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DETERMINATION OF GROUP NATURE OVER SOCIAL AND ECONOMIC VARIABLES FOR SELF-HELP GROUP: A STUDY IN JALPAIGURI DISTRICT OF WEST BENGAL

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Abstract

The implementation of SHGs under SGSY should consider the specific ground realities of the district of Jalpaiguri. The scheme aims to generate income and create employment opportunities for the poor, which depend on the availability of resources, technology, attitude, enterprise, and political will. The state has made poverty eradication its immediate priority. The state action should be complemented by the positive mindset of the poor, who are supported by NGOs and civil society actions, to overcome poverty and deprivation. The groups should select income generating projects carefully, taking into account the backward and forward linkages that are essential for the sustainability of the scheme. Therefore, a study on the evaluation of SHGs in this district should be accompanied by an overview of the economic opportunities, the extent of poverty, and the state of human capital in the district. Present study firstly deals with the responsiveness of the socio-economic factors of the selected members of the Self-Help group. To define the socio-economic influences of such people, study considers group nature as the main response captured variable. The study constructs such variables as per the considered methods. The study divided the respondents in terms of present status with the groups. The study considers two major categories like active and passive. The division of active and passive is done on the basis of proportionate participation of workers, number of arrangement of meetings and the respective Cash Credit (CC) limit.

Key words: *Self-Help Group, Jalpaiguri, Group Nature*

Introduction

The implementation of SHGs under SGSY should consider the specific ground realities of the district of Jalpaiguri. The scheme aims to generate income and create employment opportunities for the poor, which depend on the availability of resources, technology, attitude, enterprise, and political will. The state has made poverty eradication its immediate priority. The state action should be complemented by the positive mindset of the poor, who are supported by NGOs and civil society actions, to overcome poverty and deprivation. The groups should select income generating projects carefully, taking into account the backward and forward linkages that are essential for the sustainability of the scheme. Therefore, a study on the evaluation of SHGs in this district should be accompanied by an overview of the economic opportunities, the extent of poverty, and the state of human capital in the district. Present study firstly deals with the responsiveness of the socio-economic factors of the selected members of the Self-Help group. To define the socio-economic influences of such people, study considers group nature (grp-ntr) as the main response captured variable. The study constructs such variables as per the considered methods. The study divided the respondents in terms of present status with the groups. The study considers two

major categories like active and passive. The division of active and passive is done on the basis of proportionate participation of workers, number of arrangement of meetings and the respective Cash Credit (CC) limit. Here, active means those groups have more than 60% members been working continuously and at least three meetings used to arrange in a month and are entitled more than 250000 CC limit. The passive means those groups have less than 60% members have been working continuously and at least two meetings used to arrange in a month and are entitled equal or less than 250000 CC limit. The study deals with 31 groups with 270 members. Each of the groups has one president, one secretary and one cashier.

Table-1: Distribution of Group-Nature & Significance

Frequencies of GRP_NTR		
GRP_NTR	Counts	% of Total
PASSIVE	171	63.3 %
ACTIVE	99	36.7 %
χ^2 Goodness of Fit		
χ^2	df	p
68.5	1	< .001

Source: Study Estimation, 2023

The study observes that 36.7 percent of the respondents are in active group, 63.3 percent are in passive category (Table-1). The Chi-square goodness of fit measurement between the observed counts and expected count of participation under different group nature is found significant. The passive group consists of those who did not participate in any group activity, while the active group consists of those who did.

Data and Methods

The study considers only those covariates which can be directly or indirectly linked with before formed response variable like group nature. In support of such linking we have several literatures which are discussed in Chapter II of the thesis. On the basis of earlier sketches study considers nine independent covariates. The study also used code name for each and every covariate. The education level of the respondent, measured in years of schooling (*edu_respndt*), the education level of the respondent's husband, measured also in years of schooling (*edu_hus*), the age of the respondent, measured in years (*age_respndt*), the age of the respondent's husband, measured in years (*age_hus*), the family size, measured by the number of members in the household (*fmsz*), the number of dependents, measured by the number of children under 5 years old in the household (*depndt*), the land holding, measured by the number of bighas owned by the household (*lnd_hld*), the experience in joining a group, measured by the number of years since joining a group (*exper_join*) and the gap between joining a group and group formation, measured by the number of years (*gap_join_grp_formn*). The descriptive statistics of each of such covariate are to be discussed by the study to comprehend the social status of the members of SHGs. Firstly; we have to make some clear sense of missing observations. In our study the total sample size (*n*) is 270, but regarding any kind of information which directly related to the respondents herself, we get 270 data points. But for the data related husband we have some missing information. For the respondents, whose husband is died or separated under such situation we don't get such information. Such cases among the total 270 data points are 11 only. Thus, in the study for the husband related information *n* = 259 instead of 270.

Table-2: Descriptive of the Independent Covariates

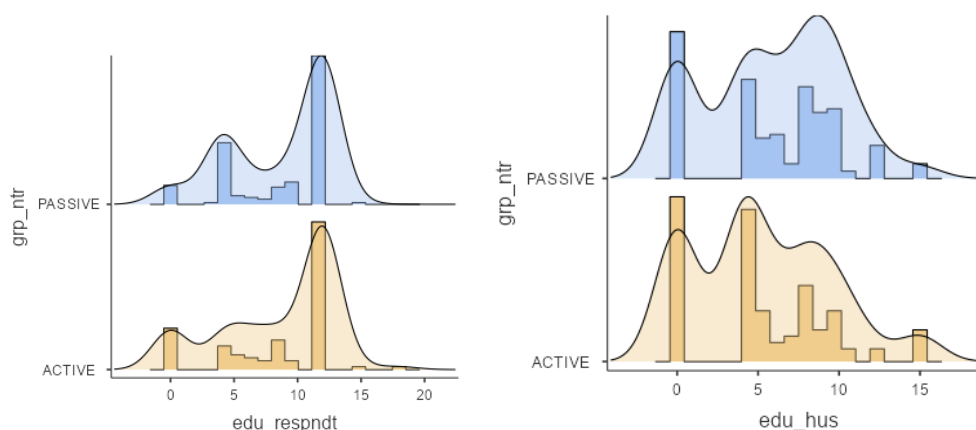
Descriptive									
	edu_respondt	edu_hus	age_respondt	age_hus	fmsz	depndt	Ind_hld	exper_join	gap_join_grp_formn
N	270	259	270	259	270	270	270	270	270
Missing	0	11	0	11	0	0	0	0	0
Mean	8.65	5.66	43.4	46.6	4.6	0.4	1.33	16.9	3.3
Median	12	5	43.5	49.5	5	0	1	19	0
Standard deviation	4.22	4.13	9.47	13.8	1.17	0.636	1.3	6.27	6.21
Minimum	0	0	20	31	2	0	0	1	0
Maximum	18	15	65	70	8	4	6	22	21
Skewness	-0.74	-0.109	-0.189	-1.59	0.0611	2.13	0.823	-1.28	1.46
Kurtosis	-0.745	-0.797	-0.252	3.5	-0.288	7.26	0.366	-0.00849	0.363
Shapiro-Wilk W	0.798	0.922	0.977	0.862	0.937	0.619	0.865	0.718	0.562
Shapiro-Wilk p	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
25th percentile	4	4	40	40	4	0	0	18	0
50th percentile	12	5	43.5	49.5	5	0	1	19	0
75th percentile	12	9	50	55	5	1	2	21	0

Source: Study Estimation, 2023

Table-2 explains such descriptive statistics of all considered independent covariates. Such descriptive statistics covers number of observation, missing number of observations, mean, median, standard deviation, maximum-minimum values, Skewness, kurtosis, Shapiro-Wilk p and the percentiles.

