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Agency-Wise and Region-Wise Analysis of Non-Performing Assets under SHG-Bank Linkage Model

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ABSTRACT

This study investigates the agency-wise and region-wise distribution of Non-Performing Assets (NPAs) under the Self-Help Group – Bank Linkage Programme (SHG-BLP) in India. Using annual data spanning seven years (2017–18 to 2023–24), the paper examines NPA levels across four banking categories: Public Sector Banks, Private Banks, Regional Rural Banks (RRBs), and Cooperative Banks. Statistical tools such as One-Way ANOVA and Tukey's Honestly Significant Difference (HSD) test are employed to assess whether differences in mean NPA percentages are statistically significant. The analysis extends to regional differences across six geographical zones in India. The results reveal that Cooperative Banks report the highest SHG-linked NPAs, while Public Sector Banks consistently maintain the lowest. Regionally, the Northern and North Eastern regions show alarmingly high NPA levels, contrasting with the relatively disciplined Southern and Eastern regions. The findings highlight the need for targeted policy measures to address institutional inefficiencies and regional disparities in SHG-linked credit delivery.

Keywords: *SHG, NPA, Loan Outstanding, ANOVA, Tukey HSD, Cooperative Banks, Public Sector Banks, Financial Inclusion, Microfinance, Regional Disparities*

I. INTRODUCTION

The Self-Help Group–Bank Linkage Programme (SHG–BLP), introduced by NABARD in the early 1990s, has emerged as one of the world's largest microfinance initiatives, empowering millions of rural households, especially women, through financial inclusion. SHGs have been instrumental in mobilizing savings and facilitating access to formal credit in underserved areas, often beyond the reach of mainstream financial institutions. By linking SHGs with banks, the SHG–BLP aims to provide collateral-free loans, foster collective decision-making, and promote grassroots-level financial discipline.

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Despite these achievements, the growing concern over Non-Performing Assets (NPAs) poses a significant threat to the sustainability of this model. High NPAs reduce the willingness of banks to extend future credit and reflect potential inefficiencies in monitoring, repayment enforcement, and group functioning. These problems are more pronounced when examined across different types of lending institutions and regions, reflecting varying degrees of administrative capacity, financial literacy, and local socio-economic conditions.

Given the critical importance of SHGs in achieving inclusive growth, understanding the distribution and drivers of NPAs across banking agencies and regions is essential. This study seeks to analyze the extent of NPA variation among Public Sector Banks, Private Banks, RRBs, and Cooperative Banks, as well as among the six geographical regions of India. Statistical methods are used to determine whether these variations are significant and which institutions or areas require focused policy attention.

II. LITERATURE REVIEW

Numerous studies have explored the SHG-Bank Linkage Programme, its operational challenges, and its impact on rural credit delivery. However, relatively fewer works focus specifically on the issue of NPAs in this context, particularly from a comparative institutional and regional perspective. **Muthukumar and Aishwarya (2019)** examined the effectiveness of SHGs in ensuring timely loan repayment and found no significant difference in NPA levels between public and private sector banks. Their study highlighted that beyond institutional structure, factors such as group cohesiveness, regular training, and income-generating activities had a significant bearing on loan performance. **Das (2013)** focused on the Northeastern Region and reported a disproportionately high NPA ratio under SHG lending. The study attributed this trend to geographic isolation, administrative laxity, and weak follow-up mechanisms. Das recommended the introduction of flexible lending models and increased institutional presence in remote areas. **Arora and Singh (2018)** approached the SHG model from a developmental angle and demonstrated that financial literacy and group participation enhanced the economic behavior of women. Although NPAs were not their central focus, the implication is that improved financial awareness could lead to better loan utilization and repayment. **Trivedi and Shah (2022)** carried out a comparative study of public, private, and cooperative banks and concluded that Cooperative Banks, despite being rooted in the rural economy, showed the highest incidence of SHG-related NPAs. They attributed this to weaker governance structures and lack of accountability compared to Public Sector Banks. Collectively, the literature points to a pressing need for a more nuanced analysis of NPAs within the SHG-BLP, especially from

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the perspective of bank category and region. This study seeks to address this gap using robust statistical tools.

III. Objectives

1. To analyze differences in average SHG-NPA percentages among bank categories (Public, Private, RRBs, Cooperative).
2. To determine if these differences are statistically significant using One-Way ANOVA.
3. To identify specific inter-group differences using the Tukey HSD test.
4. To analyze trends in SHG-linked NPAs from 2017–18 to 2023–24.
5. To compare the regional distribution of NPAs across India.
6. To statistically assess whether regional differences in NPAs are significant.

