Socio-Economic Impact of MUDRA Loans: Evidence from Hailakandi District, Assam

[1]Bodhisattwa Bhattacharjee, [2]Amrit Lal Ghosh
[1]Research Scholar, [2]Professor
[12]Department of Business Administration
[12]Assam University, Silchar

***Abstract*—Pradhan Mantri Mudra Yojana (PMMY) was introduced to enhance financial inclusion by providing collateral-free credit to micro and nano-entrepreneurs. Despite extensive coverage, empirical evidence on its socio-economic impact in India's backward regions remains limited. The present study examines the impact of Mudra loans on income, education expenditure and healthcare expenditure of beneficiaries in Hailakandi district of Assam. Primary data were collected from 250 beneficiaries using a structured questionnaire. Weighted Average Scores were used to assess perceived impacts, while paired sample t-tests compared pre- and post-loan conditions. One-way ANOVA was employed to examine variations across socio-economic dimensions. The results reveal a statistically significant increase in household income after availing Mudra loans, whereas improvements in education and healthcare expenditure are positive but comparatively modest. Income-related outcomes exhibit significantly higher gains than human-capital indicators. The findings suggest that while Mudra loans are effective in strengthening income-generating capacity, their broader socio-economic impact depends on complementary interventions in education, healthcare and skill development. The study contributes district-level evidence from North-East India and highlights the limitations of credit-led development in the absence of supportive infrastructure.**

***Index Terms*—MUDRA, Microfinance, Income, Education, Healthcare**

I. Introduction

Financial inclusion plays a central role in expanding credit access and promoting micro-enterprise growth in India. Despite substantial progress in the banking network, a considerable share of rural and semi-urban households continues to face limited access to institutional finance due to collateral constraints, high documentation requirements and low credit histories (Reserve Bank of India 2023).To address these structural bottlenecks, the Government of India launched the Pradhan Mantri Mudra Yojana (PMMY) in 2015 (Ministry of Finance 2024) to provide collateral-free credit up to ₹10 lakh to micro and nano-entrepreneurs under the Shishu, Kishore and Tarun categories. Since inception, more than 43.3 crore loans amounting to ₹28.2 lakh crore have been sanctioned under PMMY up to March 2024, with 68% of beneficiaries being women and a major share belonging to SC, ST and OBC categories. Micro and small enterprises constitute nearly 30% of India's GDP and 45% of manufacturing output (International Finance Corporation (World Bank Group) 2022; Ministry of MSME, Government of India 2023), yet continue to exhibit chronic credit gaps, especially in backward and agrarian regions. Studies show that microfinance and small credit interventions have a measurable impact on income, productivity and household welfare (Brixiová, Ncube, and Bicaba 2020; Bruhn and McKenzie 2009; Manglani 2022) Indian empirical studies

similarly highlight the positive contribution of microcredit to income generation and self-employment(Ghosal 2008; Trivedi and Kumari 2019), though outcomes vary across regions due to differences in market linkages, local infrastructure and socio-economic composition (Ghosal 2008; Son and Trai 2023; Trivedi and Kumari 2019) The North-East region, characterised by low industrial diversification, limited market access and a high rural population share, presents a unique developmental context. Hailakandi district of Assam, identified as a "backward district" by NITI Aayog (NITI Aayog 2018), exhibits weak non-farm employment, high dependence on micro-scale trading and low enterprise survival rates. Despite PMMY's rapid penetration in the state, particularly in the Shishu and Kishore categories, evidences analysing the actual socio-economic impact of Mudra loans in Hailakandi remain absent. In view of these gaps, the present study investigates the socio-economic effects of Mudra loans in Hailakandi district of Assam. The study is guided by the following specific objectives.

II. OBJECTIVES

(i) To examine the socio-demographic profile of Mudra loan beneficiaries in Hailakandi district of Assam.

(ii) To assess the impact of Mudra loans on beneficiaries' income, education expenditure and healthcare expenditure using pre- and post-loan comparison.

(iii) To compare the magnitude of improvement across income, education and healthcare dimensions.

III. METHODOLOGY

The present investigation is based on primary data collected from Mudra loan beneficiaries in Hailakandi district of Assam. A total of 250 respondents were selected using purposive sampling, considering the operational constraints such as incomplete beneficiary lists, geographical dispersion and non-availability of contact details. Only borrowers who had utilised their Mudra loans for at least one year were included in the sample to ensure comparability of pre- and post-loan indicators.

3.1 Data Collection Instrument

A structured and interviewer-administered questionnaire was employed to collect information relating to socio-demographic characteristics, loan category, utilisation pattern and changes in income, education and healthcare expenditure. The instrument also included a perception scale measured on a five-point Likert continuum. Content validity of the questionnaire was reviewed by experts in development economics and banking, and a pilot survey was conducted on 20 respondents to refine sequencing and clarity of items.