Firstly, study considers the two variables jointly, one is education of the respondents and the other is education of the husband of respondents. The study observes that respondents have higher average education levels than their husbands (8.65 vs 5.66 years). Both variables have high variability (standard deviations of 4.22 and 4.13) and are negatively skewed (-0.74 and -0.109), indicating that there are more respondents and husbands with low education levels than high education levels. The group nature wise distribution of both education levels are shown in figure-1. For both the active and passive group, study observes that density curve is majorly concentrated within 5 years to 12 years of education, but for husband discrete differential peak-ness is observed.

Figure-1: Density Curve for education of the respondents & Her Husband over Group Nature

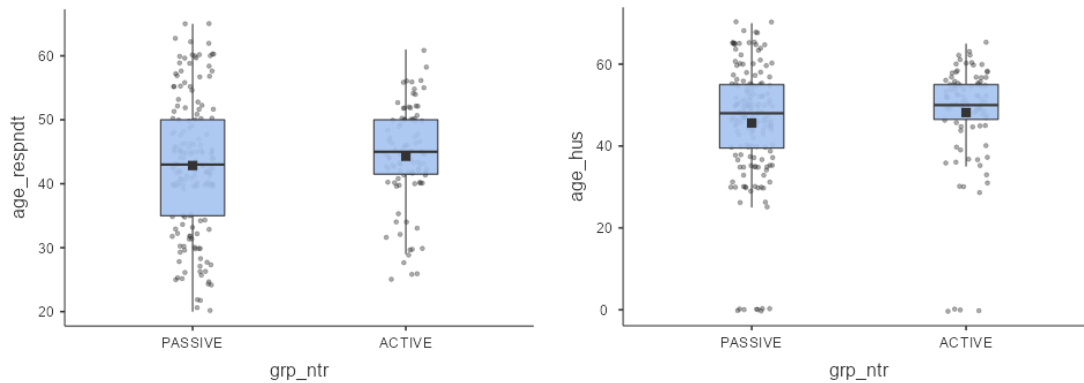


Source: Study Estimation, 2023

The study observes that respondents are younger than their husbands on average (43.4 vs 46.6 years). Both variables have moderate variability (standard deviations of 9.47 and 13.8) and are slightly negatively skewed (-0.189 and -1.59), indicating that there are more respondents' husbands with older ages than younger ages, and ranges from 20 to 65. The median age of the active respondents and passive

respondents are quite close but the difference exist between the first percentile values which is clear from box-plot (Figure-2). The first percentile age value of the active members shows that they are quite senior in terms of age than the passive. More or less, the same thing is reflected over husband age in terms of the respondent's position between two groups.

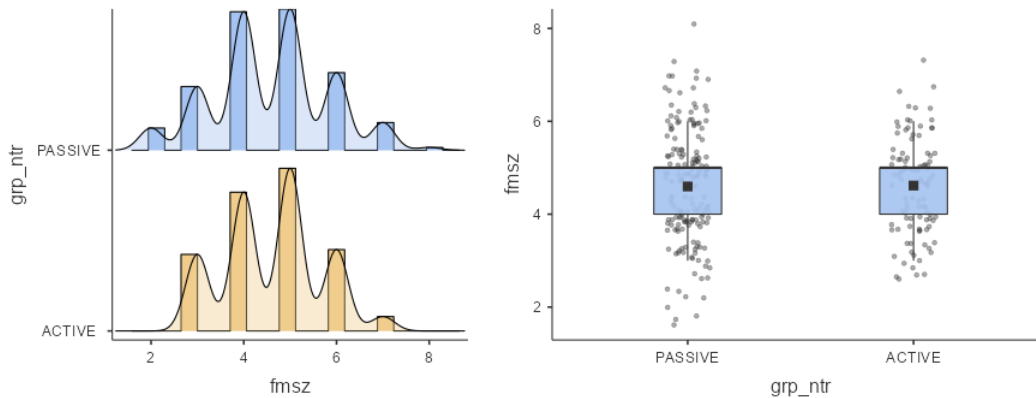
Figure-2: Box-Plot for age of the respondents & Her Husband over Group Nature



Source: Study Estimation, 2023

The average family size of all the members is 4.6 with median value 5. The family size has a low variability (standard deviation of 1.17) and is symmetric (skewness of 0.0611), indicating that most families have similar sizes around 5 members. From the density distribution of family size, study observes that among passive members variation in family size is quite large than active members.

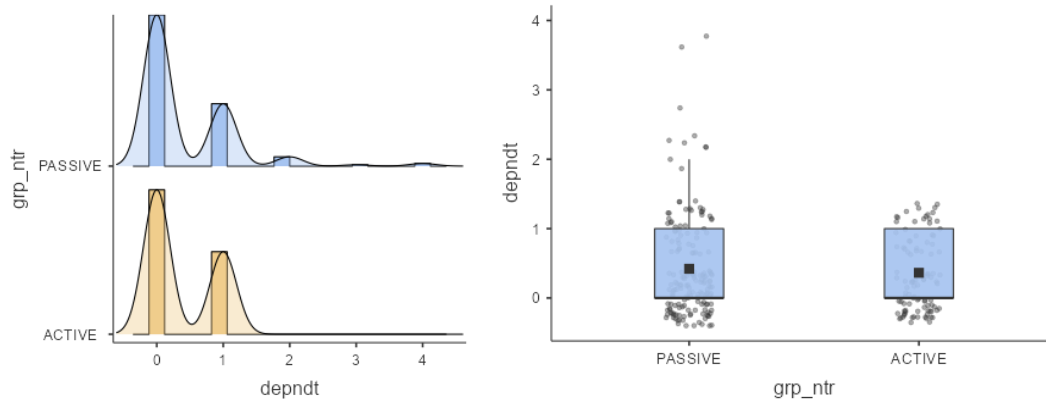
Figure-3: Distribution of Family size of the respondents over Group Nature



Source: Study Estimation, 2023

The number of dependents has a high variability (standard deviation of 0.636) and is highly positively skewed (skewness of 2.13), indicating that there are more families with no or few dependents than with many dependents. From the distribution of number of dependent over group nature, study observes that both the group members are majorly free from number of dependents. The average number of dependent is 0.4. The box-plot distribution of dependent shows that active group members are quietly concentrated between all quartiles than the passive members, but the average value of dependents are more or less same for both groups.

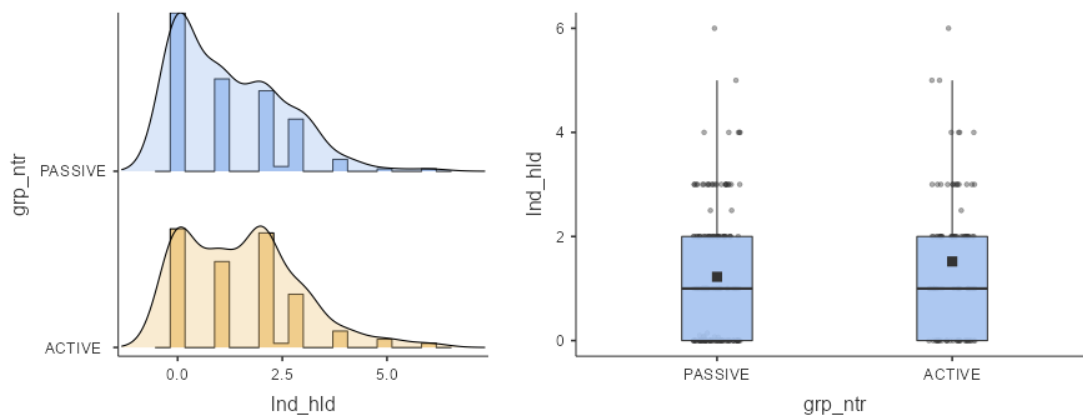
Figure-4: Distribution of Number of Dependents of the respondents over Group Nature



Source: Study Estimation, 2023

The average land holding of the households where the respondents belong is 1.33 bigha and which shows no variation among two categories of members. The land holding has a high variability (standard deviation 1.3) and is positively skewed (Skewness 0.823), indicating that there are more families with small or no land holdings than with large land holdings. The density curve of the land holding shows that a large section of members are found with small or no land holdings and the box-plot distribution shows that large size of land is actually hold by some terminal members.

