social sciences

MDPI

Article

Patriarchal Challenges for Women Empowerment in Neoliberal Agricultural Development: A Study in Northwestern Bangladesh

Md. Mizanur Rahman [1,*], Hamidul Huq [1,2] and M. Anwar Hossen [3]

[1] Department of Environment and Development Studies, United International University, Dhaka 1212, Bangladesh; hamidulhuq@idss.uiu.ac.bd
[2] Institute of Development Studies and Sustainability, United International University, Dhaka 1212, Bangladesh
[3] Department of Sociology, University of Dhaka, Dhaka 1000, Bangladesh; anwar_sociology@du.ac.bd
* Correspondence: mizanur@eds.uiu.ac.bd

Abstract: Women are recognized as proactive catalysts for societal change in rural Bangladesh because of their significant socio-economic contributions to agricultural practices. Historically, they have been closely associated with various agricultural activities ranging from seed preservation to crop harvesting. Despite their vital role in the rural economy, women farmers have encountered a number of obstacles resulting from the adaptation of neoliberal agrarian policies. In recent decades, women's participation in the agricultural sector has declined, which can be attributed to the influence of capitalist patriarchy on agricultural practices. Grounded on this argument, this present study aims to investigate a research question: What are the major challenges to women's participation in agricultural practices in Bangladesh? In order to answer this question, data has been collected through in-depth interviews and household surveys from three villages of Jaldhaka Upazila in the Nilphamari district of northwestern Bangladesh. The findings of this paper argue that women's participation in agriculture is challenged by the effects of the neoliberal policy perspective, such as the mechanization of agriculture, commercial land use, and land inequality, which continue to ratify patriarchy in agriculture. In such a situation, this study suggests women's empowerment could be effectively facilitated by adopting agricultural policies that are specifically tailored to address gender dynamics, emphasizing the active engagement and meaningful representation of women in the processes of policy formulation and execution.

Keywords: women; agriculture; exclusion; agricultural mechanization; neoliberal policies; patriarchy

check for updates

Citation: Rahman, Md. Mizanur, Hamidul Huq, and M. Anwar Hossen. 2023. Patriarchal Challenges for Women Empowerment in Neoliberal Agricultural Development: A Study in Northwestern Bangladesh. *Social Sciences* 12: 482. https://doi.org/10.3390/socsci12090482

Academic Editor: Georgios Maris

Received: 17 July 2023
Revised: 21 August 2023
Accepted: 25 August 2023
Published: 30 August 2023

Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

The development of agriculture owes a great deal to the efforts of women. As a result of their pioneering work in this field, they are often credited as the "inventors of agriculture" (Christ 1998). In most traditional societies, even today, women are believed as the key actors in agricultural production. They are now able to efficiently manage agriculture in addition to caring for their families, communities, and the state (FAO 2011). Although women initially invented agriculture, it has recently emerged as a mechanism for the empowerment of women in the modern world. On the one hand, women's empowerment has the ability to enhance agricultural productivity (Diiro et al. 2018; Akter et al. 2017); on the other hand, the agricultural sector has actual potential for empowering women (Smur et al. 2021; Sutton 2021; Farnworth and Hutchings 2009).

Agriculture drives the economy of Bangladesh, and a large number of people rely on it either directly or indirectly. It employs 40.60 percent of the country's total population (BBS 2018). In Bangladesh, women accounted for 3.84 percent of the total agricultural labor force in 1974, and, as of 2018, it reached 31.22 percent (BBS 2019). Women in rural Bangladesh are generally responsible for most of the agricultural work in the homestead and they have significant contributions at every stage of agricultural production processes

(Rahman 2010). Overall, women contribute to 17 types of agricultural work in 21 agricultural activities, including seed conservation, seed selection, seed dispersal, seed sowing, harvesting, processing, storage of the crops, etc. (Sefat-E-Zerin 2019). However, the role of women in agriculture has changed in recent years. As the world has experienced large-scale globalization and liberalization, which have had the greatest impact on agriculture, posing numerous challenges (FAO 2017), particularly for women. Neoliberalism should be understood as the institutionalization of transforming agriculture in agro-business to a global scale (Ness and Cope 2016). It indicates a significant shift from a farming system governed by local farmers depending on the resources produced on the farm to an extensive reliance on technologies, seeds, fertilizers, and pesticides produced and manufactured by multinational corporations headquartered in the developed world (Gonzalez 2004).

Bangladesh, since the early 1980s, has embarked upon the implementation of neoliberal policies (Nuruzzaman 2004). This path witnessed the nation's progressive engagement in liberalization and deregulation measures within the agricultural sphere, involving a gradual reduction in the scope of state-owned enterprises and a concomitant decrease in agricultural subsidies (Misra 2016). Nevertheless, amidst the discernible implications of such neoliberal agrarian paradigms, prominently underlined by the introduction of contemporary agricultural machinery and consequential technological advancements within the agricultural domain (Gonzalez 2004; Nuruzzaman 2004; Aydin 2010), Bangladesh distinctly showcases a considerable inclination toward the endorsement of agricultural mechanization. This tendency finds tangible expression through a proactive proposition that endeavors to establish an incremental framework of tax exemptions targeting the import of pivotal agro-industrial components. These components encompass an array of indispensable elements, ranging from rice transplants to diverse auxiliary apparatus and potato planting machinery (GoB 2023). On the contrary, empirical evidence posits a counter-narrative, signaling the catalysis of the de-agrarianization process in tandem with the advent of liberalization policies, as posited by Aydin (2010). The neoliberal economic schema, foregrounding the production of agricultural commodities to facilitate export-oriented earnings (Gonzalez 2004), invariably redounds to the advantage of substantial agrarian entities. Paradoxically, the trajectory leading to the marginalization of indigenous people and socioeconomically disadvantaged farmers (Altieri and Rojas 1999) is intertwined with the concomitant reduction in the demand for low-skilled and unskilled labor within the agro-industry, as evidenced by the findings of the Food and Agriculture Organization (FAO 2017). This shift is further exacerbated by agricultural mechanization and commercialization, trademark features of neoliberal agriculture (Mamo and Habte 2020), which contribute to the exclusion of women from their traditional roles in agriculture (Satyavathi et al. 2010).

Furthermore, a prevailing discourse contends that the role of women within the agricultural sector is undergoing a significant transformation, shifting away from the traditional domain of unpaid familial labor toward positions of authority as farm managers, particularly in instances where male relatives are absent. This paradigmatic shift has been conceptualized as the "feminization of agriculture" (Jaim and Hossain 2011). Correspondingly, empirical investigations have extended evidence indicative of a visible move up in the involvement and contributions of women in the agricultural setting within Bangladesh. Particularly, the Food and Agriculture Organization's (FAO) report on the "Status of Women in Agricultural Systems" highlights an impressive 9.1 percent increment in female engagement within the sector over the course of 15 years (FAO 2023). Even though historical data shows a significant increase in women's participation in agriculture, a counter-narrative emerges, as certain scholarly inquiries posit a contrary trajectory in women's agricultural participation. For instance, the research conducted by Sen et al. (2021) presents that, in rural Bangladesh, participation in non-farm activities, for instance, salaried employment and paid activities in city areas, increased while participation in agriculture and related activities decreased between 2000 and 2013. This inquiry falls short in delivering an exhaustive comprehension of the intricate causal underpinnings precipitating

the exclusion of women from the agricultural domain, as well as its implications on the agricultural landscape. Our study aims to identify the challenges faced by women that precipitate women's exclusion from their longstanding traditional practices. To identify a real picture of the prevailing challenges in the agricultural participation of women, this study was conducted using mixed methods research in three villages of Jaldhaka Upazila in the Nilphamari District of northwestern Bangladesh. Our study entails a pronounced focus on engendering active participation and the substantial representation of women in the domains of policy formulation and execution.

