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The Impact of Self-Help Groups on Rural Female Self-Employment Across Indian States and Union Territories

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ABSTRACT

Self-Help Groups (SHGs) are an important component of rural development policy in India, providing women with access to savings, credit and collective networks. This study examines the association between SHG promotion and rural female self-employment across Indian States and Union Territories from 2017 to 2024. The final balanced panel contains 232 State/UT-year observations across 29 regional panels. Female self-employment is measured as the percentage of rural women aged 15 years and above classified as own-account workers or employers. Following multicollinearity checks, the Hausman specification test favoured fixed effects, while diagnostic tests identified heteroscedasticity and autocorrelation. Feasible Generalised Least Squares was subsequently used for the final estimation. SHG promotion was negatively and significantly associated with female self-employment ($\beta = -0.707$, $p < 0.001$), whereas rural female education had a positive and significant association ($\beta = 1.228$, $p < 0.001$). SGDP was also negatively associated with self-employment ($\beta = -4.221$, $p < 0.001$). LFPR, the wage gap and unemployment were not statistically significant. These results represent state-level associations and should not be interpreted as causal effects. The findings suggest that increasing the number of SHGs alone may be insufficient without education, financial capability and continued enterprise support.

Keywords: *Self-Help Groups, rural female self-employment, female education, panel data, FGLS, India*

1. INTRODUCTION

Rural entrepreneurship plays an important role in economic development by creating enterprise opportunities within rural areas. This includes using local resources to establish enterprises and improve the living standards and income of rural people (Desai et al., 2024). However, these opportunities are often harder for rural women to access because of socio-cultural prejudices and biases, infrastructural shortcomings, and the absence of formal education and business training (Teotia, 2025). These barriers also explain why financial inclusion alone may not lead to stronger economic participation, as women may receive access to financial services without having the skills, mobility or market access needed to use them productively. The impact of financial inclusion on economic participation was relatively limited, as

only 42.1% of respondents indicated that these initiatives helped with income-generating activities (Thomas, 2025). This suggests that financial access becomes more effective when it is combined with collective support, training and livelihood-based structures. Women-centric development initiatives, especially Self-Help Groups (SHGs), have therefore proven to be effective vehicles for poverty alleviation and empowerment in India, Bangladesh and other countries (Murali & Singaporean Publishing Inc., 2011b).

Among these initiatives, one of the most effective and popular has been the Self-Help Group (SHG) model. A Self-Help Group (SHG) is a committee typically composed of 10-20 local women or men, primarily in India, where members contribute small savings to create capital for business ventures (Sukanya, 2018). The involvement of women in training can enhance their decision-making capability within the SHG, while the improved social support and decision-making capabilities of women within SHGs can boost their decision-making power (Jisha & Sumathy, 2024). Indian studies on SHGs indicate that microcredit programmes with specific support for poor families can enhance the empowerment of women, although they may not necessarily increase income or assets of SHG members (Deininger & Liu, 2013). SHGs have been linked to formal financial institutions through the Self-Help Group–Bank Linkage Programme, which is based on microfinance to enhance financial inclusion among disadvantaged rural communities (Maity, 2024).

In addition to serving as a tool to improve access to credit, SHG participation can have broader social effects such as increasing women's empowerment and their participation in groups and household decision making (Deininger & Liu, 2013). Among these broader gains, the economic empowerment of women stands out as one of the most transformative outcomes. Female self-employment plays an important role in the economic development of rural areas, as it increases family income, creates local employment, and contributes to the well-being of rural communities. In India, the majority of rural women entrepreneurs have their businesses at their own residence, and many rely on family members and community members to undertake various basic activities of the business, such as the procurement of inputs, distribution of products, or other activities.

SHGs help foster entrepreneurship by offering credit, skill development, risk sharing and confidence building. They help to strengthen social capital, foster women’s aspirations to become entrepreneurs, and help them gain access to the market and become financially literate through collective bargaining (Alva & Dsa, 2024). Entrepreneurial capacity is significantly improved in association with SHG participation as more than 65% of the SHG members are trained in setting up microenterprises. Through the creation of social networks, women can access peer support, mentoring, and entrepreneurial training, which leads to the development of social capital in SHGs. Furthermore, women's entrepreneurial activities, if constrained by family pressures and traditional gender norms, can be supported through such networks (Lakhawat et al., 2024). The financial skills that can be imparted to women in SHGs can also improve their financial literacy by teaching them budgeting, investment and credit management skills, while empowering them with a collective voice. This enables women to gain knowledge regarding financial choices and participate in formal financial institutions and decision-making processes (Ramya & Kalluraya, 2025).

2. SPECIFIC BACKGROUND

2.1. Literature Review

Existing research identifies institutional support, education, labour-market conditions, wage inequality and economic development as important factors associated with women's self-employment. SHGs may provide women with credit, savings facilities and social networks, while education can strengthen the skills required to use these resources productively. However, women may enter self-employment either because they identify an economic opportunity or because suitable wage employment is unavailable.

Research on SHGs generally finds that participation can improve access to formal credit, reduce dependence on moneylenders and strengthen women's economic and social empowerment (Sinha et al., 2012; Hoffmann et al., 2021). However, improved borrowing conditions do not necessarily produce immediate increases in household income, consumption or asset ownership. The benefits also depend on financial literacy, since members require knowledge of budgeting, credit management and financial risk to convert loans into sustainable income-generating activities (Pandey et al., 2024). Evidence from DAY-NRLM further indicates that greater SHG concentration and longer membership are associated with higher female labour-force participation and movement from casual work towards self-employment (Deshpande et al., 2024). Collectively, these studies examine SHG participation, credit access and membership quality more extensively than the number of groups promoted. Therefore, creating additional groups may have a limited relationship with self-employment unless group formation is followed by active participation, financial access, training and continued enterprise support.