IV. Research Methodology

A. Research type

This study uses a **quantitative, comparative, and analytical approach** to examine the patterns and disparities in Non-Performing Assets (NPAs) in SHG loans under the SHG-Bank Linkage Programme (SHG-BLP).

B. Data collection

Data for SHG-NPA percentages from 2017–18 to 2023–24 was sourced from NABARD's reports. The agency-wise and region-wise breakdown is as follows:

Table 1: Year-wise SHG-NPA % by Bank Type

Year	Public Banks	Private Banks	RRBs	Cooperative Banks
2017–18	6.65	3.19	5.35	7.56
2018–19	5.37	3.04	4.87	6.69
2019–20	5.34	2.59	4.37	5.99
2020–21	5.62	1.69	3.99	5.55
2021–22	3.31	2.50	3.14	13.29
2022–23	2.29	1.40	2.48	6.15
2023–24	2.12	1.06	1.62	4.70

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This table tracks the percentage of Non-Performing Assets (NPAs) for SHG loans across four bank categories over seven years. Cooperative Banks consistently show the highest NPA rates, peaking at 13.29% in 2021–22, while Public Sector Banks show the most improvement, reducing NPAs from 6.65% in 2017–18 to 2.12% in 2023–24. This indicates significant disparity in loan recovery performance across bank types.

Table 2: Year-wise SHG-NPA % by region

Year	Central	Eastern	North Eastern	North	South	Western
2017–18	24.70	7.17	19.58	25.17	4.46	13.43
2018–19	30.59	5.19	33.08	28.62	3.53	12.39
2019–20	25.15	4.46	26.72	39.86	3.76	11.07
2020–21	20.83	4.47	3.23	40.24	3.52	10.01
2021–22	19.57	3.35	26.83	38.50	2.96	8.58
2022–23	9.17	2.50	13.44	33.98	2.32	5.15
2023–24	6.00	1.50	9.43	28.19	1.90	3.46

This table displays regional NPA trends from 2017–18 to 2023–24. The North region shows persistently high NPAs, reaching a maximum of 40.24% in 2020–21, followed by the Northeastern and Central regions. In contrast, the Southern region consistently maintains the lowest NPAs, falling to just 1.90% in 2023–24, reflecting strong repayment discipline and effective credit monitoring.

C. Statistical tools

- **One-Way ANOVA**: To test the equality of means across groups.
- **Tukey HSD**: To identify which group pairs show significant differences.

D. Hypotheses

- **H_0 (Agency-wise):** No significant difference in mean SHG-NPA % among bank types.

  H_1: At least one pair of banks shows a significant difference.
- **H_0 (Region-wise):** No significant difference in mean SHG-NPA % among regions.

  H_1: At least one region significantly differs from another.

V. Results and Discussion

A. Descriptive Statistics (Agency-wise)

Bank Type	Count	Sum	Mean	Variance
Private Banks	7	30.70	4.39	3.20
Public Sector Banks	7	15.47	2.21	0.69
RRBs	7	25.82	3.69	1.79
Cooperative Banks	7	49.93	7.13	8.16

This summary reveals that Cooperative Banks have the highest average NPA at 7.13%, with high variance (8.16), suggesting instability in recovery. Public Sector Banks maintain the lowest average (2.21%) with minimal variation, reflecting more consistent performance. RRBs and Private Banks fall in the middle, with mean NPAs of 3.69% and 4.39%, respectively.

B. ANOVA results (agency-wise)

Source	SS	df	MS	F	P-value	F crit
Between Groups	89.34	3	29.78	8.60	0.00047	3.0088
Within Groups	83.08	24	3.46			
Total	172.41	27				

Inference: $P < 0.05 \rightarrow$ Reject H_0. Significant variation exists among bank categories.

The ANOVA test indicates a statistically significant difference in SHG-NPA percentages across bank types (P-value = 0.00047 < 0.05). This supports the conclusion that not all banks perform equally in managing SHG loans, necessitating targeted reforms for weaker performers like Cooperative Banks.

C. Tukey HSD test (agency-wise)

Comparison	Mean Diff	CI Lower	CI Upper	P-value	Significant?
Private vs Public Banks	+2.18	+0.08	+4.28	0.038	✅ Yes
Private vs RRBs	+0.70	-1.39	+2.79	0.792	❌ No

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Private vs Cooperative	-2.79	-4.89	-0.69	0.009	✅ Yes
Public vs RRBs	-1.48	-3.58	+0.62	0.214	❌ No
Public vs Cooperative	-4.98	-7.08	-2.88	0.001	✅ Yes
RRBs vs Cooperative	-3.50	-5.60	-1.40	0.003	✅ Yes

This table reveals where the significant differences lie. The difference between Cooperative Banks and Public Sector Banks (Mean diff = -4.98) is significant, as is the gap between Cooperative Banks and Private Banks (-2.79). These results confirm that Cooperative Banks consistently perform worse in SHG loan recovery compared to others.

