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Necessity as a driver in bending agricultural gender norms in the Eastern Gangetic Plains of South Asia

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ABSTRACT

The majority of the farmers in the rural Global South continue to depend directly or indirectly on agriculture for their livelihoods. Despite the fact that women account for almost half of the world's farmers, they face gender-specific challenges such as deeply rooted cultural and social norms that limit their access to land, assets, financial markets, agricultural training, and information. Using semi-structured interviews with farmers in the Eastern Gangetic Plains, this study investigates how necessity is becoming one of the major drivers in the bending of agricultural gender norms. The study investigates the connections between feminist political ecology and agricultural technology production frameworks in order to comprehend the implications of technology adoption and influences on gender norms in communities. Women's participation in agriculture was found to be heavily influenced by social and cultural barriers, and they were frequently subjected to social criticism for breaking the systemic gender norms. This paper emphasizes on the growing pattern of bending gender norms with recommendations for increasing women's participation and scope in future agriculture development initiatives through policies and interventions that emphasize gender equity.

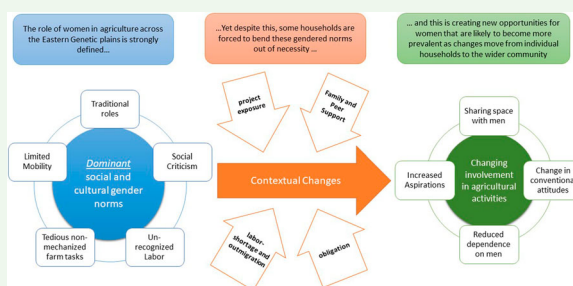
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Gender norms; South Asia; women farmers; agriculture; technology



Introduction

Women play a key role across the agricultural production in the Global South from pre-harvest preparation, in season farm labour, processing and

marketing, yet their role remains largely unrecognized (Agarwal, 2018; Vemireddy & Pingali, 2021). However, the social structures in South Asia perpetuate gender inequalities and limit women's agency through a patriarchal setup (Kabeer, 2020), religious and cultural

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norms (Devi & Kaur, 2019), and caste system disparities (Rao, 2020). This leads to a loss of autonomy, and possible losses in women's economic and social well-being, while simultaneously impacting the development of entire communities and regions. Previous studies have also demonstrated that cultural norms concerning gender roles for women arise as a result of certain historical settings, which tend to persist even after other social conditions have evolved over time (Giuliano, 2017). The primary space for men has historically been perceived as the public sphere whereas the primary space for women has been considered private space, and this disparity was reflected in paid labour alternatives (Gordon, 2019). Women are often expected to simultaneously manage household and other livelihood activities such as livestock care, preparing food, and childcare (Richardson et al., 2017). Furthermore, women are allotted farming activities that require high levels of drudgery like manual weeding, transplanting and post-harvesting activities resulting in longer working hours (Satyavathi et al., 2010).

Similarly, in the Eastern Gangetic Plains (EGP) of India, Nepal and Bangladesh, men continue to control the majority of financial decisions, despite women playing significant roles in agriculture (Sugden et al., 2014). There is a tendency for societal pressure against changing traditional gender roles to break barriers (Ickes, 1993), further compounded by the caste system (Bhupatiraju et al., 2021), ethnicity, income, age, and marital status (Holmelin, 2019) prevalent in South Asia that is a driver in establishing gender and religious norms. As a result, women do not have space to bargain their roles and place in the society, especially since these roles are socially recognized and sanctioned (Esteve-Volart, 2004). Hence, gender disparities cannot always be explained by quantitative measures, rather gendered impacts on knowledge acquisition and on-farm decision-making must be recognized in order to create gender-inclusive initiatives (Iraddock et al., 2019; Quisumbing et al., 2015). Rural-to-urban male migration due to economic opportunities is common in Bangladesh (Lee et al., 2021) and also in the state of West Bengal in India (Vepa, 2005), resulting in an increasing trend of de facto feminization in agriculture (Gartaula et al., 2010). Similarly, in Nepal, patterns of men out-migration led to an agricultural labour shortage, and in the absence of their men counterparts, women

gradually took on various tasks and duties, including extra farm jobs (Paudel et al., 2020).