Education can strengthen literacy, numeracy, communication and financial decision-making, thereby improving women's capacity to identify and manage economic opportunities. Higher and secondary education have been associated with improved self-employment outcomes, although these relationships vary across gender, caste, age, household characteristics and access to suitable markets (Awasthi et al., 2021; Dutta et al., 2022). Education does not, however, automatically increase women's labour-force participation. Rising household income, social expectations and insufficient availability of secure employment can discourage women from working even as their education improves (Klasen & Pieters, 2015). This contributes to the U-shaped relationship between education and female labour-force participation, under which participation may be relatively high among women with little education, decline at intermediate levels and rise again among highly educated women (Chattopadhyay & Chowdhury, 2022). Furthermore, increases in measured self-employment do not necessarily represent productive entrepreneurship because women may be underemployed, work limited hours or assist in unpaid family enterprises (Afridi, 2025).

Labour-market inequality can influence whether women enter self-employment by choice or necessity. Gender wage differences arise partly from occupational segregation, differences in experience and working hours, unequal care responsibilities, discrimination and bargaining power (Blau & Kahn, 2017). Lower returns from salaried employment may encourage women to consider self-employment, but the inequalities producing the wage gap can simultaneously restrict their access to credit, networks and

business opportunities (Smyk et al., 2023). Similarly, unemployment can encourage necessity-based self-employment when suitable paid work is unavailable, whereas opportunity-based entrepreneurs generally enter business to pursue an idea, independence or higher expected returns (Fairlie & Fossen, 2018). Nevertheless, unemployment can also weaken household resources, purchasing power and demand, making enterprises more difficult to establish and sustain. The relationship between unemployment and self-employment may therefore operate in either direction (Thurik et al., 2008).

Economic development also has an uncertain relationship with women's employment. Goldin's (1995) U-shaped framework proposes that women's participation may initially decline as household income rises and production moves away from family-based activities, before increasing at higher development levels as education and service-sector opportunities expand. Evidence from India, however, shows that economic growth has not consistently produced employment opportunities accessible to women. Growth may reduce the need for distress-based self-employment without creating sufficient formal or entrepreneurial opportunities to replace it (Lahoti & Swaminathan, 2016).

Overall, the literature suggests that SHG participation can support women through credit, networks and collective action, but the number of groups promoted does not necessarily indicate whether those groups function effectively or support viable enterprises. Education may improve women's capacity to use available opportunities, while LFPR, wage inequality, unemployment and state economic development shape whether self-employment is entered through opportunity or necessity. This distinction supports examining SHG promotion alongside education and wider labour-market conditions rather than treating group formation alone as evidence of increased rural female entrepreneurship.

2.2 Literature Gap

Despite a significant amount of research in this realm, there still remain gaps in the current literature on SHGs and female self-employment.

First, existing research often focuses on SHG participation, poverty reduction and women's empowerment, but gives less attention to whether the number of SHGs promoted leads to measurable entrepreneurship outcomes. This creates a gap because participation in SHGs and promotion of SHGs are not the same. While participation may improve access to credit and networks, promotion only shows that more groups have been created. Therefore, it remains unclear whether increasing the number of SHGs directly increases female self-employment.

Second, the current literature discusses SHGs mainly as financial inclusion tools, but does not sufficiently examine whether SHG-linked credit is converted into productive enterprise activity. Access to credit may help women borrow at lower cost, but it does not automatically mean that loans are used for business creation, income generation or enterprise expansion. In many rural contexts, funds may be used for consumption, household needs or debt repayment. Therefore, a gap remains in understanding whether SHG promotion supports entrepreneurship specifically, rather than only improving access to savings and credit.

Third, existing studies often mention education, training and financial literacy as important for women's economic participation, but these factors are not always examined alongside SHG promotion in one model. This is important because women may join SHGs but still lack the knowledge, confidence or business skills needed to use credit productively. Education may affect how women manage accounts, understand repayment, identify market opportunities and sustain self-employment. Therefore, the relationship between SHG promotion and female self-employment cannot be understood fully without considering rural female education and financial capability.

Fourth, there is limited recent panel-based evidence that studies SHG promotion together with wider labour-market and economic factors. Female self-employment is not shaped by SHGs alone, but also by labour force participation, wage inequality, unemployment and state-level economic development. These variables can influence whether women enter self-employment by choice, necessity or lack of alternatives. Therefore, this study addresses the gap by examining SHG promotion alongside rural female education, LFPR, wage gap, unemployment and SGDP across Indian States and Union Territories from 2018 to 2024.

2.3 Rationale of the Study

The current study is necessary because although SHGs are one of the most important tools of rural development in India, their impact on entrepreneurship remains unclear (Deininger & Liu, 2013; Maity, 2024). While group formation is expected to provide improved access to savings, credit, peer networks and livelihood opportunities for women, it is not guaranteed to generate viable enterprises. In parallel, the role of female self-employment is gaining significance for rural India as it can increase household income, women are less dependent on irregular wage work, and economic decision-making is strengthened (Desai et al., 2024). Education, participation in the labour force, wage gap, unemployment and economic development are some factors that affect female self-employment beyond SHGs. Thus, it is important to assess if there is a significant independent effect of SHG promotion after controlling the above factors. This study quantifies the direction and strength of these relationships, thereby revealing what is conducive to women's entrepreneurship in rural India.

3. METHODOLOGY

3.1 Research Aim and Objectives

3.1.1 Research Aim

The broader aim of this study is to examine whether Self-Help Group promotion significantly affects female self-employment in India, measured through female self-employment across Indian States and Union Territories from 2018 to 2024.

