Examining Rural Credit Access in India: The Role of Literacy, Banking Infrastructure, and Socio-Economic Factors

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Sincerely,

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Abstract

India's agrarian economy, which supports over half of the workforce, heavily relies on rural credit to foster agricultural productivity and economic resilience. Despite government efforts, rural credit accessibility remains limited, with many farmers dependent on informal lenders due to high collateral requirements, limited banking infrastructure, and financial illiteracy. This study examines the state of rural credit in India by analyzing socio-economic factors influencing credit access, such as literacy rates, asset ownership, and infrastructure availability. Data from the 77th round of the Debt and Investment Survey (NSSO, 2019),RBI Statistics of Indian States and the World Development Indicators are analyzed using regression and correlation methodologies to uncover patterns of indebtedness and financial inclusion disparities. Results highlight that Regional Rural Bank (RRB) density are significant predictors of institutional credit access, while wage levels,literacy and telecommunication access have minimal direct impact. These findings emphasize the need for targeted expansion of rural banking infrastructure, financial literacy programs, and digital banking solutions to bridge rural credit gaps and foster economic resilience in India's rural economy.

Keywords : Rural credit access , Financial inclusion and regional inequality , Socio-Economic Factors in Credit Access

Introduction

India is predominantly an agrarian economy, with agriculture and related sectors engaging more than half of the nation's workforce. This sector serves as a vital source of livelihood for a significant portion of the population and plays an essential role in ensuring food security, rural development, and overall economic growth. Given its central role in the economy, the growth and sustainability of the agricultural sector are integral to India's broader economic progress and social well-being.

However, the sector faces numerous challenges, including the impacts of climate change, resource constraints, fluctuating market demands, and the need for sustainable practices. Addressing these challenges requires a comprehensive understanding of agricultural systems, as well as an exploration of innovative practices and policies that can enhance productivity, ensure food security, and promote environmental sustainability.

A key component in supporting the agricultural sector is access to credit, which enables farmers and rural entrepreneurs to invest in technology, infrastructure, and essential inputs, thus promoting agricultural activities, enhancing productivity, and improving the livelihoods of rural households. Despite its critical role, rural credit in India faces several challenges, such as limited availability, high-interest rates, and a heavy reliance on informal credit sources. Institutional credit access is often hindered by obstacles like lack of collateral, limited financial literacy, and socio-economic disparities, creating substantial barriers for many rural communities. Consequently, these issues impact the efficiency and output of the agricultural sector, making it difficult for small and marginal farmers to achieve financial stability and economic resilience.

To address the persistent challenges of financial exclusion in rural India, the government has introduced several initiatives aimed at expanding access to institutional credit. Programs like the Pradhan Mantri Jan Dhan Yojana (PMJDY) aim to bring basic banking services to underserved rural households, providing them with bank accounts, debit cards, and insurance. Additionally, efforts to expand rural banking infrastructure, such as increasing the number of bank branches and implementing mobile banking solutions, have made credit access more feasible for rural communities. Despite these efforts, significant disparities in credit access persist across different states and socio-economic groups within rural India.

This paper seeks to assess the current state of rural credit access in India by examining various socio-economic indicators. Specifically, the paper aims to explore how accessible rural credit is to the population and identify the factors that influence this accessibility. Additionally, we examine the role of asset ownership in shaping access to rural credit,

Literature Review

After India's independence, significant strides were made to promote financial inclusion, especially in rural areas, as part of the country's development strategy, which prioritized achieving

growth with equity. To achieve the goals of increasing production and productivity, the rural credit policy aimed to ensure that a broad segment of the rural population received ample and timely credit at reasonable interest rates. The strategy emphasized expanding the institutional framework for credit delivery, prioritizing lending to disadvantaged borrowers and sectors, and maintaining lower interest rates to facilitate access to credit for those in need.

In 1954, the All-India Rural Credit Survey laid the foundation for expanding rural financial services. This was followed by the nationalization of the Imperial Bank of India in 1955, which became the State Bank of India, and later, the nationalization of 14 major commercial banks in 1969. These measures were crucial in bringing banking services to rural areas. In 1970, the Lead Bank Scheme was introduced to enhance credit outreach, and in 1975, the establishment of Regional Rural Banks (RRBs), based on recommendations from the Narasimham Working Group, further expanded rural access to credit. The government also launched the Integrated Rural Development Programme (IRDP) in 1978 to alleviate rural poverty and boost financial inclusion. In the following decades, further nationalization of banks in 1980 and the launch of the Swarnajayanti Gram Swarozgar Yojana (SGSY) in 1999, which focused on rural entrepreneurship through the self-help group (SHG) model, continued these efforts. In 2004, the Reserve Bank of India (RBI) formed a committee under HR Khan to review rural credit access, instructing banks to provide basic 'no-frills' accounts to promote inclusivity (Totala, 2018). The term "financial inclusion" defined as "ensuring access to timely and adequate credit and financial services by vulnerable groups such as weaker sections and low-income groups at affordable costs." (RBI, 2005) was first formally introduced by the RBI in its 2005 policy statement, and in 2008, the Committee on Financial Inclusion, chaired by C. Rangarajan recommended that each public sector bank branch open 250 new accounts annually to expand access (Rangarajan Committee,2008). The most significant initiative in recent years has been the Pradhan Mantri Jan-Dhan Yojana (PMJDY), launched in 2014. PMJDY aimed to provide marginalized communities, especially in rural areas, with access to essential financial services such as savings accounts, credit, insurance, and pensions. This major policy intervention succeeded in bringing unbanked households, particularly those in rural regions, into the formal financial system, thereby empowering economically vulnerable groups. By 2018, PMJDY had opened millions of new accounts, although challenges such as financial literacy and sustainable usage of these accounts remained (Demirgüç-Kunt et al., 2018; Totala, 2018). Through PMJDY and other initiatives, the government has made

significant strides in bridging the financial gap in rural India, unlocking economic potential, and improving the resilience of rural communities.

These initiatives helped broaden the reach of formal credit, aiming to reduce rural reliance on non-institutional credit sources. However, despite these efforts, many farmers, especially those in economically weaker regions, still rely heavily on non-institutional lenders due to various barriers. Formal loans from institutional lenders often come with stringent collateral requirements, such as land or other valuable assets, which small and marginal farmers frequently lack. Without collateral, access to formal credit becomes nearly impossible for these vulnerable groups. Additionally, the loan application processes in formal institutions are often lengthy and bureaucratic, leading to delays in fund disbursement, which proves particularly detrimental for farmers needing timely resources for seasonal agricultural activities. The high transaction costs and complex documentation requirements further alienate rural borrowers.

