Beyond Membership: Determinants of Active Self-help Groups Participation Across Agro-climatic Zones in Bihar

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Abstract

The study examines the factors influencing both the participation and intensity of engagement among women in Self-Help Groups (SHGs) across four agroclimatic zones in Bihar. A multistage sampling technique was used to collect data from 1,200 respondents (656 SHG members and 544 non-members). Descriptive analysis revealed that SHG members were more likely to be middle aged, from economically marginalised households and engaged in farming or livestock activities. Women from Other Socially Marginalised Castes (OSMC) and Scheduled Castes/Scheduled Tribes (SC/ST), being a farm woman, having a rental land had significantly higher probabilities of SHG engagement, while Muslim women, the wealthiest households and large land holdings showed lower levels of participation. A U-shaped relationship with wealth was observed and middle-aged women showed the highest intensity of involvement. Regional disparities were evident, Zone 1 recording the highest average number of SHG activities per member. However, a considerable share of SHG members (37.35%) were inactive, highlighting the gap between nominal and meaningful participation. The findings underscore the importance of designing region and identity-sensitive SHG interventions to enhance active and inclusive engagement, particularly for the most socio-economically disadvantaged groups.

Achieving gender equality and empowering women (Sustainable Development Goal- 5) is a cornerstone for inclusive and sustainable socio-economic development. Women empowerment involves expanding their ability to make strategic life choices and exert control over resources and decision-making, key processes often impeded by persistent gender gaps in education, employment, income, asset ownership and political representation (Kabeer, 2017 and Pattnaik *et al.*, 2018). In India, although women constitute nearly half of the population, their contribution to GDP remains disproportionately low at just 17 per cent, compared to the global average of 37 per cent (Anonymous, 2021). The barriers to women's economic participation are multifaceted and rooted in limited access to credit, skills, markets and enabling institutional environments (Raghunathan *et al.*, 2019; Agarwal, 2018).

To address these inequities and enhance women's agency at the grassroots level, the Government of India has promoted several targeted schemes, including the expansion of Self-Help Groups (SHGs)

community-based collectives where 12-20 women, who voluntarily come together aimed at fostering savings, credit access and group-based enterprise (Garikipati, 2008; Chaithra & Gowda, 2017 and Lakkannavar *et al*., 2017). In Bihar, where patriarchal norms, caste-based discrimination and economic deprivation are acute, SHGs have emerged as critical platforms to mobilize rural women, particularly those at the base of the economic pyramid (Joshi *et al*., 2017 and Datta, 2015). Through programs like *Jeevika*, millions of women have been organized into SHGs, creating opportunities for income generation, skill development and collective decision-making (Datta, 2015).

While the scale of SHG mobilization in Bihar is impressive, concerns remain regarding the depth and quality of women's participation. Recent studies have emphasized that nominal membership does not always translate into active engagement or empowerment outcomes, especially among women from marginalized households (Sanyal *et al*., 2015; Agarwal, 2018 and Kumar *et al*., 2021). Moreover, given the structural disadvantages in access to formal finance and livelihood opportunities, it is crucial to understand who engages meaningfully with SHG platforms and in what ways (Raghunathan *et al*., 2019).

This study addresses this gap by examining both the determinants of SHG participation and the intensity of engagement across multiple group activities, including microcredit, agricultural support, livestock rearing and non-farm enterprises. Using primary data from 1,200 households across four agro-climatic zones of Bihar, we apply probit and multivariate probit regression models to investigate how individual, household and regional characteristics shape women's involvement in SHGs. The study particularly interrogates the role of caste, land ownership, wealth, religion and occupation in driving both membership and multidimensional participation.

In doing so, this paper contributes to a more nuanced understanding of whether SHGs in Bihar are functioning as inclusive spaces for economic and social transformation or if existing inequalities are being replicated within collective structures. The findings carry important implications for policy design aimed at strengthening women's empowerment through collective action and credit-linked development programs in rural India.

METHODOLOGY

Data Collection

The sampling design was stratified based on the four major agro-climatic zones of Bihar to ensure adequate geographic representation. A total of 10 districts across these zones were selected, with each district contributing 8 villages, resulting in 80 villages overall. Within each village, respondents were selected using a two-stage sampling technique. First, villages were chosen through both random and purposive sampling, ensuring the adequate number of SHG members from each village, resulting in 800 respondents through random sampling and 400 through purposive sampling. The total sample size constituted 1200 respondents, distributed evenly across the four agro-climatic zones.

Analytical Framework

The descriptive statistics is used to summarize individual and household characteristics of the sample respondents, along with the types of group activities undertaken by SHG members.

To examine the determinants of SHG participation, we employ a probit regression model. This is appropriate because the dependent variable whether or not a woman is an SHG member is binary (1=member, 0=non-member). The probit model is particularly suited for such binary outcome variables as it assumes a normal distribution of the error term and provides consistent and efficient estimates of the probability of participation.

