has recently been reversed, i.e., women's dominant roles have been adjusted such that both males and females have equal rights

to make decisions. The Garo community has begun to recognize the necessity of gender equity (equal rights of men and women) since they have moved out of numerous prejudices of their traditional culture and adopted modern concepts. According to the study, however, the majority of respondents (both men and women) shared decisions during agroforestry management. **Table 6** illustrates that both men and women make the majority of farming decisions jointly.

Respondents revealed that both men and women play a dominant role in making decisions regarding crop and variety preferences (80%) and seedling purchases (80%). Other activities like planting time (62.8%), time of applying fertilizer (61.4%), how much to sell from production (75.8%), given/taken lease (45.8%) (**Table 6**) are also decided by both genders in a family. But male respondents stated that in case of planting and fertilizing, most of the time they took decisions that raised the percentage to (34.4%), (28.6%) (*P*-value < 0.01) respectively compared to women. Because women have very little education as well as technical knowledge.

Table 6. Making decisions by Garo males and females in agroforestry management.

Statements	Male%	Female%	Both%
Crop/Variety Preference	10	10	80
Seedling Purchase	11.4	8.6	80
When to Plant	34.4	2.8	62.8
When to give Fertilizer	28.6	10	61.4
Sell from Production	11.4	12.8	75.8
Land Purchase/Lease	30	24.2	45.8

3.9. Problems in adopting agroforestry by Garo community

The Garo community relies significantly on agroforestry for various types of produce and multipurpose uses. In the studied area, Garo men and women collaborated on different farming activities. However, they encountered challenges that impeded their adoption of agroforestry. While both men and women faced difficulties, women experienced more significant challenges. The study provided valuable insights into the problems faced by Garo farmers.

Table 7. Challenges faced by Garo men and women in adopting agroforestry.

Problems	Male%		Female%	
	yes	no	yes	no
Lack of Technical Knowledge	48.6	51.4	87.8	12.2
Lack of Money	16.2	83.8	84.8	15.2
Lack of Labor	32.4	67.6	81.8	18.2
Difficult to Practice	16.2	83.8	60.6	39.4

According to **Table 7**, male and female participants pointed out challenges they faced such as a lack of technical knowledge (male 48.6% and female 87.8%), a lack of money (male 16.2% and female 84.8%), a lack of labor (male 32.4% and female 81.8%), and practice difficulties (male 16.2% and female 60.6%) (*P*-value < 0.01). These statistics clearly demonstrated that women faced challenges in practically a few

sectors of agroforestry management. This is because of their lack of educational attainment, technical knowledge, time and labor, and communication skills. Although women appeared to be more engaged in agroforestry, they also looked to face more challenges than men.

4. Discussion

In Madhupur, banana agroforestry emerges as a more profitable option financially. However, research suggests that pineapple agroforestry holds promising ecological and economic potential due to its favorable ecological properties and lower initial investment requirements [14]. A major challenge in agroforestry planning is selecting the right species that meet the system's demands [15]. The findings indicate that the Garo community practices agroforestry with fast-growing trees like *Acacia auriculiformis* and *Eucalyptus camaldulensis*, in combination with shade-tolerant crops such as pineapple and turmeric, highlighting their reliance on species offering both ecological and economic benefits [6]. Agroforestry plays a vital role in enhancing food security, with both men and women actively participating. The findings reveal that men are mostly involved in tasks such as land preparation (95%) and tree planting (72.9%), while women play a significant role in activities like pruning (84.8%) and non-wood forest product collection (84.8%) [6]. However, women's involvement and benefits are restricted by cultural norms, lack of technical knowledge (87.8%), financial barriers (84.8%), and limited access to markets and labor resources [6,16]. Studies show that although agroforestry offers potential benefits for women, their participation is often more prominent in tasks traditionally considered as women's domain, such as collecting indigenous fruits and vegetables, rather than in commercially valued enterprises like timber production [17]. Despite relatively high participation in activities such as soil fertility management and fodder production, women's engagement is constrained by factors like land ownership and access to extension services [17]. Research indicates that women primarily manage trees on farms, especially in the early stages, emphasizing their vital role in agroforestry [18]. In addition to challenges related to a lack of technical know-how, women, especially from ethnic minority backgrounds, face compounded difficulties like limited access to land and labor resources, as noted by Catacutan and Naz [19]. This is consistent with the study findings, where women reported more challenges than men in adopting agroforestry, particularly in accessing labor and technical resources [6]. Despite these obstacles, rural women play an essential role in increasing household income through their active participation in various agricultural tasks, underscoring their indispensable contribution to the success of agroforestry, as highlighted by Hanum et al. [20]. Moreover, the diverse benefits of agroforestry, including its ability to provide a range of products at minimal costs, as emphasized by Kiptot [21], show promise in improving rural livelihoods. Recognizing the importance of inclusive participation, both genders must be actively engaged in agroforestry practices to maximize its benefits and ensure equitable access to productive resources, echoing the views expressed by Catacutan and Naz [19].

The study by Akther et al. [22] further explores gender-based disparities in decision-making within agroforestry, highlighting the distinct roles men and women

take in specific tasks. This aligns with the findings, which show that decisions regarding planting times and fertilization are typically made by men (34.4% and 28.6%, respectively), while decisions about crop variety and seedling purchase are generally joint (80%) [6]. While men primarily oversee tasks like sales and land preparation, women mainly manage activities such as harvesting and processing. Despite their crucial role in maintaining the food system, gender imbalances persist at the household level, negatively impacting women's nutritional status, as noted by Ali and Niehof [23]. However, there are signs of progress, such as increasing female literacy rates and shifting kinship structures, indicating a gradual reduction in the gender gap. Yet, entrenched issues like dowry practices continue to pose challenges to achieving gender equity and inclusive development within agroforestry communities, highlighting the ongoing need for concerted efforts to address these systemic inequalities [23]. Despite women's active involvement, their engagement is hindered by a lack of technical knowledge, financial constraints, and limited access to markets and resources. This study underscores the importance of promoting gender equality by removing barriers to women's full participation. Recommendations include increasing women's access to training, technical knowledge, and financial resources, as well as encouraging their participation in decision-making processes. These measures could help reduce disparities and empower women in agroforestry practices. Additionally, this research fills gaps in understanding the gender dynamics of agroforestry adoption, illustrating how cultural norms, resource limitations, and joint decision-making shape gender roles within the Garo community.

5. Conclusion

This study emphasizes the significant role of gender dynamics in the adoption and management of agroforestry, offering important insights for the global community to address gender disparities in sustainable agricultural systems. The findings show that while both men and women are actively involved in agroforestry, their roles are clearly differentiated, with men handling more physically demanding tasks, while women play a key role in pruning, weeding, and resource collection. Despite this, women face greater challenges, such as limited access to technical knowledge, financial resources, and markets, which hinder their full participation and benefits from agroforestry practices.

To ensure both genders benefit equally, it is crucial to implement gender-sensitive policies and programs in agroforestry development. We recommend enhancing women's access to technical training, financial support, and market opportunities through targeted initiatives. Collaborative efforts involving governments, NGOs, and local communities should focus on promoting inclusive decision-making, joint resource ownership, and addressing structural barriers such as cultural norms and unequal resource distribution. By recognizing and empowering women's contributions, agroforestry systems can improve livelihoods, ensure equitable benefits, and foster sustainable development. These findings highlight the need for global efforts to prioritize gender equality in agroforestry, paving the way for more inclusive and resilient agricultural landscapes.

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