Non-institutional lenders, such as moneylenders, exploit these gaps by providing easy access to credit with minimal formalities and immediate disbursement. However, this convenience comes at a steep price, as these loans often carry exorbitant interest rates, sometimes exceeding 20-30%, trapping farmers in cycles of debt. The lack of financial literacy among rural populations exacerbates the issue, as many borrowers are unaware of the long-term implications of such borrowing. Consequently, despite government efforts to expand financial inclusion, informal lending persists as a dominant credit source in rural areas.

The All-India Debt and Investment Survey (AIDIS, 2019) underscores these challenges, revealing a persistent trend of mounting indebtedness among rural households. This indebtedness is shaped by a combination of socio-economic factors, such as land ownership, income levels, and access to formal credit. Regional disparities also play a significant role, with economically weaker regions facing higher debt burdens and limited access to institutional credit. Factors such as poverty compel farmers to borrow for subsistence needs, while small landholdings restrict agricultural productivity, further reducing their repayment capacity. Illiteracy and limited financial awareness hinder effective credit management, leaving borrowers vulnerable to exploitative practices by moneylenders who charge exorbitant interest rates and use deceptive methods to perpetuate indebtedness (Kumari & Kumar, 2016). These intertwined challenges highlight the ongoing

struggle to achieve comprehensive financial inclusion and the need for targeted interventions to address these systemic barriers.

Financial Inclusion

Financial inclusion in India is a key component of economic development, particularly in rural areas where access to banking and credit services can drive growth and reduce poverty. The expansion of bank branches (Figure: 1) over the years in India reflects a significant advancement in the goal of achieving financial inclusion and broadening access to financial services for all.
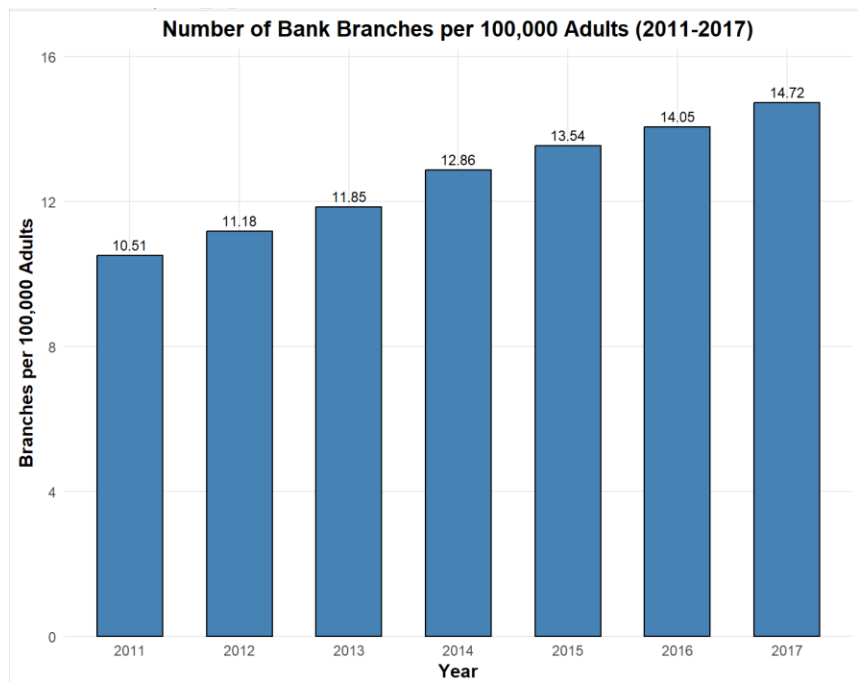

Figure 1: Number of Bank Branches per 100,000 across years: World Development Indicators Data

From 2011 to 2017, the number of bank branches per 100,000 adults steadily increased from 10.51 to 14.72, representing a clear commitment to making financial services more accessible. Increasing the availability of banking services, particularly in underserved rural and semi-urban areas, has a profound impact on the lives of individuals and communities. Access to banking services allows people to engage with the formal financial sector, offering secure ways to save, access to credit, and channels for receiving government benefits and subsidies directly. For individuals, having a nearby bank branch can mean moving away from risky informal financial practices, such as

keeping savings at home or relying on high-interest loans from informal lenders, and instead gaining access to safer, regulated financial products.

The benefits of increased banking access extend beyond individuals to small and micro-enterprises, which are often the backbone of local economies. When small businesses can secure formal credit, they have the means to invest in equipment, expand operations, and hire additional workers, creating a ripple effect of economic growth within their communities. For example, the rise in bank branches from 11.85 per 100,000 adults in 2013 to 12.86 in 2014, and further to 13.54 by 2015, likely contributed to increased economic activity in underserved areas. This kind of grassroots economic development is crucial for reducing poverty and promoting upward economic mobility, especially in rural areas where job opportunities may be limited. The expansion of bank branches is also aligned with various government initiatives aimed at poverty reduction and economic empowerment, where access to credit, savings, and insurance plays a fundamental role in financial resilience and long-term economic stability.

However, while the physical availability of bank branches is essential, it alone does not guarantee financial inclusion. Many potential customers, particularly in rural areas, may face obstacles that prevent them from fully utilizing available banking services. For instance, low levels of financial literacy can lead to limited understanding of financial products, and some individuals may feel intimidated by formal banking environments or wary of dealing with financial institutions. Cultural factors, language barriers, and lack of trust in the banking system can also contribute to underutilization of banking services, even when branches are accessible. Thus, to maximize the impact of branch expansion, there is a need for financial literacy programs that educate people on the benefits and functionalities of banking, encouraging them to use these services confidently and effectively.

In addition, the quality of service at bank branches plays a critical role in whether people choose to use these facilities. Poor service, such as long wait times, inadequate staff support, or limited operating hours, can discourage customers from visiting branches regularly or even from opening accounts. In areas where branch staffing is insufficient or resources are limited, people may feel that banking is inconvenient or inaccessible despite the physical proximity of a branch. For instance, in 2016, even as the number of branches reached 14.05 per 100,000 adults, such challenges could prevent the infrastructure from having its intended impact. Addressing these

service quality issues is necessary to ensure that the investment in expanding branches yields real benefits in terms of customer engagement and satisfaction.

Ultimately, while the rise in the number of bank branches marks a significant achievement toward financial inclusion, it is just one piece of a larger strategy needed to ensure that all people can participate in the formal financial system. Comprehensive approaches that combine infrastructure expansion with financial literacy, high-quality services, and community engagement are essential for transforming physical access into meaningful financial inclusion. As these efforts continue, they hold the potential to empower individuals, drive economic growth, and improve livelihoods in communities that have long been underserved by the formal financial sector.

