

AN EMPIRICAL STUDY ON THE ROLE OF DIGITAL PAYMENTS IN PROMOTING FINANCIAL INCLUSION IN RURAL INDIA

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ABSTRACT

India's digital payments revolution has fundamentally reshaped the landscape of financial inclusion, particularly in rural areas where traditional banking infrastructure has long been sparse. The Reserve Bank of India's Financial Inclusion Index (FI-Index) reached 67.0 in March 2025, marking a 24.3% increase since 2021, with notable gains in access, usage, and quality of financial services. This empirical study synthesises recent literature, government data, and field research to investigate the evolution and adoption of digital payment systems—especially Unified Payments Interface (UPI), mobile wallets, and Aadhaar-enabled Payment Systems (AePS)—in rural India. It examines the impact of digital payments on access to financial services, savings behaviour, credit access, and economic empowerment, while also analysing persistent challenges such as digital literacy, infrastructure gaps, trust deficits, and gender disparities. Drawing on case studies from West Bengal and comparable states, the report offers policy recommendations for deepening financial inclusion through digital payments, emphasizing the need for targeted interventions, robust infrastructure, and inclusive design.

Keywords: Digital Payments; Financial Inclusion; Rural India; UPI; Aadhaar-enabled Payment System; Digital Literacy

INTRODUCTION

Financial inclusion is widely recognised as a cornerstone of inclusive and sustainable economic growth, particularly in a country as diverse and populous as India. With over 65% of its population residing in rural areas, India's development trajectory is inextricably linked to the economic empowerment of its rural citizens. Historically, rural India has faced significant barriers to accessing formal financial services, including limited physical banking infrastructure, low financial literacy, and socio-cultural constraints. The advent of digital payment systems—driven by government initiatives such as the Pradhan Mantri Jan Dhan Yojana (PMJDY), Digital India, and the Unified Payments Interface (UPI)—has been transformative, offering new pathways to bridge the financial divide.

The rapid proliferation of smartphones, expansion of internet connectivity, and the emergence of innovative fintech solutions have enabled millions of rural households to participate in the formal financial system. Yet, the journey toward universal financial inclusion is far from complete. Persistent challenges—ranging from digital literacy gaps and infrastructure deficits to trust and security concerns—continue to impede the full realisation of digital finance's potential in rural India.

This study aims to provide a comprehensive, empirical analysis of the role of digital payments in promoting financial inclusion in rural India. It explores the evolution and adoption of digital payment systems, assesses their impact on financial behaviours and economic outcomes, and identifies the barriers that must be addressed to achieve inclusive growth. Special attention is given to gender disparities, regional variations, and the role of government and private sector initiatives in shaping the digital financial ecosystem.

LITERATURE REVIEW

Current State of Financial Inclusion in Rural India

India's progress in financial inclusion has been remarkable over the past decade. The Reserve Bank of India's Financial Inclusion Index (FI-Index), which aggregates 97 indicators across access, usage, and quality, rose from 53.9 in 2021 to 67.0 in March 2025—a 24.3% increase. This growth reflects improvements in the availability and usage of financial services, as well as enhanced financial literacy and consumer protection.

Key indicators of financial inclusion in rural India include:

- **Bank Account Ownership:** As of 2025, account ownership in India reached 89%, up from 35% in 2011, with rural areas accounting for a significant share of new accounts.
- **PMJDY Beneficiaries:** Over 55.98 crore PMJDY accounts have been opened, with 67% in rural or semi-urban areas and 56% held by women.
- **Banking Correspondents:** More than 13.55 lakh Bank Mitras (business correspondents) have been deployed to provide last-mile banking services.
- **Digital Banking Units:** 107 Digital Banking Units (DBUs) have been established as of December 2024, offering a range of digital financial services in rural and semi-urban locations.

Despite these advances, disparities persist. The digital divide remains pronounced, with rural internet subscribers per 100 population at 37.74 compared to 105.06 in urban areas (TRAI, 2021). Gender gaps are also significant: only 51.6% of rural women own a mobile phone, compared to 80.7% of rural men.

