

Surendran Padmaja, Subash; Korekallu Srinivasa, Aditya; Trivedi, Pooja;
Srinivas, Kondapi

Article — Published Version

Women self-help groups and intra-household decision-making in agriculture

Annals of Public and Cooperative Economics

Provided in Cooperation with:

John Wiley & Sons

Suggested Citation: Surendran Padmaja, Subash; Korekallu Srinivasa, Aditya; Trivedi, Pooja; Srinivas, Kondapi (2023) : Women self-help groups and intra-household decision-making in agriculture, Annals of Public and Cooperative Economics, ISSN 1467-8292, Wiley, Hoboken, NJ, Vol. 94, Iss. 3, pp. 857-876,
<https://doi.org/10.1111/apce.12442>

This Version is available at:

<https://hdl.handle.net/10419/288146>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<http://creativecommons.org/licenses/by/4.0/>

SPECIAL ISSUE

Women self-help groups and intra-household decision-making in agriculture

Subash Surendran Padmaja^{1,2}  | Aditya Korekallu Srinivasa^{3,4} |
Pooja Trivedi⁵ | Kondapi Srinivas⁶

¹Center for Development Research (ZEF), University of Bonn, Bonn, Germany

²Agricultural Growth and Development, ICAR-National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi, India

³Humboldt-Universität zu Berlin, Berlin, Germany

⁴Department of Agricultural Economics, ICAR-Indian Agricultural Research Institute, New Delhi, India

⁵Independent Researcher, Bangalore, India

⁶ICAR-National Academy of Agricultural Research Management, Hyderabad, Telangana, India

Correspondence

Subash Surendran Padmaja, Center for Development Research (ZEF), University of Bonn, Bonn, Germany.

Email: subashspar@gmail.com

Funding information

Bill and Melinda Gates Foundation, Grant/Award Number: opp1116475

Abstract

This study examines the effect of women-centric agricultural self-help groups (SHGs) on intra-household decision-making in agriculture. Using data collected from an intra-household survey of 815 households, we analyze the effect of women's membership in different types of SHGs on 14 decisions related to farms and households. Specifically, we investigate the discord in decision-making, which is the difference in the perceived decision-making roles of spouses within a household. Our results show that women's participation in SHGs has increased their role in decision-making by 8–13%. However, the effects vary according to the type of intervention and the decision. We found fewer discords in intra-household decision-making in seed SHGs than in micro-finance SHGs. In conclusion, our study suggests that women's engagement in agriculture-based SHG interventions can encourage joint decision-making, but the magnitude of this effect depends on the type of SHG. Development agencies can use this information to design interventions targeted at empowering women through the improvement of the agricultural value chain.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *Annals of Public and Cooperative Economics* published by John Wiley & Sons Ltd on behalf of Edgard Milhaud Foundation.

KEYWORDS

intra-household discord, self-help groups (SHGs), women empowerment, farm households

1 | INTRODUCTION

Sustainable Development Goal 5 of United Nations Development Program aims to promote gender equality and empower women and girls, which has led to various efforts over the past few decades. Initially, the focus was on human rights, but the concept of equality and empowerment has evolved to include access and control over resources. Similarly, the emphasis on gender in agriculture has also evolved during the same period. International organizations such as the United Nations, World Bank, and CGIAR have initiated several gender-centric programs (Sarapura-Escobar et al., 2017), followed by government and non-governmental organizations promoting programs to empower women in agriculture in developing countries. Most of these initiatives involve providing training to women in improved agricultural technologies. Over time, the approach has shifted from individual-level programs (van den Bold et al., 2015; Quisumbing et al., 2015) to community-level programs (Quisumbing and Kumar, 2011) that aim to empower women in agriculture to improve their welfare and that of their households. There is a growing body of literature on the impact of such interventions on women's empowerment (Rao, 2008; Quisumbing et al., 2015). Studies have shown that women's participation in self-help groups (SHGs) or community-based interventions leads to their empowerment (Brody et al., 2016; Hoffman et al., 2021; Kochar et al., 2022; Kumar et al., 2021), although some studies have also reported instances of disempowerment (Garikipati, 2008; Balasubramanian, 2013).

Women's empowerment is a broader concept defined differently depending on the context. Generally, it aims to achieve equal rights, capacity, access to assets and resources, and decision-making authority (Alkire et al., 2013). The Women's Empowerment in Agriculture Index (WEAI) developed by Alkire et al. (2013) has outlined various dimensions of empowerment, including decision-making, ownership, control, leadership, and time. Among these dimensions, intra-household bargaining power is a crucial indicator of women's empowerment, as highlighted in detailed reviews by Kebede et al. (2014), Doss (2013), and Malapit and Quisumbing (2014). Mwambi et al. (2020) have shown that women are excluded from decision-making in producer organizations due to poor bargaining power. The impact of bargaining power within households on women's empowerment and household welfare has been studied in various social and economic contexts across countries. For instance, in India, the relative authority of women over their husbands is associated with the increased use of modern contraception (Jejeebhoy, 2002). Similarly, the relationship between women's decision-making authority and nutritional outcomes has been examined in countries like Nepal (Malapit et al., 2013), Bangladesh (Bhagowalia et al., 2012), and Ghana (Malapit et al., 2014).

The literature also highlights that interventions targeted towards women that do not consider intra-household dynamics can significantly impact their outcomes (Alkire et al., 2013). Quisumbing and Kumar (2011) demonstrated that interventions targeting individual women could result in growing gender asset inequality within households, compared to interventions at the group level. Anderson et al. (2017) concluded that the absence of spousal agreement could pose a challenge for interventions aimed at reducing gender inequality or empowering women in rural regions. On the other hand, Kochar et al. (2022) showed that the impact of SHGs on women's decision-making depends on the size of the loan they can obtain from the SHG. In her study

on loans channeled through SHGs in India, Garikipati (2008) highlighted that a lack of women's co-ownership in productive assets could result in disempowerment. Therefore, studies on women empowerment programs need to focus on intra-household dynamics, as they can be potential constraints for achieving the desired impact. In this context, the present paper explores the impact of women-centric community-based programs on intra-household decision-making. We studied the perceived decision-making authority regarding the decisions related to farms and households separately from both men and women in a household. We compared it across different types of interventions.

This paper investigates an SHG-based initiative in a typically patriarchal society in Uttar Pradesh, India. SHGs were established and linked with banks under a microfinance program (Panda & Reddy, 2020). To streamline the research, we conducted Focus Group Discussions (FGDs) and in-depth interviews to comprehend the premises of the problem. During the interviews and discussions, we discovered numerous anecdotal evidence of changing intra-household decision-making in targeted households. Many stories were shared about the household and community conflicts faced during their journey as a member of the SHG. The key takeaway from these narratives is that the financial support received through SHGs played a crucial role in bringing about change in intra-household dynamics. Interestingly, one significant intervention of SHGs was seed production and marketing (paddy and wheat crops). This involved training SHG members on seed production technology. The findings from the pilot study suggested that such an intervention could substantially impact intra-household bargaining power and decision-making. This prompted us to investigate household bargaining power in the context of household decision-making using a larger household survey.