3.1.2 Research Objectives

- To identify the major socio-economic and labour-market factors that influence female self-employment, including SHG promotion, rural female education, labour force participation, wage gap, unemployment and SGDP.
- To examine the direction and magnitude of the impact of each independent variable on female self-employment across Indian States and Union Territories.
- To analyse whether SHG promotion has a statistically significant independent effect on female self-employment after controlling for education, labour-market conditions, wage inequality, unemployment and economic development.
- To propose evidence-based policy recommendations for strengthening the role of SHGs and other supporting factors in improving rural female self-employment.

3.2 Research Hypotheses

NH 1: no significant impact of SHGs on rural female self-employment

NH 2: no significant impact of rural female education on rural female self-employment

NH 3: no significant impact of LFPR on rural female self-employment

NH 4: no significant impact of wage gap on rural female self-employment

NH 5: no significant impact of unemployment on rural female self-employment

NH 6: no significant impact of SGDP on rural female self-employment

3.3 Data & Variables

The source dataset was assembled at the State/Union Territory-year level and contained 37 regional series covering 2017–2024, producing 296 potential state-year observations. The dataset contains 37 rather than 36 regional series because Dadra and Nagar Haveli and Daman and Diu were retained as separate historical series, consistent with how they were reported for part of the study period. Jammu and Kashmir and Ladakh were also recorded separately following their administrative reorganisation. Data availability differed across variables and regions. SHG-promotion data were unavailable for A & N Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Ladakh, Lakshadweep and Puducherry; these eight regions were therefore excluded from the regression. Following the treatment of missing observations, the final balanced estimation sample contained 29 regional panels covering eight years, giving 232 State/UT-year observations. Appendix A reports the state-year coverage, while Appendix C distinguishes directly observed, interpolated, extrapolated and retained observations.

The study uses female self-employment as the dependent variable and SHG promotion as the main independent variable to examine whether SHG expansion affects rural female self-employment. Rural female education, LFPR, wage gap, unemployment and SGDP are included as control variables.

F_EMP represents female self-employment and is used as the dependent variable in the model. The indicator used is the percentage distribution of rural women by broad status of employment for each State/UT [above 15 years of age] (own account worker, employer). It is measured in percentage terms. This variable captures the extent to which women are engaged in self-employment across state-year observations (MoSPI, 2024).

SHG_PROM represents the annual number of Self-Help Groups promoted in each State or Union Territory and is the main independent variable. SHG promotion is measured as a raw count because consistent rural female population or rural-household denominators were unavailable for every state-year observation. Consequently, the measure may partly reflect differences in state size. Because the values are large and vary widely, their natural logarithm, **L_SHG_PROM**, is used in the regression model (Ministry of Rural Development, n.d.).

RUR_EDU represents rural female education. The indicator used here is the percentage distribution of rural women by higher secondary level of education for each State/UT. It is measured in percentage terms and is considered as a control variable. This variable is included because education can influence women's ability to enter the workforce, access better job opportunities and participate more actively in economic activities (MoSPI, 2024).

LFPR represents the Labour Force Participation Rate. The indicator used is the Labour Force Participation Rate, in percent, according to usual status (ps+ss) for rural women aged 15 years and above in each State/UT. It is used as a control variable. LFPR is defined as the percentage of persons in the labour force, meaning those working or seeking or available for work, in the population. It is included because female self-employment is closely linked to broader labour market participation (MoSPI, 2024).

WAGEGAP represents the difference between the average monthly wages of rural men and rural women, calculated by subtracting female wages from male wages. The data refer to regular wage or salaried employees under Current Weekly Status and are measured in rupees (MoSPI, 2024). All observations retained in the final analytical sample were positive, ranging from ₹311.98 to ₹22,582.49; therefore, the natural logarithm, **L_WAGEGAP,** was applied without modifying or replacing any zero or negative values.

UNEMP represents the unemployment rate. The indicator used is the Unemployment Rate, in percent, according to usual status (ps+ss) for rural women in each State/UT. It is considered as a control variable. The unemployment rate is defined as the percentage of unemployed persons among persons in the labour force. It is included because unemployment reflects labour market conditions and can influence whether women enter self-employment due to limited wage employment opportunities (MoSPI, 2024).

SGDP represents the total nominal State Gross Domestic Product at current prices and is used as a measure of state economic output. A real per-capita measure was considered, but consistent population and price-adjustment series were unavailable for every state-year observation in the assembled dataset. Consequently, total SGDP may partly reflect differences in state size and prevailing prices. Because the

values are large and vary considerably, their natural logarithm, **L_SGDP**, is used in the regression model (Handbook of Statistics on Indian States, n.d.).

3.4 Data Analysis Method

Data analysis was conducted using the cleaned panel dataset after addressing missing state-year observations through interpolation and extrapolation. Interpolation was used to estimate missing values between two available observations, while extrapolation was used to estimate missing values outside the observed range using the nearest available trend. The final interpolated and extrapolated dataset was analysed using Stata/MP 17. Stata is a statistical software package used for data management, statistical analysis and econometric estimation, while Stata/MP is the multiprocessing version designed to process large datasets more efficiently (StataCorp, 2021).

3.4.1 Multicollinearity Matrix of Correlation

Correlation analysis is commonly used as an initial check for possible multicollinearity, since very high pairwise correlations between explanatory variables can affect regression interpretation (Gujarati & Porter, 2009). Pearson correlation coefficient has been calculated to evaluate the same. If the absolute value of correlation coefficient between two variables is above 0.8, it may indicate a high correlation and possible multicollinearity concern. The correlation matrix was used to examine the direction and strength of relationships between the independent variables.