2. Materials and Methods

2.1. Study Area

This research was conducted with small and medium farmer families in Madrashapara, Kabirajpara, and Jelepara (Daspara) villages under Jaldhaka Upazilla of Nilphamari District in northern Bangladesh (see Figure 1). There are 110 households with a population of 450 in Madrashapara village, 373 households with a population of 1640 in Kabirajpara village, and 60 households with a population of 280 in Jelepara village.

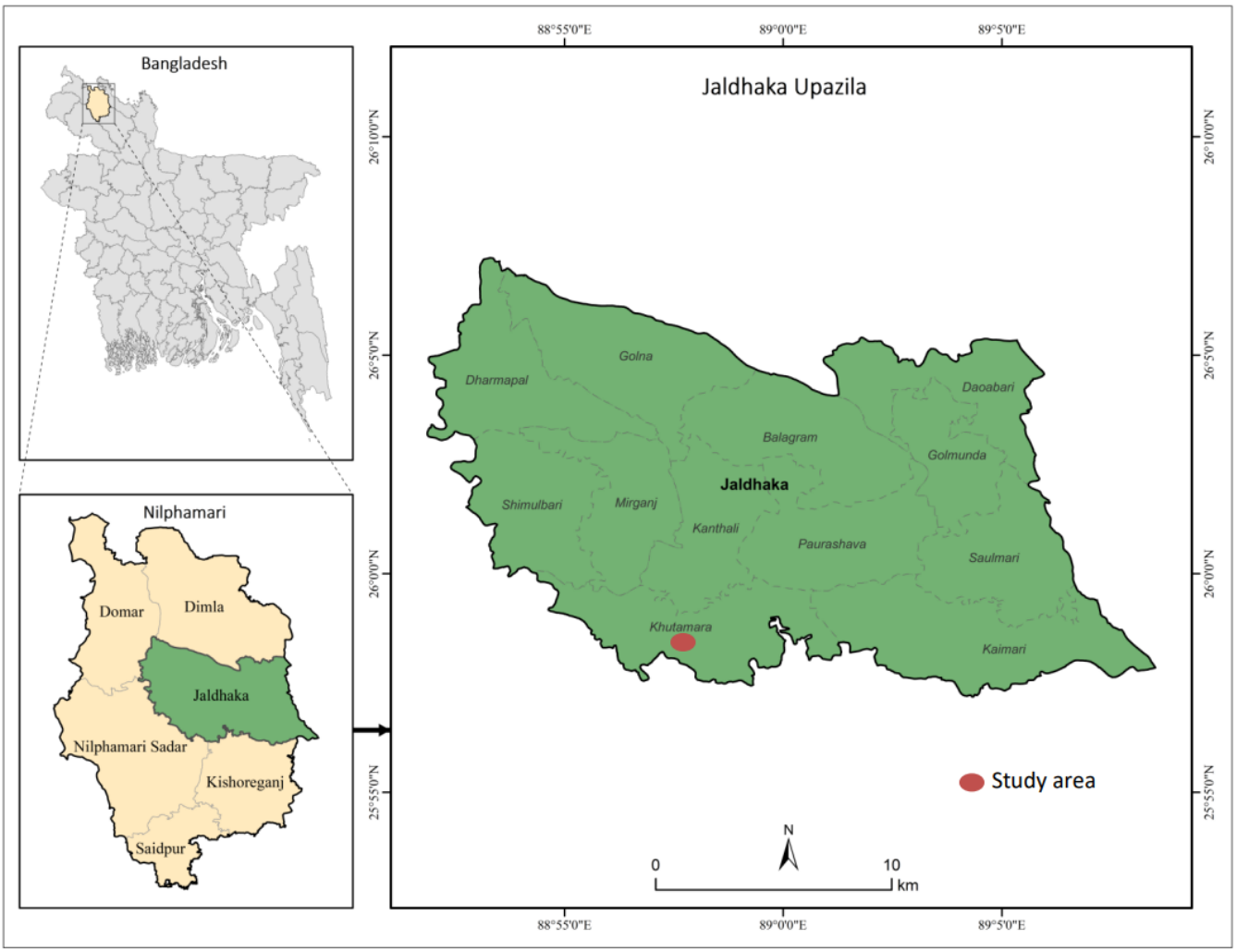


Figure 1. Location map of the study area (Madrashapara, Kabirajpara, and Jelepara villages within Khutamara Union, Jaldhaka Upazila, Nilphamari District in Bangladesh).

Agriculture serves as the primary occupation across all three villages, and the study areas exhibit visible evidence of traditional crop production practices oriented to nature. In contemporary agricultural practices, modern techniques and equipment are being em-

ployed to enhance production processes. The study area encompasses traditional agriculture, which pertains to the longstanding farming practices that have been implemented for many years (Pulido and Bocco 2003). This form of agriculture has demonstrated proficiency and expertise. The primary agricultural commodities cultivated in the region include rice, jute, potato, and tobacco. In recent years, however, there has been a noticeable increase in the popularity of maize cultivation. At the homestead level, villagers engage in the cultivation of vegetables. In addition to their primary means of subsistence, they engage in the rearing of cattle, goats, and chickens. The local populations, particularly individuals who rely on labor-based income, experience a period of unemployment lasting four months each year (specifically, April–May and October–November). This temporary lack of employment renders them susceptible to various vulnerabilities during this timeframe. In this phase, the seeds are meticulously planted and, subsequently, there is a temporary cessation of labor in the agricultural field until the arrival of the harvesting season. Inadequate alternative livelihood options are observed among individuals during this specific four-month duration. In recent decades, there has been a notable increase in the frequency of extreme natural events, such as droughts, sudden rainfall, irregular precipitation patterns, and excessive fog. These phenomena have had a significant impact on crop production. During the dry season, which typically occurs in the months of April and May, crop production is significantly impacted by drought conditions. As a result of these natural events, women are deprived of the opportunity to use their earning potential to support their families and provide meals for family members. Nonetheless, there is discrimination between men and women in labor wage payments. Women are treated as weaker than men because of the existence of patriarchal social structures.

Women have some additional responsibilities in their families; for instance, cooking, collecting fuel, cleaning the homestead, managing vegetables, nursing their children, home-based income-generating activities, and so on are all important household tasks for women.

All the families send their school-going children to school, but the parents do not know how long they can afford their children's schooling because of financial constraints. For health care services for major diseases, they have to go to the Upazila Health Centre. If the condition becomes severe, they have to move to Rangpur Medical College, located in another district. Eight NGOs operate social development programs in these three villages. Most of the households are connected to rural electrification. Many households are using solar energy nowadays.

2.2. Data Collection and Analysis

This study was conducted employing a mixed research approach, which refers to the utilization and combination of qualitative and quantitative methodologies in a single research work (Rahman et al. 2023; Knappertsbusch et al. 2021; Alexander et al. 2008). This method has been utilized to improve the accuracy and level of confidence of our research (Rahman et al. 2023; Alexander et al. 2008; Kelle 2001). Primarily, a survey was conducted between November and December 2021, encompassing a sample size of 1707 individuals, consisting of both men and women from three villages of Khutamara Union of Jaldhaka Upazila. The primary objective of the survey was to map and analyze the socio-economic characteristics of the villagers and to confirm women's agricultural participation. We found a substantial portion of women population is engaged in agriculture. Subsequently, a series of in-depth interviews was conducted with 150 women farmers between 26 November 2021 and 12 June 2022 to apprehend the challenges they faced by women farmers. The interviews were carried out with respondents residing in the villages of Kobirajpara (n = 53), Jelepara (n = 42), and Madrashapara (n = 55). The participants who met the criteria for inclusion in this study were female farmers who are aged between 40 and 55 years. A total of three Key Informant Interviews (KIIs) were carried out with the Agriculture Extension Department of the local government, as well as two local non-governmental organizations (NGOs) that are actively involved in supporting women farmers. Key Informant Interviews (KIIs) were utilized to gather insights into women's involvement in agricultural activities

and to validate the prevailing circumstances. However, the respondents were primarily well-updated about the objectives of this study. Two research assistants were employed to gather primary data from the designated study area. Both verbal and written consent of the respondents were taken to ensure proper ethical protocol. The participants were provided with a guarantee that their privacy and confidentiality would be safeguarded during the dissemination of the research findings. During the data analysis process, pseudonyms were employed to ensure the privacy and confidentiality of the respondents. The findings were shared with the villagers, and the results were validated by the villagers after the analysis. The data were subjected to analysis using various statistical tools, such as (SPSS). Following the collection of data through in-depth interviews, the subsequent step involved the transcription of textual content. In order to identify significant emergent themes from the data obtained in each interview, the transcriptions were analyzed through discourse analysis employing conventional qualitative data analysis techniques.