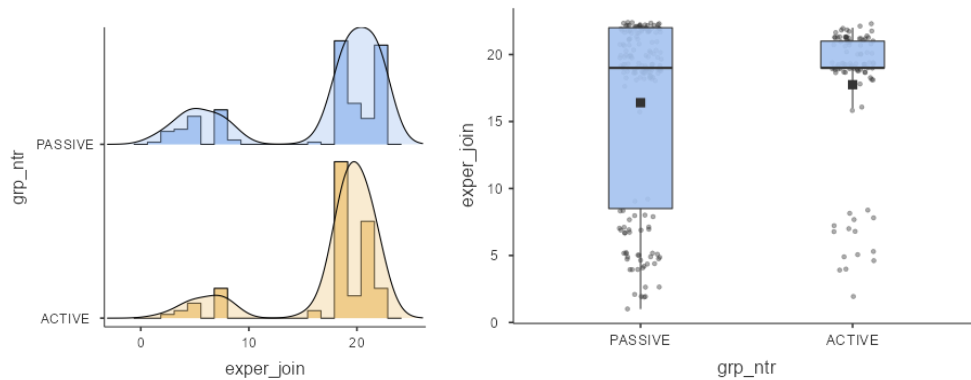
Figure-5: Distribution of Land holdings of the respondents over Group Nature



Source: Study Estimation, 2023

The average experience in joining a group is 16.9 years with high variability (standard deviation 6.27) and is negatively skewed (skewness of -1.28), indicating that there are more respondents with long or moderate experience than with short or no experience. The density curve for both the active and passive members shows that there is a clear compartmentalization in terms of experience in joining in the group. One group has less than 8 year's experiences and another group has experiences by more than 12 years.

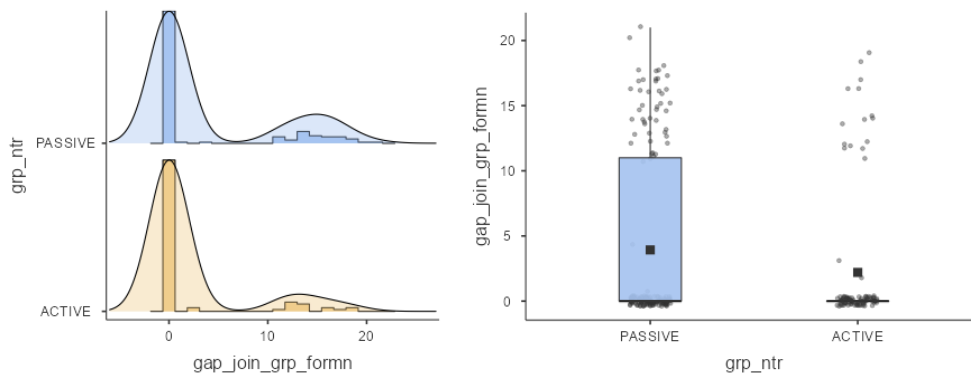
Figure-6: Distribution of Experience of Joining of the respondents over Group Nature



Source: Study Estimation, 2023

The gap between joining a group and group formation year has a high variability (standard deviation of 6.21) and is positively skewed (skewness of 1.46), indicating that there are more respondents with short or no gaps than with long gaps. Among both the active and passive such gap varies from 0 to 20 years and a large section of members are found with 0 years of gap.

Figure-7: Distribution of the gap between joining a group and group formation of the respondents over Group Nature



Source: Study Estimation, 2023

None of the variables follow a normal distribution, as indicated by the low Shapiro-Wilk W and the small Shapiro-Wilk p values for all variables. This means that the mean and standard deviation may not be the best measures of central tendency and variability for these variables, and that some statistical tests that assume normality may not be valid for these variables.

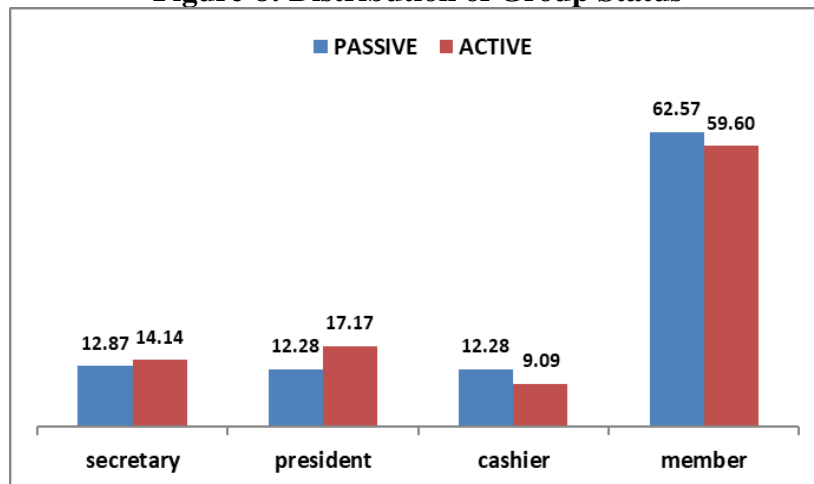
Economic Covariates

Among the economic covariates study considers several literatures to identify the economic variables. Among the economic variables, study considers the status of the respondent in the group, such as secretary, president, cashier, or member (*grp_sts*), the occupation of the respondent (*occupn_respnndt*) (where the occupation is categorized as such as mid-day meal and ASHA (MDM_ASHA), household work (HHWRK), daily wage labour (DWL), or other informal work (OTH_INFWRK)), the economic status of the respondent (*econ_sts*), (where such status are APL (above poverty line) or BPL (below poverty line)), the marital status of the respondent, such as married or widow or others (*martrl_sts*), the employment status of the respondent, such as yes or no (*empl_sts_respnndt*), the type of member in the

group (*Member Type*), (which is also classified as EXPR_MEMBR (experienced member) or INEXPER_MEMBR (inexperienced member)), the occupation of the respondent's husband (*occupn_hus*), (which is classified as AGRIL_WRK (agricultural worker), DWL (daily wage laborer), SML_BSNS (small business owner), or INF_SERVICE (informal service provider)), and social status of the respondent (*socl_sts*), (which is classified as OTH (other) or RESV (reserved)).

The distribution of group status shows that the majority of the respondents are members (107 passive and 59 active), followed by secretary (22 passive and 14 active), president (21 passive and 17 active), and cashier (21 passive and 9 active).

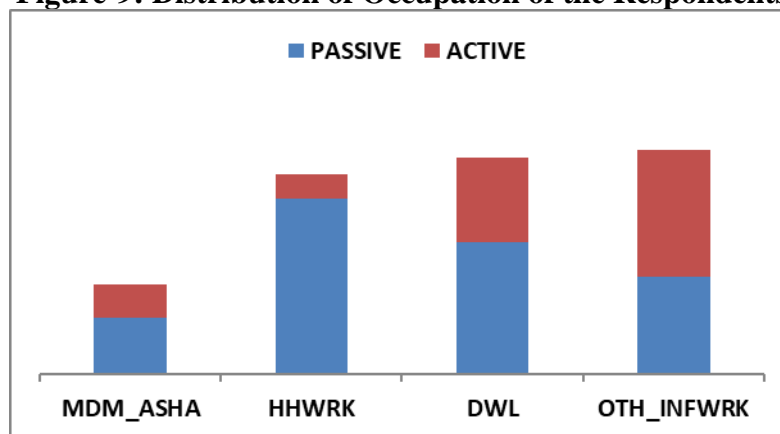
Figure-8: Distribution of Group Status



Source: Study Estimation, 2023

The most common occupation of the respondents is HHWRK (household work), with 65 passive and 9 active respondents. The second most common occupation is DWL (daily wage laborer), with 49 passive and 31 active respondents. The least common occupation is MDM_ASHA (accredited social health activist), with 22 passive and 20 active respondents.

