

**IMPACT OF FINTECH ON POVERTY REDUCTION: A STUDY OF
SELECTED SOCIOECONOMIC FACTORS WITH SPECIAL REFERENCE
TO UPI IN INDIA**

A THESIS

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE

OF

MASTER OF ECONOMICS

SUBMITTED BY:

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ACKNOWLEDGEMENTS

I take this opportunity to express my sincere gratitude to everyone who supported me throughout the journey of completing this dissertation. First and foremost, I express my deepest appreciation to my supervisor, Prof. Amit Mookerjee, University School of Management & Entrepreneurship (USME), Delhi Technological University, for his invaluable guidance, critical insights, and continuous encouragement throughout the research process. His expertise in financial inclusion and digital economics greatly shaped the conceptual and empirical dimensions of this study.

I am grateful to the Head of Department and faculty members of USME, DTU, for providing an intellectually stimulating academic environment and access to research resources. I also wish to acknowledge the contributions of researchers and scholars whose published works formed the theoretical foundation of this dissertation. The works of Inoue (2019), Suri and Jack (2016), Barik and Sharma (2019), Gautam et al. (2022), and many others have been instrumental in shaping the intellectual direction of this research.

I am thankful to my family and friends for their unwavering moral support, patience, and encouragement during the course of this research.



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ABSTRACT

Digital financial systems are becoming essential tools to improve financial inclusion and alleviate poverty in developing economies. The Unified Payments Interface (UPI) is also India's flagship digital public good that has revolutionised the payment ecosystem through instant, low cost, bank linked payments which are now accessible for all income and generational groups. In FY 2024–25, UPI has emerged as one of the world's largest real-time payment systems with nearly 185.8 billion transactions valued at ₹260.6 lakh crore. However, the evidence from the micro level that there is any relationship between poverty reduction and intensity of UPI use, and how this relationship occurs is still limited. The thesis examines the link between the use of FinTech or UPI, financial inclusion and the multidimensional poverty outcomes of 400 households in the National Capital Territory (NCT) of Delhi. The data were gathered using a structured household survey questionnaire with socioeconomic profile, UPI usage intensity (5 items), financial inclusion (8 items) and multidimensional poverty and living standards (5 items) through stratified random sampling by generational and income cohort. The analysis used was Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and the Structural Equation Modelling (SEM). The following four hypotheses were tested: (H1) UPI usage intensity positively affects financial inclusion; (H2) financial inclusion has a positive effect on multidimensional household poverty; (H3) financial inclusion positively affects household welfare; and (H4) financial inclusion mediates the relationship of UPI and poverty. The measurement model was reliable, with Cronbach's α values of 0.931 for UPI Usage Intensity, and valid with all Average Variance Extracted (AVE) values > 0.50 . Support for all four structural hypotheses was found. The usage intensity of UPI had a strong positive effect on financial inclusion ($\beta = 0.744$, $p < 0.001$), and financial inclusion significantly reduced multidimensional poverty ($\beta = 0.476$, $p < 0.001$). A direct positive effect of the usage

of UPI on welfare was found ($\beta = 0.268$, $p < 0.001$), and the indirect path through financial inclusion was also significant ($\beta = 0.354$, $p < 0.001$), which confirmed the partial mediation. The results support a usage intensity approach to financial inclusion, showing that the intensity of UPI use yields welfare gains, rather than just access. The thesis ends by proposing policy options such as broadening QR code acceptance in the informal markets, integrating UPI transaction with the formal credit assessment and extending the integration of UPI with Direct Benefit Transfer (DBT) schemes. Technology: UPI, Financial Inclusion, Digital Payments, SEM, Financial Inclusion, Financial Technologies, Village Level Welfare.

Keywords: UPI, FinTech, Financial Inclusion, Multidimensional Poverty, Household Welfare, Digital Payments, SEM, India, Socioeconomic Factors.