3. Results

3.1. Socio-Economic Characteristics of the Villagers

According to the available data, the agricultural sector in rural Bangladesh accounts for 50 percent of the total workforce (UNFPA 2015). Similar to other rural areas of the country, the primary occupation of both males (35.38 percent) and females (38.61 percent) residing in the three villages is agriculture (see Figure 2). In the three villages, the employment of the male members is closely associated with agriculture and related activities encompassing daily wage-based labor (59.4 percent). Other notable occupations of the villagers include fishing, accounting for 13.81 percent of male employment, followed by construction work at 8.25 percent, rickshaw or auto van pulling at 4.90 percent, and business activities at 9.07 percent. Moreover, some individuals engage in various supplementary endeavors, such as assuming roles as street vendors, electricians, or textile industry laborers within urban settings, while others are occupied with culinary pursuits. On the contrary, a significant proportion of the female population in the three villages, specifically 66.22 percent, engages in agriculture and related activities encompassing wage-based employment in the agricultural sector as their primary sources of livelihood. The remaining women are engaged in various occupations, including household chores (22.57 percent), employment in an artificial hair manufacturing factory (8.69 percent), and sewing (3.52 percent). The significant finding of this study is that women who are involved in household chores do not have a connection to any other activity, and they experience extended periods of unemployment throughout the day. There is no indication that they refrained from engaging in any extracurricular activities beyond their residences.

3.2. Land Ownership Status and Patterns in Agriculture in the Study Area

The field data show that among 150 respondents (women farmers) of in-depth interviewers, none of them has ownership over cultivable lands. They have lands at the household level owned by male members of the family. A total of 25 percent of respondents claimed that their husbands have land for housing and cultivation, whereas 65 percent only have land for housing. A total of 10 percent of respondents claimed they do not own land for housing or cultivation at the household level. As 75 percent of respondents do not own land for cultivation at the household level, most of the respondents are engaged in agriculture either by taking land under a leasing system or working as wage laborers. Based on this study's findings, only 9.33 percent of the respondents produce crops on their own land, whereas 5.33 percent cultivate crops by taking Adi (local sharecropping system) and 40.67 percent cultivate by leasing other people's land. Another 44.67 percent of respondents work on other people's land to earn money (see Figure 3).

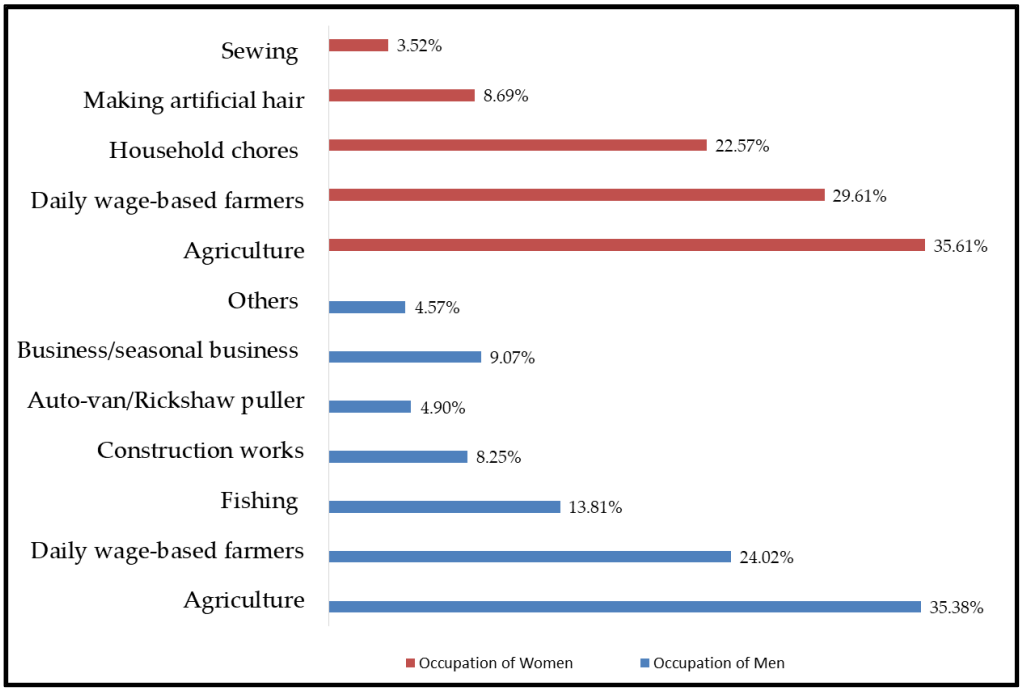


Figure 2. Occupations of the people of three villages. Occupational percentage of women was counted on 483 women. Occupational percentage of men was calculated on 1224 men.

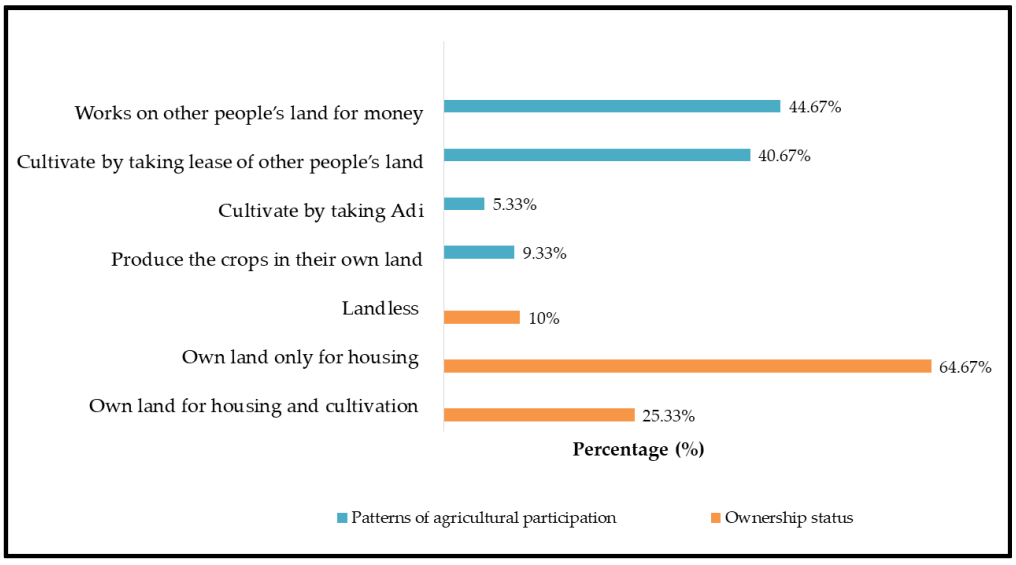


Figure 3. Household land ownership status of the respondents. Percentage was calculated among 150 women farmers.

