



DIGITAL PAYMENTS AS A PATHWAY TO FINANCIAL INCLUSION IN RURAL ANDHRA PRADESH

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Abstract

This paper examines the role of digital payments in promoting financial inclusion in rural Andhra Pradesh using descriptive and analytical secondary data. It draws on data from the Reserve Bank of India (RBI), National Payments Corporation of India (NPCI), Department of Financial Services, World Bank Global Findex, National Family Health Survey (NFHS), Telecom Regulatory Authority of India (TRAI), and Andhra Pradesh State Level Bankers' Committee.

India's UPI transactions increased from 0.92 billion in 2017–18 to 185.87 billion in 2024–25, with a compound annual growth rate of about 114.5%. In Andhra Pradesh, PMJDY enrolments reached 1.70 crore by mid-2025, alongside a financial inclusion campaign covering 13,324 gram panchayats. These developments indicate substantial expansion of formal financial access, but do not necessarily reflect active, safe, or meaningful usage.

The paper suggests strengthening rural inclusion through panchayat-level digital service points, assisted payment channels, Telugu-language digital literacy, wider merchant acceptance, gender-sensitive monitoring, and timely grievance redressal. The study concludes that the next stage of digital financial inclusion should focus not only on expanding access, but on ensuring that rural households can use financial services regularly, safely, affordably, and meaningfully.

Keywords: Digital payments, Indian economy, UPI; rural economy, Andhra Pradesh; digital public infrastructure; consumer protection.

1. Introduction:

India's digital payment system has expanded rapidly through bank accounts, Aadhaar, mobile technology, and interoperable platforms. UPI has made bank transfers and small merchant payments faster, while AePS, micro-ATMs, Business Correspondents (BC), and Direct Benefit Transfer (DBT) have improved access for rural users, including those with limited smartphone or internet access.

However, financial inclusion is more than account ownership or digital transactions. Meaningful inclusion requires affordable access, regular use, reliable services, security, and improved financial well-being. In rural areas, connectivity, digital literacy, distance, social factors, cash dependence, and fraud can limit effective use. A successful digital payment does not necessarily mean that households can save, obtain affordable credit, access insurance, or manage financial shocks. Andhra Pradesh provides an important setting for examining these issues because of its large rural population, strong self-help group network, and experience with technology-based service delivery. Its agriculture, fisheries, livestock, informal trade, and seasonal employment create significant demand for small-value and assisted financial transactions. Differences in infrastructure across regions also affect access and usage.

The study examines four issues: the growth of India's digital payment system, the spread of formal and digital finance in rural Andhra Pradesh, barriers to effective use, and appropriate state-level interventions. It combines payment, financial inclusion, household, and rural development indicators to assess meaningful inclusion.

The study does not treat transaction volume as direct evidence of improved welfare or establish causality. Instead, it uses payment growth to assess financial-system expansion and develops an access–use–quality–outcome framework for understanding digital financial inclusion and guiding future district- and household-level research.



2. Conceptual Framework

2.0. Rural Andhra Pradesh as study location

Rural Andhra Pradesh is largely agrarian, with households depending on agriculture, fisheries, livestock, casual work, government transfers, and self-help groups. Irregular incomes create demand for affordable and reliable payment services. Digital payments can help, but failed transactions, delayed payments, and limited cash access can significantly affect cash-constrained households.

Financial access varies across the state. Town-adjacent villages generally have better banking and connectivity, while remote and tribal areas may depend on Business Correspondents or distant service centres. Floods, cyclones, droughts, and network problems can further disrupt services, making local-level monitoring important.

Women's self-help groups provide a useful platform for digital and financial literacy through peer learning and bank linkages. However, participation does not guarantee independent digital use. Access to phones, financial decision-making, and account control may differ among members.

DBT has improved the delivery of government benefits, but beneficiaries still need reliable access to their funds. Since cash withdrawals remain important, Business Correspondents play a key role. Their liquidity, connectivity, equipment, service quality, and availability determine whether digital transfers can be effectively used by rural households.

2.1 Financial Inclusion as a Multidimensional Outcome

Financial inclusion means affordable and timely access to useful financial services. It has four dimensions: access, use, quality, and outcomes. Access covers accounts, connectivity, devices, identification, and authentication; use includes payments, savings, credit, insurance, and pensions; quality involves reliability, transparency, grievance redressal, and data protection; and outcomes reflect improved financial management, lower costs, and greater resilience.