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LIST OF SYMBOLS AND ABBREVIATIONS

Abbreviation	Full Form
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
DBT	Direct Benefit Transfer
EFA	Exploratory Factor Analysis
FI	Financial Inclusion
FinTech	Financial Technology
FY	Financial Year
GDP	Gross Domestic Product
GoI	Government of India
HTMT	Heterotrait-Monotrait Ratio
MDP	Multidimensional Poverty
MFI	Micro Finance Institution
MPI	Multidimensional Poverty Index
NCT	National Capital Territory
NPCI	National Payments Corporation of India
P2P	Peer-to-Peer
PMJDY	Pradhan Mantri Jan Dhan Yojana
PLS-SEM	Partial Least Squares – Structural Equation Modelling
QR	Quick Response

Abbreviation	Full Form
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RBI	Reserve Bank of India
SDG	Sustainable Development Goal
SEM	Structural Equation Modelling
UPI	Unified Payments Interface
USME	University School of Management & Entrepreneurship
UII	UPI Usage Intensity
β	Standardized Path Coefficient
ρ_a	Composite Reliability (ρ_a)
ρ_c	Composite Reliability (ρ_c)
α	Cronbach's Alpha

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND CONTEXT

Poverty is one of the most complicated and enduring problems of the developing 21st century. Even though there has been significant macroeconomic development and structural transformation, many groups of people in countries such as India are still not participating in formal economic systems, accessing financial services and are still at risk of income shocks. Over the decades, there have been many studies on the links between finance and poverty, and it is widely recognized in development economics literature that access to formal financial services (FFS) – such as savings, credit, insurance, and payments – is one of the key conditions for sustainable poverty reduction (Inoue, 2019; Duan et al., 2024). In the past in India financial exclusion was attributed to a variety of structural factors: geographic remoteness, inadequate banking infrastructure, high costs for transactions, lack of documentation, and information asymmetry. Households that were engaged in the informal economy for the majority of their income did not have a history of formal finance or could not access credit or risk sharing groups. Consequently, they were left in a situation of financial insecurity, such that one negative event, such as a health crisis, a crop failure, or a loss of employment, could cause a household to fall further behind. In recent years, the ability of Financial Technology (FinTech) to overcome these structural exclusions has gained increasing traction in academic research and policy debates in the past decade. FinTech is a term that encompasses all technological advancements in financial products, services and delivery systems that lower costs, increase access and improve the efficiency of financial intermediation. FinTech platforms can drive access to financial services to underserved populations, like through mobile phones and digital interfaces, bypassing geographic and socioeconomic barriers, unlike traditional banking infrastructure which needs physical branches and in-person interaction. The three gamechangers that have defined India's financial inclusion journey are the Pradhan Mantri Jan Dhan Yojana

(PMJDY), which opened more than 500 million bank accounts, the Aadhaar biometric identification system, which added a new layer of digital identity to facilitate seamless authentication for financial transactions, and the Unified Payments Interface (UPI), which turned these institutional foundations into an easy-to-use, interoperable, and widely used digital payment system. The National Payments Corporation of India (NPCI) developed UPI, a unique form of digital public infrastructure, and launched it in 2016. It provides seamless and real-time settlement, spans all the participating banks or payment service providers, has minimal transaction fees and offers an intuitive QR-code based interface that is accessible to a wide range of income, education and generational groups, including Generation Z (born 1997-2012 – digitally native) through to Millennials (born 1981-1996), Generation X (born 1965-1980) and even older Baby Boomers (born before 1965). This generational inclusivity is a unique characteristic of the design of UPI, which has not been widely studied in the academic literature. UPI is now the preferred mode of digital payment in India, and one of the largest real-time payment systems in the world, with close to 185.8 billion transactions worth approximately ₹260.6 lakh crore by FY 2024-25. This thesis aims to answer the important empirical question: Does UPI usage really result in household-level poverty reduction, and in which way? The study is guided by a primary household survey which covers the respondent's generational cohort, gender, education level, sources of income (such as salaried employment, business, casual labour, agriculture, pension/government transfer, remittances and others), monthly income, use of UPI, financial inclusion, and multidimensional poverty and living standards.