CRISIL's financial inclusion report (Figure: 2), based on data from the Reserve Bank of India (RBI) and the Census of India, sheds light on significant disparities in access to financial services across different regions. The report measures three core indicators of financial inclusion: Branch Penetration (BP), Credit Penetration (CP), and Deposit Penetration (DP). Each indicator provides insight into how accessible banking infrastructure, credit, and deposit facilities are in various parts of the country.
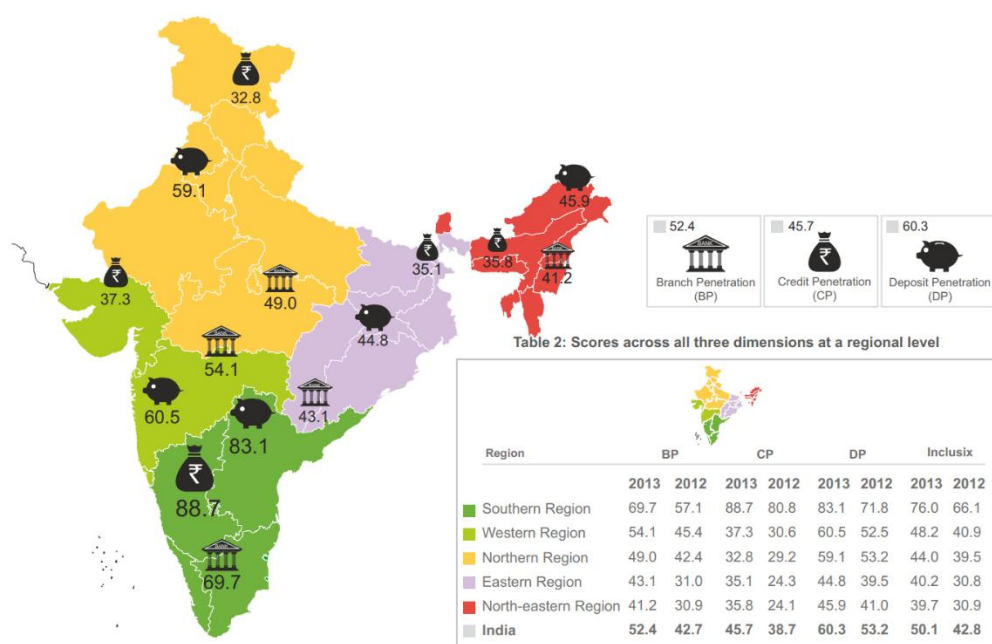

Table 2: Scores across all three dimensions at a regional level

Region	BP		CP		DP		Inclusix	
	2013	2012	2013	2012	2013	2012	2013	2012
Southern Region	69.7	57.1	88.7	80.8	83.1	71.8	76.0	66.1
Western Region	54.1	45.4	37.3	30.6	60.5	52.5	48.2	40.9
Northern Region	49.0	42.4	32.8	29.2	59.1	53.2	44.0	39.5
Eastern Region	43.1	31.0	35.1	24.3	44.8	39.5	40.2	30.8
North-eastern Region	41.2	30.9	35.8	24.1	45.9	41.0	39.7	30.9
India	52.4	42.7	45.7	38.7	60.3	53.2	50.1	42.8

Figure 2 :CRISIL Index of Financial Inclusion.
The CRISIL Index of Financial Inclusion (Inclusix) measures access to banking services in India, using three factors: branch penetration, credit penetration, and deposit penetration. It provides a score from 0 to 100, highlighting regional disparities in financial access.

The Southern Region of India emerges as the leader in financial inclusion, with the highest scores across all three indicators. Branch Penetration in this region stands at 69.7, Credit Penetration at an impressive 88.7, and Deposit Penetration at 83.1, indicating that individuals in this area have relatively easy access to banking services, credit facilities, and deposit options. This high level of financial inclusion suggests that a well-developed banking network has facilitated greater economic participation and stability for residents in the South. The Western Region shows moderate financial inclusion, with a slightly lower score in Branch Penetration (54.1) and an even lower Credit Penetration (37.3). The relatively lower access to credit in the West could imply fewer opportunities for financial growth in rural communities.

In contrast, the Northern and Eastern regions exhibit lower levels of financial inclusion, particularly in terms of Credit Penetration. The Northern Region scores 49.0 in Branch Penetration but has only a 29.2 score in Credit Penetration, suggesting limited access to loans and credit facilities. Similarly, the Eastern Region shows moderate scores in Branch (43.1) and Deposit Penetration (44.8) but low Credit Penetration (31.0), reflecting an ongoing challenge in extending credit to rural populations. The North-eastern Region, however, is the most financially underserved, with the lowest scores across all three indicators: 41.2 in Branch Penetration, 35.8 in Credit Penetration, and 45.9 in Deposit Penetration. This situation could be attributed to geographical challenges, lower population density, and socioeconomic barriers that limit the expansion of financial infrastructure.

At a national level, India's Branch Penetration average is 52.4, Credit Penetration is 45.7, and Deposit Penetration is 60.3, with deposit facilities being more widely accessible than branch and credit facilities. This gap underscores that while people may have options to save and deposit money, their access to banking locations and credit for financing personal or business needs is still limited, especially in rural areas. This lack of access to credit in rural areas is a critical issue because credit is vital for agricultural productivity, rural entrepreneurship, and overall economic resilience.

This growth reflects concerted efforts by the government and financial institutions to enhance banking access nationwide, especially as part of broader financial inclusion initiatives like the

Pradhan Mantri Jan Dhan Yojana (PMJDY). Despite this progress, the uneven distribution of bank branches remains a challenge. Many underserved regions still face significant barriers in accessing essential banking and financial services, which limits economic opportunities and can perpetuate cycles of poverty.

For research on the dynamics of the rural credit market, these findings highlight critical areas of focus. The Southern Region's success in fostering financial inclusion could serve as a model for other regions. A combination of high branch density and credit availability has contributed to a more inclusive financial environment there. Extending similar models to underserved regions could improve rural credit access, empowering individuals to invest in agriculture, small businesses, and education.

Addressing these disparities will require targeted strategies that consider the unique challenges of each region. Mobile banking, digital financial services, and government-backed schemes could play a transformative role in expanding access to financial services in remote and rural areas. Leveraging technology, for instance, can reduce the dependency on physical bank branches and bring financial services to people's mobile devices, making banking more accessible. Government and financial institutions could also incentivize banks to set up branches in underserved areas, as well as develop credit products tailored to rural needs. By implementing these strategies, India can bridge the financial inclusion gap, promoting equitable economic growth and resilience across its diverse regions.

Asset Inequality and Institutional Credit

Asset ownership, often used as collateral, plays a critical role in determining access to formal credit in rural India. Households with substantial assets find it easier to meet institutional credit requirements and secure loans at lower interest rates, while asset-poor households depend on costly informal credit sources. This disparity contributes to a cycle where low-income households remain marginalized from the formal credit system due to limited collateral, further widening the wealth gap (Chakravarty & Pal, 2019).