Most studies in South Asia have focused on gendered influences or outcomes in agriculture and have relied on quantitative methods (e.g. Brown et al., 2021). While these methods may depict some aspects of gendered variances, they are frequently misrepresented, insufficient, and biased due to limited engagement with participants and a lack of opportunity to tell their narratives (Huyer & Partey, 2019). Studies have also shown that views on traditional gender practices and dominant perceptions are important to understand existing gender biases (Ferdous & Mallick, 2019). While there are very few studies that have looked at the perception of women as agricultural counterparts in South Asia, particularly concise studies on gendered norms in agricultural participation in the geographical region of EGP are limited, despite the fact that male-dominated setup still persists in the region (Roomi & Parrott, 2008). Understanding the step-by-step processes in an agricultural technology, such as Conservation Agriculture (CA), and its adoption has consequences for development policies and practises, and how gender issues are perceived and addressed (Chanamoto & Hall, 2015). Brown et al. (2017) proposed the 'Livelihood Platforms Approach' (LPA) to conduct a qualitative analysis of farmer decision-making in Africa, using the four components of the LPA framework (financial, physical, human, and informational). They emphasized how the coherence of these four resource pillars at the household, community, and institutional levels is essential for CA adoption. Earlier studies that assess CA through the lens of Feminist Political Ecology (FPE) have highlighted that land management, resource use, time allocation, labour division within household and livelihood strategies are impacted by men's and women's social roles (Parks & Bagares, 2014). According to Farnworth et al. (2015), the adoption of CA has the ability to alter how women and men interact in households, make decisions, manage crops, and the agency that women have. Adams et al. (2018) identified that such social interactions are gendered, indicating the need for a deeper investigation of how gendered disparities evolve, particularly in the context adoption of agricultural technologies. Thus, there is an opportunity to add to the body of knowledge in the areas of FPE and agricultural technology adoption in

South Asia, particularly with regard to CA as the technology in focus.

Given that CA has emerged as an approach to regenerative sustainable agriculture and land management as an alternative to inefficient tillage-based conventional agriculture (Kassam et al., 2018), and is now in the midst of a few decades of global expansion, particularly in South Asia (Gathala et al., 2015), this period of time and context is ideal for understanding the interactions between gendered aspects of technology adoption and for adding to the body of research especially using qualitative methodologies. This paper explores the existing gender norms in the EGP, and their evolution in the region which will contribute not only to understanding but also in practice to understand inclusivity in practice via perceptions of women farmers in scenarios of agricultural technology adoption. The study sites have already been the subject of a decade-long project on sustainable and resilient farming systems particularly CA. Furthermore, Brown et al. (2023) investigated diversification patterns in these sites, and Chaudhary et al. (2022) and Chaudhary et al. (2023) have further explored farmer perception in these sites. To understand the integration and adoption of sustainable agricultural technologies like CA within these

communities, it is crucial to comprehend the inclusivity of these technologies and the perceptions of women farmers; however, it is also important to acknowledge implications on the social context of communities after adoption.

Materials and methods

Location selection

The EGP region includes the Terai area of lower Nepal, the northern districts of Bangladesh, the northern districts of West Bengal, and the northern section of Bihar (Lahiri-Dutt & Adhikari, 2016). This work analyses a set of interviews from a broader study that investigated the adoption of various sustainable intensification technologies across six locations in the EGP of South Asia (Chaudhary et al., 2022) (Figure 1). These six locations – Sunsari district in Nepal, Rangpur and Rajshahi districts of Bangladesh, Malda and Cooch Behar districts of West Bengal, and Purnea district of Bihar were selected based on suitable agro-ecologies for the implementation of CA for Sustainable Intensification (CASI) practices (Gathala et al., 2021). These agro-ecologies were chosen as they were representative of the broader EGP region, with different