Our study contributes to the existing literature on intra-household decision-making in the following ways. Existing empirical work is primarily restricted to single-spouse accounts of decision-making. Few intra-household studies have examined the interaction between husbands and wives using a dual-household model (Anderson et al., 2017). However, in developing countries, households have multiple adults, and decision-makers may not be household heads or spouses (Doss, 2013). We reject the default notion that only the husband and wife make decisions in the household. The decision-maker could be anyone from the household, but for intra-household dynamics, we limit our analysis only to the primary decision-maker and their spouse. We also demonstrate that while women's participation in SHGs increases their role in decision-making, it can also result in intra-household discord. As one of the objectives of promoting collective action amongst women is to empower them, the study highlights the need to pay closer attention to intra-household decision-making. One limitation of the study is that it does not delve into how negotiations occur within the household. These dimensions have been explored in several other qualitative studies (Rivers et al., 2018) and are beyond the scope of this study.

The paper is structured into six sections. In Section 2, we provide details about the intervention. In Section 3, we discuss the theoretical framework used for the study. Section 4 outlines the methodology used, while Section 5 presents the results. The conclusion and policy implications are presented in Section 6.

2 | THE INTERVENTION

The program titled Strengthening Informal Seed Systems through Women SHGs in Uttar Pradesh, India, was funded by the Bill and Melinda Gates Foundation (BMGF). It was implemented as an extension to the existing SHGs initiative of Rajiv Gandhi Mahila Vikas Pariyojana (RGMVP) under the Rajiv Gandhi Charitable Trust in Rae Bareilly, Uttar Pradesh, India. The program was launched

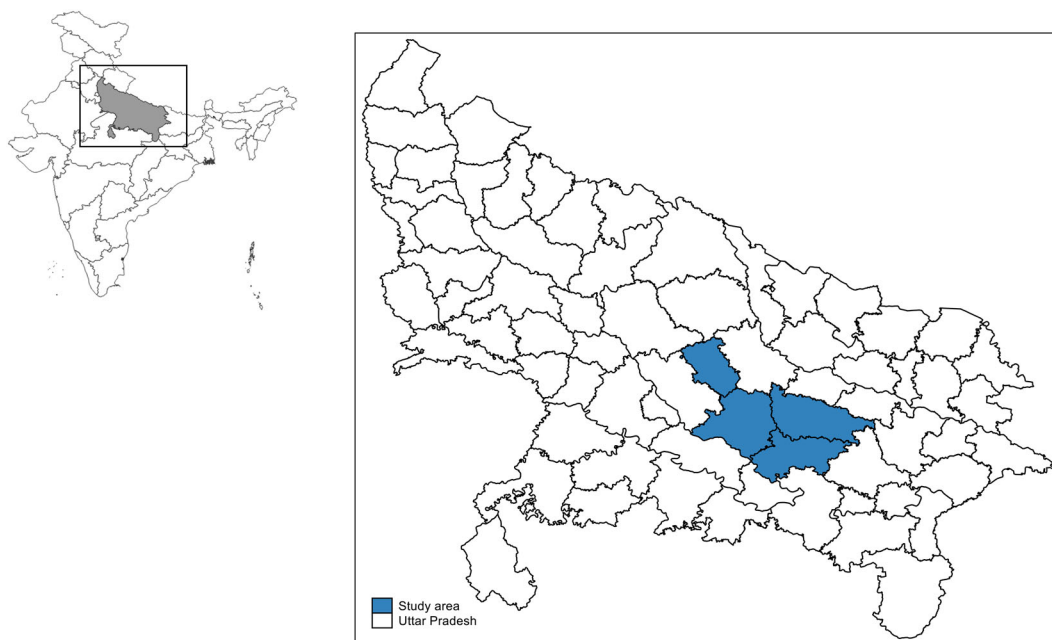


FIGURE 1 Study area under the program in Uttar Pradesh, India. [Colour figure can be viewed at wileyonlinelibrary.com]

in 2015 and was implemented in five districts of Uttar Pradesh (Amethi, Lucknow, Pratapgarh, Rae Bareilly, and Sultanpur), covering 12 blocks across these districts (refer to Figure 1).

The objective of the program was to improve the availability of high-quality rice and wheat seeds to farmers through SHGs and their federations. RGMVP's SHG initiative followed a three-tier structure: the lowest level being the SHG, the Village Organization (VO) above that, and the Block Organization (BO) at the top. The model was federal in nature, with SHGs consisting of 10–15 members, VOs comprising women representatives from 10 to 20 SHGs, and BOs comprising selected members from 25 to 40 VOs. The seed program was layered on this three-tier structure.

SHGs for seed intervention (henceforth seed SHGs) were selected based on their successful track record as micro-finance SHGs. The selection of seed producers within the SHGs was based on the presence of agricultural land for seed production. The VOs or BOs purchased foundation seeds of preferred varieties from research institutions (State Agricultural Universities, Indian Council of Agricultural Research, International Rice Research Institute). The seed was then provided to the selected seed producers with the condition that they would take all the necessary steps to ensure seed quality and return a portion of the harvest to the VO. To ensure quality, RGMVP provided regular training to the community on seed production and management. SHG members also participated in participatory varietal selection (PVS) trials, which improved their understanding of various varieties and their performance. For further details on the structure of the SHGs, the selection process for seed SHGs, and the seed production process in this project, please refer to de Boef et al. (2021).

In two ways, this program is ideal to address our research question. First, this program is implemented in a patriarchal society in a developing country. The state of Uttar Pradesh in India is characterized by a patriarchal society where the authority to make decisions regarding households and farms is held by male family members. The program focuses on strengthening the abilities of women members of the households in seed variety selection, production, sale, and other

agricultural-related activities in this male-dominated region. Women are usually not engaged in purchasing seeds because of a lack of knowledge regarding improved varieties. Through this intervention, the program aimed at building their capabilities to produce and market seeds. Secondly, the seed production program is layered over an existing micro-finance program run as a self-help group. This provides an opportunity to distinguish the effect of intervention types: only micro-finance SHG, and micro-finance plus seed SHG. In micro-finance SHGs, women avail credit for individual and household needs, in which they play a passive role. In contrast, the women members are involved in seed enterprise, and they undertake the seed management activity, thus playing an active role in the case of seed SHG.

3 | CONCEPTUAL FRAMEWORK AND METHODOLOGY

3.1 | Conceptual framework

Previous studies on women's intra-household authority were based on a unitary household framework (Bobonis, 2009; Quisumbing & Maluccio, 2003) that assumed homogeneous spousal preferences (Anderson et al., 2017) and did not consider the effect of bargaining power on household outcomes (Doss, 2013). However, recent literature has challenged the unitary models and categorized intra-household bargaining theories into three: cooperative, collective, and non-cooperative bargaining models (Doss, 2013). These models explain intra-household decision-making processes and their outcomes (Anderson et al., 2017). The cooperative model assumes that bargaining outcomes result from direct negotiation between spouses and their relative power, while collective models suggest that households can achieve Pareto efficiency without making another household member worse off (Doss, 2013). In contrast, non-cooperative models hypothesize that spouses' independent actions lead to a self-enforcing Nash equilibrium that may or may not be Pareto efficient (Lundberg & Pollack, 1994). Studies in developing countries provide evidence for non-cooperative bargaining models in intra-household decision-making (Mabsout & Van Staveren, 2010; Malapit & Quisumbing, 2014) and demonstrate the potential effect of women's decision-making power on household welfare (Kebede et al., 2014; Malapit & Quisumbing, 2014). These models provide insights into household bargaining power not captured by unitary models.

In this study, we draw explicitly from the interpersonal circumplex model (Freedman et al., 1951), which classifies personality traits into agreeableness, quarrelsomeness, dominance, and submissiveness, to understand the nature of differences in perceived decision-making power between spouses within families. We focus specifically on the dyadic conflict outcomes of dominance and submissiveness (Wheaton, 1974; Au & Lam, 2015), which helps us understand the nature of differences in perceived decision-making power between spouses within families.