To assess the active engagement in multiple SHG related activities (such as microcredit, agricultural information sharing, allied activities etc.), multivariate probit (MVP) model is used. This approach is justified as each type of SHG activity represents a separate

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TABLE 1

Sampling procedure used for selection of sample respondents

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Agro-climatic zones of Bihar	Districts	Number of villages	Sample size (n=1200)	
			Random sampling	Purposive sampling
Zone 1 (North-West Alluvial Plains)	Muzaffarpur	8	80	40
	Darbhanga	8	80	40
	Vaishali	8	80	40
	Samastipur	8	80	40
Zone 2 (North-East Alluvial Plains)	Purnia	8	80	40
	Katihar	8	80	40
Zone 3 (South West Alluvial Plains)	Buxar	8	80	40
	Nalanda	8	80	40
Zone 4 (South East Alluvial Plains)	Bhagalpur	8	80	40
	Banka	8	80	40
Total	10 Districts	80	800	400

binary outcome and these outcomes are likely to be interdependent. For instance, participation in microcredit activities may be correlated with involvement in agricultural extension activities. The MVP model allows for correlated error terms across equations, thereby accounting for unobserved heterogeneity and providing more accurate estimates of the determinants of simultaneous involvement across multiple activities.

Probit Regression Model

The model specification is as follows:

$$P(Y_i = 1) = \Phi\ (\beta_0 + \beta_{1w} W_{iW} + \beta_{2h} H_{ih} + \beta_{3r} R_{ir} + \mu_i)\ ......(1)$$

where P (Y_i=1) is the probability that the respondent women i belong to an SHG. This binary outcome variable takes the value of one if woman is a member of SHG and zero otherwise. $\Phi(.)$ in equation (1) is the probability distribution function of the standard normal distribution.

The Explanatory Variables Include : W_{iw} is the vector of individual-specific characteristics such as age (years), education (years), primary occupation (dummy), wage labour engagement (dummy),

working hours in primary occupation (hours). H_{ih} represents the vector of household specific characteristics like the caste category of the individual (dummy), wealth status (PCA scores), religion (dummy), land tenure status, operational land, migration status of the household, spousal primary occupation, total adult members, number of girls and boys, access to amenities like pipe water and gas connections. R_{ir} a regional dummy variable capturing variations across Zone 1, Zone 2 and Zone 3, with Zone 4 as the reference category which is used in the full model (model 4). μ_I is a random error term. A positive (negative) coefficient of β_1 value would indicate that as the respondent's age or educational status increases (decreases), the likelihood of SHG participation also increases (decreases). Model fit will be assessed using the likelihood values and LR chi-square values. The data was tabulated, coded and analysed using STATA software.

Multi Variate Probit Regression Model

Given that SHG members may be simultaneously involved in multiple group activities such as microcredit, access to agricultural information, involvement in livestock intervention, group farming,

marketing, or allied sector initiatives. In such case Multivariate Probit model is appropriate to account for potential correlations between these binary outcome variables.

$$Y^*_{ij} = \Phi\left(\beta_0 + \beta_i X_i + \mu_{ij}\right), \ Y^*_{ij}=1 \text{ if } Y^*_{ij} > 0; \ Y^*_{ij} = 0 \quad ......(2)$$

The MVP model simultaneously estimates a system of binary equations as follows:

where:

Y^*_{ij} is a latent variable representing the propensity of respondent i to engage in activity j,

X_i is the same set of explanatory variables used in the Probit model (*i.e.*, $W_{iw} + H_{ih} + R_{ir}$),

β_j is a vector of variable-specific coefficients and μ_{ij} are error terms assumed to follow a multivariate normal distribution with mean zero and a variance-covariance matrix allowing non-zero correlations between the error terms across equations.

The MVP model thus captures unobserved heterogeneity and interdependence among different SHG activity outcomes. Model adequacy is examined using Wald chi-square statistics and log-likelihood measures. All analyses were conducted using STATA software.

RESULTS AND DISCUSSION

Individual-Specific Characteristics of Sample Respondents

Table 2 presented a comparative summary of individual level characteristics between SHG members (n = 656) and non-members (n = 544). In terms of age distribution, a larger proportion of SHG members were middle-aged (53.66%) compared to non-members (38.60%), while a higher share of non-members belonged to the older age group (31.25%). The average age of SHG members was 43.22 years, slightly lower than non-members at 44.42 years. With respect to educational attainment, nearly half of the SHG members (49.85%) were illiterate, compared to 40.44 per cent among non-members. However, a relatively higher proportion of non-members had completed higher secondary education (11.40 %) and held a degree (8.82%), in contrast to SHG members (5.49% and 3.35%, respectively). The primary occupation profile reveals that the majority of both groups were engaged in domestic activities, with a notably higher proportion among non-members (81.25%) than SHG members (66.16%). SHG members showed greater engagement in self-employment in farming