1.2 THE INDIAN DIGITAL PAYMENT ECOSYSTEM

The digital payment ecosystem in India has undergone a series of institutional, regulatory and technological changes, all of which have shaped the way transactions are done across all socio-economic groups and generations.

1.2.1 Pre-UPI Digital Payment Landscape

Before the introduction of UPI, digital payment systems were not consolidated in India and were not available for the low-income group people. Net banking

necessities web connectivity and familiarity with digital systems. However, mobile wallets like Paytm, MobiKwik and Freecharge got momentum in the early 2010s, but were closed-loop and lacked interoperability. Access to credit and debit cards continued to be skewed towards higher educated and affluent city dwellers. Until 2015, cash was the preferred means of payment for more than 90 per cent of consumer transactions in value terms. Digital payment adoption surged in November 2016 when the government of India announced the demonetization of high denomination currency notes, prompting households and merchants to find options to the new notes. Digital payment adoption also spurted in November 2016, following the demonetization of high denomination currency notes, which forced households and merchants to find alternatives to the new currency notes. This allowed UPI's launch to quickly get traction among the various generations.

1.2.2 Architecture and Features of UPI

The UPI has been designed as an open and interoperable payment system on the Immediate Payment Service (IMPS) platform by NPCI. UPI offers unique features which render it a suitable instrument for financial inclusion for a different income and age category:

Interoperability: UPI follows a single interface to operate on all banks and payment service providers. Any user who registers on any UPI application can make any transaction with other user irrespective of the application or bank they use.

Virtual Payment Address (VPA): Each individual UPI user gets a unique Virtual Payment Address (VPA) like name@bankname which helps in avoiding the sharing of sensitive bank account numbers and helps to overcome the information asymmetry.

Real-Time Settlement: Transactions settled in real time (24/7, including public holidays), as directly observed in the financial inclusion measurement instrument used in this study ("I can do financial transactions and use formal markets or services through the internet 24/7, including public holidays").

Low transaction cost: UPI transactions are either free or involve low transactions costs, which makes them economical for small dollar transactions that are conducted by the low-income segments of income groups ranging from below ₹10,000 per month to above ₹60,000 per month.

QR Code based payment interface: It lowers the hurdles for merchants and consumers with a lower level of digital literacy, allowing for a QR code that is static as well; without having to invest in point-of-sale hardware, merchants can accept payments.

Trust and Security: The survey instrument employed in this study explicitly measures trust in the UPI-based platform as a component of usage intensity, "I believe the UPI-based platform is secure to conduct payments using my money.

Multi-Purpose Functionality: UPI provides peer-to-peer (P2P) transfer, merchant payment, bill payments, and government-to-citizen Direct Benefit Transfer (DBT) receipts; the latter is the most important function for households with income that is received as pension or government transfers (as captured in Section C of the survey questionnaire).

1.2.3 UPI's Growth Trajectory

UPI has been growing at an exponential rate since its launch in 2016. The transaction volume and value for the five financial years (FY) FY 2020-21, FY 2021-22, FY 2022-23, FY 2023-24, and FY 2024-25 are shown in Table 1.1.