3.2 | Methodology

3.2.1 | Sampling method

The study uses primary intra-household data collected from SHG and non-SHG households in the study region comprising 12 blocks in five districts. Multi-stage random sampling was used in the study. In stage one, targeted (regions in which the program is implemented) and non-targeted Village Organizations (VOs) located at the Gram Panchayat level were randomly selected from the 12 blocks. The number of VOs and sampling households was determined based on power

calculation.¹ In stage two, the population from the sampled VOs (targeted and non-targeted) was divided into six strata, including seed producers in targeted SHG in targeted VO (S1), non-seed producers in targeted SHG in targeted VO (S2), non-seed producer SHG in targeted VO (S3), non-SHG members in targeted VO (S4), non-seed producer SHG in non-targeted VOs (S5), and non-SHG members in non-targeted VOs (S6) (refer to [Appendix Figure A1](#)). SHG households were randomly sampled from the census data on targeted households in the region. In each stratum, 140 households were sampled, making a total of 840 households planned for the survey. However, the study ended up surveying 815 households. Non-SHG households in targeted and non-targeted VOs were selected randomly from households after a census of non-SHG households in the sampled VOs in the treatment and control regions.

3.2.2 | Data

The study collected primary data from June to July 2017 using three structured questionnaires: one for the household head, second for the woman SHG member (if applicable), and another for the primary decision maker in the household (spouse or another family member, if applicable). In the case of non-SHG households, the interviews were conducted with the household head, the primary decision maker (if the household head was not the primary decision maker in agriculture), and the household head's spouse. Details about the questionnaire-respondent type across different strata are provided in [Appendix Table A1](#).

To account for the possibility of multiple adults and decision makers in rural areas of developing countries, the study departed from the conventional approach of interviewing the husband and wife in a dual household model. Instead, the interviews of SHG members and primary decision makers were conducted separately. This approach avoids the assumption that the household head and spouse are always the primary decision makers. Data were collected on socio-economic characteristics, decision making (including production, marketing, post-harvest practices, access and control of resources), social capital, time and resource allocation, farm characteristics, and cost of cultivation. The information provided by the household head determined the information provided by the primary decision maker in agriculture.

4 | EMPIRICAL MODEL AND VARIABLES

4.1 | Empirical model

In the first step, we estimated the effect of SHG membership (seed/ non-seed) in improving the role of women in agricultural decision-making using a unitary household model. We modeled

¹The sample size was estimated through power calculation using optimal design software (Spybrook et al., 2011). The effect size was calculated based on paper by Garikipati (2008) which also looked on impact of SHG women lending on women empowerment. The estimated effect size ranged from 0.12 to 0.24 for various household level decisions. We used effective size approach in estimating the number of VOs and power size approach in estimating total sample size. A total of 92 VOs were sampled (with effect size 0.12 and $\alpha = 0.05$). For estimation of total sample size per VOs we considered higher effect size (0.20) with $\alpha = 0.05$. The sample size was estimated to be 800 and we interviewed 840 households (140 households per strata). We oversampled it by 5% to account for missing observations / possible data collection errors. We don't have data on interclass correlation from existing literature so we did not account for inter-class correlation.

the gender of the primary decision maker as stated by the household as a function of several of individual, household, and farm characteristics. The empirical form of the model is

$$Y_i = \beta_0 + \beta_1 T_{ik} + \beta_2 X_{ij} + \mu_i \quad (1)$$

where $Y_i = 1$ indicates female is the primary decision maker regarding agriculture in the i th household and 0 otherwise. T_{ik} is the k th group (seed SHG, non-seed SHG, and others) to which the household belongs and X_{ij} is the j th set of individual characteristics, household characteristics, and farm characteristics.

To analyze the intra-household difference, we model it as

$$Z_i = \gamma_0 + \gamma_1 T_{ik} + \gamma_2 X_{ij} + \varepsilon_i \quad (2)$$

where $Z_i = 1$ indicates a household with intra-household discord in decision making in the i th household and 0 otherwise. The definition and approach used for measuring discord is provided in next section on outcome variables. T_{ik} is the k th group (Seed SHG, Non-seed SHG, and others) to which the household belongs and X_{ij} is j th set of individual characteristics, household characteristics and farm characteristics. Although we could model Equations (1) and (2) using a linear probability model (LPM) or other binary models (Probit/Logit), the estimates would be biased due to self-selection of SHG members. Households with certain characteristics have a higher probability of being a member of SHG, and not accounting for these differences leads to selection bias. As our study was designed and carried out after the intervention was implemented, we cannot implement a randomized control trial or regression discontinuity design. The only approach for managing the self-selection bias is through quasi-experimental methods.

To estimate the effect of women's participation in different SHGs, we used Propensity Score Matching (PSM) and Inverse Probability Weighted Adjusted Regression (IPWRA). These models are commonly used in similar recent studies (Ainembabazi et al., 2017; Ma et al., 2022b; Minah, 2022; Wossen et al., 2017). While there is a concern that this approach can only account for selection bias due to observables, recent studies have shown that it can still provide reasonable causal estimates (Kumar et al., 2021). We used the nearest neighborhood match (nnmatch:NNM) for matching the households in treatment and control groups and estimated NNM using the "teffects" command in Stata. While we acknowledge the limitations of matching methods, this approach provides reasonable causal estimates. To ensure the robustness of our results, we used both PSM and IPWRA. IPWRA is considered a doubly robust technique and does not use propensity score for matching and uses it instead as regression weight (Grashuis & Skevas, 2022; Ma et al., 2022a). However, we caution that our inference from this approach is limited, and we term it an association rather than causation. Please see Appendix Section 1 for details about the empirical strategy.

4.2 | Outcome variables

We used a binary outcome variable to estimate the effect of seed and non-seed SHG on improving women's participation in agricultural decision-making. We asked the household head who was the primary decision maker regarding agriculture in the household and recorded a value of one if the primary decision maker was female (refer to Table 2). We cross-checked the head of the household's response with the spouse's response from the same household.

		Individual 2			
		No role	Solely	Jointly	Others
Primary decision maker	No role	1	2	3	4
	Solely	5	6	7	8
	Jointly	9	10	11	12
	Others	13	14	15	16

FIGURE 2 Intra-household decision making matrix.

To test our hypothesis that women-centric interventions have an effect on intra-household bargaining power, we asked two individuals from each household, the primary decision-maker and the spouse, about their roles in decision-making. While it is impossible to measure individual bargaining power as it is fundamentally unobservable (Doss, 2013), bargaining in decision-making can be measured using various approaches. For instance, Anderson et al. (2017) used a “bean game” to capture intra-household differences. Similarly, other studies have used experimental games (Ashraf, 2009) to capture bargaining power.

We followed a simple approach to measure the discord in bargaining power by capturing the difference in perceived decision-making power from the responses of couples within a household, where each person is unaware of the other person’s response to the same question. Two individuals in the household were asked separately about their decision-making role, with possible responses being decision-making solely, jointly (with spouse), or another family member making the decision. The responses (D_i) were compared between the two individuals: the primary decision-maker $P_i(D_i)$ and individual 2 [$S_i(D_i)$], which were then plotted as a matrix $P_i(D_i) \times S_i(D_i)$. A total of 16 combinations emerged from the options provided to them (refer to Figure 2). These combinations indicate the interaction of roles or bargaining among individuals or perceived intra-household differences over decision-making.