3.3. The Scenario of Women's Participation in Agriculture

This study revealed that the participation of women in the agricultural sector during the past two decades has declined. Among 150 respondents, a significant majority of women farmers, specifically 138 individuals (92 percent), believe that the level of women's involvement in agriculture has undergone notable changes compared to 20 to 30 years ago. In addition, it is worth noting that eight women farmers, accounting for 5.33 percent of the total, hold the belief that women's involvement in agriculture has witnessed an increase. Conversely, four farmers, equivalent to 2.67 percent, maintain the perspective that the situation has remained unchanged.

As the result of this study indicates a substantial decline in women's agricultural participation, the respondents were asked, "Why has the participation of women in agriculture decreased in the last 20 years?"

3.3.1. Land Use Pattern and Women's Ownership over Land

Bangladesh has a huge population compared to its territory. The land–person ratio is very low, and landlessness has increased significantly over the last decades. In 1968, landlessness was 20 percent of the total population and, as of today, it is estimated at 40 percent (UNFPA 2015). The Agricultural Extension Department of the Bangladesh Government has reported that the land-to-person ratio in the study area has experienced a notable decrease as a result of population growth and the conversion of arable land for residential and infrastructure development. Nevertheless, the constraint imposed by limited land resources has a detrimental impact on the involvement of women in agricultural activities. Based on the research results, 24.64 percent of respondents stated that women's participation has declined due to limited access to available land (see Figure 4).

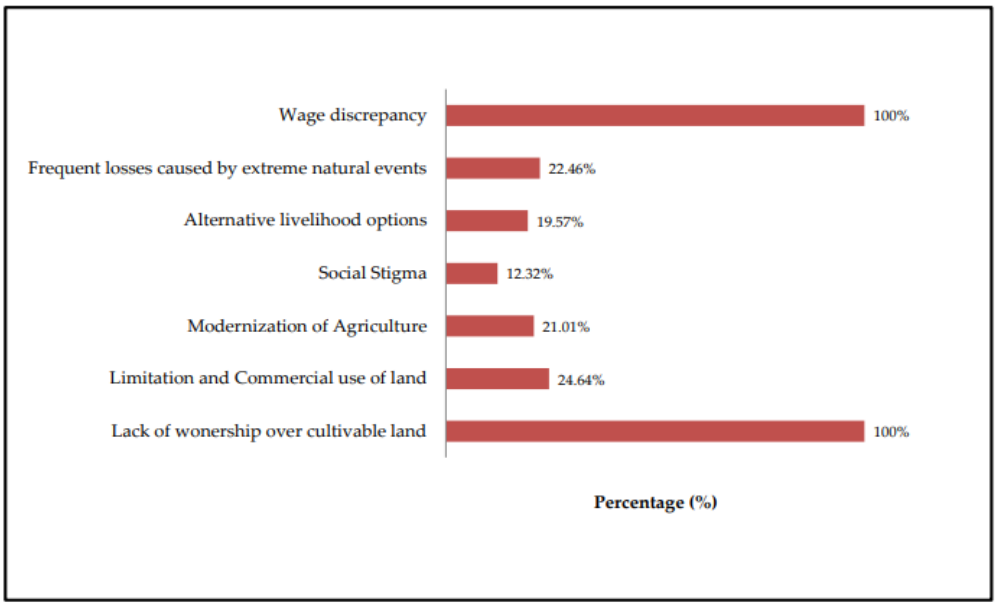


Figure 4. The challenges of participating in agriculture in the study area. Percentage was calculated among 138 women farmers.

Women from Madrashapara village remarked,

> "*Lands were available for undertaking agricultural operations 20–30 years ago. If someone lacked land, they might rent it from others, enter into a contract, or use Adi (a regional sharecropping system in which the grower and landowner receive equal shares of the products). Over time, land per person has decreased. Right now, signing a lease or contract is more expensive, and Adi is much more challenging. Due to the current land crisis, it has become tough for us to carry on the traditional agricultural practices*".

When we asked the respondents, "Why has the land reduced over the last 20 years?" Rahimun, a respondent of Kabirajpara village, rationalizes,

> "*The increasing population works as the main reason. Thirty years back, the area was sparsely populated. However, the number of houses has now increased. This house is being constructed primarily on agricultural land. Furthermore, infrastructures (roads) have increased in recent decades. The increasing infrastructures (roads) accelerate the accumulation of houses, which may be the leading cause of cropland limitation*".

The dominance of agricultural commercialization is observed to be at its peak in the study area. According to the assertions put forth by two grassroots non-governmental

organizations (NGOs), namely the Rangpur Dinajpur Rural Service (RDRS) and the Self-Help And Rehabilitation Programme (SHARP), there has been a notable expansion of commercial agriculture in recent decades. In addition, the local Agricultural Extension Department has been actively engaged in efforts to promote the growth and development of commercial agriculture. Commercial agricultural land utilization excludes women farmers from crop fields because it creates the opportunity to concentrate lands in the hands of a few rather than the masses. Consequently, the opportunities and prospects available to female farmers have become limited. Rahela, a Kabirajpara village respondent, stated,

> "*We do not have enough land to continue farming. Previously, we farmed on other people's land. However, due to the high cost of leasing land, it is now impossible. Moreover, the land is used for commercial purposes for specific crops such as maize and tobacco, whereas we produce rice and other food grains. People are moving towards commercial farming and monocropping farming systems for lucrative profits. It increases the rate of leasing lands in this area*".

Moreover, this study's findings indicate that none of the women respondents possess ownership rights to the cultivable lands. Due to their lack of ownership of arable land, individuals are unable to exercise their freedom to engage in agricultural pursuits. The absence of land ownership has exacerbated the marginalization and exclusion of women in the agricultural sector.

3.3.2. Modernization and Mechanization of Agriculture

In recent years, Bangladesh has been recognized as a highly mechanized agricultural economy in South Asia (Rahman et al. 2021; Baudron et al. 2015; Islam 2009). Mechanization and modernization of agriculture work as barriers to women's access to this profession. The study of Satyavathi et al. (2010) reflects that the introduction of mechanization packages in agriculture replaces female labor with male labor in Asia. The contribution of women often has been bypassed by neglecting their role as agricultural producers and resource managers. Modernized and mechanized agricultural practices affect women in two different directions. Firstly, it replaces women from their traditional role. Secondly, it places men in the driving seats because of the lack of women-specific technologies (Satyavathi et al. 2010). However, this study replicates a similar result as 21.01 percent of respondents affirmed it that new technologies exclude participation in Agriculture. Most of the respondents of the three villages claimed,

> "*As the days pass, engagement in agriculture is becoming harder for us. We used to work physically in the crop field to earn some money. It was ascertained that we would have business in the harvesting seasons, but it is now uncertain. Twenty years back, we used to irrigate, but it has become mechanized. Even a few years ago, I used to thresh rice by myself; now, machines are used for cutting and threshing rice. What is our job now? The machine has made us lazy and taken away our sources of livelihood*".

This study's results reveal that women farmers have shown a positive attitude toward the adoption and utilization of modern equipment in the agricultural sector. However, a significant point of contention among critics lies in the perceived lack of inclusivity for women in technological equipment. These critics argue that the design and functionality of such equipment often cater predominantly oriented to male users and those with higher socioeconomic status (rich). The mechanisms employed to diminish women's involvement in the agricultural sector can be categorized into two distinct approaches. According to existing research, it has been observed that the majority of individuals operating technological equipment are men. As a result, it has been observed that a significant number of women lack the necessary skills and training to operate various types of equipment. Furthermore, it is worth noting that the ownership of technological equipment in rural areas is predominantly concentrated among affluent individuals within the community. This is primarily attributed to the high costs associated with purchasing such equipment, which often renders it financially unattainable for impoverished farmers. As Rebeka Begum stated,

> *"There is a lot to be said about technologies. We are poor people, and we used to work physically in the field. But, in recent days, technologies are being used, from preparing lands to threshing crops. Our workloads have decreased, in many cases, since the introduction of technologies here. I used to plow the land with cows and thresh crops with my husband. Wherever is the opportunity now? The plowing is done with a tractor, and crop threshing has become mechanized. I do not have the opportunity to plow the lands and thresh the crops. Surprisingly, tractors and harvesters are driven by a man. Again, it takes a lot of money to buy a tractor or harvester. It is beyond our buying capacities".*

Interestingly, although women argued that modern technology excluded them from agricultural participation, the Agriculture Extension department is planning to bring more new technologies into the community.