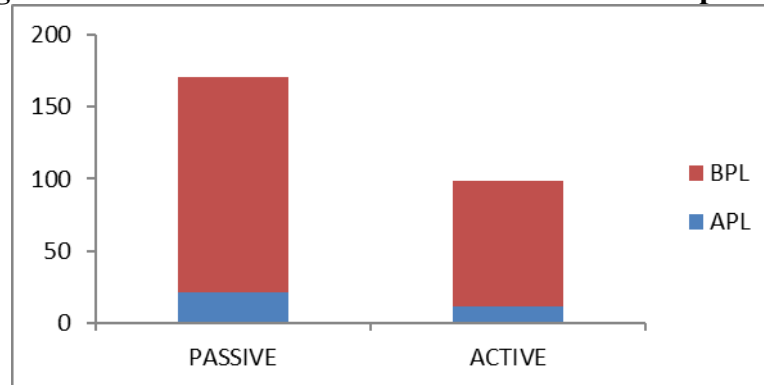
Figure-9: Distribution of Occupation of the Respondents



Source: Study Estimation, 2023

The majority of the respondents are BPL (below poverty line), with 150 passive and 88 active respondents. Only 21 passive and 11 active respondents are APL (above poverty line).

Figure-10: Distribution of Economic Status of the Respondents

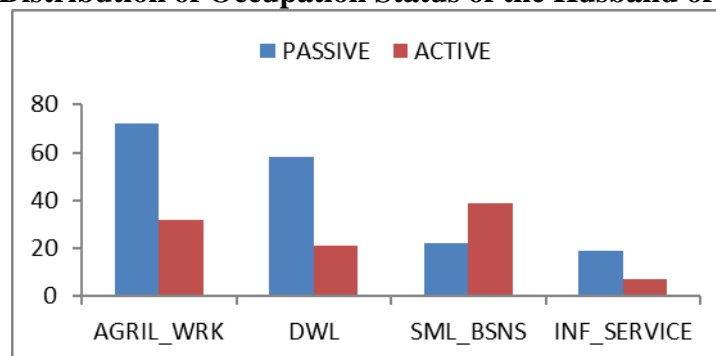


Source: Study Estimation, 2023

The majority of the respondents are married, with 164 passive and 95 active respondents. Only 7 passive and 4 active respondents are widow. The majority of the respondents are employed, with 106 passive and 88 active respondents. Only 65 passive and 11 active respondents are not employed. The majority of the respondents are experienced members, with 126 passive and 84 active respondents. Only 45 passive and 15 active respondents are inexperienced members.

The most common occupation of the respondent's husband is AGRIL_WRK (agricultural worker), with 65 passive and 25 active respondents. The second most common occupation is DWL (daily wage laborer), with 58 passive and 21 active respondents. The least common occupation is INF_SERVICE (informal service provider), with 24 passive and 15 active respondents.

Figure-11: Distribution of Occupation Status of the Husband of Respondents



Source: Study Estimation, 2023

The majority of the respondents are RESV (reserved), with 96 passive and 55 active respondents. Only 75 passive and 44 active respondents are OTH (other).

Correlation Matrix of the Nominal Variables

A correlation matrix is a table that shows the relationship between two or more variables. Each cell in the table contains the correlation coefficient, which is a measure of how strongly the variables are related. The correlation coefficient ranges from -1 to 1, where -1 indicates a perfect negative relationship, 0 indicates no relationship, and 1 indicates a perfect positive relationship. The p-value is the probability of obtaining a correlation coefficient as extreme as or more extreme than the observed one by chance, assuming that there is no relationship between the variables. The p-value is used to test the statistical significance of the correlation coefficient, which means how likely it is that the observed relationship is not due to random fluctuations. A common threshold for significance is 0.05, which means that there is less than a 5% chance of obtaining. This correlation matrix shows the relationship between nine social variables what we consider before. These are *edu_respndt*, *edu_hus*, *age_respndt*, *age_hus*, *fmsz*, *depndt*, *lnd_hld*, *exper_join*, and *gap_join_grp_formn*.

Table-3: Correlation Matrix of the Social Variables

Correlation Matrix										
		edu_respn dt	edu_hu s	age_respn dt	age_hu s	fmsz	depnd t	lnd_hl d	exper_joi n	gap_join_grp_for mn
edu_respndt	Pearson's r p-value	— —								
edu_hus	Pearson's r p-value	0.077 0.208	— —							
age_respndt	Pearson's r p-value	0.047 0.44	-0.451 *** <.001	— —						
age_hus	Pearson's r p-value	0.032 0.597	-0.246 *** <.001	0.529 *** <.001	— —					
fmsz	Pearson's r p-value	0.139 * 0.022	-0.024 0.697	0.303 *** <.001	0.309 *** <.001	— —				
depndt	Pearson's r p-value	-0.017 0.786	0.069 0.262	-0.026 0.673	0.016 0.798	0.044 0.473	— —			
lnd_hld	Pearson's r p-value	0.145* 0.017	0.018 0.77	0.06 0.324	0.114 0.062	0.185 ** 0.002	-0.03 0.622	— —		
exper_join	Pearson's r p-value	-0.032 0.598	-0.394 <.001	0.787 *** <.001	0.488 *** <.001	0.24 *** <.001	- 0.035 0.564	0.061 0.315	— —	
gap_join_grp_for mn	Pearson's r p-value	0.092 0.133	0.408 *** <.001	-0.784 *** <.001	-0.48 *** <.001	- 0.208 *** <.001	0.034 0.579	-0.031 0.609	-0.977 *** <.001	— —

Note. * p < .05, ** p < .01, *** p < .001

Source: Study Estimation, 2023

There is a weak positive correlation between *edu_respndt* and *edu_hus* ($r = 0.077$), which means that respondents with higher education tend to have husbands with higher education as well. However, this correlation is not statistically significant ($p = 0.208$), which means that we cannot rule out the possibility that this relationship is due to chance. There is a moderate negative correlation between *age_respndt* and *edu_hus* ($r = -0.451$), which means that older respondents tend to have husbands with lower education. This correlation is statistically significant ($p < 0.001$), which means that there is very strong evidence that this relationship is not due to chance.

There is a very strong positive correlation between *age_respndt* and *exper_join* ($r = 0.787$), which means that older respondents tend to have more experience in joining groups. This correlation is statistically significant ($p < 0.001$), which means that there is very strong evidence that this relationship is not due to chance. There is a very strong negative correlation between *exper_join* and *gap_join_grp_formn* ($r = -0.977$), which means that respondents with more experience in joining groups tend to have less gap between joining and group formation. This correlation is statistically significant ($p < 0.001$), which means that there is very strong evidence that this relationship is not due to chance. The correlation coefficient between *age_respndt* and *age_hus* is 0.529, and the p-value is less than 0.001, indicating a moderate positive correlation that is statistically significant.