The households were classified into two categories based on the options provided by two individuals: those with discord in decision-making and those without. Here, we used the term “discord” to capture the difference in perceived decision-making authority among household members. Anderson et al. (2017) have also used the term “discord” to capture the difference in the allocation of power in decision-making among members in the household.

The classification of households is based on the matrix presented in Figure 2, which captures the responses regarding perceived power in decision-making. If the responses of the individuals make up combinations 2, 3, 5, 9, and 11 in the matrix, the household is classified as having no discord in decision-making. In these households, decision-making is perceived as either joint or by one individual, and there is agreement within the household regarding who makes the decisions. Combinations 6, 7, 8, 10, 12, 14, and 15 result from differences in perceived decision-making authority and these households are classified as having discord. The classification is highlighted by black and grey boxes in Figure 2 for households with discord and households without discord in decision-making, respectively. Combinations 1, 4, 13, and 16 were dropped as, in these cases, one of the individuals in the comparison has no role in decision-making. Based on this classification, we created a binary outcome variable, “discord,” if there is discord in intra-household decision-making (Table 1).

As previously mentioned, the seed SHG program is implemented alongside a micro-finance SHG program. This provides an opportunity to explore the differential effects of varying levels of

TABLE 1 Outcome variables.

S. No.	Outcome variables	Type	Description
1	Primary decision maker	Binary	1 = If primary decision maker is female, 0 = otherwise
2	Discord	Binary	1 = If there is a difference in perceived decision-making role, 0 = otherwise

TABLE 2 Framework used to measure varying effect by level of intervention.

Effect	Treatment household	Control household	Assessment
Effect 1	Strata1	Strata2	Effect of seed production
Effect 2	Strata1 & Strata2	Strata3 & Strata 5	Effect of seed SHG
Effect 3	Strata 5	Strata 6	Effect of SHG in non-targeted region
Effect 4	Strata 1,2,3,5	Strata 4,6	Overall Effect of SHG

intervention. To examine this, we designed our sample and collected data by stratifying treatment and control households based on different levels of intervention (as shown in Table 2).

To better understand the outcomes, we further classified the combinations into eight categories based on gender and relative bargaining power of the two individuals (Table A2). These classifications were based on the interpersonal circumplex model (Freedman et al., 1951) and dyadic conflict (Au & Lam, 2015). We used a self-reported option to measure relative bargaining power, as opposed to the scales commonly used to measure dominance and submissiveness of individuals (Mehrabian & Hises, 1978). While self-reported measures have been used in literature (Sommerfeld & Bitton, 2015), they are subject to various observable and unobservable factors. Observable factors include the presence of spouses and other family members, as well as the gender of the enumerator. We controlled for the presence of other spouses and family members with an additional variable, but all our enumerators were female, which could have introduced bias.

We measured relative bargaining power (dominant or submissive) based on the options provided by both individuals. An individual was considered to be in a dominant position if they claimed to be the sole decision-maker, while the other individual stated no role or considered the decision to be joint or involved another family member. An individual was considered to be in a submissive position if they stated no role in the decision while the other individual reported joint decision-making.

Category A households were those in which the male played a dominant role in decision-making, while in category B households, the female had a dominant role. Category C households were those with joint decision-making, with no discord and clearly defined roles. In households belonging to category D and E, male and female members may not have recognized their own role, but their counterparts reported joint decision-making, indicating that they underestimated their role. In category F and G households, one individual (either male or female) claimed their role while others reported it as a joint role or did not recognize the counterpart's role. In households falling under category H, male and female members equally claimed themselves to be the sole decision-maker. Category I households had no identified discord. For computational ease, these categories were grouped into discord (Category D to H) and non-discord (Category A to C) households.

TABLE 3 Dependent variables.

	Variable	Type	Description
1	Sex of the household head	Binary	1 = If Household Head is Female, 0 = otherwise
2	Age of the household head	Continuous	Age of the household head in years
3	Age square of the household head	Continuous	Square of the age of household head
4	Household head education	Binary	1 = Household head is illiterate, 0 = otherwise
5	Migrant	Binary	1 = If spouse of the household head is a migrant, 0 = otherwise
6	Caste	Categorical	1 = Non-marginalized caste (NMC), 2 = Other socially marginalized caste (OSMC), 3 = Scheduled tribe, 4 = Scheduled caste
7	Household members	Continuous	Total number of members in the family
8	Agricultural asset	Continuous	Total value of agricultural asset
9	Non-agricultural assets	Continuous	Total value of non-agricultural asset
10	Total land holding	Continuous	Total land owned by household (ha)
11	Cultivated land	Continuous	Total land cultivated by household (ha)

4.3 | Control variables

Several empirical studies have modeled various factors that could affect bargaining power. Key variables that have been identified include the position of women in the family, sex, age, education, and assets (Chattopadhyay & Duflo, 2004; Duflo & Udry, 2004). Similarly, we have included variables capturing individual, household, and farm-level characteristics as control variables. A list of variables used as control variables is given in Table 3. The control variables, namely sex of the household head, age of the household head, migrant status, caste, number of household members, assets, total land holding, and cultivated area, were selected based on an extensive review of literature (Garikipati, 2008; Hoffman et al., 2021; Kumar et al., 2021). Age and age squared are reported to have a positive and significant relationship with SHGs, showing that the relationship is nonlinear (Kumar et al., 2021). In the study area, a woman household head could be due to de facto (real) or de jure (perceived) status. To capture this difference, we have included the migrant status of the spouse of the household head. The number of household members is negatively related to defaults at SHGs (Panda & Reddy, 2020). Caste is a key variable that captures the social capital dimension and is related to the accessibility of a member to SHGs (Hoffman et al., 2021). As discussed before, the selection of seed producers is also determined by the availability of land for seed cultivation, so we have included total cultivable area in the model. Total landholding is also a predictor of the selection of a member into an SHG (Kumar et al., 2021).

5 | RESULTS AND DISCUSSION

5.1 | Summary of variables

A summary of the variables used in the study, categorized by strata, is presented in Table 4. The majority of households belonged to the OBC category, share of disadvantaged groups (SC/ST)

TABLE 4 Summary of socio-economic profile of the household in different strata.

Caste	Strata1	Strata2	Strata3	Strata4	Strata5	Strata6	Total
Non-marginalized caste	9.09	11.67	10.69	10.29	12.88	21.74	12.70
Other socially marginalized caste	47.40	50.00	51.91	50.00	53.03	52.90	50.80
Scheduled tribe	14.94	7.50	14.50	9.56	12.12	5.80	10.85
Scheduled caste	28.57	30.83	22.90	30.15	21.97	19.57	25.65
Family size							
Nuclear	60.65	65.83	68.18	58.7	61.36	63.04	62.82
Joint	39.35	34.17	31.82	41.3	38.64	36.96	37.18
Household members*	5.74	5.93	5.86	5.60	5.55	5.69	5.72
House type							
Thatched house	33.55	37.29	45.8	40.15	33.08	37.23	37.75
Tiled house	43.23	44.92	32.06	41.61	49.23	40.88	41.96
Pucca house	23.23	17.80	22.14	18.25	17.69	21.90	20.30
Agricultural asset value*	14,714.48	6,636.81	13,617.65	9,680.928	10,056.64	14,038.65	11,626.34
Non-agricultural asset value*	21,734.36	15,345.27	29,194.6	16,050.27	16,031.63	29,643.10	21,454.97
Migrant	19.35	15.00	18.94	10.14	13.64	20.29	16.32
Land owned (ha)	0.54	0.33	0.45	0.54	0.31	0.57	0.46
Land cultivated (ha)	0.54	0.37	0.44	0.51	0.33	0.57	0.46

Note: Variables * are average values, others are in percentages.

was higher among SHG households (both seed and non-seed), as the intervention was targeted towards socio-economically backward households. About 63% households were nuclear families, but the share varies among categories. The average family size was highest in non-seed producer SHG households, followed by seed SHG households, SHG households, and finally non-SHG households.