Digital payments can improve inclusion by reducing travel costs, enabling remittances and merchant payments, and creating transaction records. However, poor connectivity, costly devices, difficult interfaces, authentication failures, and unsafe assistance can create new barriers. Therefore, digital technology can expand access but cannot alone ensure meaningful financial inclusion.

2.2 Channels Linking Payments to Financial Inclusion

Digital payments influence financial inclusion through five main channels:

1. **Cost:** Reduces the time and expense of making transactions.
2. **Distance:** Connects rural households to formal financial services without requiring a nearby bank branch.
3. **Information:** Creates transaction records that can support budgeting and responsible credit assessment.
4. **State capacity:** Enables faster and more transparent delivery of government benefits.
5. **Market access:** Helps small merchants accept digital payments and expand their customer base.

These channels work together. Meaningful inclusion requires active accounts, digital skills, reliable connectivity, convenient cash-in and cash-out services, merchant acceptance, user trust, and effective grievance mechanisms. Therefore, digital payments improve financial inclusion only when access, capability, reliability, acceptance, and consumer protection are present.



Table 1. Analytical framework for rural digital financial inclusion.

Dimension	Illustrative indicators	Failure risk
Access	Active bank account; phone or feature-phone channel; BC or branch proximity; network availability	Nominal account ownership without usable access
Use	Payments received and made; savings; remittances; credit; insurance; pension	One-purpose or assisted-only transactions
Quality	Success rate; cost; transparency; privacy; grievance resolution time	Failed transactions, hidden charges or coercive assistance
Outcome	Lower transaction cost; resilience; formal saving; productive credit; control over money	Higher transaction counts without improved financial well-being

Source: RBI financial-inclusion concepts and Global Findex measurement principles.

3. Review of Literature

International studies show that digital finance can reduce distance and transaction costs, but its benefits depend on connectivity, agent availability, trust, and digital skills. Suri and Jack (2016) found that mobile money improved household resilience in Kenya, particularly among female-headed households. However, differences between Kenya and India limit direct comparison.

Ozili (2018) noted that digital finance can improve access and reduce service costs, while also creating risks such as cyber fraud, exclusion, and data vulnerabilities. Demirgüç-Kunt et al. (2022) reported global growth in digital payments and account ownership, but found continuing gaps based on gender, income, education, and employment. Thus, higher adoption does not necessarily ensure equal inclusion.

Indian research highlights the importance of digital public infrastructure, including digital identity and interoperable payment systems. D'Silva et al. (2019) showed that such infrastructure supports large-scale and low-cost digital transactions. However, meaningful inclusion also requires digital capability, reliable last-mile services, and consumer protection.

The literature highlights three major gaps: access–use, where accounts remain underused; gender, where account ownership may not provide independent digital access; and protection, where users face fraud and weak grievance awareness. These challenges can be greater for older, low-literacy, migrant, and poorly connected populations.

Research also shows that digital payments and digital credit involve different risks. Transaction data may improve credit assessment, but poorly designed digital lending can cause over-indebtedness and privacy concerns. Therefore, financial inclusion should be assessed through access, use, quality, and outcomes, rather than transaction volume alone.

There is limited evidence combining banking, household, telecommunications, and government programme data for rural Andhra Pradesh. This study addresses the gap by synthesising secondary data to examine digital financial inclusion across these four dimensions.

3.1 Adoption, Continued Use and Welfare

Technology adoption depends on usefulness, ease of use, social influence, and supporting conditions. In digital finance, trust and user experience are also important. Fraud, failed transactions, or delayed refunds can discourage continued UPI use despite its convenience.

Measuring use only by whether someone has used UPI can be misleading. Assessment should consider frequency, independent use, transaction verification, and the ability to report problems. Assisted use should be measured separately.



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Digital payments can improve household welfare by reducing travel and waiting time, lowering remittance costs, speeding up transactions, reducing cash-related risks, and supporting households during emergencies. These benefits may not directly increase income but can still improve financial security.

3.2 Digital Inequality and Consumer Protection

Digital inequality includes differences in connectivity, device access, digital skills, usage, and financial outcomes. Progress in one area does not ensure equality in others. For example, women may have access to a household smartphone but limited control over its use or financial decisions. Therefore, inclusion should consider personal device access, privacy, decision-making, and control of funds, not account ownership alone.

Consumer protection is essential for sustained digital finance. Rural users may not know where to report failed or fraudulent transactions, while complex procedures and language barriers can discourage complaints. Simple reporting, clear transaction updates, time-bound resolution, and easy appeals are needed. Local monitoring of transaction failures and complaints can also identify service and geographic gaps.