Research suggests that asset inequality is deeply linked to regional disparities in rural credit access. Asset-rich regions like Punjab and Maharashtra, with established credit systems, offer more favorable terms to borrowers with assets, while economically disadvantaged regions struggle to

provide equitable credit access (Basu & Srivastava, 2018). In these areas, the relationship between asset inequality and credit access is exacerbated, as credit eligibility heavily depends on the borrower's asset base, preventing asset-poor households from accessing affordable credit.

The map of Gini coefficients across Indian states (Figure : 3) provides insights into the state of asset inequality in the country. The Gini coefficient is a measure of inequality of a distribution. It is defined as the ratio of the area between the Lorenz curve (Figure A1) of the distribution and the line of equality; and the area under the line of equality. The Gini's coefficient should lie between 0 & 1 and is often used as a measure of income inequality. Here, 0 corresponds to perfect income equality (i.e. everyone has the same income) and 1 corresponds to perfect income inequality (i.e. one person has all the income, while everyone else has zero income). The Gini coefficient can also be used to measure wealth inequality. In this map, Punjab has the highest Gini coefficient of 0.72, suggesting significant asset inequality, while Jharkhand has the lowest coefficient of 0.48, indicating relatively lower levels of inequality.

Figure 3: Gini Coefficient by State.
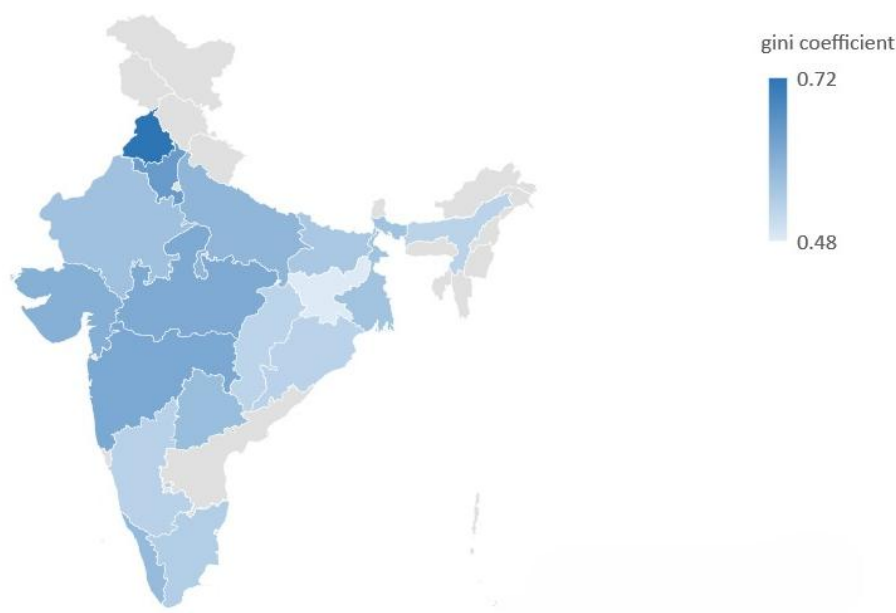Illustrates the Gini coefficient, a measure of income inequality, across states. A higher Gini coefficient indicates greater inequality, providing a snapshot of economic disparity in each region.

Other states show a varied range of inequality levels. Maharashtra (0.62), Madhya Pradesh (0.61), and Gujarat (0.60) also exhibit relatively high asset inequality, reflecting an unequal

distribution of wealth within these regions. In contrast, states like Assam, Chhattisgarh, and Odisha each have a Gini coefficient of 0.53, indicating a more balanced distribution of assets compared to some of their counterparts. Southern states like Tamil Nadu (0.54) and Karnataka (0.53) have moderate levels of asset inequality, while Kerala, often noted for its social indicators, has a coefficient of 0.58, slightly above the national average for asset distribution. This map suggests that asset inequality varies widely across Indian states, with northern and western states generally displaying higher levels of inequality than some eastern and southern states. Addressing this disparity may require targeted policy interventions to ensure a more equitable distribution of resources and reduce economic inequality across regions.

Figure 4 shows the average amount of loans taken by agricultural households in the 2021-22 agricultural year, categorized by the size of land possessed and source type. The data indicates that households with larger landholdings tend to borrow higher amounts, with those possessing over 2 hectares borrowing an average of ₹1,32,556, compared to ₹71,857 for households with 0.01-0.40 hectares. The table also reveals a strong reliance on institutional sources (such as banks and cooperatives), which account for a higher share of loan amounts across all land sizes. Households with larger landholdings exhibit the highest reliance on institutional loans, with a share of 91.7% for those owning over 2 hectares. In contrast, smaller landholders (<0.01 ha) display a relatively higher dependency on non-institutional sources, at 15.4%. Overall, 86% of the total loans are sourced from institutional channels, underscoring the importance of formal financial institutions in agricultural lending. This distribution highlights how landholding size influences borrowing patterns and preferences for institutional versus non-institutional credit.

Size Class of Land Possessed (Ha)	All Sources Combined (₹)	Institutional Sources (₹)	Non-Institutional Sources (₹)	Share of Institutional Sources (%)	Share of Non-Institutional Sources (%)
1	2	3	4	5	6
<.01	86,606	73,291	13,315	84.6	15.4
.01-.40	71,857	57,902	13,954	80.6	19.4
.41-1.00	82,337	71,422	10,914	86.7	13.3
1.01-2.00	98,383	87,295	11,088	88.7	11.3
>2.00	1,32,556	1,21,563	10,994	91.7	8.3
All Size Classes	86,106	74,033	12,073	86.0	14.0

Base =All loans taken by Agricultural Households in the Agricultural Year 2021-22

Figure 4 : Average amount of loan taken by the agricultural households reporting to have taken any loan in the agricultural Year 2021-22 by the type of source and size class of land possessed. Source :NABARD ALL INDIA FINANCIAL INCLUSION SURVEY