Households across different strata mainly possessed semi-pucca houses. SHG households had better housing than non-SHG households in the treatment region, with seed producers having better housing than non-seed producers in the same SHG. The livestock asset holding of households was calculated by converting different types of livestock into Livestock Units (LSU), with the average LSU being higher among SHG households compared to non-SHG households in the control region, but opposite in the treatment region. Seed producers had higher LSU than non-seed producers in the seed-SHGs.

The SHG households were better off compared to non-SHG households in both agricultural and non-agricultural assets in the target region, but the opposite was observed in the control region. The average value of agricultural assets was higher in seed producers of seed-SHG households compared to non-seed producers of seed-SHG households in the treatment region. In comparison, the average value of non-agricultural assets was higher in non-seed SHG households compared to seed-SHG households. A higher share of migrant members was found in SHG households in the treatment regions, but vice versa in the control region, with seed producer SHG households having a higher share of migrants compared to other households in the treatment region. The average land holding and cultivated area were higher in seed households and non-SHG members in the treatment regions.

5.2 | Effect of SHG on decision making by women

The study uses PSM and IPWRA to assess the impact of women's participation in SHGs and other groups on intra-household decision-making differences. Probit models (see [Appendix Table A3](#)) were initially used for estimation, with the treatments coded as shown in [Table 2](#) for each effect. After calculating the propensity score using a selection equation with specifications based on theoretical expectations and literature review, balancing property and common support assumptions were tested (see [Figures 3](#)).

Most of the covariates in the model comply with the expected signs from the previous studies. The density plots indicate the satiation of the common support assumption ([Figures 3](#)). We also checked for robustness using different matching. The impacts estimated using alternative estimators are given in [Appendix Table A5](#). As seen in the table, the matching results gave similar results. To evaluate the reliability of the estimates, we computed Rosenbaum bounds (Becker & Caliendo, 2007) and reported in [Appendix Table A5](#). The test is based on Nearest Neighbor match (5), as neighbors shown in [Appendix Table A6](#). For most cases, the gamma value (2) is statistically significant. The gamma value indicates the extent of hidden bias at which the reported causal estimates will no longer be statistically significant. For instance, if the hidden bias due to unobservable affects odds of treatment participation by two times (Significance at gamma value of 2) within a matched pair, then the estimated ATT will no longer be statistically significant (Following Ainembabazi et al., 2017). Though this a concern, we check the robustness by estimating the ATT through IPWRA.

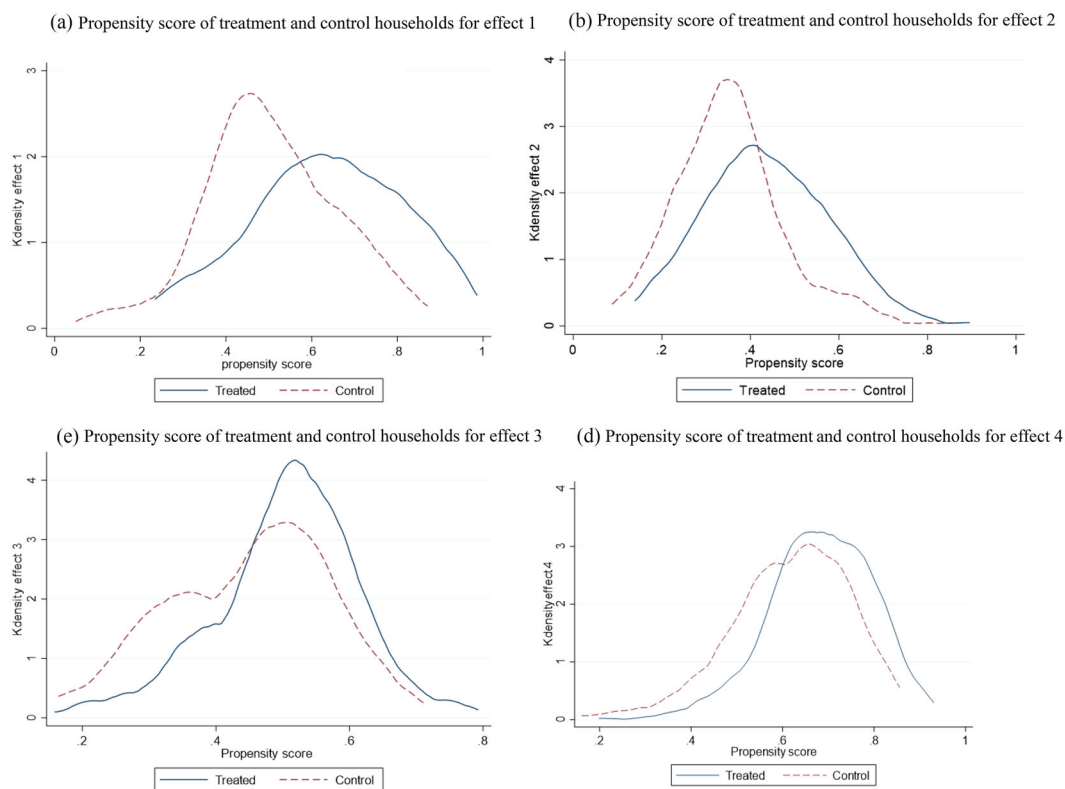


FIGURE 3 Propensity score of treatment and control households. [Colour figure can be viewed at wileyonlinelibrary.com]

5.3 | Effect of intervention on decision making by women

The estimated impact of seed and non-seed SHG on improving the role of women in agricultural decision-making using the unitary household model is presented in Table 5. We report nonparametric estimates of the average treatment effect on the treated (ATT), which indicates the mean impact of the treatment. The study finds that the impact measured as a percentage of female members as primary decision-makers, was significantly higher in seed-SHG (12%) and SHGs (8–13%) compared to their respective control groups. A comparison of SHG and non-SHG households in the non-targeted region also shows a higher share of decision-making by women in SHG households (11–13%). The results are robust to alternative estimators (see Appendix Table A5) and sensitivity analysis (see Appendix Table A6). These findings suggest that women's participation, regardless of the type of intervention (micro-finance, micro-finance + seed), increases their decision-making power in agriculture. These results are consistent with other studies exploring the relationship between SHGs and women's decision-making power in agriculture (Ragunathan et al., 2019). They also found that although the participation of women in SHGs has increased agricultural decision-making, it has limited impact on agricultural activities, possibly due to financial constraints, women's responsibilities, and social norms. Comparing the ATT values of different interventions, we find that the seed intervention itself does not have any effect on decision-making.

TABLE 5 Effect of intervention on improving role of women in agriculture.

Effect	PSM	IPWRA
	ATT	ATT
Effect of seed production	0.051 (0.047)	0.040 (0.065)
Effect of seed SHG	0.055 (0.056)	0.080 (0.049)
Effect of SHG in non-targeted region	0.129*** (0.048)	0.110** (0.046)
Overall Effect of SHG	0.096*** (0.033)	0.078** (0.034)

Note: Balancing test and post-estimations were carried out (Appendix Tables A5 to A7). The standard errors given in parentheses are Abadie–Imbens robust standard errors. Standard errors in parentheses; ** is significant at the 5% level and *** is significant at the 1% level. In this table, we have reported ATT estimates with Nearest Neighborhood (NN) Matching with five neighbors. ATT estimated is obtained by applying “`nnmatch`” command using the bias-adjusted option in Stata (Abadie et al., 2004).