4. Data and Methods

4.1 Research Design and Sources

This study uses a descriptive and analytical approach to examine digital payment growth and financial inclusion in rural Andhra Pradesh. National payment trends show digitalisation, while financial inclusion, household, telecommunications, and state programme data indicate access and usage conditions. The study uses data from NPCI, RBI, Department of Financial Services, World Bank Global Findex 2021, NFHS-5, TRAI, and the Andhra Pradesh State Level Bankers' Committee. UPI trends are analysed up to 2024–25, with policy information through 2025. Since the sources differ in coverage and reference periods, they are analysed separately rather than combined into a causal dataset.

4.2 Measures and Analysis

UPI growth is assessed using annual transaction volume and value. Compound annual growth rate (CAGR) is calculated using the standard formula:

$$\text{CAGR} = [(\text{Ending Value} / \text{Beginning Value})^{(1/n)} - 1] \times 100$$

Average transaction size is calculated by dividing transaction value by transaction volume. A rise in transaction volume with a fall in average transaction size may indicate greater use of small-value payments, but it is not treated as direct evidence of rural usage.

State-level financial inclusion is assessed using four dimensions: access, use, quality, and outcomes. PMJDY and social-security enrolments indicate institutional reach, while panchayat coverage reflects last-mile policy efforts. Digital access indicators help identify barriers to independent usage. The study uses triangulation by comparing payment, banking, household, and telecommunications evidence. It does not create synthetic household data or report regression or significance tests. This approach ensures that descriptive administrative figures are not presented as evidence of causal household-level effects.



5. Results

5.1 Growth and change in composition of UPI.

Table 2: The growth of UPI transactions in India.

Financial year	Volume billion	Value lakh crore rupees	Average value rupees
2017-18	0.92	1.10	1,202
2018-19	5.35	8.77	1,638
2019-20	12.52	21.32	1,703
2020-21	22.33	41.04	1,838
2021-22	45.96	84.17	1,831
2022-23	83.75	139.15	1,661
2023-24	131.17	199.89	1,524
2024-25	185.87	260.56	1,402

Source: Compiled from NPCI product statistics and RBI reports. Values are rounded and average transaction value is calculated by the author.

UPI transaction volume increased more than 200 times between 2017–18 and 2024–25, with a compound annual growth rate of about 114.5% in volume and 118.6% in value. Continued growth after the pandemic suggests that UPI adoption has become a lasting part of India's payment system rather than a temporary response to restricted mobility.

The average transaction value declined to about ₹1,402 in 2024–25, indicating greater use of UPI for small-value payments. QR-based payments have also made digital acceptance easier and cheaper for small merchants, making them particularly useful in rural markets where transactions are often low in value.

RBI reports show that UPI has become India's leading retail digital payment system by transaction volume, while the RBI Digital Payments Index has also increased steadily. These trends indicate strong national digital payment infrastructure. However, the benefits for rural households depend on reliable access, regular use, digital skills, and protection from payment failures and fraud.

5.2 Financial Reach in Andhra Pradesh

By mid-2025, Andhra Pradesh had around 1.70 crore PMJDY enrolments, along with 2.86 crore enrolments under Pradhan Mantri Suraksha Bima Yojana, 1.29 crore under Pradhan Mantri Jeevan Jyoti Bima Yojana, and 0.38 crore under Atal Pension Yojana. These figures represent scheme enrolments rather than unique individuals, but they show the wide reach of formal banking, insurance, and pension services.

The 2025 financial inclusion saturation campaign covered 13,324 gram panchayats and focused on re-KYC, functional bank accounts, social-security enrolment, and awareness of cyber fraud. This shows that financial inclusion requires more than opening accounts; accounts must remain active, accessible, and secure.

Andhra Pradesh's strong self-help group network can further support digital inclusion through peer learning and links with banks. However, group participation does not guarantee individual digital independence. Therefore, monitoring should distinguish between account ownership, personal control, independent usage, and informed consent.

Table 3 Selected indicators of the inclusion architecture in Andhra Pradesh

Indicator	Reported level	Interpretation and limitation
PMJDY enrolments	About 1.70 crore by mid-2025	Wide basic-account reach; enrolment does not measure activity or unique households
PMSBY enrolments	About 2.86 crore	Broad low-cost accident-insurance reach; renewal and claim experience also matter



PMJJBY enrolments	About 1.29 crore	Life-insurance access; cannot be added to other scheme totals as unique persons
APY enrolments	About 0.38 crore	Pension participation remains narrower than basic account and insurance reach
Gram panchayats in saturation drive	13,324	Statewide last-mile effort; outcomes require post-campaign verification

Source: Andhra Pradesh SLBC-related public reporting, 2025. Figures are rounded and represent enrolments, not necessarily active accounts or unique individuals.