3.3.3. Frequent Losses Due to Extreme Natural Events

Crop production is very much climate-sensitive and is inclined to the seasonal patterns of ecosystems (Hossen et al. 2021). Bangladesh is a country that experiences a range of natural phenomena, such as floods, droughts, late rainy seasons, heavy rainfall, excessive fog, rising temperatures, and riverbank erosion (Rahim et al. 2018), and the northwestern part of the country is vulnerable to these events (Karmakar 2019). These events are widespread and pose significant challenges to the country, particularly in agriculture. In the northwestern region of Bangladesh, a series of floods occurred in 2020, causing significant damage to agricultural land. Specifically, three distinct phases of flooding resulted in the destruction of standing crops in a total area of 42,055 hectares. As a consequence, the production of grains experienced substantial losses, amounting to 149,416 tons (the monetary value of these losses is estimated to be BTD 499.16 crore) (The Daily Star 2020). The impact of extreme natural events, such as sudden floods, rainstorms, irregular rainfall patterns, excessive fog, and drought, on crop destruction has been found to have significant implications for the exclusion of women's participation in agriculture. When crops are subjected to loss or damage due to these events, they encounter severe and irreversible consequences. The declining interest of women farmers in pursuing agriculture as their profession is attributed to their concerns regarding potential losses. Consequently, a significant number of women farmers are opting to transition toward occupations that ensure immediate cash flow. Based on this study's findings, 22.46 percent of respondents expressed their concerns that women's interests have been pushed out from agriculture due to frequent and uncertain occurrences of severe natural phenomena, including droughts, heavy rainfall, and foggy weather. Jamila, a woman farmer, stated,

> *"In recent years, crop production has been a real challenge. Extreme natural events, such as rain, floods, droughts, foggy weather, and diseases and insects, can attack, destroy, and damage crops and have become more common in recent years. Furthermore, crop production costs have increased five to six times in the last 20 to 25 years. However, crop prices have remained unchanged. Women have lost interest in agriculture as a result of these factors, and their participation is decreasing day by day".*

3.3.4. Alternative Working Opportunities of Women

Bangladesh is experiencing a high rate of urbanization. Here, people migrate from one area to another for better livelihood opportunities, and a high-scale migration occurs among the poor and landless (Rashid 2013). However, the overall gross migration (in and out-migration) rate is 138 per 1000. Surprisingly, the migration rate is higher among women than men (BBS 2020). This study's result revealed that 19.57 percent of women left agriculture to settle down in the cities for alternative livelihood options. They think that it is better to work in a factory than in a crop field. Alternative working opportunities in urban areas are considered one of the leading causes of leaving agriculture.

Rabeya Banu specified,

"*Agricultural activities are more difficult than working in garments. So the young girls tend to move to Gazipur, Dhaka, Rangpur, or even Nilphamari to find jobs. In recent years, most of the young girls from this village moved to Dhaka to work in garments. Because profit from agriculture is an uncertain and lengthy process, but wages from garments are certain and fixed*".

Women farmers of three villages echoed,

"*Agriculture is not a better option for many women. Moreover, many families do not want their female members to be engaged in agriculture. So, women are moving and searching for other options for their livelihoods. Some families allow their daughters to work in factories rather than crop fields. It is noticed that the girls' father or brother brings them to the factory in the nearest export processing zone (Uttara EPZ) in the morning and carries them back while finishing the factory work in the evening. Their family members appreciate the factory work of females, but agriculture as a profession is not well appreciated*".

Saiju Khatun added,

"*Although the participation of women in agriculture has decreased, they are not still inactive. Many women are now sewing Nakshikantha in addition to household chores, and some are making Hatpakha (hand-fans)*".

3.3.5. Social Stigma

The social stigma impacts women's participation in the labor market and work (MJF 2020). It has been observed that social stigma acts as a significant barrier, preventing women from fully engaging in economic activities, such as agriculture. Based on this study's finding, 12.32 percent of respondents remarked that prestige and the fear of stigmatization caused the exclusion of women from agriculture in recent times. Chandra, one of the respondents from Jelepara village, explained clearly that,

"*Previously, I worked in the field with my husband for cultivation, and I have also done the same in recent years. Sometimes, I sell my labor for other people's land. I have two sons who got married. I do not expect my daughter-in-law in the field to work with us because it is a matter of prestige. Can you please tell me how I can send my daughter-in-law to the crop field or to work on other people's land? If she works in the field, she, as well as my family, will be stigmatized by society*".

Likewise, though women are making vital contributions to the agricultural sectors, they are not allowed to go to the market for fear of social stigma to sell the products they produce, and they are paid lower prices for their products. Moreover, young women are unwilling to work in the crop field, and they think agriculture is the activity of men. Sahana Bibi, another respondent, said,

"*The ages of us and the current phase are very different. I, along with my mother-in-law, worked together on the field to have the best outcomes from the field. But the girls of the current generation are not willing to work in the field. They think those activities are not suitable for them. They think that days have been modern and agricultural activities are solely traditional, and say, "Why should I be in traditional practices in modern days? Even I can't grow interest of my daughter in agriculture whether I want her to work with me on the crop field*".

3.3.6. Wage Discrepancies between Men and Women

Wage discrepancies between men and women limit women's participation in agriculture. In three villages, there is a clear wage disparity between men and women. One hundred percent of respondents said that the wage discrepancy is extreme between men and women in the agricultural labor force, and they are not willing to accept unequal pay for performing the same tasks as their male coworkers do.

Furthermore, men's and women's wages fluctuate during/after the harvesting and non-harvesting seasons. In the harvesting period, a man is paid BDT 350 to 450 (approximately USD 4.2 to 5.4) per day while selling labor on other people's land, whereas a woman is paid BDT 150 to 200 (approximately USD 1.8 to 2.4) for similar types of activities (see Table 1). Again, during harvesting seasons, women may not always have the opportunity to work a full day as waged agricultural laborers. They are paid BTD 100 for working as an agricultural wage laborer for half a day (approximately USD 1.2). During the non-harvesting seasons, however, a woman is usually paid BTD 100 to 150 (around USD 1.2 to 1.8) per day. She is paid BTD 50 (approximately USD 0.6) for being engaged for half a day (5 h) (see Table 1). Because of their vulnerable economic situation and the lack of better opportunities in the rural community, they are docile to continue working for such a low wage. However, 100 percent of the respondents claimed that the involvement of women in agriculture is significantly decreased by wage discrepancies.

Table 1. Wage discrepancy between men and women.

Gender	Seasons	Wage per Day (in BDT)
Man	Harvesting season	350–450
	Non-harvesting season	250–350
Woman	Harvesting season	150–200
	Non-harvesting season	100–150
Seasons	Women's Working Hours	Women's Wages (in BDT)
Harvesting Season	8:00 a.m.–5:00 p.m. (9 h)	150–200
	8:00 a.m.–1:00 p.m. (5 h)	100–150
Non-harvesting Season	8:00 a.m.–5:00 p.m. (9 h)	100–150
	8:00 a.m.–1:00 p.m. (5 h)	50

4. Discussion

This study aimed to understand the challenges of women's participation in agriculture. Women have been subject to multiple challenges in agriculture in recent days. As identified above, wage discrepancies between men and women, limitations of land holdings and unequal ownership over cultivable land, commercial agriculture, modernization of agriculture, social stigma, alternative livelihood options, professional migrations, extreme natural events, and frequent losses in agriculture are putting severe strain on women's participation in agriculture.