5.4 | Effect of intervention on intra-household discord in decision making

We investigated the impact of various interventions on intra-household decision-making discord. To capture the self-reported authority on household and farm decisions, we used 14 questions that asked whether the respondent alone, jointly with their spouse or another family member made decisions on specific subjects. We calculated the intra-household discord using the methodology described earlier in our study. To ensure that the primary decision makers and spouse/SHG members were not influenced by each other, we interviewed them separately. We also quantified and tested the circumstances under which this condition was violated. Appendix Table A4 shows the intra-household difference among households in different strata. Across strata, discord was observed in decisions regarding borrowing and lending money from SHG and money received from the sale of seeds, both of which were influenced by the interventions.

In the treatment region, seed producer households of seed-SHG generally showed less discord in decision making than non-seed seed-SHG households, with the exception of borrowing money. Comparing seed and non-seed producer households among seed-SHGs, the relative discords were high only in the case of borrowing and lending money. Non-seed seed-SHG households had higher discord in decision-making regarding buying and selling of land and other property, education, and participation in other groups.

In the control region, SHG member households exhibited higher discord than non-SHG households, except in decisions regarding borrowing and lending money, money received from cash crop sales, and the use of income earned by a female member of the household.

Using PSM and IPWRA, we assessed the overall effect of women’s participation in different SHG interventions on intra-household decision-making dynamics. We reported the Average Treatment of the Treated (ATT), which is the average of discords (% of households with discord in decision making) for 14 intra-household decisions. Table 6 shows the impact of women’s participation in seed production on intra-household decision-making discord. The results were significant for decisions on planting/harvesting of cash crop/variety and seed crop, buying and selling of land, participation in institutions, and money received from food and cash crop sales. The discords were lower in seed producer households compared to non-seed producer households in seed-SHGs.

TABLE 6 Effect of participation of women in seed production on the difference in perceived role in farm and household decisions.

	Decisions	PSM ATT	IPWRA ATT
1	Planting /harvesting of food crop/variety	-0.113* (0.065)	-0.054 (0.062)
2	Planting /harvesting of cash crop/variety	-0.179*** (0.054)	-0.170** (0.070)
3	Planting /harvesting of crop for seed crop/variety	-0.088 (0.069)	-0.117* (0.069)
4	Livestock keeping, buying and selling	-0.129 (0.087)	-0.108 (0.072)
5	Buying selling land and other property	-0.193** (0.087)	-0.164** (0.070)
6	Borrowing and lending money	-0.190** (0.076)	-0.152* (0.079)
7	Education and marriage of children	-0.068 (0.081)	-0.064 (0.069)
8	Participation in institutions and other groups	-0.221*** (0.082)	-0.206** (0.081)
9	Money received from food crop sales	-0.290*** (0.058)	-0.277*** (0.074)
10	Money received from cash crop sales	-0.287*** (0.092)	-0.242*** (0.081)
11	Money received from sales of seed	-0.112* (0.060)	-0.135* (0.076)
12	Use of income the household in total earns from non-agricultural activities	-0.171*** (0.044)	-0.139* (0.079)
13	Use of income earned by male household members	-0.155*** (0.043)	-0.130 (0.079)
14	Use of income earned by female household members	-0.148** (0.070)	-0.152* (0.078)

Note: Balancing test and post-estimations were carried out (Appendix Tables A5–A7). The standard errors given in the parentheses are Abadie–Imbens robust standard errors. Standard errors in parentheses; ** is significant at the 5% level and *** is significant at the 1% level. In this table we reported Nearest Neighborhood (NN) Matching with five neighbors. ATT estimated is obtained by applying “nmatch” command using the bias-adjusted option in Stata (Abadie et al., 2004).

The mechanism behind the observed reduction in discord in seed SHGs can be attributed to the fact that before the seed intervention, there was a lack of availability and access to good quality seeds of high yielding varieties. Seed SHG members were able to provide quality seed to the household at cheaper rates during sowing time. Brody et al. (2016), in their systematic review on the effect of SHGs on women’s empowerment, identified factors such as familiarity in handling money, independence in financial decision-making, solidarity, social networks, and respect from other community members as mechanisms associated with empowerment. Similarly, in our

case, since SHG members have knowledge about high yielding varieties and the seed production process, they were able to bring seeds and community support from other members of SHGs. Although seed SHGs did not result in an overall increase in decision-making in agriculture, the women members were able to reduce discord in decision-making in agriculture.

Previous studies have pointed out that micro-financed SHGs are not efficient in generating sources for entrepreneurial activities (Dhake & Narkhede, 2019) and may lead to credit defaults in SHGs (Panda & Reddy, 2020). Nonetheless, studies have also established that membership in SHGs leads to the economic well-being of the household (Hoffman et al., 2021). Pal & Singh (2021) argue that SHGs should move beyond financing and consumption and need to be aligned with socially beneficial activities focused on sustainable development goals. Our study adds to this discourse by providing insights into a social welfare intervention (women empowerment) by layering an enterprising activity (seed production) over existing micro-finance SHGs focused on SDG Goal 5.

5.5 | Nature of discord in intra-household decision making

Appendix Table A8 shows that discord in decision-making regarding the planting/harvesting of cash crop/variety, seed crop, buying/selling land, participation in institutions, and money received from food and cash crop sales has a significant impact. Among SHG households in treatment and control regions, and non-SHG households in the control region, male dominance was observed in decisions regarding planting/harvesting of cash crop/variety, except for seed producer households where female dominance was observed. Control groups showed higher discord in this decision.

Regarding decisions on planting/harvesting of seed crop, treatment regions showed higher discord, with male dominance in non-seed SHGs and control households. Female-dominant households were only found among seed producer households. The study revealed that discord was higher in decisions regarding borrowing and lending of money in SHG households in the target region due to male dominance, consistent with earlier studies by Garikipati (2008) and Balasubramanian (2013).

Among SHG households, decisions on participation in institutions and other groups showed dominant female households, and discord in these decisions was higher. Female members believed they were the sole decision makers, while male members shared that it was a combined decision. In non-SHG households, discord in decisions regarding participation in institutions and other groups was mainly due to male dominance. Surprisingly, non-SHG households and SHG households in the control region showed households with male submissive nature.

Discord in decisions regarding money received from sales of food crops was higher among SHG households in both treatment and control regions, mainly due to female dominance. Male-submissive households were observed in non-seed producer seed-SHG households and SHG households in both treatment and control regions. Dominant-male households were higher among SHG and non-SHG households in the control regions.

Similarly, decisions on money received from cash crop sales showed higher discord in SHG and non-SHG households in the control region due to male dominance. Among non-seed producer seed-SHG households, the discord in the decision was higher, and the share of female dominance was also higher. The discord in decision making in non-SHG households in the control region was due to male dominance.