ANOVA of Nominal Variables:

Table-4: One way ANOVA for grouping variable: Experience

Group Descriptive					One-Way ANOVA				
	Member Type	Mean	SD	SE		F	df1	df2	p
edu_respondt	EXPR_MEMBR, N=210	8.448	4.248	0.2932	Welch's(Assumes unequal Var)	2.224	1	98.1	0.139
	INEXPER_MEMBR, N=60	9.35	4.1	0.5293	Fisher's(Assumes equal Var)	2.138	1	268	0.145
edu_hus	EXPR_MEMBR, N=210	4.805	3.929	0.2712	Welch's(Assumes unequal Var)	57.04	1	109.5	< .001
	INEXPER_MEMBR, N=60	8.667	3.358	0.4335	Fisher's(Assumes equal Var)	47.922	1	268	< .001
age_respondt	EXPR_MEMBR, N=210	47.31	6.367	0.4394	Welch's(Assumes unequal Var)	640.708	1	143.9	< .001
	INEXPER_MEMBR, N=60	29.617	4.211	0.5436	Fisher's(Assumes equal Var)	411.285	1	268	< .001
age_hus	EXPR_MEMBR, N=210	50.048	13.354	0.9215	Welch's(Assumes unequal Var)	159.363	1	204.1	< .001
	INEXPER_MEMBR, N=60	34.333	6.482	0.8369	Fisher's(Assumes equal Var)	77.697	1	268	< .001
fmsz	EXPR_MEMBR, N=210	4.738	1.159	0.08	Welch's(Assumes unequal Var)	13.548	1	98.6	< .001
	INEXPER_MEMBR, N=60	4.133	1.112	0.1435	Fisher's(Assumes equal Var)	12.939	1	268	< .001
depndt	EXPR_MEMBR, N=210	0.381	0.617	0.0426	Welch's(Assumes unequal Var)	0.736	1	86.9	0.393
	INEXPER_MEMBR, N=60	0.467	0.7	0.0904	Fisher's(Assumes equal Var)	0.847	1	268	0.358
Ind_hld	EXPR_MEMBR, N=210	1.356	1.264	0.0872	Welch's(Assumes unequal Var)	0.249	1	87.6	0.619
	INEXPER_MEMBR, N=60	1.255	1.418	0.183	Fisher's(Assumes equal Var)	0.283	1	268	0.595
exper_join	EXPR_MEMBR, N=210	20.133	1.445	0.0997	Welch's(Assumes unequal Var)	2762.36	1	77.4	< .001
	INEXPER_MEMBR, N=60	5.567	2.003	0.2586	Fisher's(Assumes equal Var)	3943.18	1	268	< .001

Source: Study Estimation, 2023

This table-4 provides the results of a one-way ANOVA (Analysis of Variance) comparing the means of several variables between two groups: EXPR_MEMBR (experienced members, N=210) and INEXPER_MEMBR (inexperienced members, N=60). The mean for experienced members is 8.448 whereas it is 9.35 for new members, based on *edu_respondt*. As there is a no significant difference between the two groups, the p-value is greater than 0.05. In terms of *edu_hus* the mean for experienced members is 4.805 and for inexperienced members is 8.667. The p-value is less than 0.001, indicating a significant difference between the two groups. For *age_respondt* the mean age for experienced members is 47.31 and for inexperienced members is 29.617. The p-value is less than 0.001, indicating a significant difference between the two groups. For *age_hus* the mean age for experienced members is 50.048 and for inexperienced members is 34.333. The p-value is less than 0.001, indicating a significant difference between the two groups. For *fmsz* the mean family size for experienced members is 4.738 and for inexperienced members is 4.133. The p-value is less than 0.001, indicating a significant difference between the two groups. For *dependent*, the experienced members, the mean number of dependents is 0.381, whereas for inexperienced members, it is 0.467. As there is no significant difference between the two groups, the p-value is greater than 0.05. The typical *Ind_hld* for experienced members is 1.356, but it is 1.255 for inexperienced members. As there is no significant difference between the two groups, the p-value is greater than 0.05. For *exper_join*, the mean experience before joining for experienced members is 20.133 and for inexperienced members is 5.567. The p-value is less than 0.001, indicating a significant difference between the two groups. In summary, there are significant differences between experienced and inexperienced members in terms of education of husband (*edu_hus*), respondent's age (*age_respondt*), husband's age (*age_hus*), family size (*fmsz*), and experience before joining (*exper_join*). There are no significant differences in terms of respondent's education (*edu_respondt*), number of dependents (*depndt*), and land holding (*Ind_hld*).

Table-5: Homogeneity of Variance Test

Homogeneity of Variances Test (Levene's)				
	F	df1	df2	p
edu_respndt	1.696	1	268	0.194
edu_hus	5.43	1	268	0.021
age_respndt	15.001	1	268	<.001
age_hus	4.604	1	268	0.033
fmsz	0.654	1	268	0.419
depndt	2.765	1	268	0.098
lnd_hld	0.503	1	268	0.479
exper_join	15.078	1	268	<.001

Source: Study Estimation, 2023

The table-5 shows the result of Levene's test for homogeneity of variances. This test checks if the variances are equal across our samples. A larger F value indicates a larger difference in variances between groups. The degrees of freedom for the test are df1 and df2. Degrees of freedom are expressed as df1 for the numerator (between groups) and df2 for the denominator (within groups). The p-value is 0.194, which is higher than 0.05, according to *edu_respndt*. As a result, we cannot rule out the null hypothesis and come to the conclusion that the variances are not significantly different. The p-value is 0.021, which is less than 0.05, according to *edu_hus*. As a result, we determine that there is a significant variance difference and reject the null hypothesis. For *age_respndt* the p-value is substantially lower than 0.05 and less than 0.001. As a result, we determine that there is a significant variance difference and reject the null hypothesis. For *age_hus* the p-value, which is less than 0.05, is 0.033. As a result, we determine that there is a significant variance difference and reject the null hypothesis. The p-value is 0.419, which is higher than 0.05, according to *fmsz*. For *depndt* the p-value is 0.098, which is greater than 0.05. Therefore, we fail to reject the null hypothesis and conclude that there is no significant difference in variances. For *lnd_hld* the p-value is 0.479, which is greater than 0.05. Therefore, we fail to reject the null hypothesis and conclude that there is no significant difference in variances. For *exper_join* the p-value is less than 0.001, which is much smaller than 0.05. Therefore, we reject the null hypothesis and conclude that there is a significant difference in variances. In summary, it appears that *edu_hus*, *age_respndt*, *age_hus*, and *exper_join* have significantly different variances while *edu_respndt*, *fmsz*, *depndt*, and *lnd_hld* do not.

This table-6 appears to be the result of a pairwise comparison using the Durbin-Conover method, which is a non-parametric statistical test used to determine if there are significant differences between pairs of groups. The table lists pairs of variables (e.g., *gap_join_grp_formn* and *edu_respndt*), along with a statistic value and a p-value for each pair. The statistic value is a measure of the difference between the two groups. For example, in the first row, *gap_join_grp_formn* and *edu_respndt* have a statistic value of 20.67 and a p-value of <.001. This means that there is a significant difference between these two groups. The difference between these two groups is not statistically significant at the 5% level, on the other hand, if the p-value is larger than 0.05, as it is for *lnd_hld* and *gap_join_grp_formn* with a p-value of 0.157.

In summary, this table provides a comprehensive comparison of different pairs of groups, indicating whether or not their differences are statistically significant.