TABLE 2

Individual specific characteristics of sample respondents

Particulars	SHG member (n=656)	SHG Non-member (n=544)
Age group		
Young (Up to 35)	179 (27.29)	164 (30.15)
Middle-aged (36-54)	352 (53.66)	210 (38.60)
Older (Above 54)	125 (19.05)	170 (31.25)
Average age	43.22 (10.84)	44.42 (13.79)
Education level		
Illiterate	327 (49.85)	220 (40.44)
Primary	88 (13.41)	53 (9.74)
Secondary	183 (27.90)	161 (29.60)
Higer Secondary	36 (5.49)	62 (11.40)
Degree	22 (3.35)	48 (8.82)
Average years of schooling	4.14 (4.69)	5.61 (5.30)

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TABLE 2 Continued....

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Particulars	SHG member (n=656)	SHG Non-member (n=544)
Primary Occupation		
Self-employed in farming	114 (17.38)	47 (8.64)
Self-employed in livestock	51 (7.77)	21 (3.86)
Wage labour provision	45 (6.86)	17 (3.13)
Business	9 (1.37)	4 (0.74)
Domestic activities	434 (66.16)	442 (81.25)
Unemployed	3 (0.46)	13 (2.39)
Marital Status (dummy)	635 (96.80)	513 (94.30)
Regional dummies		
Zone 1	130 (19.81)	110 (20.22)
Zone 2	260 (39.63)	220 (40.44)
Zone 3	127 (19.35)	113 (20.77)
Zone 4	139 (21.89)	101 (18.57)

Note : Figures in the parentheses indicate percentages to total sample

(17.38%) and livestock (7.77 %) compared to non-members (8.64 % and 3.86 %, respectively). Regarding marital status, most respondents were married, with a slightly higher proportion among SHG members (96.80 %) than non-members (94.30 %).

Household Specific Characteristics of Sample Respondents

Table 3 provides a comparative overview of household-level characteristics between SHG members and non-members. In terms of family size, both groups were predominantly from medium-sized households (5–7 members), comprising 52.59 per cent of SHG members and 49.82 per cent of non-members. The average family size was slightly smaller among SHG members (5.83) compared to non-members (5.99). Migration patterns reveal that SHG households reported a higher incidence of out-migration, with 6.58 per cent of SHG members having a migrant spouse and 15.25 per cent having another migrant household member, in contrast to 2.41 per cent and 11.91 per cent, respectively, among non-member households.

Regarding husband's primary occupation, self-employment in farming was common in both groups, though it was more prevalent among non-members (77.70 %) than SHG members (68.35 %). A higher share of spouses of SHG members were engaged in wage labour (14.03 %) compared to non-members (6.88 %), indicating potential economic vulnerability among SHG households. The caste composition indicates a higher proportion of Scheduled Castes/Scheduled Tribes (SC/ST) among SHG members (17.84 %) compared to non-members (10.48 %). Similarly, Other Socially Marginalized Communities (OSMC) formed the majority in both groups but were more represented among SHG members (74.39 %). Notably, Non-Marginalized Castes (NMC) were under represented in SHG membership (7.77 %) but formed a significant portion of non-members (14.17%). In terms of religion, Hindus constituted the majority across both categories but were more dominant among SHG members (93.45%) than non-members (88.05 %), whereas the proportion of Muslim respondents was higher among non-members (11.95%).

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TABLE 3

Household specific characteristics of sample respondents

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Particulars	SHG member (n=656)		SHG Non-member (n=544)	
Family size (No.)				
Small (d" 4)	188	(28.66)	161	(29.60)
Medium (5-7)	345	(52.59)	271	(49.82)
Large (> 7)	123	(18.75)	112	(20.59)
Average family size	5.83		5.99	
Average number of boys below age	150.93	(1.03)	0.89	(1.05)
Average number of girls below age	150.85	(1.09)	0.83	(1.08)
Migration Status				
Spouse	79	(6.58)	29	(2.41)
Other household member	183	(15.25)	143	(11.91)
Husband's primary occupation				
Self-employed in farming	419	(68.35)	418	(77.70)
Self-employed in livestock	18	(2.94)	16	(2.97)
Wage labour provision	86	(14.03)	37	(6.88)
Business	71	(11.58)	53	(9.85)
Unemployed	7	(1.14)	6	(1.12)
Caste##				
SC/ST	117	(17.84)	57	(10.48)
OSMC	488	(74.39)	368	(67.65)
NMC	51	(7.77)	170	(14.17)
Religion				
Hindu	613	(93.45)	479	(88.05)
Muslim	43	(6.55)	65	(11.95)
Distribution of respondents based on operational land holdings#				
Marginal (< 1 ha)	67.07		50.74	
Small (1-1.99 ha)	21.95		27.02	
Semi-Medium (2-3.99 ha)	8.54		14.71	
Medium (4- 9.99 ha)	2.44		7.17	
Large (?10 ha)	0.00		0.37	
Average land holding size (ha)	0.97	(0.99)	1.50	(1.69)
Tenancy status				
Owned land	534	(81.40)	508	(93.38)
Rental (Leased in)	63	(9.60)	15	(2.76)

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TABLE 3 Continued....