6 | CONCLUSIONS AND POLICY IMPLICATIONS

We found that membership of women in SHGs leads to an 8–13% increase in decision-making in agriculture. However, the effect varied across types of SHGs. For instance, in the case of seed SHGs, we could not find any improvement in women's role in decision-making. In the case of intra-household decision-making, discord was common across interventions. Importantly, membership in SHGs led to a change in the dynamics of discord. In non-SHG households, discords were due to male dominance in decision-making. In contrast, in SHG households, women drove the discord, and decision-making was more cooperative in seed SHGs. Our discussions with SHG members indicated that intra-household decision-making propagates through a series of negotiations between spouses. When women members of SHGs receive training on the scientific seed production process, it enables them to participate better in those negotiations. The study indicates that women's membership in SHGs improves their role in decision-making. However, it depends on the type of intervention and the decision. Similarly, we found that membership in agriculture-based interventions leads to an increase in joint decision-making. Therefore, developmental programs need to take a nuanced approach to using SHGs as a tool for women's empowerment, as the effects are heterogeneous based on the type of SHG being promoted.

The results help in designing women empowerment programs with SHGs. To empower women in agriculture, institutions could first identify a key need of the family that the SHG could fulfill. In the case of micro-finance SHGs, credit was the important need for households, and membership in SHGs was an enabler. The ability of women to fulfill such a need earns them power in the family in decision-making. In our case, the seed SHGs enabled households to have timely access to good quality seeds and improved varieties at affordable rates, particularly at a time when the household faces a cash crunch. The knowledge regarding seeds, varieties, production, and management, along with the material access to seeds, improves women's participation in agricultural decision-making in the household. Since household members and the community also see the standing crop in the field, it is easy to convince them to adopt the particular variety.

For scaling of this intervention to other SHGs, there are a few points to keep in mind. First, in this case, the seed program was layered over an established successful micro-finance SHG. Therefore, household members have already benefited from SHG interventions, and they also trust the implementing organization. It takes years to build such an ecosystem where the community accepts the interventions by organizations promoting SHGs. In this intervention, block-level (BOs) and village-level organizations (VOs) provided continuous monitoring and handholding of the seed-SHGs. The learnings and best practices were shared across the seed and non-seed SHGs. Second, these interventions do not guarantee changes in gender norms. In our case, since the SHGs have been operating for a long time, there were multiple interventions being carried out by RGVMP, so there was trust and gender sensitivity in the community. Third, such interventions do add an additional burden on women as they end up investing significant time and effort into such intervention. So, while designing such interventions, the time and effort required and the willingness of the beneficiaries are to be considered.

ACKNOWLEDGMENTS

We would like to thank the editorial Prof. Marco Marini, co-editors Dr. Wanglin Ma and Dr. Dil Bahadur Rahut for this opportunity to present it at the conference organized by ADBI on "Farmers" Organizations and Sustainable Development. We are also grateful to the three anonymous researchers, the discussant at the conference Dr. T. Nguyen and fellow participants for

their comments and suggestions. We thank the comments and suggestions received for a previous version of the draft presented at the International Conference of Agricultural Economics Conference (ICAE) in Vancouver, Canada organized by the International Association of Agricultural Economics (IAAE). We acknowledge the funding support provided by Bill and Melinda Gates Foundation (BMGF) [Grant number 1116475] to RGMVP for the project. We acknowledge Ms. Neelakshi Mann, Mr. P.S. Mohanan, Mr. K.S. Yadav, Mr. Yadavendra for helping us understand the project and designing the study. We appreciate the team members at RGMVP especially Vivek, Samarth, Somanath, Uma, Vineet and 20 enumerators involved in the primary survey. We also sincerely thank Dr. Mamta Meher, Dr. Prakashan Chellatan Veetil, Dr. Dhandapani, Mr. Tajuddin Khan, Dr. Udita Sanga and Dr. Arathy Ashok for intellectual support and guidance in analyzing the data. We also acknowledge the assistance we received from Dr. Abhinav Anand in proof-reading the draft. We wholeheartedly thank the SHG members and household members for their valuable time.

Open access funding enabled and organized by Projekt DEAL.

ORCID

Subash Surendran Padmaja  <https://orcid.org/0000-0001-6418-4142>

REFERENCES

- Abadie, A., Drukker, D., Herr, J. L., & Imbens, G. W. (2004). Implementing matching estimators for average treatment effects in stata. *Stata Journal*, 4, 290–311.
- Ainembabazi, J. H., Van Asten, P., Vanlauwe, B., Ouma, E., Blomme, G., Borachi, E. A., Nguetzet, P. M. D., Mignouna, D. B., & Manyong, V. M. (2017). Improving the speed of adoption of agricultural technologies and farm performance through farmers' groups: evidence from the Great Lakes region of Africa. *Agricultural Economics*, 48(2), 241–259.
- Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A. R., Seymour, G., & Vaz, A. (2013). The Women's Empowerment in Agriculture Index, OPHI Working Paper No. 58. Oxford Poverty & Human Development Initiative (OPHI) Oxford Department of International Development Queen Elizabeth House (QEH), University of Oxford.
- Anderson, C. L., Reynolds, T. W., & Gugerty, M. K. (2017). Husband and wife perspectives on farm household decision-making authority and evidence on intra-household accord in rural Tanzania. *World Development*, 90, 169–183.
- Ashraf, N. (2009). Spousal control and intra-household decision making: An experimental study in the Philippines. *American Economic Review*, 99(4), 1245–1277.
- Au, A. K. C., & Lam, S. (2015). Understanding response patterns in dyadic conflict: An interactive approach combining self-construal and opponent's dominance-submissiveness. *International Journal of Psychology*, 52(2), 116–125.
- Balasubramanian, S. (2013). Why micro-credit may leave women worse off: Non-co-operative bargaining and the marriage game in South Asia. *Journal of Development Studies*, 49, 609–623.
- Becker, S. O., & Caliendo, M. (2007). Sensitivity analysis for average treatment effects. *Stata Journal*, 7, 71–83.
- Bhagowalia, P., Menon, P., Quisumbing, A., & Soundararajan, V. (2012). What dimensions of women's empowerment matter most for child nutrition? Evidence using nationally representative data from Bangladesh. Washington, DC: International Food Policy Research Institute (IFPRI) Discussion Paper No. 01192.
- Bobonis, G. J. (2009). Is the allocation of resources within the household efficient? New evidence from a randomized experiment. *Journal of Political Economy*, 117(3), 453–503.
- Brody, C., De Hoop, T., Vojtkova, M., Warnock, R., Dunbar, M., Murthy, P., & Dworkin, S. L. (2016). Can self-help group programs improve women's empowerment? A systematic review. *Journal of Development Effectiveness*, 8(2), 101–131. <https://doi.org/10.1080/19439342.2016.1206607>
- Chattopadhyay, R., & Duflo, E. (2004). Women as policy makers: Evidence from a randomized policy experiment in India. *Econometrica*, 72, 1409–1443.