Purpose of Taking Loans by Borrowing Households

Figure 5 illustrates the various purposes for which households take loans, segmented by household type: all households, agricultural households, and non-agricultural households. The most common reason across all categories is "other household expenditure," with a notable 35% of non-agricultural households, 29% of all households, and 24% of agricultural households taking loans for this purpose. Agricultural households show a higher propensity for borrowing to fund capital expenditure in farm businesses (16%) and current expenditure in farm businesses (11%) compared to non-agricultural households, highlighting the financial needs associated with agricultural operations. For non-agricultural households, a significant proportion (13%) also borrows for housing purposes, reflecting different priorities in loan usage across household types. Additionally, medical treatment, financial investment, and education are relatively lower priorities for loans in all categories. The chart emphasizes the variance in borrowing motives, particularly between agricultural and non-agricultural households, and underscores the distinct financial demands faced by each type. This segmentation provides insights into household financial behavior, especially in understanding the economic pressures and necessities that drive borrowing.
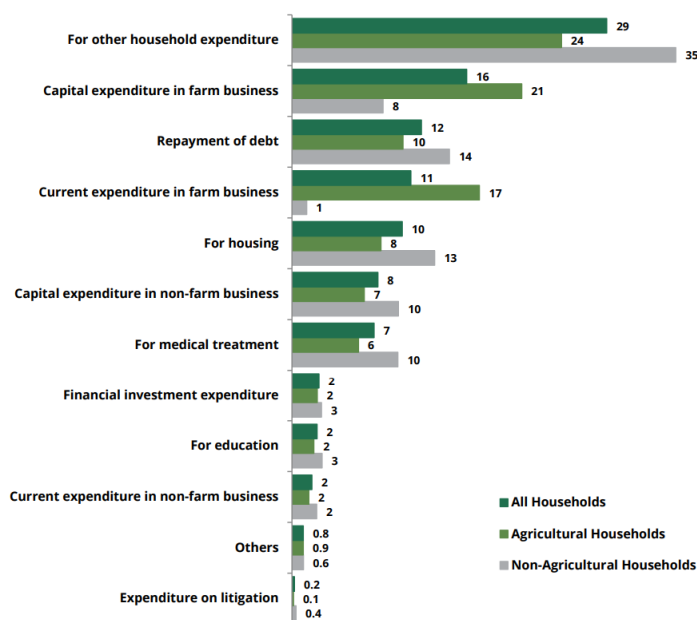

Figure 5 : Purpose of taking loans by Borrowing Households by Type of Household (%) . Source: NABARD ALL INDIA FINANCIAL INCLUSION SURVEY

Data and Methodology

This study rigorously examines the rural credit market in India, focusing on analyzing access to and utilization of credit across selected states with diverse economic and demographic profiles. The research seeks to understand the factors influencing credit accessibility, particularly in rural settings, using regression and correlation analyses on data drawn from several authoritative sources.

The primary data source for this study is the unit-level data from the **Debt and Investment Survey** conducted by the National Sample Survey Organization (NSSO), with the latest survey conducted in **2019**. Previous rounds of the survey were carried out in 1992 (48th round), 2003 (59th round), and 2013 (70th round). The Debt and Investment Survey, typically conducted every ten years, provides comprehensive information on various aspects of rural finance. It offers insights into household indebtedness, access to different credit outlets, share of formal credit institutions, credit availability, and interest rates.

The 2019 survey, as with previous rounds, covers detailed household characteristics, including asset ownership, social and demographic variables, and households' participation in networks like self-help groups and cooperatives. This dataset enables analysis from the borrowers' perspective, making the information particularly reliable for assessing rural credit access and financial inclusion.

In addition to the Debt and Investment Survey, supplementary data are drawn from the Census of India (2011) for literacy rate, and from Reserve Bank of India (RBI) records for data on wage rate, branches of regional rural banks (RRBs), and telecommunication access. Together, these datasets provide a well-rounded view of the economic and social factors influencing credit access in rural India

Analytical Approach

This study employs a structured framework of regression and correlation analyses to investigate the determinants of rural credit access and to evaluate the disparity in credit availability across

regions. This analytical approach helps in quantifying how various economic and demographic factors influence credit accessibility, highlighting regional disparities and identifying potential areas for policy intervention.

Determinants of access to institutional credit

The study uses a multiple regression model to analyze the factors influencing the Incidence of Indebtedness by institutional rural credit agencies. This represents the level of indebtedness or credit reliance among rural households, as rated by formal financial institutions, which reflects their access to and utilization of formal credit services.

$$IOI_{Incidence\ of\ Indebtedness} = b + b_1\ Literacy\ Rate + b_2\ Wage_{RURAL} + b_3\ Branches\ of\ RRBs$$
$$+\ b_4\ Telephone\ access + \varepsilon$$

The **Incidence of Indebtedness by Institutional Rural Credit Agencies** (NSS Report no. 588: All India Debt & Investment Survey - 2019) serves as the dependent variable, representing the level of indebtedness among rural households and acting as a proxy for credit accessibility and utilization in rural areas. The analysis includes several key explanatory variables: **Literacy Rate**, derived from Census 2011 data, measures the percentage of literate individuals in a region, with higher literacy rates indicating better awareness of credit options and enhanced financial inclusion. The **Wage Rate**, RBI : Handbook of Statistics on Indian State records, indicates the average wage rate of rural men and serves as a marker of income stability, which is hypothesized to positively affect creditworthiness and access. The presence of **Branches of Regional Rural Banks (RRBs)**, also sourced from RBI data, captures the number of RRB branches in rural areas, reflecting the availability of formal financial institutions. Additionally, **State Wise Telephone Access per 100 Population** acts as a proxy for infrastructure, highlighting telecommunication access, which may indirectly contribute to financial inclusion.

Correlation analysis is employed to examine the relationships between the **Incidence of Indebtedness (IoI)** by institutional rural credit agencies and various socio-economic variables such as the **average area of land per household**, **literacy rate**, and the **number of bank accounts**, all drawn from the Debt and Investment Survey 2019. The **average area of land per**

household serves as a measure of land ownership, an asset that can significantly impact a household's creditworthiness and access to formal credit institutions. The **literacy rate** reflects the level of education in a region, where higher literacy is typically linked to a better understanding of financial products, leading to greater utilization of credit services. Finally, the **number of bank accounts** serves as an indicator of the extent to which households engage with formal financial institutions, suggesting higher financial inclusion and potentially enhanced access to credit. Together, these variables provide a comprehensive view of the economic characteristics influencing rural households' reliance on institutional credit.This correlation analysis provides insights into the strength and direction of these relationships, offering a deeper understanding of the factors that collectively influence rural households' credit access and financial inclusion.

Interpretation and Insights

The regression results (Table A7) provide an in-depth look into the factors affecting rural households' access to institutional credit, as measured by the Incidence of Indebtedness by credit agencies. Among the variables examined, the number of branches of Regional Rural Banks (RRBs) is found to have a significant positive effect on the Incidence of Indebtedness . This indicates that areas with a denser network of RRBs tend to experience higher levels of credit access, likely due to improved availability of financial services in regions with strong banking infrastructure. This aligns with existing research showing that proximity to banking services is crucial for rural households, as it reduces the logistical and psychological barriers to formal credit access. However, other factors, such as literacy rate, wage rate, and telephone density, do not show statistically significant effects in this model, suggesting that while these factors are relevant to general socioeconomic development, they may not directly determine the level of access to credit in this specific framework.