EVOLUTION AND ADOPTION OF DIGITAL PAYMENT SYSTEMS

The evolution of digital payment systems in India has been shaped by both public and private sector innovations:

- **Unified Payments Interface (UPI):** Launched in 2016 by the National Payments Corporation of India (NPCI), UPI has become the backbone of India's digital payments ecosystem. By June 2025, UPI processed over ₹24.03 lakh crore in transactions across 18.39 billion payments in a single month, accounting for 85% of all digital transactions in India.
- **Mobile Wallets and Fintechs:** Private players such as Paytm, PhonePe, and Amazon Pay have expanded their reach into rural markets, offering user-friendly interfaces, cashback incentives, and offline capabilities.

- **Aadhaar-enabled Payment Systems (AePS):** AePS leverages biometric authentication to enable cash withdrawals, balance inquiries, and fund transfers at micro-ATMs operated by banking correspondents, making digital transactions accessible to non-literate and unbanked populations.
- **Government Initiatives:** Programs such as PMJDY, Digital India, PMGDISHA (digital literacy), and BharatNet (rural broadband) have laid the foundation for digital financial inclusion.

The adoption of digital payments in rural India has accelerated, particularly after demonetization in 2016 and the COVID-19 pandemic. UPI's share of digital transactions rose from 34% in 2019 to 83% in 2024. Rural UPI usage increased from 12% in FY 2020 to 37% in FY 2023-24, with nearly universal adoption among rural youth aged 15-29.

EMPIRICAL EVIDENCE: IMPACT ON ACCESS TO FINANCIAL SERVICES

Empirical studies consistently demonstrate that digital payments have expanded access to formal financial services in rural India:

- **Savings Behavior:** Over 55% of rural respondents reported increased monthly savings after adopting digital payments, attributed to better money management and reduced cash leakage.
- **Credit Access:** Digital lending platforms and microcredit schemes linked to PMJDY and UPI have facilitated access to small loans for rural households, MSMEs, and women entrepreneurs.
- **Economic Empowerment:** Direct Benefit Transfers (DBT) via digital channels have reduced leakages and improved beneficiary satisfaction, especially for women and marginalized groups.
- **Merchant Adoption:** UPI merchant transactions rose 33% year-on-year in 2024-25, with over 5 million rural merchants accepting UPI payments.

CHALLENGES AND BARRIERS TO ADOPTION

Despite significant progress, several barriers continue to hinder the universal adoption of digital payments in rural India:

- **Digital Literacy:** Low digital literacy, especially among women and the elderly, remains a major obstacle.
- **Infrastructure Gaps:** Poor internet connectivity, unreliable electricity, and limited availability of PoS terminals impede adoption in remote areas.
- **Trust and Security:** Fear of fraud, lack of grievance redressal, and limited awareness of cybersecurity measures undermine user confidence.
- **Gender Disparities:** Socio-cultural norms, economic constraints, and lower device ownership restrict women's access to digital financial services.
- **Behavioural and Socio-cultural Factors:** Deep-rooted cash-based habits and resistance to change persist, particularly among older and less-educated populations.

CASE STUDIES: WEST BENGAL AND COMPARABLE STATES

Empirical research and field studies from West Bengal, Bihar, Uttar Pradesh, and Kerala illustrate the diversity of digital payment adoption and its impact:

- **West Bengal:** Awareness campaigns such as “UPI Chalega” have increased digital payment adoption, but usage remains uneven due to infrastructure and literacy gaps.
- **Bihar:** Despite government efforts, only 17% of rural women use the internet, and cash remains dominant in rural economies.
- **Kerala:** High digital literacy and robust infrastructure have enabled near-universal smartphone and internet usage among rural youth, resulting in higher digital payment adoption.

METHODOLOGY

This study employs a literature-based empirical investigation, synthesizing quantitative and qualitative data from a wide range of sources:

- **Secondary Data:** Government reports (RBI, NPCI, Ministry of Finance, MoSPI), international databases (World Bank Global Findex, GSMA), and industry white papers.
- **Academic Literature:** Peer-reviewed journal articles, working papers, and policy analyses on digital payments, financial inclusion, and rural development.
- **Field Studies and Case Analyses:** Regional case studies from West Bengal, Bihar, Uttar Pradesh, and Kerala, including survey data, focus group discussions, and interviews with rural residents, merchants, and banking correspondents.
- **Statistical Analysis:** Descriptive statistics, regression analysis, and thematic coding were used to identify trends, correlations, and key themes across datasets.