Table 1: Pearson Correlation Coefficients between the independent variables

Variables	L_SHG_PROM	RUR_EDU	LFPR	L_WAGEGAP	UNEMP	L_SGDP
L_SHG_PROM	1.000					
RUR_EDU	-0.0580	1.000				
LFPR	-0.3547	0.0644	1.000			
L_WAGEGAP	-0.0001	-0.0794	0.1107	1.000		
UNEMP	-0.0608	0.2081	-0.2796	0.0247	1.000	
L_SGDP	0.0870	-0.0447	-0.1029	-0.1686	-0.3876	1.000

Source: Author's calculations using Stata/MP 17

Table 1 shows that the strongest relationship in the matrix is between **UNEMP** and **L_SGDP**, with a correlation value of **-0.3876**. This shows a weak to moderate negative relationship, suggesting that observations with higher state economic output tend to have lower unemployment. However, this value is not high enough to indicate a serious multicollinearity issue.

Some other variables also show negative relationships. **L_SHG_PROM** and **LFPR** have a correlation of **-0.3547**, while **LFPR** and **UNEMP** have a correlation of **-0.2796**. These values indicate weak to moderate negative relationships. Meanwhile, **RUR_EDU** and **UNEMP** have a weak positive correlation of **0.2081**.

The remaining correlations are relatively weak. For instance, **RUR_EDU** and LFPR have a correlation of **0.0644**, while **L_SHG_PROM** and **L_WAGE_GAP** have a correlation of **0.0001**, indicating almost no linear relationship. Since none of the correlation coefficients are particularly high, the matrix does not suggest a serious multicollinearity problem among the independent variables. This is further validated using the Variance Inflation Factor test.

3.4.2 Variance Inflation Factor

The Variance Inflation Factor (VIF) test was used to check for multicollinearity among the independent variables. Multicollinearity occurs when independent variables are highly related to each other, which can increase standard errors and make coefficient estimates less reliable. A VIF value below 5 is commonly treated as an indication that multicollinearity is not a serious problem, although VIF thresholds should still be interpreted with caution (Hair et al., 2010; O'Brien, 2007).

Table 2: Results of Variance Inflation Factor Test measuring multicollinearity

	VIF	**1/VIF**
UNEMP	1.46	.684
LFPR	1.34	.745
L_SGDP	1.31	.760
L_SHG_PROM	1.15	.867
RUR_EDU	1.11	.904
L_WAGEGAP	1.075	.954
Mean VIF	1.24	

Source: Author's calculations using Stata/MP 17

The results show that all VIF values are below 5. The highest VIF value is for **UNEMP** at **1.46**, followed by **LFPR** at **1.34** and **L_SGDP_I** at **1.31**. The remaining variables also have low VIF values, with **L_SHG_PROM_I** at **1.15**, **RUR_EDU** at **1.11** and **L_WAGE_GAP_I** at **1.05**. The mean VIF is **1.24**, which is also well below 5.

Therefore, the VIF test confirms that there is no serious multicollinearity problem in the model. This supports the results of the correlation matrix, where none of the correlations between the independent variables were particularly high.

3.4.3 Model Specification

Before estimating the final regression, the appropriate panel-data model had to be identified. Panel data can be analysed using pooled OLS, fixed effects and random effects models. Pooled OLS combines all observations into one dataset and does not control for state-specific differences. Fixed effects controls for time-invariant differences across States/UTs, while random effects assumes these differences are not correlated with the explanatory variables (Gujarati & Porter, 2009; Wooldridge, 2010). The model was specified to examine the impact of SHG promotion on female self-employment, while controlling for rural female education, labour force participation, gender wage gap, unemployment and SGDP. The dependent variable is F_EMP, while the independent and control variables are L_SHG_PROM, RUR_EDU, LFPR, L_WAGEGAP, UNEMP and L_SGDP.

The regression equation is:

$$\mathbf{F_EMP_{i\square} = \beta_0 + \beta_1 L_SHG_PROM_{i\square} + \beta_2 RUR_EDU_{i\square} + \beta_3 LFPR_{i\square} + \beta_4 L_WAGEGAP_{i\square} + \beta_5 UNEMP_{i\square} + \beta_6 L_SGDP_{i\square} + u_{i\square}}$$

Here, the subscript **i** and **t** show that each variable is measured for State/UT **i** in year **t**. β_0 is the constant term, while β_1 **to** β_6 are the coefficients showing the estimated effect of each explanatory variable on female self-employment. **u** represents the error term, which captures other factors affecting female self-employment that are not included in the model. The Hausman Specification Test will be used to test whether unobserved individual effects are correlated with the explanatory variables (Hausman, 1978).

3.4.4 Hausman (1978) Specification Test

The Hausman specification test was used to choose between the fixed effects model and the random effects model. The null hypothesis of the test states that the random effects model is appropriate and consistent. If the p-value is less than 0.05, the null hypothesis is rejected, meaning the fixed effects model should be used (Hausman, 1978).

Table 3: Results of Hausman (1978) Specification Test to choose between Fixed Effects and Random Effects model

	Coef.
Chi-square test value	14.479
P-value	0.0000

Source: Author's calculations using Stata/MP 17

The Hausman test produces a chi-square value of **41.99** with a p-value below **0.001**. Since the p-value is less than 0.05, the null hypothesis that the differences in coefficients are not systematic is rejected. This indicates that the random-effects model is unsuitable for this study.

Thus, the fixed-effects model is preferred because it controls for unobserved differences across states that may affect female self-employment but are not explicitly included in the model. Consequently, the heteroscedasticity and autocorrelation diagnostic tests are conducted on the fixed-effects model.

3.4.5 Diagnostics: Modified Wald Test for Groupwise Heteroscedasticity

Table 4: Results of Modified Wald Test for Groupwise Heteroscedasticity

H0: sigma(i)^2 = sigma^2 for all i
(29) = 5246.71
Prob > = 0.0000

Source: Author's calculations using Stata/MP 17

The modified Wald test was used to check for groupwise heteroscedasticity in the fixed-effects regression model. Heteroscedasticity occurs when the variance of the error terms is not constant across panels, which can make the regression estimates less reliable. The null hypothesis states that the error variance is constant across all panels, meaning that there is no heteroscedasticity (Baum, 2000).