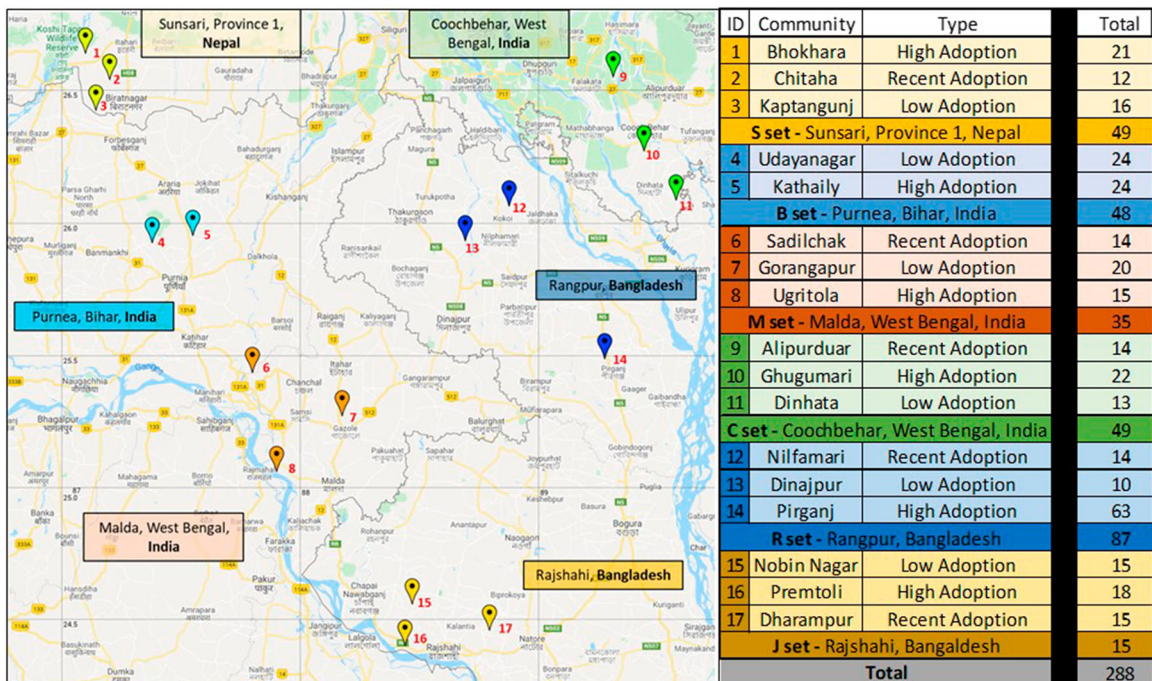


Figure 1. Map of study sites with community locations of respondents.

production systems that are representative of the dominant production systems (Rice-Rice, Rice-Wheat and Rice-Maize) present in the region identified. In contrast to the typical single-site studies that are common in the literature, this study captures a diverse set of cultural norms that highlight local contexts that are present throughout the region by gathering data from various regions.

Questionnaire development

The 'Decision-making Dartboard (DmD) framework' (Figure 2: Brown et al., 2021, p. 257) was used to guide both the question schedule development and

analysis framework for the larger study. A similar approach has been applied in both Africa (e.g. with the precursor LPA framework; Brown et al., 2018, p. 333) and Asia (e.g. Brown et al., 2021b; Chaudhary et al., 2022). The DmD breaks down important decision-making processes into six levels across four asset categories and this led to the development of a semi-structured question schedule which consisted of seven distinct modules. Module one was collected using Kobo Collect software and contained pre-screening and demographic data to categorize the respondent typology. Modules two through seven were digitally recorded for later transcription. Module two focused on their agricultural story identity and

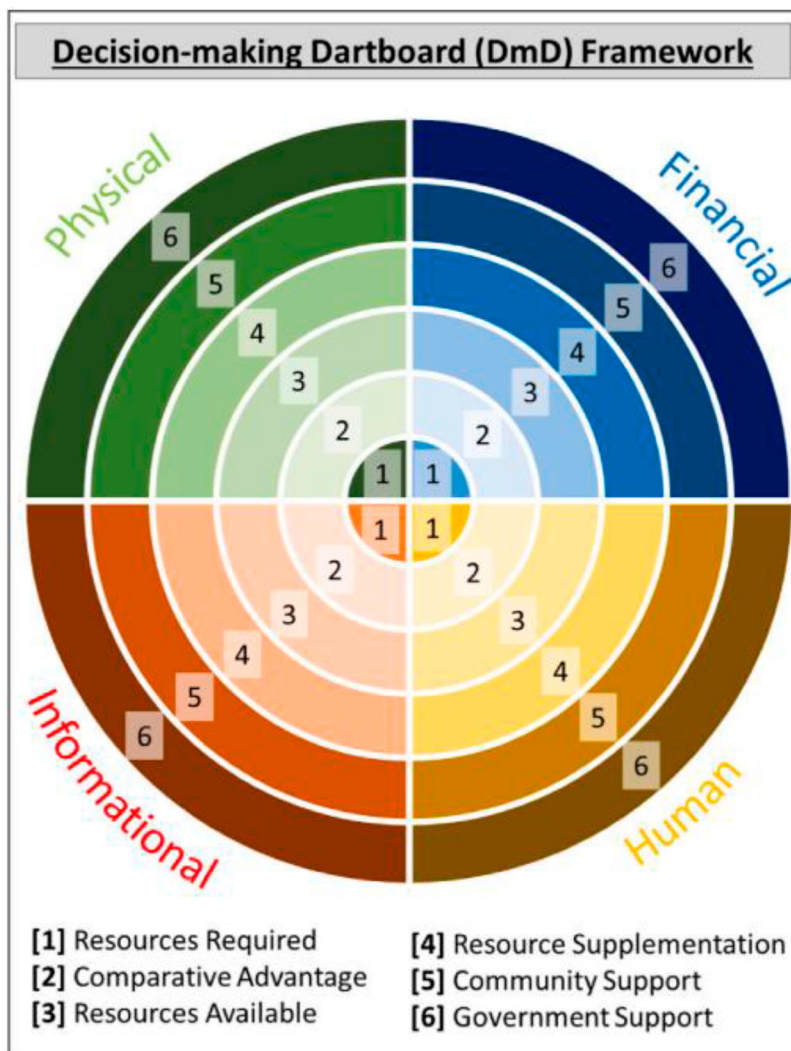


Figure 2. Decision-making Dartboard (DmD) framework (Brown et al., 2021, p. 257).

ambition while module three explored how they learn about new technologies, and then how CASI could be learned about. Module four explored their livelihood constraints while module five explored how they chose to evaluate and actions CASI. Module six explored the community context of adoption CASI, while module seven looked at the outcomes and implications of CASI implementation and what else was needed to ensure success.