Table 1.1: UPI Transaction Volume and Value: FY 2020–21 to FY 2024–25

Financial Year	Transaction Volume (Billion)	Transaction Value (Lakh Crore)
FY 2020-21	22.3	41.0
FY 2021-22	46.0	84.2
FY 2022-23	83.7	139.0
FY 2023-24	131.0	199.9

FY 2024-25	185.8	260.6
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Source: NPCI Annual Reports and RBI Data (2025)

1.2.4 UPI, Income Sources, and Household Financial Behaviour

One special aspect of this research is that it focuses as well on the composition of household income, rather than just the level of income. The survey collects the percentage of household income from seven sources: salaried work, business/self-employment, casual labour, agriculture, pension/ government transfer, remittances and others. This granular decomposition of income is of theoretical importance as the welfare impacts of UPI are likely to differ across income sources of a household. Households that rely on casual labour and/or agricultural work, traditionally characterized as informal, irregular, and cash-based, and more likely to grapple with different types of welfare pathways mediated by UPI than salaried households with more regular patterns of digital income. One of the most direct linkages between the formal financial system and the lower income households is pension and government transfers received by households, for which UPI is the channel. Likewise, households receiving remittance incomes could also become a channel for remittances within the country, and UPI can lead to savings for these households since there is no need for informal transfer fee.

1.3 STATEMENT OF THE PROBLEM

Although UPI has gained significant traction and policy attention, there is limited empirical micro-level evidence of the impact of UPI on household poverty and the pathways by which this impact derives. The current literature has the following shortcomings which the present study addresses.

First, most evidence relies on macro-level, data state-level or country-level indicators of financial depth, digital payment penetration and poverty rates. These types of aggregate analyses do not reflect the heterogeneity of the household level in terms of usage patterns, income composition and welfare outcomes.

Second, the current understanding of financial inclusion is mostly defined as access rather than quality and depth of financial interactions. Barik and Sharma (2019) have

demonstrated that the ownership of an account with PMJDY has not been able to generate any significant financial interaction, especially among income groups and generations.

Third, previous research on UPI has focused on determinants of adoption and effects of digital literacy, not on welfare or poverty effects. The household survey employed in this study is a multidimensional survey of intensity of use which goes well beyond a simple binary measure of adoption and includes not only whether the respondents use UPI, but the frequency of daily use, ease of access, time saving, substitution of cash with UPI, and confidence in UPI platforms.

Fourth, poverty is multidimensional, and this dimension has not been sufficiently captured in the research of poverty in the context of FinTech. Poverty is not just about income, it refers to food and nutritional security, housing conditions, access to health care, receipt of government support, and financial security compared to previous years. The survey instrument used in this study clearly captures all five of these dimensions with the section on Multidimensional Poverty and Living Standards, making it the perfect instrument to measure the poverty-reducing impact of UPI comprehensively.

Fifth, digital financial adoption has been mostly ignored along the generational axis. The adoption and the trust and welfare implications of UPI usage may vary across respondents based on their generations (Gen Z vs. Boomer). This generational diversity highlighted by the survey's demographic section is an important contextual part of the analysis.

1.4 RESEARCH OBJECTIVES

Based on the problem statement, this study is guided by the following specific objectives:

To examine the socioeconomic profile, generational composition, and income structure of UPI-using households in the NCT of Delhi.

To assess the impact of UPI usage intensity measured across frequency, accessibility, time-efficiency, cash-substitution, and trust dimensions on the level of financial inclusion experienced by sample households.

To evaluate the effect of financial inclusion measured across credit access, insurance, savings, cash-flow management, digital financial access, verifiable records, service registration, and 24/7 access dimensions on multidimensional household poverty and living standards.

To determine the direct effect of UPI usage intensity on household welfare outcomes across food security, housing, healthcare, government support, and financial security dimensions.

To test whether financial inclusion mediates the relationship between UPI usage intensity and multidimensional poverty reduction.

To derive evidence-based policy implications for India's digital finance and poverty alleviation agenda.

1.5 RESEARCH HYPOTHESES

The following four hypotheses, grounded in the conceptual framework and theoretical literature, guide the empirical analysis:

H1: There is a significant positive relationship between the intensity of UPI usage and the level of financial inclusion among sample households.

H2: Financial inclusion has a significant positive relationship with improvements in household multidimensional poverty outcomes and living standards.

H3: The intensity of UPI usage has a significant direct positive effect on household welfare outcomes, independent of the financial inclusion pathway.