3.2 Analytical Tools

The study employed both descriptive and inferential statistical tools following methodological approaches widely applied in socio-economic impact assessments(Field 2013; Gujarati and Porter 2009; Kothari 2004) The techniques used are described below.

3.2.1 Weighted Average Score (WAS)

Beneficiaries' perceptions on key outcome indicators were quantified using Weighted Average Scores (WAS). The WAS was computed using:

$$WAS = \frac{\sum_{i=1}^{n} w_i f_i}{\sum_{i=1}^{n} f_i}$$

where denotes the assigned weight of the response category and its frequency. This method allows integration of ordinal information into a single interpretable index, consistent with earlier microcredit studies (Aswini and Murthy 2019).

3.2.2 Reliability of Scales

Internal consistency of multi-item constructs was evaluated using Cronbach's alpha:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_i^2}{\sigma_T^2}\right)$$

where is the number of items and the variance of the total score. A threshold of $\alpha \geq 0.70$ was considered acceptable as recommended in social science research (Nunnally 1978)

3.3 Paired Sample t-test

The paired sample t-test was used to evaluate changes in household income, education expenditure and healthcare expenditure before and after availing Mudra loans. The test statistic is:

$$t = \frac{\bar{d}}{s_d/\sqrt{n}}$$

where represents the mean of differences, the standard deviation of differences and the number of paired observations (n = 250). The null hypothesis tested whether the mean post-loan value differed significantly from the pre-loan value. When normality of difference scores was violated, the Wilcoxon signed-rank test was used as a non-parametric alternative(Wilcoxon 1945) as suggested in similar empirical studies

Effect size was computed using Cohen's d:

$$d = \frac{\bar{d}}{s_d}$$

to assess the magnitude of change independent of sample size. Paired sample t-tests were performed on numeric pre-loan and post-loan income, education expenditure and healthcare expenditure values recorded for 250 beneficiaries. Respondents reported approximate pre-loan and post-loan amounts for income, education expenditure and healthcare spending, which were aggregated to compute mean differences for statistical testing.

3.4 Analysis of Variance (ANOVA)

One-way ANOVA was conducted to compare improvements across the three socio-economic dimensions: income, education and healthcare. The F-statistic was computed as:

$$F = \frac{MS_{between}}{MS_{within}}$$

where and represent the mean sum of squares between and within groups, respectively. The significance of the F-values indicated whether improvements differed significantly across dimensions. Post-hoc comparisons were undertaken using Tukey's HSD test to identify specific group differences, following the conventional approach used in agricultural and socio-economic studies (Cuddy and Della Valle 1978)

Effect size was assessed using eta squared:

$$\eta^2 = \frac{SS_{between}}{SS_{total}}$$

interpreted as small (0.01), medium (0.06) or large (0.14) based on standard benchmarks.

3.5 Assumption Tests and Robustness Checks

Normality of variables was examined using Shapiro–Wilk tests and Q–Q plots, while Levene's test was used to assess homogeneity of variances in ANOVA. Where heterogeneity was detected, Welch's ANOVA and Games–Howell post-hoc tests were used. Additional robustness checks, including Kruskal–Wallis tests, were conducted to validate the findings under non-parametric conditions.

3.6 Ethical Considerations

Participation was voluntary, and respondents were informed about the objective of the study before data collection. No personal identifiers were recorded, and confidentiality of responses was maintained throughout the analysis.

IV. RESULT AND DISCUSSION

4.1 Demographic Profile of Beneficiaries

The socio-demographic characteristics of the respondents are presented in Table 1 (not shown here). Analysis revealed that a large proportion of beneficiaries were male (90%), indicating limited participation of women in credit-linked entrepreneurial activities. This is consistent with trends reported in earlier studies on rural enterprise credit utilisation in North-East India (Das and Gogoi 2018) Educational attainment of respondents showed that 53 percent had completed HSLC, followed by 23 percent who had completed Higher Secondary education. A substantial share of the beneficiaries (53.8%) belonged to Scheduled Castes, suggesting that the PMMY scheme has achieved notable outreach among socially disadvantaged groups. These results confirm that Mudra loans in Hailakandi district are accessed primarily by micro-entrepreneurs with modest educational backgrounds and from marginalised communities.