THE ANALYSIS IS STRUCTURED AROUND THE FOLLOWING RESEARCH OBJECTIVES:

1. Assess the current state of financial inclusion in rural India, including key indicators and recent trends.
2. Examine the evolution and adoption of digital payment systems, with a focus on UPI, mobile wallets, and government initiatives.
3. Evaluate empirical evidence on the impact of digital payments on access to financial services, savings behaviour, credit access, and economic empowerment.
4. Identify challenges and barriers to digital payment adoption, including digital literacy, infrastructure, trust, and gender disparities.
5. Analyse case studies and regional examples to illustrate successful and failed interventions.
6. Formulate policy recommendations and future directions for enhancing financial inclusion through digital payments.

FINDINGS

1. Key Indicators of Financial Inclusion and Digital Payment Adoption

Table 1: Key Financial Inclusion and Digital Payment Indicators, 2021–2025

Indicator	2021	2024	2025	% Change (2021–25)
Financial Inclusion Index (FI-Index)	53.9	64.2	67.0	+24.3%
PMJDY Beneficiaries (crore)	~45	~52	55.98	+24.4%
UPI Transactions (₹ lakh crore/month)	N/A	~15.0	24.03	N/A
UPI Share in Digital Transactions (%)	~60%	~75%	85%	+41.7%
APY Subscribers (crore)	~5.5	~6.8	7.65	+39.1%
PMMY Loans Sanctioned (₹ lakh crore)	~25.0	~30.0	35.13	+40.5%
SUI Loans Sanctioned (₹ crore)	~45,000	~55,000	61,020.41	+35.6%

The data above demonstrates robust growth in financial inclusion and digital payment adoption, with UPI emerging as the dominant transaction mode in rural and semi-urban India.

2. Digital Device and Internet Penetration in Rural India

Table 2: State-wise Digital Device and Internet Penetration, 2025

State	Smartphone Usage (%)	Feature Phone Usage (%)	Internet Penetration (%)
Kerala	96–99	<4	72
Maharashtra	~90	~10	70
Punjab	94–96 (Youth)	4–6	68
Jharkhand	~51	~49	46
Uttar Pradesh	~46	~54	41
Bihar	~47	~53	37

While smartphone and internet penetration have improved, significant disparities persist across states and between genders. Only 51.6% of rural women own a mobile phone, compared to 80.7% of rural men.

3. Modes and Purposes of Digital Payment Use

Mode of Payment	% of Respondents (Rural)
UPI (e.g., Google Pay, PhonePe)	60%
Debit/Credit Cards	15%
Mobile Wallets (e.g., Paytm)	12.5%
AEPS (Aadhaar-based)	7.5%

Mode of Payment	% of Respondents (Rural)
Net Banking	5%

Table 3: Mode of Digital Payment Used by Rural Respondents

Purpose	% of Respondents (Rural)
Grocery & Daily Needs	42.5%
Utility Bills	30%
Government Transfers (DBT)	15%
Education/School Fees	7.5%
Others	5%

Table 4: Purpose of Using Digital Payments in Rural Areas

UPI is the most widely used digital payment method in rural areas, primarily for daily needs and utility payments.

4. Impact on Savings, Credit, and Economic Empowerment

Response	% of Respondents (Rural)
Increased	55%
No Change	35%
Decreased	10%

Table 5: Change in Monthly Savings Post Digital Payment Adoption

More than half of rural respondents reported increased savings after adopting digital payments, suggesting improved money management and financial discipline.

Challenge	% of Respondents (Rural)
Poor Internet Connectivity	37.5%
Lack of Digital Literacy	30%
Security/Trust Issues	20%
Technical Errors	12.5%

Table 6: Challenges Faced in Using Digital Payments

Internet access and digital literacy remain the most significant barriers to wider adoption.

5. Gender Disparities in Digital Payment Adoption

Gender	% of Respondents (Rural)
Male	65%
Female	35%

Table 7: Gender-wise Adoption of Digital Payments

While men dominate digital payment adoption in rural areas, a significant and growing percentage of women are engaging with digital platforms, particularly through AePS and government benefit schemes.