The result shows a chi-square value of **5246.71** and a p-value of **0.0000**. Since the p-value is less than 0.05, the null hypothesis is rejected.

This indicates that heteroscedasticity is present in the fixed-effects model. Therefore, the fixed-effects model alone is not sufficient for final interpretation.

3.4.6 Diagnostics: Wooldridge Test for Autocorrelation

Autocorrelation occurs when error terms in one time period are correlated with error terms in another time period (Wooldridge, 2010). The Wooldridge test is a diagnostic test used to detect first-order serial autocorrelation in panel-data models (Drukker, 2003). It must be conducted because serial correlation can make standard errors unreliable and weaken regression inference. The null hypothesis states that there is no first-order serial autocorrelation. Since the p-value was less than 0.001, the null hypothesis was rejected, indicating autocorrelation in the model.

3.4.7 FGLS Regression Model

The FGLS regression model was used because heteroscedasticity was present in the fixed effects model. Since heteroscedasticity can reduce the efficiency of estimates and affect inference, FGLS is used to produce more efficient estimates under non-constant error variance (Wooldridge, 2010; Bai et al., 2021). The dependent variable in the model is **F_EMP**, while the independent variables are **L_SHG_PROM, RUR_EDU, LFPR, L_WAGEGAP, UNEMP and L_SGDP**.

4. RESULTS & DISCUSSION

4.1 Descriptive Statistics

Table 5: Descriptive Statistics showing Number of Observations, Mean, Standard Deviation, Minimum Value, and Maximum Value of each variable

Variable	Obs	Mean	Std. Dev.	Min	Max
F EMP (%)	250	28.06	14.72	0.3	74.4
SHG PROM	145	17808.79	27790.45	3	127845
RUR EDU (%)	255	9.67	3.55	0.7	22.9
LFPR (%)	255	39.42	17.27	3.1	82.2
WAGEGAP (₹)	219	6255.22	3417.62	311.98	22582.49
UNEMP (%)	238	6.33	7.84	0.1	45.6
SGDP (₹)	232	67169725.32	75470165.99	656469	405584723

Source: Author's calculations using Stata/MP 17

The descriptive statistics show that the average female self-employment rate is approximately **28.06**, with a standard deviation of **14.72**. The minimum value is **0.3**, while the maximum is **74.4**, showing considerable variation in female self-employment across the dataset.

The average number of SHGs promoted is approximately **17,808.79**, with a standard deviation of **27,790.45**. The values range from **3** to **127,845**, indicating substantial variation in SHG promotion across state-year observations.

The average rural female education rate is approximately **9.67**, with values ranging from **0.7** to **22.9**. The average LFPR is approximately **39.42**, with a minimum of **3.1** and a maximum of **82.2**. These ranges indicate considerable variation in rural female education and labour force participation across the dataset.

The average wage gap is approximately **6,255.22**, with values ranging from **311.98** to **22,582.49**, suggesting substantial differences across states and years. The average unemployment rate is approximately **6.33**, with a minimum of **0.1** and a maximum of **45.6**, showing considerable variation across observations.

The average SGDP is approximately **67,169,725.32**, with a minimum of **656,469** and a maximum of **405,584,723**. This reflects major differences in economic output across states. The number of observations varies between variables because of missing data in some state-year observations.

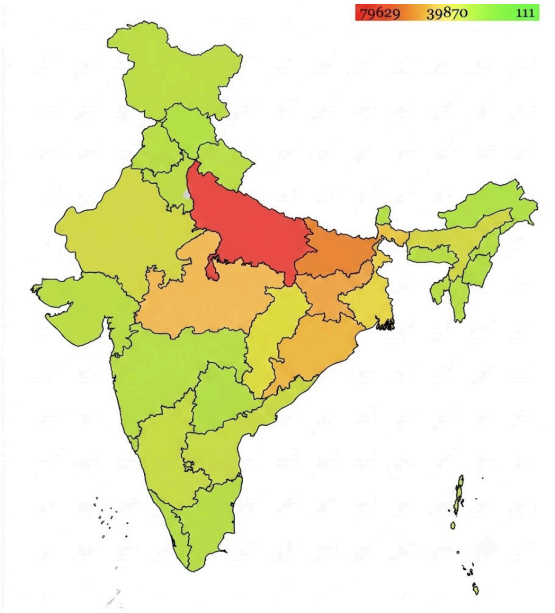


Figure 1: Mean Annual Number of Self-Help Groups Promoted by State and Union Territory, 2018–2024

Figure 1 presents the mean annual number of SHGs promoted across Indian states and Union Territories from 2018 to 2021, using Ministry of Rural Development data and the author's calculations. Red represents higher averages, green represents lower averages, and grey indicates unavailable data. Uttar Pradesh recorded the highest average at **79,629 SHGs**, while Sikkim recorded the lowest at **111 SHGs**. The highest individual value is therefore located in northern India, although high averages are also visible in large western and eastern states.