Survey implementation

Across a period of 5 months in 2019, 288 interviews were collected which totalled 171 h and 34 min of interview (an average of 35 min per interview). This work builds on the same methodology as presented in Chaudhary et al. (2022) and the dataset is not representative of the communities but is meant to represent the perspectives and experiences of farmers on the technologies investigated. Interviews were conducted in local languages by five women enumerators who were familiar with colloquial subtleties. The agricultural decision maker was interviewed irrespective of gender because this paper is a part of a larger study about the adoption of agricultural technology. In order to grasp regional languages and local community nuances, local implementing institutions were sought out in all areas. Interviews were digitally recorded and included verbal consent at the beginning of each interview from the participants. The interviews were taken with the Kobo Collect toolbox, which was used to capture basic demographic data and mobile devices were used to record the one-to-one interview in audio format with the participants with a special emphasis on ensuring privacy during the interview process and farmer's confidentiality.

Analysis process

Pre-screening information was summarized using Microsoft excel, while all cleaned English transcripts were analysed in Dedoose qualitative software (Dedoose.com), and thematically coded using the DmD framework. The themes used for coding consisted of the 24 codes related to the DmD (6 levels by 4 resource types), with an additional 20 child-themes related to commonly raised topics (for example, communal human resources and issues of gender, social structure and caste, communal informational resources, business strategies, and weed management). This paper focuses on child codes H3.2 Intrahousehold labour allocation, H5.1 Gender Norms, and H5.2 Social Structures to explore the gendered experiences in agriculture as well as agricultural technology adoption. These child codes were coded 397 times from interviews of 161 respondents out of which 31 were women farmers (Table 1).

Results

In the below results, a unique identifier is used to identify representative quotations with the location and gender of respondent, such as S = Sunsari; B = Bihar; R = Rangpur; J = Rajshahi; C = Cooch Behar; M = Malda, and an identifier number, and gender by [f] to denote a women respondent.

Currently prevalent gendered norms

Traditional gender roles based on cultural, social, and religious norms were observed across the EGP, with regional variations. There were some common roles

Table 1. Summary of demographic characteristics of respondents.

Demographic characteristics		Men	Women		
Respondents		130	31		
Average Age		43.7	43.7		
Education level	No formal education – illiterate	10	5		
	No formal education – literate	4	1		
	Primary	6	12		
	Secondary	69	0		
	Higher Secondary	32	10		
	Graduate	6	2		
	Postgraduate	3	1		
CA trained		130	14		
Country wise distribution of respondents					
	India		Bangladesh		Nepal
Cooch Behar	Malda	Purnia	Rajshahi	Rangpur	Sunsari
21	25	32	22	25	36

across the region identified by respondents that had strong gendered norms assigned (Table 2), though such norms were identified more strongly in Bihar and Bangladesh and less so in Cooch Behar.

Women's engagement in agriculture in Bihar varied from family to family, and in many households, women participated in agriculture minimally (e.g. 'My wife only does domestic work. She cooks at home' B1). Domestic chores were also prioritized over farm work in Bihar for women who were involved in agricultural activities (e.g. 'If my wife has time, she helps me with weeding activities. If she has other work at home, then she will not. In this situation, I need to take the help of 2–4 hired labours' B16). Similarly, in many households in Bangladesh, women's participation was limited to their homes, with responsibilities ranging from child-care to poultry keeping (e.g. 'She does not have that much involvement in the agricultural fields, but she does look after chickens and ducks' J15). In Nepal, although male outmigration was common (e.g. 'Their son goes abroad and earns money ... and they built a new house ... they go to Kathmandu, Delhi and Punjab, Saudi, Qatar and Dubai' S17), many women still had limited mobility and were assigned to domestic duties (e.g. 'Women stay at home. We don't let them go out of the house. They can do all the household chores but can't go out of the house' S5).

Conversely, Cooch Behar appears to have a divergent context. In Cooch Behar, women and men commonly worked together in agricultural activities (e.g. 'Both of us take care of the agricultural farm. Both of us do it together' C42), even extending their participation to other income generating activities (e.g. 'Women from our families have started to do mushroom cultivation as a business' C33). In Cooch Behar, women were also seen being involved in women-led farmer clubs that enhanced their agricultural information networks in the village (e.g. 'I go to the club. They had opened women's farmer club, they also have a men's farmer club, they send the news to us, meetings are also held there. I go to the meetings. I get to know about everything from them' C8 [f]). Notwithstanding the overall assigning of gender roles across the region, some households did engage females in agricultural activities. These tasks were often non-mechanized and laborious as in the case of rice transplanting or manual weeding, or in support roles outside of the physical field in the case of post-harvest threshing or in bringing provisions to farm labourers (Table 3).

Factors in maintaining current norms

A multitude of varying factors that influence gender roles, including existing cultural norms and attitudes

Table 2. Regionally relevant gendered norms assigned to various agricultural activities as assigned by respondents.