Particulars	SHG member (n=656)		SHG Non-member (n=544)	
Livestock possession (No.)				
Cow	2.14	(1.23)	2.39	(1.34)
Bull	1.33	(0.69)	1.28	(0.83)
Buffalo	2.20	(1.44)	2.15	(1.15)
Goat	3.72	(2.53)	2.15	(1.15)
Chicken	4.18	(3.21)	4.72	(4.17)
Tropical Livestock Unit (TLU) $	1.51	(1.29)	1.54	(1.34)
Wealth Index Score (PCA score)	-0.37	(1.75)	0.44	(2.07)
Amenities				
Access to pipe water	922	(70.27)	730	(67.10)
Access to gas connection	1186	(90.40)	964	(88.60)

Notes : Figures in the parentheses indicate percentages to total sample. #Classification of respondents according to operational holdings by All India Report on Agricultural Census 2015-2016. ## In this paper, we adopt terminology that is more neutral and inclusive, as recommended in recent literature: Other Backward Classes (OBCs) are referred to as Other Socially Marginalised Castes (OSMC) and General Castes are referred to as Non-Marginalised Castes (NMC) (Farnworth *et al.,* 2022; Krishna *et al.,* 2019). To normalize the number of livestock holding, TLU was determined using FAO guidelines, in which cattle & buffalo, sheep & goat, pigs and chickens have a TLU of 0.50, 0.10, 0.20 and 0.01, respectively. Afterward, the TLU was calculated for each household

The distribution of land holdings shows that SHG members were more concentrated in the marginal landholding category (<1 ha), accounting for 67.07 per cent of the group, compared to 50.74 per cent of non-members. The average landholding size was significantly smaller for SHG households (0.97 ha) than for non-members (1.50 ha), reinforcing the relatively poorer asset base of SHG participants. In terms of tenancy status, land ownership was lower among SHG households (81.40 per cent) than among non-members (93.38 per cent). Conversely, lease-in tenancy was more prevalent among SHG households (9.60%), suggesting reliance on rental arrangements to access agricultural land. Livestock holdings differed marginally across groups. SHG members had more goats on average (3.72 vs. 2.15), while non-members reported slightly higher average counts of cows (2.39 vs. 2.14) and chickens (4.72 vs. 4.18). The mean Tropical Livestock Unit (TLU) was nearly the same for both groups (1.51 for SHG members and 1.54 for non-members). The Wealth Index Score further indicates economic disparities, with SHG members exhibiting a negative average score (-0.37), while non-members had a positive average (0.44), suggesting relatively better economic status among non-members.

Zone-Wise Involvement of Sample SHG Members in SHG Activities

Table 4 presented the distribution of SHG members' engagement in various economic and informational activities across the four agro-climatic zones of Bihar. The analysis reflects both the diversity and intensity of SHG participation beyond micro-credit, highlighting regional patterns in group-based livelihood enhancement.

Micro-credit remained the most common activity across all zones, with an overall participation rate of 35.06 per cent, peaking in Zone 3 (42.52%). However, a substantial share of SHG women were involved in non-credit activities, particularly in information

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TABLE 4

Zone-wise involvement of sample SHG members in SHG Activities

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Activity	Zone 1 (n=130)	Zone 2 (n=260)	Zone 3 (n=127)	Zone 4 (n=139)	Pooled (n=656)
Micro-credit	44 (33.85)	88 (33.85)	54 (42.52)	44 (31.65)	230 (35.06)
Information access related to crop production	55 (43.21)	79 (30.38)	35 (27.56)	41 (29.50)	210 (32.01)
Joint crop farming	14 (10.77)	32 (12.31)	9 (7.09)	12 (8.63)	67 (10.21)
Information and resource access in livestock sectors	60 (46.15)	82 (31.54)	58 (45.67)	48 (34.53)	248 (37.80)
Marketing of agri and allied products	24 (18.46)	43 (16.52)	12 (9.45)	19 (13.67)	98 (14.94)
Mushroom cultivation	26 (20.00)	16 (6.15)	39 (30.71)	21 (15.11)	102 (15.55)
Machinery service provision	4 (3.08)	5 (1.92)	2 (1.57)	1 (0.72)	12 (1.83)
Seed production	19 (14.62)	21 (8.08)	10 (7.87)	8 (5.76)	58 (8.84)
Involvement in small business#	15 (11.54)	18 (6.92)	20 (15.75)	16 (11.51)	69 (10.52)
Average	2.02 (1.90)	1.48 (1.77)	1.88 (1.94)	1.52 (1.67)	1.67 (1.82)

Note : Figures in the parentheses indicate percentages to total sample. # Small businesses run by sample SHG women include activities such as agarbatti making, beauty parlours, knitting and embroidery design work

access related to agriculture, agri-allied sectors and small business ventures. Notably, Zone 1 and Zone 3 recorded higher involvement in SHG interventions on livestock sector (46.15% & 45.67%, respectively), indicating stronger diversification of SHG engagement in these regions.