Preexisting studies show that the participation of women in agriculture has increased. For example, the study of Jaim and Hossain (2011), The Reports on Labour Force Survey (LFS) (BBS 2002, 2008, 2018) conducted by the Bangladesh Bureau of Statistics show that women's participation in the agricultural labor force has significantly increased. The results of our study, however, vary from the conclusions drawn in previous research (BBS 2002, 2008, 2018; Jaim and Hossain 2011). This study does not claim to be representative of all parts of the country; rather, it depicts the scenario of three villages only. Nonetheless, this study suggests that further comprehensive research is required in order to gain a complete understanding of the circumstances surrounding women in the agricultural sector.

According to a report published by Oxfam, the ownership of land in the country is disproportionately skewed toward men, with a ratio of six men to every woman (The Daily Star 2019). A significant proportion of the woman population in the country, in particular 70 percent, lacks land ownership (Moni 2017). The results of our study signify the existing scenario of the country as they shed light on the current state of land ownership among women, revealing that none of the women in the three villages have ownership of land. The lack of land ownership rights, predominantly related to arable land, led to the exclusion of women from agricultural practices in the study areas. Moreover, women are categorized as waged workers, which refer to selling labor in crop fields to generate the world's food and fibers, as they do not own property or are unable to rent land (ILO 2008). Women's

share as waged agricultural workers is significantly increasing globally, and they represent 20–30 percent of total agricultural wage employment. The landowners prefer women workers because they are paid less than men (ILO 2008). The research findings indicate an analogous situation among the villages being studied. Farm owners often exhibit a preference for hiring women workers as they can offer women farmers a lower wage in comparison to their male counterparts. This study's findings suggest that the presence of wage inequality among male and female workers plays a role in the marginalization of women within the agricultural sector.

Exclusion of Women Promoting Patriarchy in Agriculture

The agricultural labor force of Bangladesh has been predominantly composed of women with traditional skills and indigenous knowledge. They were involved in all aspects of agricultural activities. In recent decades, women's connection to agriculture has undergone a transformation as a result of the challenges presented by agricultural modernization, particularly in the realm of mechanized and commercial agriculture. In the context of Bangladesh, agricultural practices have been extensively mechanized, encompassing various stages, such as land preparation and the post-harvest storage of crops (see Figure 5). The country places significant emphasis on the ratification of agricultural mechanization. The proposed fiscal year 2023–2024 budget includes a provision to allocate 51,300 agricultural machineries to farmers in the upcoming financial year. Additionally, a proposition has been made to implement an advanced tax exemption on the importation of rice transplants, various spare machines, and potato planters that are utilized in the field of agriculture (GoB 2023). However, mechanized agriculture, a prominent component of neoliberal agrarian practices, holds a position of prominence within developing agrarian nations. Based on the extant literature (Gonzalez 2004; Nuruzzaman 2004; Aydin 2010), it can be argued that traditional farmers have been adversely affected by neoliberal agrarian policies, such as the implementation of contemporary agricultural machinery and technologies, as well as the commercialization of the agricultural sector. This is primarily due to the fact that these policies necessitate a proficient level of technical expertise and training. Traditional farmers, particularly women, may lack the necessary resources and skills to effectively engage in these arrangements.

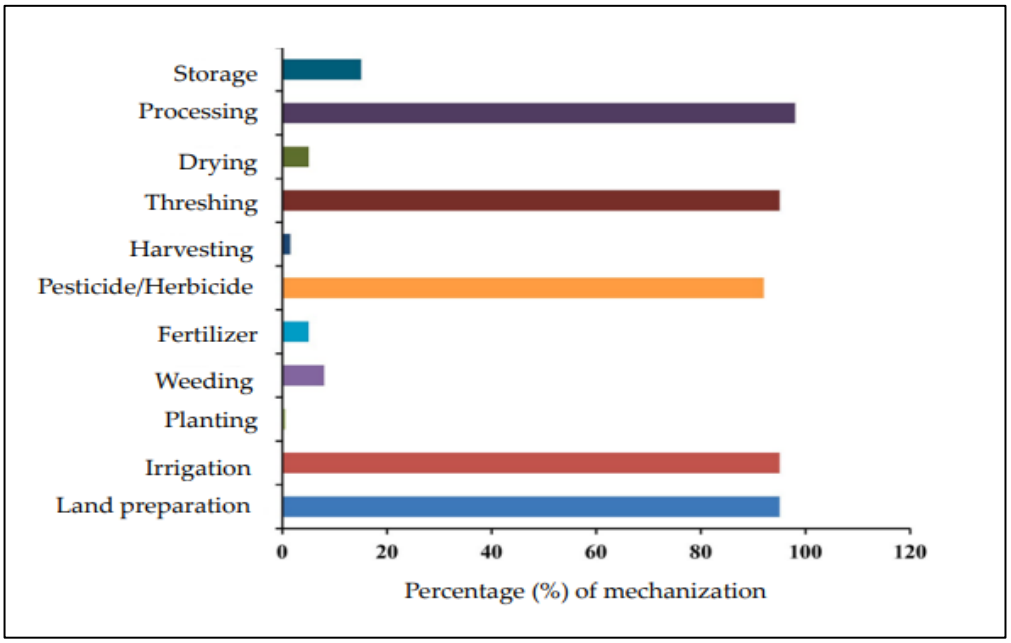


Figure 5. Percent (%) of agricultural mechanization based on field operations (Rahman et al. 2021).

Based on the empirical evidence gathered, it can be observed that approximately 79 percent of the respondents believe that women have been marginalized from their customary involvement in the agricultural sector (see Figure 4). Women, who were previously excluded from the agricultural sector, may exhibit a reduced interest in engaging in this field due to various factors, such as frequent losses caused by natural circumstances, wage disparities, social stigmatization, the availability of alternative employment opportunities, or insufficient skills to adapt to agricultural modernization and commercial practices. In recent decades, there has been a shift toward technology-dependent agricultural practices, replacing traditional reliance on human labor. The orientation of the new technologies in agriculture cut off women from laboring in crop fields and added new overheads. One hundred percent of respondents claimed the cost of conducting agricultural activities has increased 7–8 times higher than the production costs of 20 years back because of the extensive reliance on technologies and declining women's participation, whereas the government of Bangladesh has implemented a farm modernization policy in order to enhance farm profitability through the reduction of production costs (Hossen et al. 2020). The findings of this study are in contradiction with the objectives of government policies for two distinct reasons. Firstly, the financial burden associated with purchasing agricultural machinery is prohibitively higher for small-scale and economically disadvantaged farmers. Secondly, the implementation of technological equipment in farming methods has the potential to exacerbate unemployment rates among female laborers. The exclusion of women laborers or farmers from agricultural sectors, nonetheless, reinforces patriarchal dynamics within agricultural practices. For instance, a significant majority of respondents (93.48%) asserted that the exclusion of women's involvement in agricultural activities has contributed to the ratification of "patriarchy" within local agricultural practices. Currently, men are taking the responsibilities of agricultural activities, which have been historically performed by women. Because of their social status, women are kept home on the one hand; men are sitting in the driver's seat of technology on the other. By means, the place of women is replaced by technologies or technological equipment. Consequently, agricultural activities have now become male-oriented with very little involvement of women.