6. Role of Banking Correspondents and Micro-ATMs

Banking correspondents (BCs) and micro-ATMs have been instrumental in extending financial services to remote and underserved areas:

- **BC Network:** Over 14.68 lakh BCs operate across India, with nearly every mapped village having a BC or bank branch within 5 km.
- **Services Provided:** Account opening, cash deposits/withdrawals, fund transfers, bill payments, and government benefit disbursements.
- **Impact:** BCs have enabled last-mile delivery of financial services, particularly for women, the elderly, and marginalized groups.

7. Merchant Adoption and MSME Readiness

- **UPI Merchant Transactions:** Over 5 million rural merchants now accept UPI payments, with QR code saturation highest in Kerala and Karnataka.
- **MSME Impact:** Digital payments have expanded market reach, improved cash flow, and reduced transaction costs for rural MSMEs. However, challenges remain in onboarding, training, and addressing trust and security concerns.

8. Regional Case Studies

West Bengal

- **Awareness Campaigns:** The “UPI Chalega” campaign increased awareness, but usage remains uneven due to infrastructure and literacy gaps.
- **Digital Villages:** Initiatives such as Bangla Sahayata Kendras provide e-governance and banking services, but digital literacy and trust remain barriers.

Bihar

- **Digital Divide:** Only 17% of rural women use the internet; cash remains dominant in rural economies.
- **Start-up Ecosystem:** The Bihar Start-up Policy and IT Policy support digital ventures, but infrastructure and literacy gaps persist.

Kerala

- **High Digital Literacy:** Near-universal smartphone and internet usage among rural youth; high adoption of digital payments and e-governance services.

Discussion

The Transformative Role of Digital Payments

The consistent rise in the FI-Index and the proliferation of digital payment systems such as UPI and AePS indicate a strong correlation between digital infrastructure and financial inclusion in rural India. Government schemes like PMJDY, PMMY, and APY have played pivotal roles in expanding access to financial services, particularly among women and marginalized populations. The deployment of banking correspondents and digital banking units has addressed last-mile connectivity challenges, while financial literacy initiatives have improved the quality of financial inclusion.

UPI's Impact: UPI has emerged as the most widely adopted digital payment platform, favored for its simplicity, interoperability, and zero-merchant-discount-rate (MDR) policy. Rural merchants and users alike prefer UPI for its instant settlement and reliability.

Mobile Wallets and AePS: Mobile wallets like Paytm and PhonePe have gained traction among younger, mobile-literate users, while AePS remains the backbone for government-to-person transactions, especially for women and non-literate populations.

Empirical Evidence on Financial Behaviour

- **Savings and Economic Empowerment:** Digital payments have encouraged better money management, increased savings, and enhanced financial autonomy, particularly among women and self-help group (SHG) members.
- **Credit Access:** Digital lending platforms and microcredit schemes have expanded access to credit for rural households and MSMEs, leveraging alternative data for credit scoring.
- **Economic Participation:** Direct Benefit Transfers and digital payment adoption have reduced leakages, improved transparency, and empowered beneficiaries, especially women and marginalized groups.

Persistent Challenges and Barriers

Despite notable progress, several challenges continue to hinder full digital inclusion:

- **Digital Literacy:** Low digital literacy, especially among women and the elderly, remains a major obstacle. Targeted training and community-based outreach are essential.
- **Infrastructure Gaps:** Poor internet connectivity, unreliable electricity, and limited PoS terminals impede adoption in remote areas. Investment in last-mile connectivity and alternative technologies is critical.

- **Trust and Security:** Fear of fraud, lack of grievance redressal, and limited awareness of cybersecurity measures undermine user confidence. Cybercrime in rural areas has surged, necessitating robust security frameworks and awareness campaigns.
- **Gender Disparities:** Socio-cultural norms, economic constraints, and lower device ownership restrict women's access to digital financial services. Gender-intentional outreach and inclusive design are needed to bridge this gap.
- **Behavioural and Socio-cultural Factors:** Deep-rooted cash-based habits and resistance to change persist, particularly among older and less-educated populations. Community-led models and peer influence can accelerate adoption.