Table-6: Pairwise Comparison among variables

Pairwise Comparisons (Durbin-Conover)			
		Statistic	p
gap_join_grp_formn	edu_respndt	20.67	< .001
gap_join_grp_formn	edu_hus	13.175	< .001
gap_join_grp_formn	age_respndt	44.332	< .001
gap_join_grp_formn	age_hus	49.933	< .001
gap_join_grp_formn	fmsz	13.525	< .001
gap_join_grp_formn	depndt	7.145	< .001
gap_join_grp_formn	lnd_hld	1.416	0.157
gap_join_grp_formn	exper_join	30.186	< .001
edu_respndt	edu_hus	7.495	< .001
edu_respndt	age_respndt	23.662	< .001
edu_respndt	age_hus	29.263	< .001
edu_respndt	fmsz	7.145	< .001
edu_respndt	depndt	27.815	< .001
edu_respndt	lnd_hld	22.086	< .001
edu_respndt	exper_join	9.516	< .001
edu_hus	age_respndt	31.156	< .001
edu_hus	age_hus	36.757	< .001
edu_hus	fmsz	0.35	0.726
edu_hus	depndt	20.32	< .001
edu_hus	lnd_hld	14.592	< .001
edu_hus	exper_join	17.01	< .001
age_respndt	age_hus	5.601	< .001
age_respndt	fmsz	30.806	< .001
age_respndt	depndt	51.476	< .001
age_respndt	lnd_hld	45.748	< .001
age_respndt	exper_join	14.146	< .001
age_hus	fmsz	36.407	< .001
age_hus	depndt	57.078	< .001
age_hus	lnd_hld	51.349	< .001
age_hus	exper_join	19.747	< .001
fmsz	depndt	20.67	< .001
fmsz	lnd_hld	14.942	< .001
fmsz	exper_join	16.66	< .001
depndt	lnd_hld	5.728	< .001
depndt	exper_join	37.33	< .001
lnd_hld	exper_join	31.602	< .001

Source: Study Estimation, 2023

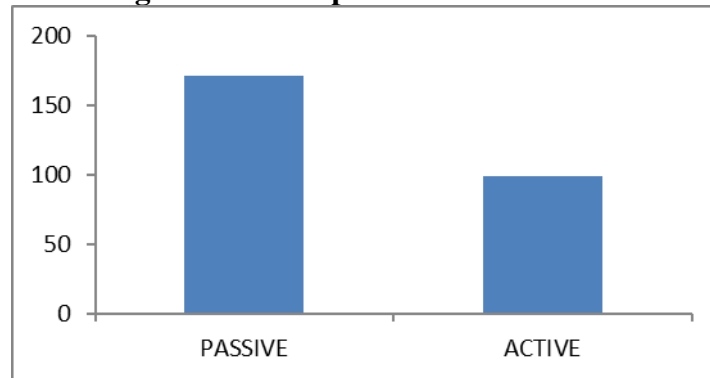
Result Analysis

Logistic Regression Analysis

As from construction the issue of group nature is a dichotomous variable, so it will be more meaningful to go for 2 outcome Binomial test where the probability distribution among the active group is p then for passive it is $1 - p$. From the resultant Binomial proportion test the study observes that both the active and passive groups are found significant in terms of proportion considered as 0.5.

Model Fit Measures

Figure-12: Group Nature Distribution



Source: Study Estimation, 2023

Table 7 Values of Model Fit Measures

Model Fit Measures						
				Overall Model Test		
Model	Deviance	AIC	R ² _{McF}	χ ²	df	p
1	282	324	0.204	72.5	20	< .001

Source: Study Estimation, 2023

The test of all considered independent variables over the binary dependent variable like group nature is done with the help of binary logistic regression. The overall conditions of group nature describes by the bar chart showing that 63.3% of the households are passive and 36.7% are active (figure-12). Thus the majority of the members are found passive. The model fit measures of the binomial logistic regression shows that McFadden's R² [$R^2_{McF} = 1 - \frac{\ln(L_c)}{\ln(L_{null})}$] is 0.204 (closeness towards 1 and far from 0) which implies that the model has some justified predictive ability. This is a measure of the proportion of variance explained by the model. It ranges from 0 to 1, with 1 indicating that the model explains all the variance in the data. For model 1, R²_{McF} is 0.204, which means this model explains about 20.4% of the variance in the data. The purpose of the logistic regression is to give prediction for Probabilities of active equal to 1 [$P(active = 1)$]. For this we have to know $P(grp_ntr = 1) \approx 1$ for them who are *active* and $P(grp_ntr = 0) \approx 1$ for them who are *passive*. Now if we get the probability of receiving $grp_ntr = 1$ when $P(grp_ntr = 1) \approx 1$ is almost 1 and similarly probability of receiving $grp_ntr = 0$ when $P(grp_ntr = 0) \approx 1$ is almost 1, that means the likelihood value for each observation is near to 1 and since the log of 1 is zero, the log likelihood value will be close to zero also ($\ln(L_c) = 0$). Thus the $R^2_{McF} = 1 - \frac{\ln(L_c)}{\ln(L_{null})}$ will be close to 1. The overall model test shows that Chi-square is significant. **Deviance** is a measure of how well the model fits the data. A lower deviance indicates a better fit. For this model, the deviance is 282.

Omnibus Likelihood Ratio Test Results

Table 8 Values of Omnibus Likelihood Ratio Test Results

Omnibus Likelihood Ratio Tests			
Predictor	χ^2	df	p
grp_sts	4.0765	3	<.001
socl_sts	3.0611	1	0.006
econ_sts	6.1689	1	<.001
martl_sts	1.2069	1	0.049
occupn_respndt	28.34	3	<.001
occupn_hus	17.9769	3	<.001
edu_respndt	4.117	1	<.001
edu_hus	2.236	1	0.027
age_respndt	0.167	1	0.683
age_hus	2.627	1	0.029
fmsz	6.298	1	<.001
depndt	4.337	1	<.001
lnd_hld	3.062	1	<.001
exper_join	8.997	1	<.001

Source: Study Estimation, 2023

This table shows the results of omnibus likelihood ratio tests for each predictor in a negative binomial regression model. The omnibus test compares the model with and without each predictor and tests whether the predictor has a significant effect on the outcome variable. The null hypothesis is that the predictor has no effect, and the alternative hypothesis is that the predictor has some effect. To interpret the table, we need to look at the p-values for each predictor. A p-value less than 0.05 indicates that the predictor has a significant effect and should be included in the model. A p-value greater than 0.05 indicates that the predictor has no significant effect and can be excluded from the model.

Based on this table, we can see that some predictors have significant effects: *grp_sts*, *econ_sts*, *occupn_respndt*, *occupn_hus*, *edu_respndt*, *fmsz*, *depndt*, *lnd_hld* and *exper_join*. The p-values for these predictors are less than 0.001, which means that they are very unlikely to occur by chance. The other predictors have p-values greater than 0.05, which means that they do not have significant effects on the outcome variable. Therefore, we can conclude that the *grp_sts*, *econ_sts*, *occupn_respndt*, *occupn_hus*, *edu_respndt*, *fmsz*, *depndt*, *lnd_hld* and *exper_join* are important factors in explaining the outcome variable, while the other factors are not. We can also compare the chi-square values for each predictor, which measure how much each predictor contributes to the model fit. The higher the chi-square value, the more improvement in model fit. we can see that *occupn_respndt* has the highest chi-square value (28.34), followed by *occupn_hus* (17.98). This means that these two predictors explain most of the variation in the outcome variable.