Activities such as mushroom cultivation showed strong zonal variation, with the highest participation in Zone 3 (30.71%), whereas machinery service provision remained marginal across all zones, with less than 2 per cent overall participation. Participation in seed production was moderate but relatively more common in Zone 1 (14.62%).

Zone-wise differences are also evident in small business participation, which includes micro-enterprises like agarbatti making, beauty parlours and embroidery work. This was most prominent in Zone 3 (15.75%), aligning with its overall higher engagement in multiple activities.

The average number of activities per SHG member was highest in Zone 1 (2.02) and lowest in Zone 2 (1.48), reflecting greater multi-dimensional involvement of SHG members in Zone 1. The pooled average across all zones stood at 1.67 activities per SHG member.

Factors Affecting SHG Participation Across Four Agro-climatic Zones of Bihar

The probit regression analysis reveals several important insights into the determinants of women's participation in SHG across regions. Caste plays a prominent role, with women belonging to OSMC significantly more likely to participate in SHGs across Zones 2, 3 and 4, and also in the pooled model. The effect is particularly strong in Zone 3, indicating a relatively more inclusive environment for marginalised caste groups. Similarly, SC/ST women in Zone 3 and in the overall sample also show a significantly higher likelihood of participation, suggesting that SHG structures in certain regions may be more accessible to disadvantaged caste groups.

Economic status, as captured by the wealth index, shows a non-linear relationship with participation. In Zones 1, 2 and 4, as well as in the pooled sample, wealth has a negative effect while its squared term is positive and significant in some zones implying a U-shaped relationship. This suggests that both the

poorest and the relatively better-off women are more likely to participate, while those in the middle are less engaged. Religious affiliation also emerges as a key determinant: Muslim women are significantly less likely to participate in SHGs, especially in Zone 1 and in the pooled model, indicating possible social exclusion that may require policy attention.

Access to land shows a consistent negative relationship with SHG participation, highlighting that landless or marginal landholding women are more reliant on SHGs for credit and livelihood support. This is further supported by the positive association between rental tenancy and SHG participation in Zone 2 and in the overall model. Individual characteristics such as age and education are also influential. Age has a positive but concave effect, suggesting middle-aged women are more likely to be active members, while very young and older women are less likely to engage. Similarly, education shows a positive impact in some zones and overall, but the squared term indicates diminishing returns beyond a point.

Other household factors such as access to amenities like gas connection are negatively associated with participation, indicating that women from relatively better-off households may be less dependent on SHGs. Farming as a primary occupation is positively associated with participation, especially in Zones 2 and 4 and in the pooled model, suggesting that SHGs may be particularly beneficial to women engaged in agriculture. Taken together, these findings highlight the intersectionality of caste, class, occupation and regional contexts in shaping SHG engagement, with Zone 3 standing out for its inclusive participation among marginalised groups. This zone not only demonstrates significantly higher SHG participation among marginalised women but is also characterized by diversified cropping patterns, moderate temperatures and emerging livelihood avenues such as mushroom cultivation. These agro-ecological and economic features, combined with potentially stronger institutional outreach, may enhance the utility and accessibility of SHGs for a broader cross-section of women, reinforcing Zone 3's

distinctiveness in promoting inclusive collective action.

Factors Affecting Active Participation in Self Help Groups (SHGs)

The active participation in SHG refers to the extent to which members engage in SHG interventions beyond mere group membership. The multivariate probit regression analysis reveals significant heterogeneity in the determinants of women's simultaneous participation in multiple SHG activities. It shows that the error terms across different SHG activities are significantly correlated, meaning the decisions to participate in these activities are not made independently. Therefore, using a multivariate model is more appropriate than running separate probit models for each activity.

Caste remains a strong predictor across all activities. Women from OSMC are significantly more likely to participate in microcredit, access farming inputs and information, engage in livestock and non-farm activities and take part in mushroom cultivation. Similarly, SC/ST women show consistently significant and strong positive associations across almost all activities, especially for livestock-related initiatives and non-farm income generation. These findings suggest that SHG platforms are serving as important avenues of social and economic inclusion for women from disadvantaged caste backgrounds.

Wealth status exhibits a non-linear relationship with participation. While higher wealth index scores positively influence participation in farming-related and mushroom activities, the negative coefficients on the squared wealth index term indicate diminishing returns-suggesting that SHG engagement is higher among moderately well-off women, but not necessarily the wealthiest. Interestingly, women from poorer wealth categories show higher participation in non-farm activities, possibly reflecting a reliance on SHGs as a livelihood strategy.