5.3 Barriers to Effective Financial Inclusion

Several barriers can prevent digital access from becoming meaningful financial inclusion. Connectivity and device access remain basic challenges, as poor networks, power interruptions, and limited devices can affect digital payments. Services such as UPI 123PAY, AePS, micro-ATMs, and Business Correspondents can reduce these problems, but their availability and awareness vary across rural areas.

Digital and financial skills are also important. Users need to identify the correct recipient, understand PIN-based payments, and recognise fraudulent requests. Local-language support can help, but practical training is needed to build confidence and reduce errors.

Gender and social inequalities can further limit independent use. Women, migrants, tenant farmers, and disadvantaged communities may face limited phone access, connectivity, documentation, or income-related constraints. State averages may hide these differences.

The cash–digital connection is another challenge. Rural economies continue to depend heavily on cash for wages, agricultural activities, and informal transactions. Reliable and affordable cash-in and cash-out services are therefore essential. Failed withdrawals or delayed reversals can quickly reduce user trust.

Finally, fraud and consumer risks remain serious concerns. Fake customer-care services, deceptive QR codes, screen-sharing requests, and remote-access scams can cause financial losses and discourage future digital use. Consumer protection should therefore be treated as an essential part of digital financial inclusion.

5.4 Interpreting the Evidence

The evidence shows rapid national growth in digital payments, with increasing use of small-value transactions. However, national data cannot determine the exact rural share. They mainly show that a digital payment system is available for rural users, while last-mile access remains important.

In Andhra Pradesh, PMJDY and social-security enrolments indicate wide formal financial reach, while the saturation campaign shows continued efforts to improve account functionality and safety. However, these figures do not reveal how frequently accounts are used or whether users control them independently.

The evidence points to connectivity, digital skills, functional accounts, and consumer security as major barriers. The need for re-KYC and fraud awareness further suggests that opening accounts alone is not sufficient for inclusion.



Therefore, effective policy requires an integrated approach covering infrastructure, reliable services, digital capability, merchant acceptance, cash access, and consumer protection. No single intervention can address all the barriers between financial access and meaningful inclusion.

Table 4 Rural constraints and policy responses.

Constraint	Operational response	Monitoring indicator
Weak or unstable connectivity	Offline-capable and feature-phone channels; redundancy at service points	Transaction success rate by block and channel
Limited digital capability	Hands-on Telugu training through SHGs, schools, FLCs and panchayats	Share able to complete a payment independently
Gendered device and account control	Women-centred device access and private assisted service	Sex-disaggregated active-use and grievance data
Merchant cash preference	Village-market QR onboarding and reliable settlement support	Active rural merchants and monthly receipt frequency
Fraud and failed transactions	Visible warnings, rapid account freezing and time-bound redress	Loss rate, complaint disposal time and reversal time
BC liquidity and distance	Service standards, liquidity support and public availability schedules	Cash-out denial rate and median travel time

Source: Author's synthesis.

6. Discussion

The evidence leads to three main findings. First, the basic infrastructure for large-scale rural digital finance is now in place. Rapid UPI growth, increasing small-value transactions, wider account coverage, and state-level financial inclusion efforts show that rural Andhra Pradesh is increasingly connected to formal digital finance. The key issue is now the depth and regularity of usage.

Second, digital payment growth does not automatically mean meaningful financial inclusion. National payment volumes do not show how many rural households use digital payments, how often they use them, or whether they gain better financial outcomes. Similarly, PMJDY enrolments mainly indicate access, not active or independent use. Better monitoring should therefore combine administrative data with household and merchant-level information.

Third, assisted digital finance will remain important for older people, persons with disabilities, low-literacy users, and households facing poor connectivity. Instead of treating assistance as temporary, it should be made safer and more accountable through clear receipts, displayed charges, agent identification, secure authentication, privacy, and effective grievance mechanisms.

Digital payment data may also support credit assessment, but rural incomes are often seasonal and affected by weather and price changes. Automated lending based on limited transaction histories can therefore result in unsuitable credit. Where payment data is used for lending, strong consent, transparency, safeguards, and monitoring of repeated borrowing are necessary.

Finally, Andhra Pradesh's self-help groups (SHGs) can support digital and financial capability through regular local engagement. SHGs can help members practise safe transactions, identify fraud, report failures, and pursue complaints. Such programmes should remain separate from loan or insurance sales to avoid conflicts of interest.