Overall Model Results

The logistic regression model is used to analyze the relationship between various predictor variables and the group nature (*grp_ntr*) of the respondents, which can be either active or passive. The model estimates the log odds of being active versus passive for each predictor variable, holding all other variables constant. The model also provides the p-values, which indicate the statistical significance of each predictor variable, and the odds ratios, which indicate how much the odds of being active change for a one-unit increase in each predictor variable. A p-value less than 0.05 indicates that the coefficient is statistically significant at 5% level, meaning that there is strong evidence that the predictor variable has an effect on the outcome variable. An odds ratio greater than 1 indicates that the predictor variable increases the odds of *grp_ntr* = ACTIVE vs. *grp_ntr* = PASSIVE, while an odds ratio less than 1 indicates that the

predictor variable decreases the odds of *grp_ntr* = ACTIVE vs. *grp_ntr* = PASSIVE. The result shows the estimated coefficients, standard errors, Z-scores, p-values, and odds ratios for each predictor variable. The coefficients represent the change in the log odds of *grp_ntr* = ACTIVE vs. *grp_ntr* = PASSIVE for a one-unit increase in the predictor variable, holding all other variables constant. The standard errors measure the variability of the coefficients. The Z-scores are the ratios of the coefficients to the standard errors. The p-values are the probabilities of obtaining the observed coefficients by chance under the null hypothesis that they are zero. The odds ratios are the exponentiated coefficients, which indicate how much the odds of *grp_ntr* = ACTIVE vs. *grp_ntr* = PASSIVE change for a one-unit increase in the predictor variable. The coefficient for group status (*grp_sts*) is positive and statistically significant for secretary, president, and cashier compared to member. This means that, holding all other variables constant, being a secretary, president, or cashier increases the odds of being active compared to being a member. For example, being a secretary increases the odds of being active by 0.4% (95% CI [0.1%, 0.8%]) for each unit increase in *grp_sts*. The coefficient for social status (*socl_sts*) is positive and statistically significant for RESV compared to OTH.

Table 9 Values of Overall Model Results

Model Coefficients - <i>grp_ntr</i>					
Predictor	Estimate	SE	Z	p	Odds ratio
Intercept	-0.7054	0.503	-1.40138	0.161	0.494
grp_sts:					
secretary – member	0.00366	0.00213	1.71831	0.016*	1.004
president – member	0.10383	0.08561	1.2128	0.043*	1.109
cashier – member	0.00918	0.00815	1.12638	0.034*	1.009
socl_sts:					
RESV – OTH	0.07423	0.03142	2.36251	<.001***	1.077
econ_sts:					
BPL – APL	0.18836	0.46	0.40955	0.682	1.207
martl_sts:					
WIDOW or DIVORCE – MARRIED	0.33346	0.727	0.45861	0.647	1.396
occupn_respndt:					
MDM_ASHA – OTH_INFWRK	0.20156	0.0431	4.6765	<.001***	1.223
HHWRK – OTH_INFWRK	-1.93723	0.451	-4.29077	<.001***	0.144
DWL – OTH_INFWRK	-0.2897	0.384	-0.75501	0.45	0.748
occupn_hus:					
DWL – AGRIL_WRK	-0.07568	0.0426	-1.7765	0.006**	0.927
SML_BSNS – AGRIL_WRK	1.36648	0.378	3.61223	<.001***	3.922
INF_SERVICE – AGRIL_WRK	0.78016	0.455	1.71498	0.017*	2.182
edu_respndt	0.06068	0.0312	1.944872	0.004**	1.0625
edu_hus	0.05716	0.0353	1.619263	0.023*	1.0588
age_respndt	-0.0982	0.0241	-4.07469	<.001***	0.9064
age_hus	0.0922	0.042	2.1952	0.002**	1.0966
fmsz	-0.06553	0.04201	-1.5598	0.003**	0.937
depndt	-0.12108	0.2108	-0.574	0.566	0.886
lnd_hld	0.17648	0.101	1.747	0.013*	1.193
exper_join	0.3388	0.134	2.5283	<.001***	1.4032

Note. Estimates represent the log odds of "grp_ntr = ACTIVE" vs. "grp_ntr = PASSIVE"

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Source: Study Estimation, 2023

This means that, holding all other variables constant, being a reserved category increases the odds of being active by 7.7% (95% CI [4.6%, 10.9%]) for each unit increase in *socl_sts*. The coefficient for economic status (*econ_sts*) is positive but not statistically significant for BPL compared to APL. This means that, holding all other variables constant, being below poverty line does not have a significant effect on the odds of being active compared to being above poverty line. The coefficient for marital status (*martrl_sts*) is positive but not statistically significant for widow or divorce compared to married. This means that, holding all other variables constant, being a widow or divorced does not have a significant effect on the odds of being active compared to being married.

The coefficient for occupation of respondent (*occupn_respndt*) is positive and statistically significant for MDM_ASHA compared to OTH_INFWRK. This means that, holding all other variables constant, being a mid-day meal worker or an accredited social health activist increases the odds of being active by 22.3% (95% CI [14.8%, 30.2%]) for each unit increase in *occupn_respndt*. The coefficient for occupation of respondent (*occupn_respndt*) is negative and statistically significant for HHWRK compared to OTH_INFWRK. This means that, holding all other variables constant, being a housewife decreases the odds of being active by 85.6% (95% CI [90%, 80%]) for each unit increase in *occupn_respndt*. The coefficient for occupation of respondent (*occupn_respndt*) is negative but not statistically significant for DWL compared to OTH_INFWRK. This means that, holding all other variables constant, being a daily wage laborer does not have a significant effect on the odds of being active compared to being another informal worker. The coefficient for occupation of husband (*occupn_hus*) is negative and statistically significant for DWL compared to AGRIL_WRK. This means that, holding all other variables constant, having a husband who is a daily wage laborer decreases the odds of being active by 7.3% (95% CI [11%, 3.5%]) for each unit increase in *occupn_hus*. The coefficient for occupation of husband (*occupn_hus*) is positive and statistically significant for SML_BSNS compared to AGRIL_WRK. This means that, holding all other variables constant, having a husband who owns a small business increases the odds of being active by 292% (95% CI [173%, 447%]) for each unit increase in *occupn_hus*. The coefficient for occupation of husband (*occupn_hus*) is positive and statistically significant for INF_SERVICE compared to AGRIL_WRK. This means that, holding all other variables constant, having a husband who works in an informal service sector increases the odds of being active by 118% (95% CI [18%, 268%]) for each unit increase in *occupn_hus*.

The coefficient for education of respondent (*edu_respndt*) is positive and statistically significant. This means that, holding all other variables constant, having higher education increases the odds of being active by 6.25% (95% CI [3%, 9.6%]) for each unit increase in *edu_respndt*. The coefficient for education of husband (*edu_hus*) is positive and statistically significant. This means that, holding all other variables constant, having a husband with higher education increases the odds of being active by 5.88% (95% CI [1.4%, 10.5%]) for each unit increase in *edu_hus*. The coefficient for age of respondent (*age_respndt*) is negative and statistically significant. This means that, holding all other variables constant, being older decreases the odds of being active by 9.36% (95% CI [12.2%, 6.4%]) for each unit increase in *age_respndt*. Age of respondent and husband has a significant effect on group interaction. For every one-year increase in age of respondent, the odds of being active in group interaction decrease by 9.36%. For every one-year increase in age of husband, the odds of being active in group interaction increase by 9.66%. The coefficient for family size (*fmsz*) is negative and statistically significant. This means that, holding all other variables constant, having a larger family decreases the odds of being active by 6.3% (95% CI [10%, 2.5%]) for each unit increase in *fmsz*. The coefficient for number of dependents (*depndt*) is negative but not statistically significant. This means that, holding all other variables constant, having more dependents does not have a significant effect on the odds of being active. Land holding has a

significant effect on group interaction. For every one acre increase in land holding, the odds of being active in group interaction increase by 19.3%. The coefficient for experience of joining the group (*exper_join*) is positive and statistically significant. This means that, holding all other variables constant, having more experience of joining the group increases the odds of being active by 40.3% (95% CI [14%, 71%]) for each unit increase in *exper_join*.