Religious affiliation also appears relevant; Muslim women are significantly less likely to participate in marketing and non-farm income-generating activities,

TABLE 5
Factors affecting SHG participation across four major agro-climatic zones of Bihar: Binomial Probit Regression Analysis

Variable	Zone 1		Zone 2		Zone 3		Zone 4		Pooled	
Caste (Reference: NMC)OSMC	-0.329	(0.400)	0.351 ***	(0.191)	0.925 ***	(0.316)	0.702 *	(0.387)	0.444 ***	(0.124)
Caste SC/ST	-0.797	(0.492)	0.032	(0.273)	1.311 ***	(0.391)	0.661	(0.484)	0.334 **	(0.167)
Wealth index score (PCA score)	-3.208 *	(1.842)	-3.046 **	(1.207)	1.353	(2.089)	-3.998 *	(2.299)	-2.008 ***	(0.729)
Religion (Reference: Hindu)Muslim	-0.662 **	(0.257)	-0.325	(0.348)	0	(omitted)	-0.342	(0.507)	-0.496 ***	(0.158)
Owned land (in hectares)	-0.177 **	(0.079)	-0.101	(0.072)	-0.247 **	(0.116)	-0.213 *	(0.111)	-0.150 ***	(0.042)
Tenancy status Rental (Dummy)	0.471	(0.569)	0.971 ***	(0.367)	0.162	(0.318)	0.352	(0.476)	0.503 ***	(0.184)
Tropical Livestock Unit (TLU)	0.062	(0.073)	0.011	(0.053)	-0.065	(0.095)	-0.106	(0.075)	-0.004	(0.032)
Spouse migrated (dummy)	-0.050	(0.451)	0.171	(0.240)	0.808	(0.645)	0.421	(0.389)	0.224	(0.165)
Total adult members (numbers)	0.103	(0.068)	0.002	(0.042)	-0.088	(0.060)	0.084	(0.075)	-0.008	(0.025)
Boys (numbers)	-0.044	(0.109)	0.030	(0.065)	0.017	(0.107)	0.240 **	(0.110)	0.033	(0.042)
Girls (numbers)	0.066	(0.097)	-0.027	(0.062)	-0.130	(0.112)	0.098	(0.093)	-0.014	(0.039)
Access to pipe water (dummy)	0.066	(0.196)	0.142	(0.127)	-0.141	(0.231)	0.159	(0.212)	0.079	(0.082)
Access to gas connection (dummy)	-0.036	(0.235)	-0.090	(0.136)	-0.648 ***	(0.231)	-0.206	(0.229)	-0.174 *	(0.089)
Spousal occupation is farming (dummy)	-0.199	(0.199)	-0.068	(0.140)	0.415 **	(0.211)	-0.239	(0.203)	-0.057	(0.085)
Age of the respondent (years)	0.241 ***	(0.067)	0.056	(0.035)	0.134 **	(0.064)	0.259 ***	(0.063)	0.125 ***	(0.023)
Education of the respondent	0.169 ***	(0.064)	0.016	(0.048)	0.046	(0.073)	0.074	(0.072)	0.061 **	(0.029)
Primary occupation isFarming (dummy)	0.408	(0.310)	0.489 ***	(0.167)	0.534	(0.327)	0.514 *	(0.279)	0.469 ***	(0.115)
Wage labourer (dummy)	0.412	(0.495)	0.375	(0.351)	0.856	(0.537)	-0.415	(0.721)	0.347	(0.229)
Working hours (hours)	0.005	(0.013)	0.016 *	(0.008)	0.009	(0.013)	0.012	(0.015)	0.011 **	(0.005)
Constant	-3.984 **	(1.586)	-1.038	(0.907)	-3.161 *	(1.621)	-5.775 ***	(1.477)	-2.518 ***	(0.598)
Regional dummy	No		No		No		No		Yes	
Number of observations	240		480		240		240		1200	
Log likelihood	-134.66		-289.98		-117.34		-129.35		-714.31	
LR chi2	59.24		82.13		97.21		65.78		224.47	

Note : Values in the parentheses indicate standard error. ***, **, and * indicates significant at one per cent, five per cent and ten per cent level of statistical significance, respectively

TABLE 6

Determinants of active participation in SHG activities: Multivariate probit regression model