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6.1 Transactional Inclusion to Financial Resilience

Financial inclusion should progress from reliable payments to broader financial security. Regular wages, remittances, and government transfers can make bank accounts useful for daily needs and encourage savings, insurance, pensions, and suitable credit. Financial products should match household needs and seasonal incomes and remain voluntary.

However, accounts should not become mere pass-through channels. Rural households may still need cash because local merchants and services depend on it. Policy should therefore focus on improving merchant acceptance, balance information, cash access, and trust rather than discouraging withdrawals.

The ultimate goal should be financial resilience rather than a cashless economy. A financially resilient household can manage emergencies, meet essential expenses, and avoid high-cost borrowing. Digital payments can support this through faster transfers, but fraud and service failures can also cause harm. Therefore, both service reliability and consumer protection are essential.

6.2 Institutional Coordination

Rural digital finance involves banks, NPCI, payment applications, telecom providers, Business Correspondents, panchayats, SHGs, and cybercrime authorities. Although users experience these services as one system, responsibility is divided across institutions.

Andhra Pradesh needs stronger district- and block-level coordination to monitor service availability, transaction failures, complaints, and credit conditions. Clear definitions should be used for indicators such as active Business Correspondents and active merchants.

Monitoring should protect privacy. Service gaps can be identified through aggregate data on transaction success, complaints, and resolution times without publishing individual transaction histories. Where payment data is used for credit, users should know what data is collected, why it is used, and how errors can be challenged.

7. Policy Recommendations

The state should develop a rural digital financial inclusion dashboard covering active account use, independent payment ability, transaction success, merchant acceptance, Business Correspondent availability, complaint resolution, savings, insurance, and suitable credit. Data should be disaggregated by relevant social and demographic groups while protecting privacy.

Every gram panchayat should have a reliable digital finance access point, supported by a Business Correspondent, micro-ATM, assisted services, and scheduled help. Information on charges, service hours, and complaints should be available in Telugu.

Digital literacy programmes should use practical, task-based training. Users should learn to verify payees, protect UPI PINs, identify fraudulent requests, confirm transactions, and report problems. Training should focus on independent ability rather than attendance.

Merchant inclusion should be measured by actual transactions rather than QR-code distribution. Banks and payment providers should ensure successful settlement and prioritise markets, fair-price shops, transport services, and agricultural input dealers.



A simple local fraud-response system should allow users to report incidents, receive confirmation, track complaints, and access timely support. Banks, cybercrime authorities, telecom providers, and local administrations should have clearly defined responsibilities.

Finally, digital payments should be linked to broader financial outcomes. PMJDY accounts should provide a pathway to voluntary savings, appropriate insurance, pensions, and responsible credit. Success should be measured not by transaction volume alone, but by whether digital finance improves household financial security and resilience.

Table.5 Phase implementation and evaluation plan.

Phase	Priority actions	Evaluation evidence
First six months	Map service points; publish charges and hours; establish district complaint protocol; define indicators	Verified service-point availability and baseline household measures
Months 7 to 18	Task-based training; merchant activation; BC liquidity support; targeted low-connectivity interventions	Independent-use gains, active merchants, success rates and complaint times
Months 19 to 36	Link payments to voluntary savings, insurance continuity and suitable credit; refine weak interventions	Household resilience, renewal, claim and borrower-outcome indicators
Annual review	Audit exclusion, fraud, gender and social-group gaps; publish district results	Comparable district scorecard with methods and limitations

Source: Author's recommendations. Timelines are indicative and require alignment with RBI, bank and state responsibilities.

9. Conclusion

Digital payments have greatly expanded the potential for financial inclusion in rural Andhra Pradesh. Rapid UPI growth, wide PMJDY and social-security coverage, and panchayat-level initiatives show that the basic digital financial infrastructure is well established. The main challenge now is to convert access into regular, reliable, safe, and meaningful use that supports savings, insurance, suitable credit, and financial resilience.

The evidence shows that more digital transactions do not automatically mean greater financial inclusion. Meaningful inclusion depends on access, use, quality, and outcomes. Rural users need reliable connectivity, affordable devices or trusted assistance, merchant acceptance, practical digital skills, and effective consumer protection.

Therefore, Andhra Pradesh should focus on strengthening digital finance where gaps are greatest. Success should be measured not by the number of accounts, QR codes, or transactions, but by whether rural households can use formal financial services independently or with trusted assistance, at low cost, with security and meaningful control.

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