- Dhake, S. P., & Narkhede, S. P. (2019). Income-generating activity: An avenue to improve the sustainability of SHGs. *Annals of Public and Cooperative Economics*, 90(4), 737–759.
- De Boef, W. S., Singh, S., Trivedi, P., Yadav, K. S., Mohan, P. S., Kumar, S., Yadavendra, J. P., & Issacs, K. (2021). Unleashing the social capital of self-help groups for strengthening seeds systems in Uttar Pradesh, India. *Global Food Security*, 100522.
- Doss, C. (2013). Intra-household bargaining and resource allocation in developing countries. World Bank Policy Research Working Paper No. 6337.
- Duflo, E., & Udry, C. (2004). Intra-household resource allocation in Cote d'Ivoire: Social norms, separate accounts and consumption choices. National Bureau of Economic Research (NBER) Working Paper No. 10498.
- Freedman, M. B., Leary, T. E., Ossorio, A. G., & Coffrey, H. S. (1951). The interpersonal dimension of personality. *Journal of Personality*, 20, 143–161.
- Garikipati, S. (2008). The impact of lending to women on household vulnerability and women's empowerment: Evidence from India. *World Development*, 36(12), 2620–2642. Available at: <https://doi.org/10.1016/j.worlddev.2007.11.008>
- Grashuis, J., & Skevas, T. (2022). What is the benefit of membership in farm producer organizations? The case of coffee producers in Peru. *Annals of Public and Cooperative Economics*. <https://doi.org/10.1111/apce.12390>
- Hoffman, V., Rao, V., Surendra, V., & Datta, U. (2021). Relief from usury: Impact of a self-help group lending program in rural India. *Journal of Development Economics*, 148, 102567.
- Jejeebhoy, S. J. (2002). Convergence and divergence in spouses' perspectives on women's autonomy in rural India. *Studies in Family Planning*, 33, 299–308.
- Kebede, B., Tarazona, M., Munro, A., & Verschoor, A. (2014). Intra-household efficiency: An experimental study from Ethiopia. *Journal of African Economies*, 23(1), 105–150.
- Kochar, A., Nagabhushana, C., Sarkar, R., Shah, R., & Singh, G. (2022). Financial access and women's role in household decisions: Empirical evidence from India's National Rural Livelihoods project. *Journal of Development Economics*, 155, 102821.
- Kumar, N., Ragunathan, K., Arrieta, A., Jilani, A., & Pandey, S. (2021). The power of the collective empowers women: Evidence from self-help groups in India. *World Development*, 146, 105579.
- Lundberg, S., & Pollack, R. A. (1994). Non co-operative bargaining models of marriage. *American Economic Review*, 84, 132–137.
- Mabsout, R., & Van Staveren, I. (2010). Disentangling bargaining power from individual and household level to institutions: Evidence on women's position in Ethiopia. *World Development*, 38(5), 783–796.
- Malapit, H. J., & Quisumbing, A. (2014). What dimensions of women's empowerment in agriculture matter for nutrition-related practices and outcomes in Ghana? Washington, DC: International Food Policy Research Institute (IFPRI) Working Paper.
- Malapit, H. J., Kadiyala, S., Quisumbing, A. R., Cunningham, K., & Tyagi, P. (2013). Women's empowerment in agriculture, production diversity, and nutrition: Evidence from Nepal. IFPRI Discussion Paper No. 1313. Washington, DC: International Food Policy Research Institute.
- Malapit, H. J., Sproule, K., Kovarik, C., Meinzen-Dick, R. S., Quisumbing, A. R., Ramzan, F., Hogue, E., & Alkire, S. (2014). *Measuring progress toward empowerment: Women's empowerment in agriculture index: Baseline report*. Washington, DC: International Food Policy Research Institute (IFPRI).
- Ma, W., Vatsa, P., Zheng, H., & Guo, Y. (2022a). Learning to eat from others: Does nutritional information acquired from peers affect nutrition intake? *Journal of Rural Studies*, 95, 449–457.
- Ma, W., Vatsa, P., & Zheng, H. (2022b). Cooking fuel choices and subjective well-being in rural China: Implications for a complete energy transition. *Energy Policy*, 165, 112992.
- Mehrabian, A., & Hises, M. (1978). A questionnaire measure of individual differences in dominance-submissiveness. *Educational and Psychological Measurement*, 38(2), 479–484.
- Minah, M. (2022). What is the influence of government programs on farmer organizations and their impacts? Evidence from Zambia. *Annals of Public and Cooperative Economics*, 93(1), 29–53.
- Mwambi, M., Bijman, J., & Mshenga, P. (2020). Which type of producer organization is (more) inclusive? Dynamics of farmers' membership and participation in the decision-making process. *Annals of Public and Cooperative Economics*, 91, 213–236. <https://doi.org/10.1111/apce.12269>
- Pal, A., & Singh, P. K. (2021). Do socially motivated self-help groups perform better? Exploring determinants of micro-credit groups performance in Eastern India. *Annals of Public and Cooperative Economics*, 92(1), 119–146.

- Panda, D., & Reddy, S. (2020). Predictors of microcredit default in Indian Self-Help Groups. *Annals of Public and Cooperative Economics*, 91(2), 303–318.
- Quisumbing, A. R., Rubin, D., Manfre, C., Waithanji, E., Van Den Bold, M., Olney, D., Johnson, N., & Meinzen-Dick, R. (2015). Gender, assets, and market-oriented agriculture: Learning from high-value crop and livestock projects in Africa and Asia. *Agriculture and Human Values*, 32(4), 705–725.
- Quisumbing, A., & Maluccio, J. (2003). Resources at marriage and intrahousehold allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. *Oxford Bulletin of Economics and Statistics*, 65, 283–327.
- Quisumbing, A. R., & Kumar, N. (2011). Does social capital build women's assets? The long-term impacts of group-based and individual dissemination of agricultural technology in Bangladesh. *Journal of Development Effectiveness*, 3(2), 220–242.
- Rao, S. (2008). Reforms with a female face: Gender, liberalization, and economic policy in Andhra Pradesh, India. *World Development*, 36(7), 1213–1232.
- Rivers III, L., Sanga, U., Sidibe, A., Wood, A., Paudel, R., Marquart-Pyatt, S. T., Ligmann-Zielinska, A., Olabisi, L. S., Du, J. E., & Liverpool-Tasie, S. (2018). Mental models for food security in rural Mali. *Environment Systems and Decisions*, 38, 33–51.
- Raghunathan, K., Kannan, S., & Quisumbing, A. R. (2019). Can women's self-help groups improve access to information, decision-making, and agricultural practices? The Indian case. *Agricultural Economics*, 50, 567–580. <https://doi.org/10.1111/agec.12510>
- Sarapura-Escobar, S., Odame, H. H., & Tegbau, (2017). Gender transformative approaches in agriculture innovation. Chapter 21 in Njuki, J., Parkins, J.R., & Kaler, A (Eds.), *Transforming gender and food security in the global south*. EarthScan.
- Sommerfeld, E., & Bitton, M. S. (2015). Sheltered women's perceptions of their abusive marital relationship: Conflictual themes of dominance and submissiveness. *Health Care for Women International*, 37(7), 760–772.
- Spybrook, J., Bloom, H., Congdon, R., Hill, C., Martinez, A., & Raudenbush, S. (2011). Optimal design plus empirical evidence: Documentation for the "optimal design" software.
- Van Den Bold, M., Dillon, A., Olney, D., Ouedraogo, M., Pedehombga, A., & Quisumbing, A. (2015). Can integrated agriculture-nutrition programmes change gender norms on land and asset ownership? Evidence from Burkina Faso. *Journal of Development Studies*, 388, 1–20.
- Wheaton, B. (1974). Interpersonal conflict and cohesiveness in dyadic relationships. *Sociometry*, 37(3), 328–348.
- Wossen, T., Abdoulaye, T., Alene, A., Haile, M. G., Feleke, S., Olanrewaju, A., & Manyong, V. (2017). Impact of extension access and cooperative membership on technology adoption and household welfare. *Journal of Rural Studies*, 54, 223–233.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Surendran Padmaja, S., Korekallu Srinivasa, A., Trivedi, P., & Srinivas, K. (2023). Women Self-Help Groups and intra-household Decision-making in Agriculture. *Annals of Public and Cooperative Economics*, 94, 857–876. <https://doi.org/10.1111/apce.12442>