At present, there is a discernible trend wherein men are assuming the roles and responsibilities associated with agricultural practices that were traditionally undertaken by women. This shift can be attributed to the societal pressure that keeps women confined to their homes due to the fear of social stigma. Simultaneously, men predominantly occupy positions of authority and control in the operation of technological equipment, while women are often excluded from access and training opportunities in this domain. As a result, agricultural activities have increasingly become predominantly male-centric, with limited participation from women.

Although mechanized and commercial agriculture impedes women's participation in agriculture by looking at them as unskilled agricultural labor, the Local Agriculture Extension Department of the Bangladesh Government affirmed that they have an extensive focus on promoting agricultural modernization and commercialization to enhance agricultural productivity ignoring gendered dimensions. The gender-responsive agricultural policies prioritizing women's voices are the contemporary demands for ensuring women's agricultural participation and empowerment.

5. Conclusions

This study aimed to explore the challenges women encounter when participating in agricultural activities and found that numerous factors contribute to their exclusion from the agricultural sector. Neoliberal policies, which favor mechanized and commercial farming practices, are among these influencing factors. In addition, limited ownership rights over crop lands, along with disparities in wages between men and women in agricultural labor, exacerbate this problem. Aside from these obstacles, the lack of alternative working options and the presence of social stigma led to the marginalization of women in agriculture. Overall, the results indicate that the whole exclusion process has been significantly

accelerated by the implementation of neo-liberal agricultural policies. In the end, such exclusion reinforced patriarchal norms and practices within the agricultural industry.

Although agriculture was initially introduced by women, the current neoliberal capitalist patriarchy tends to exclude women and restrict their ownership within this sector. Consequently, gender-based agricultural policies have emerged as a pressing imperative, demanding immediate attention and action to deal with the prevailing challenges within agricultural production.

The socioeconomic conditions of rural Bangladesh have traditionally encouraged women to participate actively in agriculture. In this way, their active participation has a profound effect on shaping the agricultural sector, and they bear a great deal of responsibility for agricultural production. The present circumstances, however, have made it difficult for women to maintain their customary practices in this field. As an agrarian nation, women participating in the agricultural industry of Bangladesh are expected to yield more favorable results. Therefore, the inclusion of women, who make up a substantial portion of the agricultural labor force, is paramount to achieving sustainable agriculture in the country. In this context, gendered agricultural policies, such as subsidized agricultural credits and access to land, can potentially empower women by facilitating their agricultural participation.

Author Contributions: Conceptualization, M.M.R., H.H. and M.A.H.; methodology, M.M.R., H.H. and M.A.H.; software, M.M.R. and M.A.H.; validation, M.M.R. and H.H.; formal analysis, M.M.R., H.H. and M.A.H.; investigation, M.M.R., H.H. and M.A.H.; resources, M.M.R., H.H. and M.A.H.; data curation, M.M.R., H.H. and M.A.H.; writing—original draft preparation, M.M.R.; writing—review and editing, H.H. and M.A.H.; visualization, M.M.R. and M.A.H.; supervision, M.M.R., H.H. and M.A.H.; project administration, M.M.R., H.H. and M.A.H.; funding acquisition, M.M.R., H.H. and M.A.H. All authors have read and agreed to the published version of the manuscript.

Funding: This project was funded by the Institute for Advanced Research (IAR) of the United International University, Bangladesh (research project code: IAR/01/19/BE/08).

Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki, and it was approved by the Ethics Committee of Institute for Advanced Research, United International University (Approval code: IAR/01/19/BE/08) on January 1, 2022 under a research project titled "Reconstruction of Shabolombee Gram: Exploring Local People's Practices of Sustainable Development".

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Acknowledgments: The authors express their gratitude to Salma Begum for her valuable contributions and insightful suggestions for enhancing the quality of the manuscript. The authors are thankful to the reviewers who have contributed to developing the manuscript with constructive feedback. The authors also thank the respondents whose contributions made this study possible. The authors acknowledge the financial contribution of the Institute for Advanced Research (IAR) of the United International University (UIU), which facilitated the successful execution of this study.

Conflicts of Interest: The authors declare no conflict of interest.

References

Akter, Sonia, Pieter Rutsaert, Joyce Luis, Nyo Me Htwe, Su Su San, Budi Raharjo, and Arlyna Pustika. 2017. Women's empowerment and gender equity in agriculture: A different perspective from Southeast Asia. *Food Policy* 69: 270–79. [CrossRef]

Alexander, Victoria D., Hilary Thomas, Ann Cronin, Jane Fielding, and Jo Moran-Ellis. 2008. Mixed methods. *Researching Social Life* 3: 125–44.

Altieri, Miguel A., and Alejandro Rojas. 1999. Ecological impacts of Chile's neoliberal policies, with special emphasis on agroecosystems. *Environment, Development and Sustainability* 1: 55–72. [CrossRef]

Aydin, Zülküf. 2010. Neo-Liberal Transformation of Turkish Agriculture. *Journal of Agrarian Change* 10: 149–87. [CrossRef]

Baudron, Frédéric, Brian Sims, Scott Justice, David G. Kahan, Richard Rose, Saidi Mkomwa, Pascal Kaumbutho, John Sariah, Raymond Nazare, and Girma Moges. 2015. Re-examining appropriate mechanization in Eastern and Southern Africa: Two-wheel tractors, conservation agriculture, and private sector involvement. *Food Security* 7: 889–904. [CrossRef]