Despite literacy rate not being significant in the regression model, literature suggests that literacy and access to formal credit are positively related. Literacy enables farmers to understand loan conditions, navigate documentation requirements, and take responsibility for repayment, all of which make formal credit more accessible and attainable. Studies in agricultural economies show that literate farmers are more likely to trust and use formal financial services, recognizing the long-

term benefits of investing in farming productivity. However, literacy alone is insufficient to close accessibility gaps, indicating that structural support, such as improved financial infrastructure, is needed alongside educational empowerment to enhance credit access comprehensively.

The significance of RRB branch density further underscores the importance of local financial infrastructure. In line with global research, the availability of nearby bank branches reduces logistical challenges, making it easier for rural residents to interact with financial institutions. Increasing rural banking infrastructure, particularly in underdeveloped and agriculturally productive regions, could help overcome geographic isolation and improve access to formal credit. Expanding rural banking should be paired with complementary policies, such as mobile banking, to address accessibility issues when physical branch visits are challenging.

Additionally, the lack of significance for wage rate in the regression suggests that structural access factors—such as the presence of local banking services—may play a more prominent role in credit access than individual household income levels. Studies in developing countries also show that while income impacts repayment capacities, it does not necessarily predict initial access to credit. This implies that stabilizing farm incomes through measures like minimum support prices or crop insurance could indirectly promote better credit repayment behaviors, lowering default rates and encouraging lenders to provide more credit to agricultural households.

Furthermore, the correlation analysis (Figure A2 & A3) provides additional insights into the relationships between the Incidence of Indebtedness and socio-economic variables, revealing positive correlations between Incidence of Indebtedness and factors like average land area per household, literacy rate, and the number of bank accounts. The positive correlation between land ownership and Incidence of Indebtedness suggests that households with larger land holdings are better positioned to access credit, as land can serve as collateral and enhance a household's creditworthiness. Similarly, the positive correlation with literacy rate reinforces the idea that educated individuals are more capable of understanding financial products, making formal credit channels more accessible. Lastly, the positive relationship between Incidence of Indebtedness and the number of bank accounts serves as an indicator of financial inclusion; households with bank accounts are already engaged with the formal financial system, which can facilitate access to credit.

Together, these regression and correlation findings emphasize the multifaceted nature of credit access in rural areas. While banking infrastructure plays a critical role, socio-economic characteristics like literacy, land ownership, and financial inclusion also contribute significantly. These insights suggest a need for policy interventions that address both infrastructural and educational barriers to credit, including measures to expand rural banking networks, enhance financial literacy, and promote land ownership. These combined efforts could support rural households in gaining reliable access to credit, fostering both financial inclusion and economic growth in rural communities.

Limitations of our study

This study on rural credit accessibility in India, using data from the 77th round of the Debt and Investment Survey, RBI : Handbook of Statistics on Indian States and World Development Indicators, has several limitations. First, reliance on secondary data presents challenges, as these sources may lack recent updates, offer limited variables, and often aggregate data at state or national levels, potentially overlooking local variations in credit access. Methodologically, the use of standard statistical techniques limits the ability to capture complex interactions or establish causal relationships, while endogeneity issues may bias the results. The scope of the study is also specific to rural India, meaning that findings may not generalize to other settings, and may lose relevance over time as policies and rural banking structures evolve. Additionally, measurement errors may arise from estimated socio-economic indicators and informal credit sources that are difficult to quantify. Changes in policy and regulatory environments across regions further complicate cross-regional comparisons, while the study's quantitative approach lacks qualitative insights into behavioral and cultural factors, such as trust in formal institutions or borrowing preferences. These limitations suggest that future research could enhance understanding by including qualitative insights, primary data, and advanced econometric methods to provide a fuller picture of rural credit dynamics.

Policy Implications

Improving Financial Literacy

Not surprisingly, literacy positively correlates with access to credit, meaning good financial literacy programs become a prerequisite for the introduction of formal financial systems that

citizens would otherwise never be able to appropriately use. It has been documented that financial literacy is correlated with not only better understanding of credit products but also responsible borrowing and repayment behavior. Such programs, specifically designed to cater to the needs of rural and low-literacy populations, have been successful, especially in India; these projects have been associated with improved access to credit as well as better financial choices (Klapper et al., 2015). Das et al. also recommend incorporating financial literacy into more general basic education systems and community programs, particularly within agricultural industries where knowledge of credit can be revolutionary. In this regard, financial literacy interventions, such as hands-on training, empower farmers and other rural borrowers to use formal credit channels with more confidence, increasing the rural economy. Source: Das et al., (2020)

Expanding Rural Bank Infrastructure

 The association of increased bank density with greater access to credit underlines the necessity of accessible financial services in rural areas. Literature has well established that proximity toward banking facilities directly affects the accessibility of credit, especially for under-served rural regions. If policies are geared to encourage banks to open their branches in remote areas through subsidies, reduced operational costs, or tax benefits, among others, then increased rural credit access can be driven (Chakrabarty, 2012).

Policies were somewhat similar in Kenya, where the expansion of financial institutions' services to their rural space dramatically improved Kenya's financial inclusion rate and increased local agricultural productivity, according to the World Bank. Access could be enhanced by creating mobile and digital banking tailored to the rural setting and pose an alternative to expensive physical expansions.

Integration of Communication with Financial Services

Mobile-based financial service potential cannot be ignored, although phone access has little influence on the supply of credit. By improving digital literacy and providing concurrent financial literacy training, rural populations will be able to use mobile banking in those under-served countries especially where very few branches of a bank exist. For example, mobile money platforms in sub-Saharan Africa studies have indicated that when mobile banking is crossed with financial literacy programs, the effects and use of financial products increase, therefore improving economic stability in rural communities. Demirguc-Kunt et al., (2018). A comparable model in

India may help bridge the gaps on physical access by making available, via mobile platforms, rural farmers' information access in credit services if governments collaborate with private sectors in digital infrastructure development and training money platforms for example in sub-Saharan Africa integrating mobile banking into financial literacy enhances the scope of and outcomes for financial products helping in stabilizing rural communities' economy, notes Demirguc-Kunt et al., 2018). This is likely to bridge physical access gaps by allowing farmers in the rural areas to access credit services via mobile platforms if government and private sectors combine their effort on digital infrastructure expansion and training.