TABLE 1. SOCIO-DEMOGRAPHIC PROFILE OF BENEFICIARIES

Particulars	Category	Percentage (%)
Gender	Male	90.0
	Female	10.0
Educational Qualification	Below HSLC	18.0
	HSLC	53.0
	Higher Secondary	23.0
	Graduate & above	6.0
Social Category	SC	53.8
	OBC	31.2
	General	15.0
Nature of Activity	Trading	47.0
	Services (Repair/ Transport / Salon etc.)	32.0
	Micro-Manufacturing	21.0

Note: Values are based on primary survey (n = 250)

4.2 Reliability of Scales

Cronbach's alpha values for the income, education and healthcare perception scales were above 0.70, indicating acceptable internal consistency and suitability for further analysis.

4.3 Income-related Outcomes

Income-related indicators exhibited the highest improvement among all socio-economic dimensions (Table 2). The Weighted Average Score (WAS) for increase in household income was 4.2, indicating a high perceived impact. Similarly, timely repayment ability (WAS = 4.1) and saving capacity (WAS = 3.9) recorded strong positive responses. The paired sample t-test confirmed a statistically significant increase in mean household income after receiving Mudra loans ($p < 0.01$). The analysis reveals a significant improvement in income levels of beneficiaries after availing Mudra loans, indicating the short-term effectiveness of credit-led interventions (Baruah 2024).These findings also indicate that credit support enabled beneficiaries to expand working capital, improve business turnover and stabilise cash flows. Earlier evaluations of microcredit programmes also reported substantial income gains (Bruhn and McKenzie 2009; Kersten et al. 2017) among small borrowers due to improved access to formal credit.

TABLE 2. INCOME-RELATED OUTCOMES AFTER AVAILING MUDRA LOAN

Indicators	Mean	SD	WAS	Interpretation
Increase in household income	4.32	0.71	4.2	High Impact
Ability to repay on time	4.15	0.82	4.1	High Impact
Ability to save	3.98	0.89	3.9	High Impact

Note: Impact measured on a 5-point Likert scale.

The strong impact on income may be attributed to the predominance of small trading and service activities in the district, where even modest capital infusion can generate immediate returns. The results align with the outcomes observed in micro-enterprise studies in similar rural contexts (Cravo and Piza 2019).

4.4 Education-related Outcomes

Education-related indicators showed moderate improvement compared to income. The WAS for ability to afford better education was 3.6, while school attendance and spending on learning materials recorded mean values of 3.42 and 3.20, respectively. Although the paired comparisons indicated positive changes, the magnitude of improvement was relatively small. Beneficiaries reported that increases in income supported timely fee payment; however, competing household expenditures and larger family sizes constrained additional investments in education.

The ANOVA test revealed a statistically significant difference between income and education improvement scores ($F = 12.34$, $p < 0.01$), indicating that the educational benefits of Mudra loans were less pronounced. Similar patterns were documented in earlier studies(Rajak 2017) where credit-induced income growth did not proportionately translate into higher educational investment due to household expenditure priorities.

4.5 Healthcare-related Outcomes

The healthcare-related indicators show moderate but meaningful improvements after availing Mudra loans. The Weighted Average Score (WAS) for affordability of healthcare was 3.56, indicating that beneficiaries experienced some relief in meeting medical expenses. Regularity of health check-ups recorded a WAS of 3.30, while the ability to purchase medicines without financial stress scored 3.25. Although respondents reported greater confidence in seeking treatment due to improved liquidity, healthcare improvements remained constrained by external factors such as limited availability of medical facilities, distance to service centres and low awareness of preventive care. These findings suggest that while Mudra-supported income gains enhanced financial capacity, structural barriers continue to limit comprehensive healthcare advancement.

TABLE 3. EDUCATION AND HEALTHCARE OUTCOMES

Indicators	Mean	WAS	Impact Level
Education Outcomes			
Ability to afford better education	3.65	3.6	Moderate
Improvement in school attendance	3.42	–	Moderate
Spending on learning materials	3.20	–	Low–Moderate
Healthcare Outcomes			
Affordability of healthcare	3.56	–	Moderate
Regular health check-ups	3.30	–	Moderate
Ability to afford medicines	3.25	–	Low–Moderate

Note: Impact assessed using Weighted Average Scores based on beneficiary perceptions.

Structural constraints such as limited healthcare infrastructure, distance to facilities and low preventive health awareness in rural areas may have restricted the potential benefits. The ANOVA results further support this interpretation, showing that improvement in income was significantly higher than improvement in healthcare ($F = 9.87$, $p < 0.01$). The difference between education and healthcare outcomes was not significant ($F = 1.45$, $p = 0.231$), implying similar levels of progress in these dimensions. Studies from rural districts in India have also reported modest health gains from credit access(Choudhury n.d.), attributing this to external infrastructural limitations rather than credit inadequacy.

The paired sample t-test provides statistical confirmation of the observed improvements across the three dimensions. Income recorded the highest mean increase (₹2,512.88), indicating strong economic impact of Mudra loans. Education and healthcare expenditures increased modestly but significantly, consistent with the Weighted Average Scores and beneficiaries' perceptions. These results validate that PMMY generates substantial short-term income gains, while its effects on education and healthcare remain comparatively limited.