Variable	Microcredit		Information and input access related to farming		Collective farming/ marketing the farm produce		Livestock activities		Non-farm income generating activities		Mushroom cultivation	
Caste (Reference: NMC)OSMC	0.451 ***	(0.156)	0.492 ***	(0.170)	0.194	(0.177)	0.530 ***	(0.166)	0.590 **	(0.233)	0.583 **	(0.251)
Caste SC/ST (dummy)	0.592 ***	(0.194)	0.448 **	(0.207)	0.173	(0.221)	0.681 ***	(0.197)	0.728 ***	(0.268)	0.820 ***	(0.280)
Wealth index score (PCA score)	0.299	(0.907)	2.288 **	(1.057)	1.197	(1.204)	2.428 **	(1.054)	-1.897 **	(0.890)	2.957 **	(1.406)
Wealth index score square	-1.947	(1.449)	-4.817 ***	(1.821)	-4.891 **	(2.177)	-6.388 ***	(1.903)	1.796	(1.175)	-5.466 **	(2.524)
Religion (Reference: Hindu) Muslim (dummy)	0.003	(0.183)	-0.103	(0.183)	-0.532 **	(0.219)	-0.131	(0.179)	-0.470 *	(0.269)	-0.387	(0.262)
Owned land (in hectares)	-0.072	(0.048)	-0.236 ***	(0.066)	-0.103	(0.063)	-0.172 **	(0.057)	-0.044	(0.058)	-0.099	(0.068)
Tenancy status Rental (Dummy)	0.168	(0.169)	0.444 ***	(0.168)	-0.090	(0.194)	0.360 **	(0.162)	-0.163	(0.215)	0.129	(0.197)
Tropical Livestock Unit (TLU)	-0.021	(0.036)	-0.013	(0.037)	-0.060	(0.042)	0.330 **	(0.235)	-0.001	(0.043)	0.025	(0.044)
Spouse migrated (dummy)	0.119	(0.165)	0.123	(0.166)	0.059	(0.181)	0.041	(0.160)	0.275	(0.188)	0.380 *	(0.200)
Total adult members (numbers)	0.050 *	(0.029)	0.011	(0.031)	0.048	(0.033)	0.002	(0.029)	0.025	(0.034)	-0.007	(0.038)
Age of the respondent (years)	0.055 **	(0.027)	0.092 ***	(0.029)	0.094 ***	(0.033)	0.048 *	(0.026)	0.129 ***	(0.038)	0.055	(0.034)
Education of the respondent	0.042	(0.032)	0.048	(0.033)	0.025	(0.037)	0.058 **	(0.032)	0.050	(0.038)	0.085 **	(0.040)
Primary occupation (Reference: Household activities)Farming (dummy)	0.115	(0.119)	0.115	(0.120)	0.224 *	(0.129)	0.390 ***	(0.114)	0.108	(0.148)	0.379 ***	(0.146)
Wage labourer (dummy)	0.166	(0.240)	0.516 **	(0.238)	0.318	(0.245)	0.352	(0.242)	0.612 **	(0.254)	0.707 ***	(0.260)
Business (dummy)	-0.716	(0.506)	0.467	(0.372)	-0.038	(0.442)	0.683 **	(0.336)	1.122 ***	(0.370)	0.767 *	(0.422)
Working hours (hours)	0.019 ***	(0.006)	-0.000	(0.006)	0.009	(0.007)	0.008	(0.006)	-0.004	(0.008)	-0.014 *	(0.008)
Regional dummies (Reference: Zone 4)Zone 1	0.023	(0.148)	0.249 *	(0.146)	0.387 **	(0.162)	0.257 *	(0.139)	0.115	(0.168)	0.219	(0.165)
Zone 2	0.044	(0.124)	0.023	(0.125)	0.235 *	(0.138)	-0.107	(0.120)	-0.119	(0.150)	-0.561 ***	(0.164)
Zone 3	0.080	(0.140)	-0.329 **	(0.147)	-0.265	(0.171)	-0.038	(0.136)	0.053	(0.164)	0.229	(0.157)
Constant	-3.284 ***	(0.694)	-3.348 ***	(0.740)	-3.834 ***	(0.847)	-2.663 ***	(0.680)	-4.038 ***	(0.911)	-2.946 ***	(0.837)
Number of observations	656		656		656		656		656		656	
Log likelihood	-2115.86											
Wald chi2	339.21											

Note : Values in the parentheses indicate standard error. *** , ** , and * indicates significant at one per cent, five per cent and ten per cent level of statistical significance, respectively

hinting at barriers to economic integration within SHG structures for religious minorities. Land ownership negatively affects participation in farming input access and livestock activities, indicating that landless or marginal farmers are more inclined to leverage SHGs for support. On the other hand, tenancy (rental) status positively influences involvement in farming-related and livestock activities, further reinforcing the idea that SHGs cater more to resource-constrained households.

Among individual-level factors, age has a consistent and concave relationship-with middle-aged women most actively involved across all activities. Education shows a generally positive but modest effect, with statistically significant influence on livestock and mushroom cultivation. Women, whose primary occupation is farming or wage labour, show higher participation in collective and specialized SHG activities such as mushroom cultivation. This may reflect both economic need and compatibility with existing skillsets. Notably, women engaged in business activities exhibit higher participation in non-farm and mushroom-related SHG activities, suggesting SHGs may be fostering small-scale entrepreneurship.