Conclusion

The findings of this study underline the importance of literacy and banking infrastructure in promoting access to institutional credit in rural India. Regression and correlation analyses, based on the 77th round of the Debt and Investment Survey ,RBI (Handbook of Statistics on Indian States) World Development Indicators, reveal that increased literacy correlates positively with formal credit access, suggesting that comprehensive financial literacy programs can enhance credit usage among rural populations. Likewise, the density of Regional Rural Banks (RRBs) shows a strong association with credit access, supporting policy initiatives aimed at expanding banking infrastructure in underserved areas. In contrast, wage rates and telecommunication availability alone are insufficient to impact credit access significantly, pointing to the need for a more targeted approach in addressing rural credit disparities. Based on these findings, several improvements can be made to enhance financial inclusion and to promote more equitable access to rural credit . To address these disparities , policy interventions should focus on expanding rural banking infrastructure by increasing the number of bank branches, especially in underserved areas, could help bridge gaps in institutional credit access , encouraging the growth of Regional Rural Banks (RRBs) and cooperative societies, along with promoting mobile banking units, may also improve outreach to remote communities and implementing region-specific financial literacy programs can empower rural populations to navigate formal financial systems, make informed borrowing decisions, and fully utilize available credit services. These programs could include practical guidance on managing accounts , applying for credits , and financial planning for small business owners and farmers. Expanding access to mobile and digital banking services to broaden access,

especially in areas lacking physical infrastructure, could also be highly advantageous. By increasing digital literacy and alongside enhancing mobile banking accessibility , rural households can benefit from secure and convenient financial service. These efforts could significantly reduce rural reliance on informal credit and strengthen economic stability in India's agricultural sector. Further studies could consider additional socio-economic and policy factors, including land ownership patterns and crop insurance, to provide a deeper understanding of rural credit accessibility.

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Appendix

Table A1: This table summarizes key banking statistics across Indian states as of March 2018, covering branch distribution, credit-deposit ratios, and loans for agriculture and personal use by scheduled commercial banks.

	STATE-WISE DISTRIBUTION OF OFFICES OF SCHEDULED COMMERCIAL BANKS (Concld.) (Number of Offices as at end-March)	STATE-WISE NUMBER OF BRANCHES OF REGIONAL RURAL BANKS (Concld.) (As at end-March)	STATE-WISE CREDIT-DEPOSIT RATIO OF REGIONAL RURAL BANKS 2018 (As at end-March) (Per cent)	STATE-WISE CREDIT TO AGRICULTURE BY SCHEDULED COMMERCIAL BANKS (Concld.) (Amount Outstanding as at end-March) 2018	STATE-WISE PERSONAL LOANS BY SCHEDULED COMMERCIAL BANKS (Amount Outstanding as at end-March) (₹ Crore) 2018
Andaman & Nicobar Islands	69	-	-	100	1100
Andhra Pradesh	6935	1,231	93.5	106000	87800
Arunachal Pradesh	153	30	33.3	400	2300
Assam	2370	481	46.2	11300	22900
Bihar	6711	2117	52.1	35600	31300
Chandigarh	441	-	-	2500	10300
Chhattisgarh	2516	618	28.9	10400	22600
Dadra & Nagar Haveli	59	-	-	100	800
Daman & Diu	47	-	-	0	500
Delhi	3613	-	-	33400	99300
Goa	684	-	-	700	8600
Gujarat	7922	752	59.5	57100	119900
Haryana	4842	664	65.2	47900	61900
Himachal Pradesh	1531	187	32.6	5800	9500
Jammu & Kashmir	1783	360	43.5	6300	19000
Jharkhand	2954	442	36.8	7200	20400
Karnataka	10041	1,778	87.4	100900	194500
Kerala	6382	626	128.3	65800	102600
Lakshadweep	-	-	-	0	-
Madhya Pradesh	13	1339	58.3	65900	57500
Maharashtra	6581	741	59.0	92700	338200
Manipur	12462	23	33.3	500	2700
Meghalaya	176	93	38.9	800	3100
Mizoram	343	86	52.4	400	1900
Nagaland	190	10	0.0	300	2300
Odisha	160	999	48.1	18000	29600
Puducherry	4839	37	71.4	2300	4300
Punjab	245	422	87.7	71100	42900
Rajasthan	6474	1,551	75.5	84200	70500
Sikkim	7184	-	-	100	1400
Tamil Nadu	137	617	93.0	144300	184500
Tripura	10851	144	40.7	2200	2900
Uttar Pradesh	455	4,304	54.6	124100	113000
Uttarakhand	17022	292	47.7	8200	16700
West Bengal	2049	961	45.0	33900	66000
ALL INDIA	7988	21,805	65.2	1199500	1865100

Table A2: This table provides an overview of state-wise data on electricity losses, rural wage rates, telephone density, and capital expenditure in India as of 2018-19. It highlights regional variations in infrastructure, labor wages, and government spending.

	STATE-WISE ELECTRICITY TRANSMISSION & DISTRIBUTION LOSSES (Thousands)	State-wise Average Daily Wage Rates in Rural India (Men - General Agricultural Labourers)	STATE-WISE TELEPHONES PER 100 POPULATION (Concld.) (As at end-March) 2018	STATE-WISE CAPITAL EXPENDITURE (Concld.) 2018-19
Andaman & Nicobar Islands	10.8	-	-	35364
Andhra Pradesh	17.6	282	97.21	6284
Arunachal Pradesh	50.8	-		14952
Assam	24.0	248.5	76.87	29759
Bihar	32.5	240.3	63.16	-
Chandigarh	17.1	-	-	10290
Chhattisgarh	25.1	-	-	-
Dadra & Nagar Haveli	10.7	-	-	-
Daman & Diu	12.4	-	-	9304
Delhi	12.6	-	-	3083
Goa	16.2	-	-	45222
Gujarat	20.3	199.3	112.45	21841
Haryana	22.8	391.9	84.44	8230
Himachal Pradesh	14.3	388.6	174.46	11054
Jammu & Kashmir	42.2	443.6	109.19	15132
Jharkhand	18.4	-	-	50229
Karnataka	16.0	288.7	109.05	18251
Kerala	16.4	682.4	121.61	-
Lakshadweep	2.2	-	-	40661
Madhya Pradesh	27.7	196.3	67.02	61711
Maharashtra	19.5	213.7	95.50	2186
Manipur	35.6	-	-	1903
Meghalaya	43.1	229.5	-	2153
Mizoram	25.2	-	-	2238
Nagaland	20.7	-	-	28592
Odisha	34.9	227.4	80.28	955
Puducherry	13.3	-	-	11509
Punjab	14.7	337.7	123.45	37666
Rajasthan	24.8	292.9	87.83	1714
Sikkim	32.7	-	-	45816
Tamil Nadu	19.1	398.7	136.36	1980
Tripura	26.7	270	-	89483
Uttar Pradesh	21.2	247.1	71.36	8425
Uttarakhand	22.2	-	-	45364
West Bengal	18.3	263.1	73.73	699591
ALL INDIA	20.7	277.4	93.3	-

Table A3: This shows the population in rural areas by state in thousands, giving insight into the distribution of rural populations. This is significant for understanding demographic challenges, resource allocation and rural development priorities.