BBS. 2002. *Report of the Labor Force Survey Bangladesh 1999–2000*. Dhaka: Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning.
BBS. 2008. *Report of the Labor Force Survey Bangladesh 2005–2006*. Dhaka: Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning.
BBS. 2018. Report on Labour Force Survey (LFS) 2016–17. Available online: https://mole.portal.gov.bd/sites/default/files/files/mole.portal.gov.bd/page/ac7088c7_a211_4905_9ff3_1e62af00c837/LFS_2016-17_compressed.pdf (accessed on 20 May 2023).
BBS. 2019. *Report on Agriculture and Rural Statistics 2018*; Dhaka: Government of Bangladesh. Available online: http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2020-02-02-10-36-84ecf771aa4c2e480f245fb79538ce14.pdf (accessed on 15 December 2021).
BBS. 2020. Report on Sample Vital Statistics 2020. Available online: http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2021-06-28-07-11-c1784c6fe700cf52ff934e8dd7cf9147.pdf (accessed on 12 January 2023).
Christ, Carol P. 1998. *Rebirth of the Goddess: Finding Meaning in Feminist Spirituality*. New York: Routledge. ISBN 9780415921862.
Diiro, Gracious M., Greg Seymour, Menale Kassie, Geoffrey Muricho, and Beatrice Wambui Muriithi. 2018. Women's empowerment in agriculture and agricultural productivity: Evidence from rural maize farmer households in western Kenya. *PLoS ONE* 13: e0197995. [CrossRef] [PubMed]
FAO. 2011. *Roles of Women in Agriculture; Prepared by the SOFA Team and Cheryl Doss*. Rome: FAO. Available online: https://www.fao.org/3/am307e/am307e00.pdf (accessed on 28 December 2022).
FAO. 2017. The Future of Food and Agriculture: Trends and Challenges. Available online: https://www.fao.org/3/i6583e/i6583e.pdf (accessed on 17 February 2023).
FAO. 2023. *The Status of Women in Agrifood Systems*. Rome: FAO. [CrossRef]
Farnworth, Cathy, and Jessica Hutchings. 2009. *Organic Agriculture and Women's Empowerment*. Bonn: IFOAM, p. 86.
GoB. 2023. Towards Smart Bangladesh Sustaining the Development Achievements in a Decade and a Half. National Budget Speech 2023–24. Available online: https://nbr.gov.bd/uploads/budget/Budget_Speech_2023-24_English_Final_Press_(1).pdf (accessed on 13 July 2023).
Gonzalez, Carmen G. 2004. Trade Liberalization, Food Security and the Environment: The Neoliberal Threat to Sustainable Rural Development. Seattle University School of Law Digital Commons. Available online: https://digitalcommons.law.seattleu.edu/faculty/385 (accessed on 18 December 2022).
Hossen, M. Anwar, David Benson, Syeda Zakia Hossain, Zakia Sultana, and Md. Mizanur Rahman. 2021. Gendered Perspectives on Climate Change Adaptation: A Quest for Social Sustainability in Badlagaree Village, Bangladesh. *Water* 13: 1922. [CrossRef]
Hossen, Md. Anwar, Md. Ruhul Amin Talukder, Muhammad Rashed Al Mamun, Hafijur Rahaman, Subrata Paul, Md. Mizanur Rahman, Md. Miaruddin, Md. Azhar Ali, and Md. Nurul Islam. 2020. Mechanization Status, Promotional Activities and Government Strategies of Thailand and Vietnam in Comparison to Bangladesh. *AgriEngineering* 2: 489–510. [CrossRef]
ILO. 2008. The Gender Wage Gap in Bangladesh. ILO Asia-Pacific Working Paper Series. Available online: http://ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/documents/publication/wcms_098063.pdf (accessed on 18 December 2021).
Islam, Md. Shirazul. 2009. Farm mechanization for sustainable agriculture in Bangladesh: Problems and prospects. Paper presented at 5th APCAEM Technical Committee Meeting and the Expert Group Meeting on Application of Agricultural Machinery for Sustainable Agriculture, United Nations Asian and Pacific Centre for Agricultural Engineering and Machinery, Manila, Philippines, October 16; pp. 14–16.
Jaim, W. M. H., and Mahabub Hossain. 2011. Women's Participation in Agriculture in Bangladesh: Trends, Determinants and Impact on Livelihoods. Paper presented at the Pre-Conference Event on "Dynamics of Rural Livelihoods and Poverty in South Asia", 7th Asian Society of Agricultural Economists (ASAE) International Conference, Hanoi, Vietnam, October 13–15.
Karmakar, Samarendra. 2019. Patterns of Climate Change and its impacts in Northwestern Bangladesh. *Journal of Engineering Science* 10: 33–48.
Kelle, Udo. 2001. Sociological Explanations between Micro and Macro and the Integration of Qualitative and Quantitative Methods. *Historical Social Research* 2: 17. [CrossRef]
Knappertsbusch, Felix, Bettina Langfeldt, and Udo Kelle. 2021. *Mixed-Methods and Multimethod Research*. Berlin: De Gruyter, pp. 261–72.
Mamo, Siyum A., and Abiot D. Habte. 2020. The Political Economy of Commercial Agricultural Land in Ethiopia. *PanAfrican Journal of Governance and Development (PJGD)* 1: 49–60. [CrossRef]
Misra, Manoj. 2016. Is peasantry dead? Neoliberal reforms, the state and agrarian change in Bangladesh. *Journal of Agrarian Change* 17: 594–611. [CrossRef]
MJF. 2020. *Recognition of Women's Role in Agriculture: Acknowledge Women's Unaccounted Contribution in Agricultural Economy*. Policy Brief 4. Available online: http://www.manusherjonno.org/wp-content/uploads/2021/03/FINAL_Policy-Brief-4-Women-in-Agriculture.pdf (accessed on 20 June 2023).
Moni, Rowshan Jahan. 2017. Women's Land Rights and Access to Commons in Bangladesh: A Case of Securing Commons (Khas Land) from Northern Bangladesh. Paper presented at the XVI Biennial IASC Conference, Utrecht, The Netherlands, July 10–14; Available online: https://www.2017.iasc-commons.org/wp-content/uploads/2017/07/1E_Rowshan-Jahan.pdf (accessed on 20 May 2023).

Ness, Immanuel, and Zak Cope. 2016. *The Palgrave Encyclopedia of Imperialism and Anti-Imperialism*. London: Palgrave Macmillan. [CrossRef]
Nuruzzaman, Mohammed. 2004. Neoliberal economic reforms, the rich and the poor in Bangladesh. *Journal of Contemporary Asia* 34: 33–54. [CrossRef]
Pulido, Juan S., and Gerardo Bocco. 2003. The traditional farming system of a Mexican indigenous community: The case of Nuevo San Juan Parangaricutiro, Michoaca'n, Mexico, 2003. *Geoderma* 111: 249–65. [CrossRef]
Rahim, Md. Abdur, Ayesha Siddiqua, Most. Nusrat Binte Nur, and A. K. M. Mostafa Zaman. 2018. Community Perception on Adverse Effects of Natural Hazards on Livelihood and Enhancing Livelihood Resiliency: A Case Study at Patharghata Upazila, Barguna. *Procedia Engineering* 212: 149–56. [CrossRef]
Rahman, Md Mostafizar, Md Rostom Ali, Md Moinul Hosain Oliver, Md AbuHanif, Md Zamil Uddin, Tamim-Ul-Hasan, Khokan Kumar Saha, Md Hamidul Islam, and Md Moniruzzaman. 2021. Farm mechanization in Bangladesh: A review of the status, roles, policy, and potentials. *Journal of Agriculture and Food Research* 6: 100225. [CrossRef]
Rahman, Md. Mizanur, Hamidul Huq, and Sharif A. Mukul. 2023. Implications of Changing Urban Land Use on the Livelihoods of Local People in Northwestern Bangladesh. *Sustainability* 15: 11769. [CrossRef]
Rahman, Sanzidur. 2010. Women's labour contribution to productivity and efficiency in agriculture: Empirical evidence from Bangladesh. *Journal of Agricultural Economics* 61: 318–42. [CrossRef]
Rashid, Mohammed Mamun. 2013. Rural-Urban Female Migration in Bangladesh: Need for Information Support and Institutional Responses, 2013. *Global Journal of Human Social Science, Sociology & Culture* 13: 1–10.
Satyavathi, C. Tara, Ch. Bharadwaj, and P. S. Brahmanand. 2010. Role of Farm Women in Agriculture: Lessons Learned. *Gender, Technology and Development* 14: 441–49. [CrossRef]
Sefat-E-Zerin, Mosammad. 2019. Challenges of Women Agricultural Laborers in the Northern Part of Bangladesh. *Advances in Social Sciences Research Journal* 6: 225–38. [CrossRef]
Sen, Binayak, Paul Dorosh, and Mansur Ahmed. 2021. Moving out of agriculture in Bangladesh: The role of farm, non-farm and mixed households. *World Development* 144: 105479. [CrossRef]
Smur, Gebrehiwet, Kassa Teka, and Abadi Teklehaimanot. 2021. Small-scale–irrigated agriculture empowered women-headed households in Tigray, Ethiopia. *Irrigation and Drainage* 70: 900–8. [CrossRef]
Sutton, Samantha. 2021. Empowering Women in Agriculture–reNature. *reNature*. March 8. Available online: https://www.renature.co/articles/empowering-women-in-agriculture/ (accessed on 20 January 2023).
The Daily Star. 2019. Land Ownership: Men Possess 6 Times That of Women. Available online: https://www.thedailystar.net/bangladesh/male-landowners-six-times-higher-women-in-bangladesh-1690681 (accessed on 16 May 2023).
The Daily Star. 2020. Floods Damage Crops Worth Tk 499 Crore in Rangpur Region. Available online: https://www.thedailystar.net/bangladesh-floods-damage-crops-worth-tk-499-crore-1987977 (accessed on 20 June 2023).
UNFPA. 2015. *The Impact of the Demographic Transition on Socioeconomic Development in Bangladesh: Future Prospects and Implications for Public Policy*. New York: UNFPA.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.