H4: Financial inclusion significantly mediates the relationship between UPI usage intensity and household multidimensional poverty outcomes.

1.6 SIGNIFICANCE OF THE STUDY

Conceptual relevance: The study contributes to the conceptualization of financial inclusion by separating the concept into five behavioural components frequency, accessibility, time efficiency, cash substitution and trust and by proposing a mediation role of financial inclusion instead of being an end goal.

Empirical Significance: The study provides unique and valuable micro-level information from a primary household survey in Delhi, based on a questionnaire that includes the multidimensional poverty dimensions, multi-source incomes and the generation cohort, aspects that are individually and collectively significant in the UPI-poverty literature.

This research offers granular insights and evidence to inform policy decisions in India on which income groups, generations, and channels of financial inclusion have the highest poverty reducing returns from UPI engagement, at a time when India is trying to harness its digital infrastructure for SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities).

1.7 SCOPE AND LIMITATIONS

The study is geographically confined to the NCT of Delhi, which limits generalizability to rural and semi-urban India. Delhi's above-average digital infrastructure, smartphone penetration, and banking density mean that estimated effects may represent an upper bound relative to less connected contexts.

The cross-sectional design precludes strict causal inference and the tracking of welfare trajectories over time. Self-reported Likert-scale data are subject to social desirability bias and recall limitations. The income source decomposition is based on percentage estimates by respondents, which may involve approximation.

1.8 ORGANISATION OF THE THESIS

The study is geographically restricted to the NCT of Delhi and hence the findings are not generalizable to rural and semi-urban India. Quantitative impact is estimated and may be a maximum relative to less connected contexts as is the case in Delhi's

above-average digital infrastructure, smartphone penetration, and banking density. The data are cross sectional, making true causal inferences and tracking welfare trajectories over time difficult. Social desirability bias and recall limitations exist for self-reported Likert scale data. Income source decomposition refers to respondents' percentage estimates and can be approximated. The thesis is organised as follows: The introduction, background, problem statement, objectives, hypotheses and significance are introduced in Chapter 1. Chapter 2 reviews the literature, and conceptualizes the framework. The research methodology, survey design, sampling and analytical framework is described in chapter 3. The data analysis and results, ranging from descriptive statistics to estimation of the structural model, are presented in Chapter 4. The results are discussed in chapter 5 and elaboration of theoretical and policy implications is elaborated. Chapter 6 is the conclusion of the thesis with the findings, conclusion, limitations, future work directions and impact on the society.

CHAPTER 2

LITERATURE REVIEW

2.1 FINANCIAL INCLUSION AND POVERTY: THEORETICAL PERSPECTIVES

Financial inclusion and poverty alleviation have been a core issue in development economics for decades. Access to and utilization of affordable and appropriate formal financial services by all population segments (financial inclusion in a broad sense) is acknowledged as a fundamental element of human development and as a vital means for poverty alleviation. The theoretical foundations behind this relationship are based on overarching concepts. According to the financial intermediation theory, efficient transfer of savings to productive investment in the formal financial sector lowers the cost of capital, increases investment opportunities and drives economic growth, which if widespread, leads to improvements in incomes for the lower income groups. The importance of financial institutions for facilitating productive economic activity was first clearly stated by Schumpeter (1911), and further formalized by McKinnon (1973) and Shaw (1973) in their studies on financial repression and financial liberalization in developing economies. Amartya Sen's capability approach (1999) offers an alternative perspective on financial inclusion, not just as a driver of economic development, but as a facilitator of individual capabilities and freedoms. According to this approach, financial service access increases the scope of the substantive freedom of poor households, as it allows them to smooth out their consumption, invest in health and education, buffer against risks and engage in economic life in a more empowered manner. Financial exclusion reinforces cycles of poverty through the ability deprivation. This concept is very relevant for the multi-dimensional poverty measurement approach that has been applied in this study, as it takes into account the different living standards (food and nutrition security, housing, healthcare, government support and financial security) all of which relate to fundamental capabilities as described in Sen's approach. Financial inclusion is seen as a poverty reduction tool with a microeconomic argument in the credit market