	Sex Ratio 2011 (%)	Literacy Rate 2011 (%)	Statewise unemployment rate	STATE-WISE POPULATION IN RURAL AREA (Thousands)
Andaman & Nicobar Islands	876	86.63	67	237
Andhra Pradesh	993	67.02	49	56362
Arunachal Pradesh	938	65.39	61	1066
Assam	958	72.19	62	26807
Bihar	918	61.80	106	92341
Chandigarh	818	86.05	0	29
Chhattisgarh	991	70.28	26	19608
Dadra & Nagar Haveli	774	76.24	18	183
Daman & Diu	618	87.10	0	60
Delhi	868	86.21	6	419
Goa	973	88.70	24	552
Gujarat	919	78.03	38	34695
Haryana	879	75.55	100	16509
Himachal Pradesh	972	82.80	53	6176
Jammu & Kashmir	889	67.16	29	9108
Jharkhand	948	66.41	58	25055
Karnataka	973	75.37	32	37469
Kerala	1084	94.00	47	17471
Lakshadweep	947	91.85	392	14
Madhya Pradesh	931	69.32	30	52557
Maharashtra	929	82.34	46	61556
Manipur	992	79.20	77	2022
Meghalaya	989	74.43	19	2371
Mizoram	976	91.33	42	525
Nagaland	931	79.60	144	1408
Odisha	979	72.89	66	34971
Puducherry	1037	85.85	125	395
Punjab	895	75.84	76	17344
Rajasthan	928	66.11	59	51500
Sikkim	890	81.42	30	457
Tamil Nadu	996	80.09	70	37230
Tripura	960	87.22	55	2712
Uttar Pradesh	912	67.68	53	155317
Uttarakhand	963	78.82	48	7037
West Bengal	950	76.26	40	62183
ALL INDIA	943	72.99	56	833749

Table A4 : This table reflects the various socio-economic factors presented such as household assets, institutional agency, bank account penetration, literacy rate and income inequality (Gini coefficient) across different states in India.

State	Avg_Household_ Assets	lol_Inst_Agency	Bank_Accounts_ Percent	Literacy_Rate	gini coefficient
Andhara Pradesh	0.88	26.7	91.2	86.63	0.58
Assam	0.44	5.1	78.9	72.19	0.53
Bihar	0.68	12.8	77.7	61.8	0.55
Chattisgarh	0.56	23.1	90.2	70.28	0.53
Gujarat	1.09	18.7	73.8	78.03	0.60
Haryana	2.81	24.8	84.6	75.55	0.64
Jharkhand	0.54	18.6	83.2	66.41	0.48
Karnataka	1.16	24	89.7	75.37	0.53
Kerala	1.56	38.5	90.6	94	0.58
Madhya Pradesh	0.9	17.6	83.6	69.32	0.61
Maharastra	1.3	23.9	82.8	82.34	0.62
Odisha	0.33	19.1	84	72.89	0.53
Punjab	2.48	16.3	84.3	75.84	0.72
Rajasthan	1.18	17.3	90.8	66.11	0.57
Tamil Nadu	0.59	22.4	90.5	80.09	0.54
Telangana	0.99	24	90	86	0.58
Uttar Pradesh	1.12	9.6	83	67.68	0.59
West Bengal	0.5	14	83.9	76.26	0.56

Table A7 : Regression Results

```
Regression Results
================================================================
                                          Dependent variable:
                                      ----------------------------
                                       IoI by Credit Agencies
   -------------------------------------------------------------
Literacy Rate                                  0.057
                                              (0.160)

Wage Rate                                      0.010
                                              (0.027)

Branches of Regional Rural Banks              0.007**
                                              (0.003)

Statewise Telephone per 100 Population         0.102
                                              (0.106)

Constant                                      -5.994
                                             (15.427)

   -------------------------------------------------------------
Observations                                     32
R2                                             0.210
Adjusted R2                                    0.092
Residual Std. Error                      6.686 (df = 27)
F Statistic                            1.789 (df = 4; 27)
================================================================
Note:                            *p<0.1; **p<0.05; ***p<0.01
```
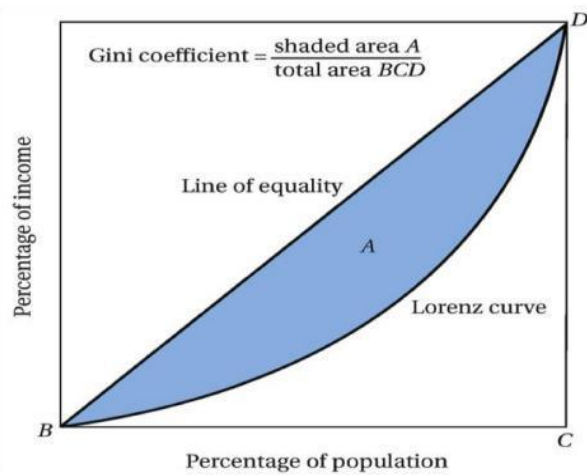
Figure A1 : Gini Coefficient - The **Lorenz curve** for asset inequality is a graphical representation that shows the distribution of assets (such as wealth, land, or other forms of capital) across a population
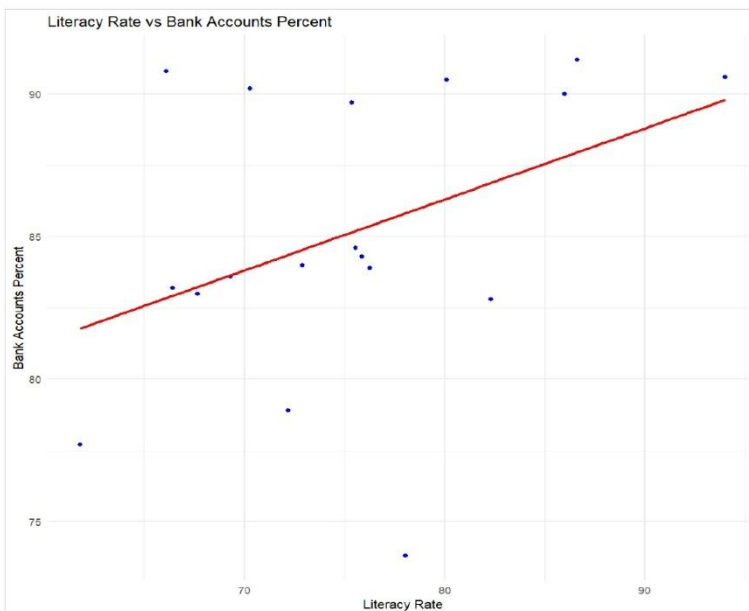

Figure A2: A scatter plot that compares literacy rates with the percentage of bank accounts held in each state. The relationship between these two variables can indicate how literacy affects financial inclusion, which is crucial for economic empowerment and poverty alleviation.

Figure A3: This graph shows the correlation between Incidence of Indebtedness (IOI)by institutional agencies against average household assets across states. It visualizes the positive Correlation between them.

Iol by Institutional Agencies vs Average Household Assets