Activity and assigned gender	Representative quotation	ID
Overall farm work (men)	'In our family women do not work on the farm. It's our culture coming from our grandparents' time. Men do all the farm-related work, and women do housework'	B17
Herbicide spraying (men)	'Men spray chemicals, do fertilizer application, irrigation application, layout or preparing seed beds, etc.'	B12
Tilling (men)	'Tilling the land with a spade can only be done by men, things like that my husband comes and does or we hire a labourer [male] and make him do it'	R10
Mobility in public spaces (men)	'He tells me agricultural information sometimes ... Since he is working in the tea shop, there are discussions when farmers gather there.'	C8 [f]
Housekeeping duties (women)	'Women cannot do farming ... In addition to their housekeeping, they're hardly free'	J18 [f]
Caring (women)	'My wife is involved in domestic work ... She also must look after the older members of the family. It is her duty'	B14

Table 3. Few exceptions when women engage in agriculture.

Categories of exceptions	Representative quotation	ID
Participation in transplanting	'We need women for trans-plantation and men for making the edges of the fields'	S28
Manual weeding	'When the farmer sprays herbicides in the field, then it reduces weeds from the field, but they never spray on bunds. In this case, women have to do manual weeding on the bunds'	B12
Post-harvesting activities	'The women members of the family do these types of work ... After harvesting and threshing of the crop with the help of labour, the drying of the grain is done by the women members'	B26
Taking food and water to the fields	'Women never go to the farm. Sometimes they come to the farm to provide water or food. They only come to the farm to see how the crop is'	B42

that limit women's ability to participate in agricultural activities outside their homes were present across the region as discussed in the following sections.

Social pressure

While some women respondents in Cooch Behar emphasized bending gender-based norms in agricultural participation, others experienced community resistance to women's engagement due to traditional gender norms which prevented women from actively engaging in activities outside of their homes (e.g. 'Let me talk about trainings, people said that women should not go outside like this, it is not good for them to attend trainings outside of village' C29 [f]). Therefore, several respondents hesitated to deviate from their assigned responsibilities for fear of being judged and ridiculed in the community, further limiting their participation (e.g. 'I feel shy [e.g. to use spray pump]. Other women from the village are not doing, then how can I do it? ... and if I am doing it alone, people will laugh at me' B27 [f]). Despite the awareness of changing gender roles, there was often resistance from within the family to women's participation in agricultural activities in some households, even as other households changed their outlook on women (e.g. 'Now it changed, now some women came outside. But still, most of the families do not send their women outside for work' B13).

Religious pressure

Women's participation in agriculture was constrained by pre-existing gender norms influenced by culture which existed in diverse forms in communities across the study area. For example, in all regions except Cooch Behar and Sunsari, gender norms restricting women's involvement in agriculture were also influenced by the religious beliefs for some households (e.g. 'None of the women in our village goes to the field. Muslim women do not go to the field' M15).

Identity through assigned tasks and marriage

Women from agricultural communities in Rajshahi did not identify themselves as farmers, but rather based on the activities they were most responsible for, which were generally connected with private spaces of the house (e.g. 'We are woman. We are housewives. We keep domestic animal like cow-goat, poultry chicken-duck. Women are housewives not farmers' J18 [f]). Moreover, women's decision to take part in other activities especially after marriage was

determined by the time, she has for other household tasks ('Before marriage, I used to go to school, and did some embroidery work. After marriage, I have not done embroidery as this need hard work and takes more time' B1 [f]).

Exclusion from training and decision making

Some male respondents in Bihar, Sunsari, and Malda believed that women lacked formal education and exposure and they were unlikely to grasp and share complex knowledge regarding farming techniques (e.g. 'How will the women know? They don't understand anything, so how will they know anything about agriculture? ... They are illiterate. How will stupid people understand? Men they go to different places and understand these things' S20). This understanding also led to the perception that men were preferred to test technology due to their close engagement with agricultural work (e.g. 'First I have to test it [agricultural methods]. The women here do not do that much agricultural work. Men do most of the work, so first men have to test it themselves' S19). As a result, decision made by men was largely devoid of women's influence (e.g. 'Whatever men would do, they will take the decisions themselves, and that will be the final decision' J19).

Factors driving (potential) change in gendered norms

While gendered norms and roles appear engrained in the community, respondents identified instances of change that were largely driven by resource constraints and underlying drivers of change.

Labour scarcity due to outmigration

Outmigration was seen as a trend in the EGP which resulted in a need for the shifting of gender roles for some women. The major incentive for migration was improved earnings, which was evident across locations for migrating male farmers (e.g. 'The current issue is the unavailability of labours as they are hard to find ... In the village, people who belong to the labour class, are working outside mostly [migration] ... And they are getting a higher payment from those' M27). A lack of both male household heads and daily labourers hence led some women to engage in agricultural activities out of necessity (e.g. 'As per our culture, women do not work on the farm. Now the time has changed, and there is a scarcity of labour, so due to helplessness

women need to work on the farm' B43). This labour shortage influenced a change in existing cultural settings which led to increased participation on the farm for women and even taking over roles of men at times when they were engaged in off farm employment (e.g. 'At that time, very few women went to the farm. I needed to go to the farm, since my husband and son are involved in a business, they did not have time to take care of the farm' B27). The quantity of domestic chores also often influenced women's engagement in agriculture, leading to a choice between employing labour or engaging women in agricultural activities (e.g. 'When there is more field work, then we hire labour, and if there is less work, then family women do it' B26).