imperfection framework. The lack of access to formal credit by poor households is not caused by the absence of productive investment opportunities, but rather by the collateral requirements and high administrative costs of making small loans and by the mismatch of information between the lender and borrower (Stiglitz & Weiss, 1981). Financial exclusion then means that productive investment is denied and that poor households are compelled to secure credit from informal providers at very high rates of interest, thus leading to continued indebtedness and vulnerability. The financial inclusion measure in the survey is an explicit probe into credit access ("I can access loans or credit from banks or registered financial organizations and apps") and whether UPI-mediated financial engagement is helping households to overcome this barrier. For the case of India, Inoue (2019) in a pioneering state level panel analysis found that the opening up of public sector banking infrastructure was important in reducing poverty rates at the state level, highlighting the importance of the formal financial infrastructure for poverty reduction. Barik and Sharma (2019) reported that the ownership of bank accounts increased significantly under PMJDY but also identified that there were inequalities in usage of bank accounts across various income, gender and education groups, reinforcing the distinction between access and usage that is core to this study's concept of usage-intensity. Demirgüç-Kunt et al. (2018) leveraged Global Findex data to show that account ownership correlates with positive outcomes in terms of saving behaviour and increased resilience to financial shocks among low-income households at the global level. The financial inclusion questions in the survey reflect these types of behaviours: "My household has been able to save money regularly to meet future needs and benefit from those savings" and "I can manage the cash-flow needs for my household or business because of financial support from formal organisations or financial applications. The theoretical-empirical correspondence between the survey instrument and financial inclusion measures enhances the construct validity of the study's results.

2.2 FINTECH AND FINANCIAL INCLUSION IN DEVELOPING ECONOMIES

With the rise of FinTech as a disruptive force, new avenues are created for financial inclusion in developing economies, in terms of lower transaction costs, greater access and learning-by-doing. FinTech's welfare impacts have been documented in various settings in the developing economy, making it possible to measure the impact of UPI. The basic empirical evidence is from mobile money in Sub-Saharan Africa. Suri and Jack (2016) drew on the seminal study conducted in Kenya on M-Pesa to estimate that in 6 years the mobile money service lifted some 2 percent of Kenyans (around 194,000 households) out of poverty. The poverty reducing effect was most clearly manifested in the female headed households, as indicated by the increase in savings and occupational mobility channels, channels which resonate closely with the welfare dimensions measured by the questionnaire items used in this study in Section F which address food security, economic improvement and financial security compared to the previous. In India, Kandpal and Mehrotra (2019) explored the impact of FinTech on financial inclusion and found that while the low cost of transactions, ease of use, and the existence of smart phones create an environment conducive to financial inclusion, other factors such as lack of digital literacy, loss of trust, and informal banking practices pose a challenge. Their analysis pointed out that it was not just adoption but active and sustained use that was critical for the transformative potential of FinTech. It is directly examined in the present study in its use of UPI usage intensity scale that measures sustained behavioural engagement by using the items like: Daily frequency (I frequently use UPI for my daily financial transactions), Cash substitution (I rely more on UPI than cash to make payments) and Trust (I trust UPI based platforms to handle my money securely). Based on the survey data in India, Asif et al. (2023) carried out the structural equation modelling, and they have found that there are significant positive influences of the use of FinTech on the dimensions of financial inclusion such as usability and trust. They only did so for adoption behaviour, however, and did not analyse household welfare or poverty outcomes. The current research builds on their study by explicitly modelling poverty as the endogenously determined outcome variable and financial