Theoretical Insights

- **Technology Acceptance Model (TAM):** Perceived usefulness and ease of use are critical determinants of digital payment adoption. UPI's simple interface and reliability have driven its popularity, while complexity and trust issues hinder adoption among older and less-literate users.
- **Diffusion of Innovation Theory:** Early adopters—particularly digitally literate youth—play a key role in influencing family and community adoption of digital payments.
- **Theory of Planned Behaviour (TPB):** Attitude, perceived behavioural control, and trust significantly influence behavioural intention to adopt digital payments. Trust serves as both a catalyst and a safeguard for financial inclusion.

Policy Implications

Strengthen Digital Infrastructure

- **Expand BharatNet and Rural Broadband:** Accelerate the rollout of high-speed internet and reliable electricity in underserved areas, leveraging public-private partnerships.
- **Promote Offline Payment Solutions:** Scale up UPI Lite and SMS/Bluetooth-based payment modes to support low-bandwidth transactions in remote regions.

Enhance Digital Literacy and Financial Education

- **Localized Training Programs:** Implement region-specific digital literacy campaigns using vernacular languages, audio-visual content, and community influencers (teachers, SHG leaders, banking correspondents).
- **Integrate Digital Literacy in School Curricula:** Embed digital payment education in schools and adult education programs to foster early adoption and responsible usage.

Promote Gender-Inclusive Financial Inclusion

- **Targeted Outreach to Women:** Expand programs like PMGDISHA and SooknaPreneur to cover more rural women and elderly. Partner with NGOs and state missions to reach women entrepreneurs and SHGs.

- **Inclusive Product Design:** Develop user-friendly interfaces with local language support, voice navigation, and simplified onboarding for women and non-literate users.

Foster Trust, Security, and Consumer Protection

- **Strengthen Cybersecurity Frameworks:** Enhance enforcement of the IT Act, 2000, and promote awareness of cybersecurity best practices in rural areas.
- **Robust Grievance Redressal:** Establish local customer support centres and accessible grievance mechanisms to build user confidence.
- **Transparent Communication:** Clearly communicate fees, terms, and security features to users, especially women and first-time adopters.

Support Merchant and MSME Adoption

- **Incentivize Merchant Onboarding:** Provide subsidies, tax rebates, and free onboarding support for rural merchants adopting UPI/QR systems.
- **Promote Hybrid Payment Models:** Encourage solutions that integrate cash and digital options, catering to diverse user preferences and infrastructural realities.

Leverage Banking Correspondents and Assisted Digital Services

- **Expand BC and Micro-ATM Networks:** Strengthen the viability and training of banking correspondents, with a focus on female BCs to enhance women's financial inclusion.
- **Assisted Digital Onboarding:** Use phygital (physical + digital) channels and community agents to onboard first-time users and build trust.

Monitor, Evaluate, and Innovate

- **Regular Impact Assessments:** Conduct periodic surveys and impact evaluations to track progress, identify gaps, and inform policy adjustments.
- **Foster Public-Private Partnerships:** Encourage collaboration among government, fintechs, telecom providers, and civil society to innovate and scale digital financial services.

CONCLUSION

India's journey toward financial inclusion has been marked by significant progress, driven by digital innovations and robust policy frameworks. The rise of UPI and the success of schemes like PMJDY, PMGDISHA, and BharatNet underscore the transformative potential of digital payments in rural empowerment. Empirical evidence demonstrates that digital payments have expanded access to financial services, improved savings behavior, facilitated credit access, and empowered women and marginalized groups.

However, the path to universal financial inclusion is fraught with challenges. Persistent gaps in digital literacy, infrastructure, trust, and gender equity must be addressed through targeted, inclusive, and context-sensitive interventions. The experience of states like Kerala and

Maharashtra highlights the importance of robust infrastructure and proactive governance, while the struggles of Bihar and Uttar Pradesh underscore the need for sustained investment and community engagement.

The future of financial inclusion in rural India hinges on a collaborative approach that leverages technology, policy, and grassroots participation. By strengthening digital infrastructure, enhancing literacy, promoting gender-inclusive design, and building trust, India can ensure that the benefits of digital finance reach every corner of its rural heartland. Continued innovation, rigorous monitoring, and adaptive policymaking will be essential to sustain and deepen financial inclusion, paving the way for inclusive and sustainable economic growth.

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