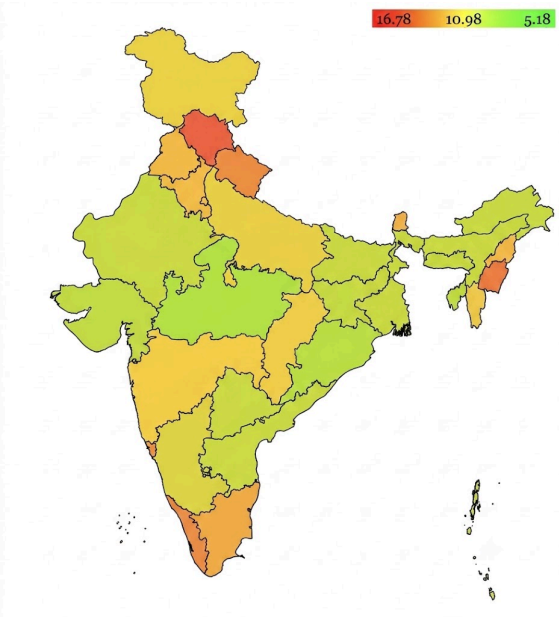


Figure 2: Mean Percentage of Rural Women with Higher-Secondary Education by State and Union Territory, 2018–2024

Figure 2 presents the mean percentage of rural women with higher-secondary education across Indian states and Union Territories from 2018 to 2021, using PLFS data and the author's calculations. Red represents higher percentages, while green represents lower percentages. Chandigarh recorded the highest average at 16.78%, whereas Madhya Pradesh recorded the lowest at 5.18%. The highest individual value is located in northern India, with relatively high values also appearing in parts of southern and northeastern India.

4.2 Cross Sectional Time-Series FGLS Regression

Table 6: Results showing Cross Sectional Time-Series FGLS Regression with **F_EMP** as the dependent variable

F_EMP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L_SHG_PROM	-.707	.173	-4.09	0	-1.046	-.368	***
RUR_EDU	1.228	.248	4.95	0	.742	1.714	***
LFPR	-.061	.056	-1.09	.274	-.171	0.048	
L_WAGEGAP	1.365	1.018	1.34	.18	-.631	3.361	
UNEMP	-.191	.183	-1.04	.297	-.551	.168	
L_SGDP	-4.221	.613	-6.89	0	-5.422	-3.02	***

Constant	88.646	15.383	5.76	0	58.496	118.796	***
Mean dependent var	31.082		SD dependent var		14.924		
Number of obs	232		Chi-square		103.390		
Prob > chi2	0.000		Akaike crit. (AIC)		1840.062		
*** p<.01, ** p<.05, * p<.1							

Source: Author's calculations using Stata/MP 17

In this model, the coefficient of **L_SHG_PROM** is negative (**-0.707**) and statistically significant at the 1% level (**p < 0.001**). This indicates that greater SHG promotion is associated with lower female self-employment, holding the other variables constant. However, this does not necessarily mean that SHG promotion causes female self-employment to decline. Promotion may be concentrated in states where female self-employment is initially weaker. Moreover, the variable measures the number of groups promoted rather than how effectively they are supported or whether they develop into profitable enterprises. Policy reports indicate that SHGs need to be scaled into successful business enterprises through training, market linkages and follow-up support (National Institute of Rural Development and Panchayati Raj, 2023). Access to microfinance may also fail to generate substantial income or consumption improvements because receiving a loan does not automatically produce significant economic gains (Banerjee et al., 2015). Inadequate financial literacy and entrepreneurial competencies may further prevent rural women from fully exploiting SHG credit opportunities (Duvendack et al., 2011).

The coefficient of **RUR_EDU** is positive (**1.228**) and statistically significant at the 1% level, indicating a strong positive relationship between rural female education and self-employment. This implies that educated rural women are more likely to enter and continue in self-employment. Education contributes to literacy, numeracy and confidence in managing accounts, loans and business decisions (Klasen & Pieters, 2015). It also enables women to better understand credit and access formal institutions, which is crucial for rural enterprise activity (Lahoti & Swaminathan, 2016). This reinforces the relationship between education and women's economic activity (MoSPI, 2024). However, education may sometimes encourage women to prefer salaried employment over informal self-employment.

The coefficient of **LFPR** is negative (**-0.061**), but its p-value of **0.274** indicates that the relationship is not statistically significant. Therefore, the model does not provide sufficient evidence that higher female labour force participation reduces female self-employment. The negative direction may arise because LFPR includes self-employed women, women in wage employment and women seeking work (MoSPI, 2024). An increase in LFPR could therefore represent more women entering wage employment or seeking work rather than establishing businesses. Evidence also suggests that increased female employment in

rural India is often concentrated in low-productivity agricultural work (Foundation for Agrarian Studies, 2024). However, because the coefficient is insignificant, these explanations must be interpreted cautiously.

The coefficient of **L_WAGEGAP** is positive (**1.365**), but its p-value of **0.180** indicates that the relationship between the rural gender wage gap and female self-employment is not statistically significant. Although the positive direction could suggest that unequal wages encourage some women to pursue self-employment instead of salaried work, the model does not provide sufficient evidence for this relationship. PLFS data show that rural salaried men receive higher wages than rural salaried women (MoSPI, 2024). Discrimination, occupational segregation and unequal bargaining power are common causes of gender wage gaps (Blau & Kahn, 2017). Social expectations, care responsibilities and limited mobility may also restrict women's access to formal employment and push some towards informal self-employment (International Labour Organization [ILO], 2024). Conversely, wage inequality may discourage women from participating in economic activity altogether.

The coefficient of **UNEMP** is negative (**-0.191**), but its p-value of **0.297** indicates that the relationship with female self-employment is not statistically significant. Therefore, the model does not provide sufficient evidence that higher unemployment reduces female self-employment. The negative direction could reflect how unemployment reduces household income, savings and local purchasing power, limiting women's ability to establish or maintain small businesses. However, unemployment may also encourage "necessity entrepreneurship" when wage employment is unavailable (Thurik et al., 2008). Fairlie and Fossen (2018) similarly demonstrate that unemployment can sometimes encourage business formation.