Interestingly there were also scenarios identified where outmigration led to reduced time in agricultural for females. In Nepal, in some cases, male outmigration contributed to a decrease in women's agriculture participation due to increased household finances (e.g. 'The husband sends money each month to his wife. Will that wife go to work in farm? The husband tells wife to stay at home and not to go to work in the field. That's the situation now' S10).

Family and peer support

In households where women are partaking in agriculture, support from a household member, such as a mother-in-law or husband, was often linked with increased ease of participation in field activities (e.g. 'If she did not allow me to go outside my house then I would not be able to do this. My mother-in-law told me to go outside and learn, it will be required for my work' C29 [f]). Women also stated that societal pressure may be a barrier to attending agricultural trainings, but this has been improving because of family members' support, which has enabled them to attend such trainings (e.g. 'My husband did not say anything. Maybe, he felt a bit embarrassed at first when I wanted to go with him ... Again, when I started training, he thought that we both should get involved. Then no one else said anything' J7 [f]).

Women centric development initiatives

Women's participation in agriculture has also been influenced by women centric development programmes and exposure. Men were more likely to attend agricultural trainings and meetings; however, women were becoming aware that some programmes were targeted specifically for them and required their involvement, especially if funding

agencies were present (e.g. 'If any meeting happens, it usually happens with the men [farmers], when madam and other people from outside come, from Australia or Delhi, then they say that they want to talk with people from women's club' C8). Some community initiatives targeting women's engagement have contributed to increasing women's visibility in a public sphere, this helped increase women's participation in communal groups and formation of village-level women's organizations (e.g. 'Women are doing a lot of work through JIVIKA (Bihar's livelihood initiative for women). Earlier women used to sit and do their household work. But now due to JIVIKA work, women have to leave the house, and they go out for learning and work' B33). There was also a sense of reflection among women who had interacted with international initiatives and with women from other western cultures and what that meant for their situation (e.g. 'Women can do it ... why will they not be able to operate a tractor. If in Australia a woman can operate a tractor, why will the women in Cooch Behar not be able to? You need courage and strength for it' C9).

Future outlook and ambitions

Women across all six locations expected that in the future they will take up male-dominated activities of agricultural mechanization and machine operation (e.g. 'Women of this village have never driven any machinery like these. These are mainly driven by men ... I think as time is progressing, women will have to do it' J31). This transition as per the respondents can be assisted by women-focused operators training (e.g. 'Yes, I can go to the training, we need to show that not only men can operate the ZT machinery, but women can do it as well' R44). Such agricultural trainings and interventions were also bringing change in the views of the communities regarding women's participation (e.g. 'After getting the trainings people of this village they saw nothing is wrong when women work in the field. They take it as a good thing' J7 [f]). Women who had participated in agriculture had begun to earn money for their families, enhancing the financial assets (e.g. 'I opened Life Insurance accounts for my home. I have bought some land and a motorcycle with the money saved after doing ZT ... It is not the money from my husband's earning, it is savings from agriculture' C29 [f]). This in turn will lead to women being motivated to work and participate in farm activities in the future, by observing peers who

bend down gender barriers (e.g. 'In future, of course this will happen because women did not usually come out of their house before, but now, I'm a woman and I go to the field, if I can work then why can't they. Like this, many are getting inspired' J7 [f]).

Discussion

Social and cultural constructs such as traditional roles, limited mobility, societal criticism for breach of gender norms, laborious unmechanized agricultural work, and unrecognized gender roles, exist dominantly for women in the EGP. While this study demonstrates that these norms are prevalent across the EGP, it also uncovers outliers and an emerging narrative that is likely to lead to greater bending (but perhaps not breaking) of such norms. This transition will most likely begin on a case-by-case basis for households owing to the necessities of their circumstances, but systemic transformation will necessitate more engagement of women household members in a broader variety of agricultural engagement. At a community level, key drivers of change include a lack of available labour driven by outmigration, and a growing awareness from other cultures who are not bound by the same gendered norms. These findings shed light on how different resource accessibility (via DmD framework) is relevant to gendered understanding of technology adoption, which greatly contributes to the fundamentals of FPE. [Figure 3](#) provides a summary of the dominant gendered agricultural norms in the region, and the contextual factors that are bending these norms and leading to changed involvement of women in agriculture.