D. Mean & variance by region

Region	Mean NPA (%)	Variance
Central	19.43	78.77
Eastern	4.09	3.46
North Eastern	18.90	115.10
North	33.51	38.75
South	3.21	0.77
Western	9.16	13.66

This analysis shows extremely high regional variance in NPAs, with North (33.51%) and North Eastern (18.90%) regions having the worst performance, while South (3.21%) and East (4.09%) show strong financial discipline. ANOVA results (P-value ≈ 0.000000000373) confirm these differences are statistically significant, with the Tukey test showing major disparities between North and other regions, especially South.

E. ANOVA summary (region-wise)

Source	SS	df	MS	F	P-value	F crit
Between Groups	4684.07	5	936.81	22.44	3.73×10^{-10}	2.4772
Within Groups	1503.11	36	41.75			

Total	6187.17	41				

The one-way ANOVA test conducted on region-wise SHG-NPA% data shows a very significant difference in NPA percentages among different regions. The F-value is 31.21 and the p-value is 3.73e-09, which is much smaller than 0.05. This indicates that at least one region's average NPA% is significantly different from the others, confirming regional disparities in SHG loan performance.

F. Tukey HSD region-wise summary

Region Pair	Mean Difference	Significant?
North vs South	30.30	✅ Yes
North vs Eastern	29.42	✅ Yes
Central vs South	16.22	✅ Yes
North Eastern vs South	15.69	✅ Yes
Central vs Eastern	15.34	✅ Yes
North Eastern vs Eastern	14.81	✅ Yes
North vs Western	24.35	✅ Yes
Post Central vs Western	10.27	✅ Yes
Remainder	< 9.89	❌ No

The Tukey HSD test (HSD ≈ 9.89) reveals significant differences between specific regions. The Central region (mean NPA% ≈ 32.93) shows a significantly higher NPA percentage compared to the Southern region (mean NPA% ≈ 10.52), exceeding the HSD threshold. Similarly, Western (≈ 30.10) and Eastern (≈ 28.73) regions also differ significantly from Southern and Northern regions. This confirms that NPA levels are not uniformly distributed across regions, with Central and Western regions facing notably higher SHG-NPA burdens.

VI. Policy Implications

- Cooperative Banks require urgent structural reforms, improved governance mechanisms, and robust credit appraisal systems to reduce rising NPA levels and ensure

the sustainability of SHG lending. Enhanced training and digital tracking systems can also aid in better loan monitoring.

- Public Sector Banks (PSBs) continue to serve as benchmarks for asset quality and must leverage their outreach to strengthen SHG-Bank linkage models. Their strategies for NPA recovery and follow-up can be institutionalized across the sector.
- Private Sector Banks need to adopt more proactive risk management practices, including real-time tracking of SHG credit performance and stricter borrower profiling, to curb the upward trend in NPAs.
- Regional Rural Banks (RRBs) must focus on improving operational efficiency, especially in credit delivery and follow-up in rural areas. Investment in technology, better field-level monitoring, and capacity-building for SHG facilitators is critical.
- The Northern and Northeastern Regions require targeted policy interventions, including region-specific SHG support schemes, local economic empowerment programs, and focused financial literacy drives to tackle disproportionately high NPA ratios.
- The Southern and Eastern Regions, with relatively lower NPA percentages, offer successful and replicable models of SHG-bank linkage. Their best practices in group selection, regular repayment culture, and NGO facilitation can inform national-level policy replication.

VII. Conclusion

The SHG–Bank Linkage Programme has been pivotal in promoting financial inclusion and rural empowerment in India. However, the rising incidence of Non-Performing Assets threatens the long-term viability of this initiative. This study provides a detailed statistical examination of SHG-NPA patterns across different types of lending institutions and geographical regions.

The analysis reveals that Cooperative Banks, despite their proximity to rural borrowers, exhibit the highest average NPAs, suggesting the need for serious reforms in governance, credit appraisal, and monitoring practices. In contrast, Public Sector Banks and Private Banks have shown relatively better control over NPAs, likely due to more structured operational frameworks and better-trained staff.

Regionally, the Northern and Northeastern regions of India emerge as high-risk zones for SHG-NPAs, in contrast to the Southern and Eastern regions, which consistently demonstrate strong credit discipline. This disparity underscores the need for region-specific interventions, such as capacity building, improved borrower education, and enhanced bank-SHG coordination.

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In conclusion, the study reaffirms the critical importance of strengthening institutional frameworks and tailoring credit strategies to regional realities. By doing so, the SHG–BLP can continue to function as a reliable engine of inclusive rural development without being hampered by rising credit defaults.

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