In terms of regional variation, women in Zone 1 are more likely to engage in input access and collective marketing, while those in Zone 2 show reduced participation in mushroom cultivation. These spatial differences reflect localized opportunities and constraints in SHG program delivery or sectoral focus.

Zone-wise SHG Participation and the Challenge of Inactive Membership

Though SHGs have emerged as vibrant institutions for expanding grassroots networks and reaching a large number of marginalised women across all agro-climatic zones of Bihar, not all members are actively engaged in group activities. Many women hold SHG membership without meaningful participation, raising concerns about the depth of empowerment and actual livelihood impact.

Fig. 1, illustrates this zonal variation in SHG participation rates and the share of inactive members-those who are members in name only. While participation is consistently above 50 per cent in all zones (ranging from 52.92% in Zone 3 to 57.92% in Zone 4), inactivity levels vary significantly. Zone 2 shows the highest share of inactive members
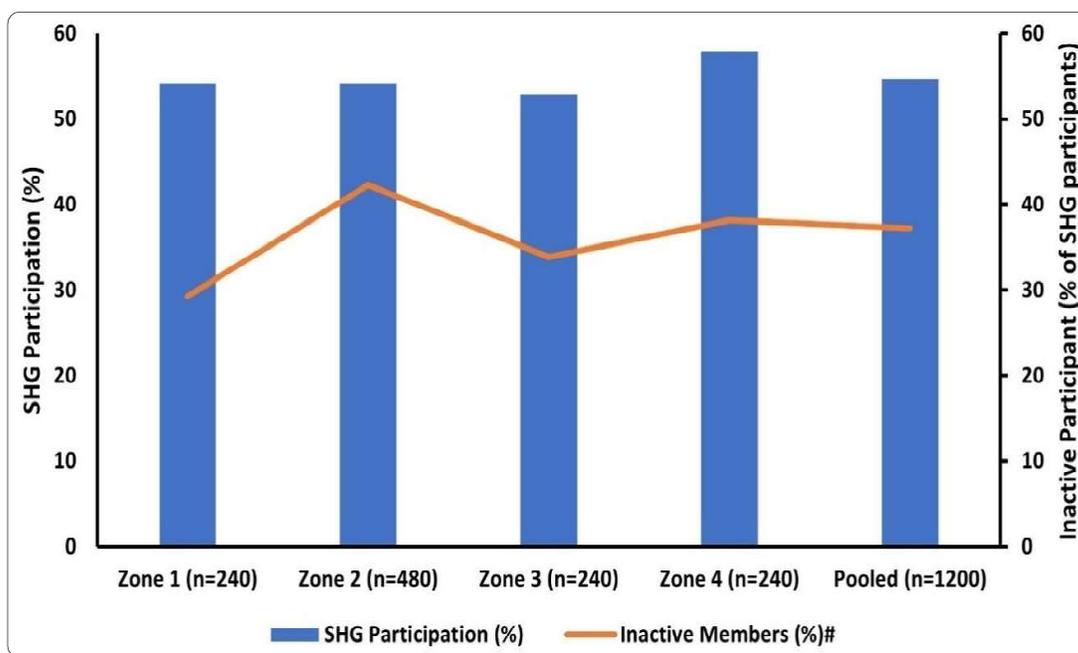

Fig. 1 : Zone-wise SHG Participation and Inactive Members (% of SHG Members).

Note : #Inactive members represent those who possess mere membership in the group but were not involved in any SHG activity. The percentage of inactive members reflects their share among SHG participants (n = 656), not the total sample size

(42.31%), while Zone 1 has the lowest (29.23%). The pooled data indicate that 37.35 per cent of SHG members are inactive, highlighting a critical gap between coverage and actual engagement. These findings stress the importance of not only expanding SHG outreach but also enhancing the quality of women's participation in SHG activities to realize their full potential in improving livelihoods.

This study highlights the key factors shaping women's participation in SHG across Bihar's agro-climatic zones. SHG members tend to be middle-aged, land-poor and from SC/ST or OSMC, indicating that SHGs are reaching disadvantaged groups. Econometric analysis confirms caste as a significant determinant of participation, particularly in diversified livelihoods like livestock and mushroom cultivation. Participation is highest among the poorest and moderately better-off women, while Muslim women face clear barriers, especially in market-linked activities. Age, occupation and regional variation also play important roles, Zone 1 shows the most diverse participation, while Zone 3 stands out for enterprise-specific engagement. However, a significant share of members, especially in Zone 2, remain inactive, suggesting that membership alone does not equate to empowerment. In conclusion, SHGs in Bihar have shown potential as plat forms for economic inclusion, especially for caste-marginalised and land-poor women. However, participation remains uneven across land ownership, wealth strata and regions. To enhance the effective ness of SHGs, policymakers must address intra-group disparities, focus on promoting active participation and adapt interventions to regional opportunities and constraints. Distinguishing between nominal membership and meaningful engagement is essential for accurately assessing SHG impact and for designing inclusive, need-responsive collective action strategies.

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