Dominant social and cultural gender norms

Pre-existing gender norms influenced by culture existed in various forms across communities in the study locations, limiting women's participation in agriculture. Religious beliefs, in particular, influenced gender norms in some households. Traditionally, women were encouraged to perform household chores, childcare, and livestock rearing, but in specific regions such as Cooch Behar, women were more actively involved in agriculture and even participated in women-led village-level farmers' groups. While men's outmigration was prevalent across regions, women's mobility was frequently observed to be dependent on men's discretionary power,

even after migration of men, as seen in prior research over the last decade (Gartaula et al., [2010](#); Lee et al., [2021](#); Maity, [2018](#)). In such cases, it was observed that decision-making powers usually forgo women and are rather handed to other men in the family (Maity, [2018](#)) or are claimed by men who remain outside of their homes. Despite the exponential growth in migration, agriculture is still essential for household members who are 'left behind' (Fernández-Sánchez et al., [2020](#); Shattuck et al., [2019](#)), particularly women for food and sustenance. In some study locations, findings showed that migrating farmers who earned enough money urged their spouses to stay at home and not work in their fields, limiting women's knowledge production and access. As a result, when women farmers had the opportunity to actively participate in agriculture after the men migrated, there was a de-feminization among them rather than a feminization in some households. Even after the men migrated, they continue to have an effect on women's autonomy in decision-making, particularly when it comes to farm decisions. Although the type and intensity of this impact on autonomy varied within households, it centred mainly on women's participation in agriculture in the context of gender constructs.

These gender norms resulted in mobility restriction thus limiting women's access to supplementary information sources and exposure with the outside world. Furthermore, the findings of this study show that these issues, along with women's perceived lack of education, have limited their access to family decision-making, as evidenced by the effect of EGP's patriarchal system (Baral et al., [2021](#); Ghose et al., [2017](#); Routray et al., [2017](#); Tamkeen & Bose, [2019](#)). While for some women in the EGP participation in public spaces has increased as they move away from unrecognized or unpaid work, this often did not reflect changes in their private spaces in terms of decision-making authority, which was largely dominated by men. The results thus revealed a circular argument from some male household heads that since women were uneducated, this should be a justification for them not receiving trainings or taking part in information exchanges, thus continuing this recurrent loop and eliminating possible way out of this vicious cycle for women. This emphasizes how crucial it is for outside organizations to focus on initiatives that target women in order to break this cycle. The results of this study also reveal that the labour distribution and drudgery of work were not

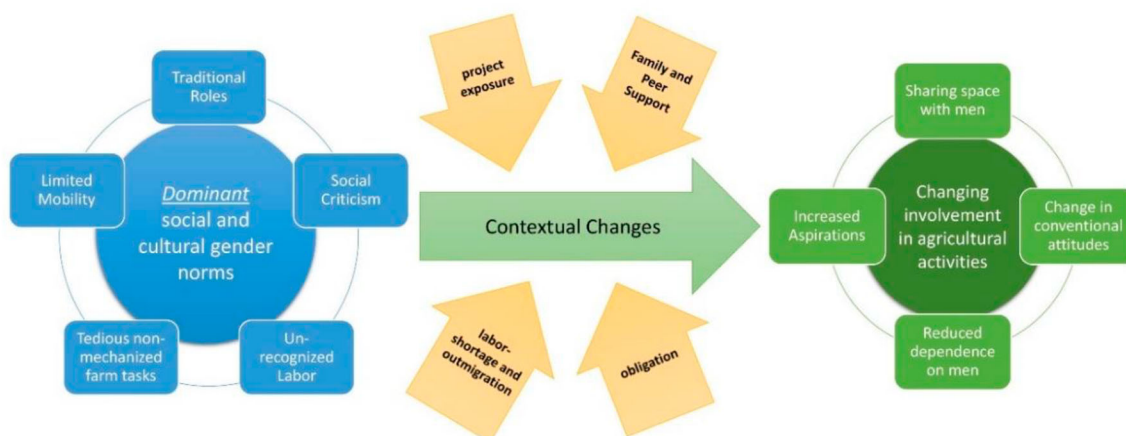


Figure 3. The emergent narrative of contextual changes that are leading to a bending of gender norms across the Eastern Gangetic Plains.

always equitable, even in households where men and women both were involved in farming. Our findings also reveal that although women were involved in various post-harvesting tasks and other indirect farm activities such as cooking for labourers and fetching water, these roles were often unrecognized, which supplements prior research (Nyanga, 2012). Bauer (2016) and McGowan (2011) have emphasized in their studies that women who engaged in agricultural activities contrary to systemic gender norms were frequently subjected to societal criticism, despite the fact that the families were aware of evolving gender roles as evidenced by our findings in the EGP. Women's participation in agriculture has been limited as a result of these forms of resistances emerging from social and cultural structures, despite widespread awareness of changes in gender norms.