The coefficient of **L_SGDP** is negative (**-4.221**) and statistically significant at the 1% level, indicating a strong negative relationship between state economic output and female self-employment. Since SGDP is logged, a 1% increase in SGDP is associated with an approximately **0.042 percentage-point decrease** in female self-employment, holding the other variables constant. This may occur because higher state income reduces distress-based self-employment, as women in better-off households may no longer need to undertake low-paid informal work. Goldin's U-shaped theory suggests that women's employment may initially decline as household incomes increase and production shifts from the household to the market (Goldin, 1995). Women's employment has also stagnated during periods of economic growth in India, showing that growth alone may not secure employment for women (Lahoti & Swaminathan, 2016). The negative coefficient may therefore suggest that economic growth is not sufficiently inclusive of women's entrepreneurship (Klasen & Pieters, 2015).

5. CONCLUSION

This study examined the association between SHG promotion and rural female self-employment across Indian States and Union Territories from 2017 to 2024. The final balanced panel contained 232 State/UT-year observations across 29 regional panels. Following model-selection and diagnostic testing, FGLS was used for the final estimation.

The results indicate that SHG promotion was negatively and statistically significantly associated with rural female self-employment. This finding does not mean that SHGs reduce women's self-employment. Instead, it may indicate that the number of groups promoted does not capture their operational quality, active membership, access to credit or conversion into sustainable enterprises. Rural female education had a positive and significant association with self-employment, highlighting the importance of literacy, numeracy and financial decision-making skills. SGDP was negatively and significantly associated with self-employment, which may reflect a reduction in necessity-based informal work as state economic output increases.

LFPR, the wage gap and unemployment were not statistically significant in the revised model. Therefore, the analysis does not provide sufficient evidence of a systematic association between these variables and rural female self-employment after accounting for the other included factors.

Overall, the findings suggest that group formation alone is not an adequate indicator of women's enterprise development. The results support examining the quality of SHG participation and the educational capabilities required to use credit and market opportunities effectively. Since the study uses observational state-level data, its findings represent associations rather than causal effects and should be interpreted within the limitations of the available measures and interpolated or extrapolated observations.

6. POLICY IMPLICATIONS

The following policy recommendations are informed by the associations identified in the analysis and the existing literature. They should not be interpreted as causal conclusions from the regression model.

The following recommendations are informed by the associations identified in the analysis and the existing literature. They should not be interpreted as causal conclusions from the regression model.

First, SHG policy should focus on enterprise quality rather than solely on increasing the number of groups formed. The negative association between SHG promotion and female self-employment does not demonstrate that SHGs harm entrepreneurship. Instead, it suggests that group counts may not capture active participation, productive credit use or enterprise sustainability. Monitoring should therefore include active membership, loan utilisation, repayment, enterprise creation, income generation and business survival. This is consistent with evidence that access to microfinance alone may not improve enterprise outcomes when loans are used for household consumption or when borrowers lack continuing support (Banerjee et al., 2015; Duvendack et al., 2011; Ministry of Rural Development, 2025).

Second, the positive association between rural female education and self-employment supports greater emphasis on financial and entrepreneurial capability. SHG members could receive practical training in bookkeeping, budgeting, pricing, digital payments, packaging and marketing in local languages. Credit provision should also be accompanied by access to customers, suppliers, local retailers and digital selling platforms. Existing schemes already recognise the importance of seed capital, branding and marketing

support for women-led enterprises (Ministry of Food Processing Industries, 2020). These measures could help women convert financial access into sustainable economic activity.

Third, LFPR, the wage gap and unemployment were not statistically significant in the revised model. Therefore, the study does not provide sufficient evidence for policy recommendations based directly on their estimated coefficients. Nevertheless, the broader literature continues to support enforcing equal-pay provisions, improving wage transparency and addressing discrimination in rural labour markets (Blau & Kahn, 2017; Government of India, 2019). Employment programmes may also provide enterprise training and financial guidance, but these recommendations arise from existing research rather than a causal finding from this study.

Finally, the negative association between SGDP and female self-employment should not be interpreted as evidence that economic growth is harmful. It may indicate that growth reduces necessity-based informal work or that expanding state output does not automatically create opportunities accessible to rural women. Policies should therefore be adapted to regional differences in education, labour-market access, infrastructure and SHG functioning. State-specific support may be more appropriate than a uniform national approach because women's employment conditions vary considerably across India (MoSPI, 2024).

7. LIMITATIONS

The present study has certain limitations, however. First, the measure of SHG promotion was only the number of SHGs promoted. This is not an indication of whether the SHGs functioned or whether members were provided credit, whether they were able to use the credit to produce goods or services, or whether the business survived. The following factors should be incorporated in the future studies: SHG loan amount, active membership, repayment rate, enterprise survival and income generated from SHG business. Secondly, the study did not consider India's regions, but treated India as a single entity. This is a constraint as the social norms, market access and employment opportunities are different for rural women in north, south, east, west and north-east of India. More research may be conducted to split the country into parts and see if the impact of SHGs is more effective in one area of India as compared to others. Thirdly, the present study failed to make comparisons between the SHG policy of India and other countries. Microfinance and group based lending schemes have been applied in Bangladesh for the development of rural women's enterprise. A cross country comparison could be useful to pinpoint if the problem with India's modest achievement with SHG is with the SHG model itself or with problems in implementation in India. Fourth, the study employed FGLS in the presence of heteroscedasticity, but other econometric models could be applied. A possible future analysis might be based on a dynamic panel approach, instrumental variables, or a difference-in-differences or a region-dependent fixed effects approach. This would help to see if the findings are reproducible with other methods and if a greater causal link is found. Fifth, there could be variables that were not measured. The key factors that affect female self-employment are the caste, income of the household, marital status, childcare responsibilities, mobility constraints, access to transport and the Internet, and land ownership and gender norms. The use

of these factors in the model does not imply that all factors relevant to the rural female self-employment barriers are covered in this model. The overall policy implication is that SHGs must transcend their promotional role and transform to effective enterprise building institutions. If the number of SHGs is increased without providing awareness, education, financial literacy, access to markets, wage equality and employment support, it will be insufficient to transform the women's situation. With correction of these policy gaps within the next 5-10 years, SHGs can be more impactful and stronger in influencing female self-employment.