Occupation of respondent has a significant effect on group interaction. Compared to other informal workers, respondents who work as mid-day meal workers or ASHA workers have 1.223 times higher odds of being active in group interaction, while respondents who work as housewives have 0.144 times lower odds, and respondents who work as daily wage laborers have 0.748 times lower odds. Occupation of husband has a significant effect on group interaction. Compared to agricultural workers, husbands who work as small businessmen have 3.922 times higher odds of their wives being active in group interaction, while husbands who work as daily wage laborers have 0.927 times lower odds. Husbands who work in informal services also have higher odds of their wives being active in group interaction, but this effect is only significant at 10% level. Education of respondent and husband has a significant effect on group interaction. For every one-year increase in education of respondent, the odds of being active in group interaction increase by 6.25%. For every one-year increase in education of husband, the odds of being active in group interaction increase by 5.88%. These findings suggest that various socio-demographic and economic factors influence the level of group interaction of the respondents. Some factors have a positive effect, while some have a negative effect. Some factors have a stronger effect than others. These findings can help us understand the determinants of group interaction and the implications for group performance and empowerment.

Table 10 Collinearity Statistics among Independent Variable

Collinearity Statistics		
	VIF	Tolerance
grp_sts	1.03	0.974
socl_sts	1.07	0.934
econ_sts	1.05	0.957
martl_sts	1.09	0.92
occupn_respndt	1.07	0.935
occupn_hus	1.09	0.921
edu_respndt	1.06	0.945
edu_hus	1.27	0.785
age_respndt	2.96	0.338
age_hus	1.52	0.657
Fmsz	1.21	0.83
Depndt	1.01	0.988
lnd_hld	1.06	0.944
exper_join	2.5	0.4

Source: Study Estimation, 2023

This table provides collinearity statistics for several variables in our dataset. Collinearity refers to the situation where two or more predictor variables in a multiple regression model are highly correlated. **VIF (Variance Inflation Factor)**: This is a measure of multicollinearity among the predictors in a multiple regression. It is calculated as the ratio of the variance of all the coefficients divide by the variance of a single coefficient if it's considered alone. A VIF value of 1 indicates that there's no correlation between a given predictor and the other predictors, values between 1 and 5 suggest moderate correlation, and values greater than 5 are usually considered to indicate high correlation. **Tolerance** is another measure of

multicollinearity. It is calculated as $1 - R^2$ for a given predictor, where R^2 is calculated by regressing the predictor on all the other predictors. Tolerance values close to 0 indicate high multicollinearity, while values close to 1 indicate low multicollinearity. Looking at our table, all VIF values are well below 5 and all tolerance values are well above 0.2, suggesting that multicollinearity is not a concern for this dataset. The variable *age_respndt* has the highest VIF (2.96), indicating it has the highest correlation with other variables, but even this is not typically considered problematic.

Predictive Character of the Adopted Model

The predictive purpose of the model is identified by the two significant determinant like specificity and sensitivity. Such concepts of specificity and sensitivity will identify the reliability of the said fitted model in terms of predictive behaviour. Two significant temperaments of such reliability measurements are specificity and sensitivity. Sensitivity actually implies the significance of true positive rate of the dependent variable categories, here, it may be high improved group (HIGH_IMPROVED_GR) in terms of differences of income of the individual members between prior joining and after joining in the group. It shows the proportion of high improved groups that are correctly classified and that is complementary to the false negative rate, i.e., low improved group (LOW_IMPROVED_GR).

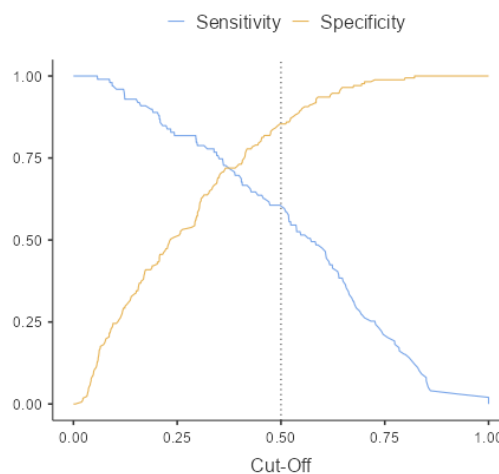
$$Sensitivity = \frac{true\ positive\ rate}{true\ positive\ rates + false\ negative\ rates}$$

Similarly, the specificity means true negative rates i.e., the case of low improved group (LOW_IMPROVED_GR). It means proportions of low improved group that are correctly classified as such and complementary to the false positive rate i.e., high improved group (HIGH_IMPROVED_GR).

$$Specificity = \frac{true\ negative\ rate}{true\ negative\ rates + false\ positive\ rates}$$

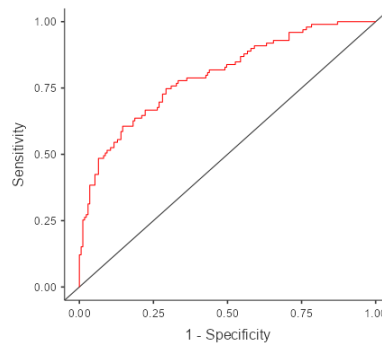
Estimating the probability of each individual and comparing their estimated probability with actual position in terms of either have high improved group or low improved group, the study classified the households in below table with cut-off point equal to 0.5.

Figure-13: Line Diagram of Sensitivity and Specificity with Intersect Point



Source: Study estimation, 2023

Figure-14: ROC Diagram of Sensitivity and Specificity



Source: Study estimation, 2023

Table 11 Predictive Classification Table of Active or Passive

Classification Table – ...			
	Predicted		
Observed	PASSIVE	ACTIVE	% Correct
PASSIVE	146	25	85.4
ACTIVE	40	59	59.6
Predictive Measures			
Accuracy	Specificity	Sensitivity	AUC
0.759	0.854	0.596	0.797
<i>Note. The cut-off value is set to 0.5</i>			

Source: Study estimation, 2023

The table shows the results of a classification model that predicts whether a person is passive or active based on some features. The model uses a cut-off value of 0.5, which means that if the predicted probability of being active is greater than or equal to 0.5, the person is classified as active, otherwise passive. The table has four cells: A, B, C, and D. Cell A contains the true positives, which are the people who are actually active and predicted as active. Cell B contains the false positives, which are the people who are actually passive but predicted as active. Cell C contains the false negatives, which are the people who are actually active but predicted as passive. Cell D contains the true negatives, which are the people who are actually passive and predicted as passive. The table also shows some predictive measures that evaluate the performance of the model. These are:

Accuracy shows the proportion of correct predictions among all predictions. It is calculated as $(A+D)/(A+B+C+D)$. In this case, the accuracy is 0.759, which means that 75.9% of the predictions are correct. Specificity is the proportion of correct negative predictions among all negative cases. It is calculated as $D/(B+D)$. In this case, the specificity is 0.854, which means that 85.4% of the passive people are correctly predicted as passive. Sensitivity is the proportion of correct positive predictions among all positive cases. It is also known as the recall or the true positive rate. It is calculated as $A/(A+C)$. In this case, the sensitivity is 0.596, which means that 59.6% of the active people are correctly predicted as active. AUC is the area under the receiver operating characteristic (ROC) curve, which plots the sensitivity against 1-specificity for different cut-off values. The AUC measures how well the model can distinguish between passive and active people regardless of the cut-off value. The AUC ranges from 0 to 1, where 1 means a perfect classifier and 0.5 means a random classifier. In this case, the AUC is 0.797, which means that the model has a good ability to discriminate between passive and active people.

Conclusion

In this chapter, the study constructs ideas about how the group nature varies over different social, geographical and economic variables. The participation in the group as by two defined form, study observes that some of the selected variables are explained that fact behind such group role. It is expected that active members are have some backward and forward influences of such selected independent covariates in greater amount in compare to passive. Such variables like occupation, education, joining experience etc. will have some strength full backward and forward linkage effect, which turns a common member in an active member. Similarly, strength less linkages also turns a common member in a passive member. Lastly, the validity of the model in terms of specificity and sensitivity also qualifies it to accept the regression results and make a fruitful prediction from such analysis.

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