Drivers of contextual changes and implications

Women's role and participation in agriculture are adjusted on a need-based approach driven largely by labour shortages or by the absence of male household members due to outmigration or participation in other lucrative income-generating livelihood activities. This involvement of women was driven by necessity emerging from financial status, rather than willingness or desire to be involved in agriculture. Although the drivers of diversifying income sources from farm to non-farm via male outmigration appear profitable for farmers, as seen in this study, prior research have shown that this could also lead

to agricultural feminization and partial autonomy for women in farming (Neog & Sahoo, 2020). When men were away, women who took over as household heads made some decisions, such as choosing crops or agricultural practises, but often, similar to earlier studies (Pattnaik et al., 2017), men still held the majority of decision-making power. However, it is difficult to determine if this engagement of women in agriculture is permanent, as it can be readily reversed when there are limited prospects for men in the cities (and this is worthy of further exploration given the large workforce re-ruralization that has occurred in the region during the COVID-19 pandemic).

The findings of this study also demonstrate that women were aware that development projects were targeted towards them, particularly because meetings and trainings requested their attendance; however, men tended to believe that women do not have the same level of agricultural knowledge as men and should not participate in decision-making. This reflects common issues in changing power dynamics that highlight the need to create 'win-win' narratives to training of women farmers, part of which is being led by developmental programmes targeting women. In Bihar, for example, government initiatives like Jeevika have helped mobilize disadvantaged rural women to work together to improve their lives, as demonstrated in the results from this study, by actively participating in various government programmes, and venturing in public spaces (Priyadarshini, 2018). Women recognized that exposure to projects and project people encouraged them to assume on roles similar to those taken

on by women in other parts of the world, not just in their own communities. Similar findings were made by Tonny and Ahmed (2020) in their research in Bangladesh, where they observed that women's contributions to agricultural practises and decision-making are frequently undervalued, but that non-governmental organization (NGO) intervention and development projects may have a significant influence on women's participation in decision-making.

The findings also suggest that participation in community groups increases awareness and provides an opportunity for increased participation in public space. In addition, financial empowerment as women start to earn from agriculture has also led to decreased reliance on men for meeting financial needs. Najafizadeh and Lindsey (2018) articulate such transformations, where women explore the idea of sharing space with men in agriculture, as a form of 'patriarchal bargain' and resistance to ingrained gender norms. Participating in such activities with peer and family support and working in groups increased confidence for some women, so coming together to overcome these social constructs was significant for them. Gender-inclusive trainings on agricultural technologies can also increase women's exposure and lower their dependence on men in activities such as the operation of farm machinery. However, trainings do not guarantee participation since machinery is often inaccessible to women due to negative traditional attitudes of men and institutional prejudices (Mudege et al., 2017). Additionally, women have historically been unable to participate in agricultural activities, particularly those involving agricultural mechanization, because the machinery or technology being promoted must be user-friendly for women (Paudel et al., 2020; Suvedi et al., 2017). The findings unequivocally show that initiatives being promoted and women's access to space, visibility, and participation must accurately reflect their current situation. Although gender norms in the EGP are changing, they are still far from being equal to those of men. A targeted strategy could lead to greater participation from women in the EGP as a whole.

Conclusion

Our findings highlight that woman in the EGP are confronted with various gendered expectations that limit their agency and empowerment. While these gender norms persist, there are instances that show

transformation by challenging these norms and are often driven by the necessity, especially of labour required in agricultural production systems. Gender norms have been shifting, although women are frequently exposed to societal criticism if gender norms are disregarded. Positive changes have only been witnessed in individual families and are yet to permeate at a communal and societal level, and there is still a long process in the EGP's culturally embedded and interwoven systemic gender standards.

The bending of gender norms was in conjunction with factors such as production, group solidarity, and transforming gendered roles and responsibilities, all of which were directly influenced by women's agency and access to and control over resources. Women's participation was subsequently impacted by conflicting power structures across each of these factors, which has been fundamental to FPE. Additionally, there were a number of trends that were likely to accelerate this process of change, including changes in household dynamics brought on by labour shortage, men's emigration, agricultural intensification, supportive environments for women at home, peer recognition and support, and increased exposure to outside projects and organizations. These elements must form the focus of future interventions in the agricultural sector, and importantly highlighted when working with women who are not decision-makers to observe long-term impacts in terms of societal change. This paper encourages increased focus on current systemic norms that impact opportunities and participation, particularly for women, in order to ensure a more equitable agricultural development. It also calls for targeted approaches to bring about transformative changes that may act to additionally bend gender norms.

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Author Contributions

The study's conceptualization and design were overseen by Brendan Brown, and under his supervision Pragya Timsina, Anjana Chaudhary, Akriti Sharma, Emma Karki, and Bhavya Suri were in charge of material preparation and data collection. Pragya Timsina led the study analysis, with Anjana Chaudhary and Brendan Brown assisting in the refinement and finalisation of the manuscript, which incorporated contributions from all authors during the review process.

Disclosure statement

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Informed consent

The studies involving human participants were reviewed and approved by Gideon Kruseman, Head of CIMMYT Internal Review Ethics Committee (Ethics approval number: IREC-2019.020). The participants provided their informed consent to participate in this study.

Data availability statement

Anonymized Data can be made available on reasonable request.

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