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APPENDIX A: State-Year Observations

state	Employment (Self-Employed) DV: indicator of female self-employment	Number of SHGs Promoted	Rural Female Education	LFPR	Wage Gap	Unemployment	SGDP
Andhra Pradesh	7	5	7	7	6	7	7
Arunachal Pradesh	7	5	7	7	6	7	7
Assam	7	5	7	7	6	7	7
Bihar	7	5	7	7	6	7	7
Chattisgarh	7	5	7	7	6	7	7
Delhi	7	0	7	7	6	2	7
Goa	7	5	7	7	6	7	7
Gujarat	7	5	7	7	6	7	6
Haryana	7	5	7	7	6	7	7
Himachal Pradesh	7	5	7	7	6	7	7
Jharkand	7	5	7	7	6	6	7
Karnataka	7	5	7	7	6	7	7

Kerela	7	5	7	7	6	7	7
Madhya Pradesh	7	5	7	7	6	7	7
Maharashtra	7	5	7	7	6	7	7
Manipur	7	5	7	7	6	7	7
Meghalaya	7	5	7	7	6	7	7
Mizoram	7	5	7	7	6	7	7
Nagaland	7	5	7	7	6	7	7
Odisha	7	5	7	7	6	7	7
Punjab	7	5	7	7	6	7	7
Rajasthan	7	5	7	7	6	7	7
Sikkim	7	5	7	7	6	7	7
Tamil Nadu	7	5	7	7	6	7	7
Telangana	7	5	7	7	6	7	7
Tripura	7	5	7	7	6	7	7
Uttarakhand	7	5	7	7	6	7	7
Uttar Pradesh	7	5	7	7	6	7	7
West Bengal	7	5	7	7	6	7	7
A & N Islands	7	0	7	7	6	7	7
Chandigarh	4	0	6	6	6	6	7
Dadra & Nagar Haveli	7	0	7	7	6	2	0
Daman & Diu	7	0	7	7	6	2	0

Jammu and Kashmir	7	5	7	7	6	7	7
Ladakh	5	0	5	5	4	4	2
Lakshadweep	4	0	6	6	5	6	0
Puducherry	6	0	7	7	6	7	7

APPENDIX B: Data Dictionary

Variable	Definition	Unit	Source	Transformation
F_EMP	Rural women classified as own-account workers or employers	Percentage	PLFS annual reports, MoSPI	none
SHG_PROM	SHGs promoted within each State/UT	Number of SHGs	DAY-NRLM reporting portal, Ministry of Rural Development	Natural logarithm
RUR_EDU	Rural women with higher-secondary education	Percentage	PLFS annual reports, MoSPI	none
LFPR	Rural female labour-force participation rate under usual status (ps+ss), age 15+	Percentage	PLFS annual reports, MoSPI	none
WAGEGAP	Male average monthly wage/salary minus female average	Rupees per month	PLFS annual reports, MoSPI	Natural logarithm

	monthly wage/salary			
UNEMP	Rural female unemployment rate under usual status (ps+ss)	Percentage	PLFS annual reports, MoSPI	none
SGDP	Gross State Domestic Product at current prices	₹ lakh	RBI, Handbook of Statistics on Indian States	Natural logarithm

APPENDIX C: Treatment of Missing Values

Variable	**Directly Observed**	**Interpolated**	**Extrapolated**	**Remained Missing**	**Retained in Final Regression**
F_EMP	**250**	**2**	**44**	**0**	**232**
SHG_PROM	**145**	**0**	**87**	**64**	**232**
RUR_EDU	**255**	**0**	**41**	**0**	**232**
LFPR	**255**	**0**	**41**	**0**	**232**
WAGEGAP	**219**	**0**	**77**	**0**	**232**
UNEMP	**238**	**2**	**56**	**0**	**232**
SGDP	**232**	**0**	**40**	**24**	**232**

The first four columns describe the complete 296-row dataset. The final column reports the 232 observations retained in the regression after eight regions without SHG-promotion data were excluded. Interpolation and extrapolation were conducted within each regional panel using Stata's 'ipolate', 'epolate' procedure.

APPENDIX D: Stata Commands

1. egen id= group(state)

```
2. xtset id year
3. ipolate (employmentselfemployed) year , gen (F_EMP) epolate by (id)
4. ipolate (ruralfemaleeducation) year , gen (RUR_EDU) epolate by (id)
5. ipolate (unemployment) year , gen (UNEMP) epolate by (id)
6. ipolate (lfpr) year , gen (LFPR) epolate by (id)
7. gen L_SGDP= ln(sgdp)
8. ipolate (L_SGDP) year , gen (L_SGDP_I) epolate by (id)
9. gen L_SHG_PROM= ln(numberofshgspromoted)
10. ipolate (L_SHG_PROM) year , gen (L_SHG_PROM_I) epolate by (id)
11. gen L_WAGE_GAP= ln(wage_gap)
12. ipolate (L_WAGE_GAP_I) year , gen (L_WAGE_GAP) epolate by (id)
13. ipolate (L_WAGE_GAP) year , gen (L_WAGE_GAP_I) epolate by (id)
14. correl L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I
15. reg F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I
16. vif
17. xtreg F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I, fe
18. estimates store FE
19. xtreg F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I, re
20. estimates store RE
21. hausman FE RE, sigmamore
22. xtserial F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I
23. xtreg F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I, fe
24. xttest0
25. xttest3
26. xtgls F_EMP L_SHG_PROM_I RUR_EDU LFPR L_WAGE_GAP_I UNEMP L_SGDP_I
```