4.6 Paired t-Test Results

Table 4 presents the results of the paired sample t-test assessing pre- and post-loan differences across income, education and healthcare expenditure. Household income exhibited the largest improvement, rising from a mean of ₹7,996.37 before the loan to ₹10,509.24 after the loan, yielding a mean difference of ₹2,512.88 ($t = 49.76$, $p < 0.001$). Educational expenditure increased from ₹1,173.07 to ₹1,392.71, with a mean difference of ₹219.65 ($t = 24.16$, $p < 0.001$). Healthcare expenditure also showed a modest rise, increasing from ₹933.36 to ₹1,096.06, resulting in a mean difference of ₹162.69 ($t = 21.50$, $p < 0.001$). Although all differences are statistically significant, the magnitude of improvement is noticeably higher for income compared to education and healthcare. This confirms that Mudra loans primarily enhance the economic dimension of beneficiaries' welfare.

TABLE 4. PAIRED SAMPLE t-TEST RESULTS (PRE-LOAN vs POST-LOAN)

Indicator	Mean (Pre-loan)	Mean (Post-loan)	Mean Difference	t-value	p-value	Inference
Household Income	7,996.37	10,509.24	2,512.88	49.76	< 0.001	Significant
Education Expenditure	1,173.07	1,392.71	219.65	24.16	< 0.001	Moderate but Significant
Healthcare Expenditure	933.36	1,096.06	162.69	21.50	< 0.001	Moderate but Significant

Note: All monetary values are in Indian Rupees (₹); n = 250.

4.7 Comparative Impact Assessment

The one-way ANOVA results demonstrate significant variation in the magnitude of improvement across the three socio-economic dimensions. Income improvement was statistically higher than both education ($F = 12.34$, $p < 0.001$) and healthcare ($F = 9.87$, $p = 0.002$), confirming that the primary effect of Mudra loans lies in strengthening income-generating capacity. The difference between education and healthcare improvements was not statistically significant ($F = 1.45$, $p = 0.231$), indicating that both sectors experienced similar levels of modest enhancement. These findings align with the paired t-test results and reinforce the conclusion that while Mudra loans deliver strong economic gains, their indirect effects on human capital outcomes remain limited without complementary social-sector interventions.

Table 5. Anova Result

Comparison	F-value	p-value	Inference
Income vs Education	12.34	< 0.001	Significant
Income vs Healthcare	9.87	0.002	Significant
Education vs Healthcare	1.45	0.231	Not Significant

Note: Significant at 1 per cent level

This pattern is consistent with earlier findings in microcredit literature (Brixiová et al. 2020), where credit availability leads to immediate income enhancement, but the translation of financial gains into educational

and health outcomes is influenced by broader household and regional constraints. The absence of significant difference between education and healthcare improvements suggests that non-economic barriers—such as inadequate facilities, lack of awareness and competing financial priorities—play a substantial role in limiting progress in these areas.

4.8 Synthesis of Findings

The overarching results indicate that Mudra loans have contributed considerably to improving the economic conditions of beneficiaries in Hailakandi district. The income enhancement is substantial and statistically significant, demonstrating that credit infusion is effective in supporting micro-enterprise activities. Improvements in education and healthcare are positive but limited in scale, highlighting the need for complementary interventions such as infrastructure development, targeted subsidies and capacity-building programmes.

These findings reaffirm the observation made in earlier financial inclusion studies (Mahajan 2021) that credit alone cannot ensure broad-based socio-economic development unless accompanied by supportive institutional and infrastructural measures.

V. CONCLUSION

The study provides empirical evidence on the socio-economic impact of Mudra loans in a backward district of Assam. The results demonstrate that Mudra loans have significantly improved household income of beneficiaries, confirming the effectiveness of PMMY in supporting micro-enterprise activities. Improvements in education and healthcare expenditure are statistically significant but modest in comparison to income gains.

The findings suggest that while access to credit strengthens economic capacity, its broader socio-economic impact is mediated by structural and institutional factors. Credit alone may not be sufficient to generate substantial improvements in human-capital outcomes. Policy efforts aimed at strengthening education and healthcare infrastructure, enhancing financial literacy and promoting skill development are essential to amplify the developmental impact of Mudra loans.

This study contributes district-level evidence from North-East India and underscores the need for integrated development strategies that combine financial inclusion with social-sector interventions. The non-random sampling design and reliance on self-reported pre-loan data constitute limitations of the study and should be considered when generalising the findings. Future research may adopt longitudinal or quasi-experimental designs to strengthen causal inference.

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