inclusion as the intervening variable. Digital finance in China is another comparative benchmark. Duan et al. (2024) discovered that digital finance contributed to a decline in the level of multidimensional poverty in urban China by facilitating access to credit for entrepreneurs, consumption smoothing, and increasing the participation in online economic activities. The multidimensional approach that their study uses is very similar to the one that is used here, which looks at poverty in the context of food security, housing, health, government assistance, and financial security. The study by Duvendack et al. (2023) focused on how inclusive India's digital financial revolution was and identified that although the overall indicators of increasing digital payments in the country had improved significantly, less educated and lower income women had benefited less. This finding is directly relevant to the present study because the survey was based on a demographic stratification variable of gender and sought to examine whether there were equalities or inequalities in the poverty reducing benefits of UPI usage among male and female respondents. Based on their cross-country analysis, Loko and Yang showed that there was a positive correlation between the country level development of FinTech and female labour force participation rates. In a study from 2021, Chen et al. found that women have lower digital financial engagement than men, as a result of a lack of trust and women having fewer smartphones. The present survey instrument deals with gender as a binary demographic variable which allows an examination of this gender dimension in the specific context of UPI-poverty linkages in Delhi. In a field study on migrant remittances, Nakasone et al. (2024) identified FinTech welfare benefits as being mediated by the ability of users to handle digital information. The respondent sample for the present study covers just one of the seven income sources included in Section C of the survey questionnaire, remittance income, for which their finding is relevant. UPI's benefit to remittance-receiving households as a domestic transfer channel that allows for instant remittance receipts without fee from workers in other cities is a particular welfare pathway which can complement the overall financial inclusion pathway.

2.3 UPI AND DIGITAL PUBLIC INFRASTRUCTURE IN INDIA

UPI is a qualitatively new form of digital public infrastructure worth discussing. While the commercial platforms are mostly proprietary, geared towards profits, UPI is an open, interoperable, public good infrastructure – a digital highway that can be used by a wide variety of financial services, which can be built and offered to users from different income groups, educational levels and generations. One of the few empirical studies focused on UPI and the developmental effects of UPI was carried out by Gautam et al., (2022). They used PLS-SEM for data collected from rural and semi-urban Maharashtra and observed that increased usage of UPI led to an increase in financial literacy among the users, which further led to an improvement in financial inclusion and broader economic development outcomes with trust and financial stability as mediating variables. The present study explicitly measured trust, as an important theoretical dimension, in the UPI usage intensity scale, such as "I trust UPI-based platforms to handle my money securely", so as to establish a more precise operationalization of the theoretically important dimension of trust, which was also found by their study to mediate the relationship between UPI and inclusion. Maripally and Bridwell (2017) suggested that the infrastructure of banks and the operation of Direct Benefit Transfer (DBT) systems can help to improve the delivery of welfare without leakage in government programmes. There are two ways of capturing this welfare delivery mechanism in the present study: first, as a proportion of household income, asking about the pension/government transfer source (item 1 in Section C) and second, as a poverty outcome, asking about the government support program (item 6 in Section F). This survey design thus allows for the study of how are households with government transfers more likely to be supported by financial inclusion through UPI. The role of UPI in the DBT ecosystem deserves particular emphasis. When beneficiaries access welfare transfers through UPI-linked bank accounts, they generate verifiable digital transaction histories that can serve as inputs for formal credit assessment. The survey's financial inclusion item "I am able to provide verifiable financial records of my earnings and transactions when required by any organization" directly operationalizes this mechanism, capturing whether UPI

usage has translated into the kind of formal financial identity that enables further formal financial engagement and, by extension, poverty reduction.

The international expansion of UPI with real-time payment linkages established in Singapore, UAE, Bhutan, Nepal, Mauritius, France, and Sri Lanka, reflects the growing recognition of UPI as a replicable model of inclusive digital payment infrastructure. This international applicability underscores the broader policy relevance of the present study's findings beyond the Indian context.

2.4 SOCIOECONOMIC AND GENERATIONAL DETERMINANTS OF FINTECH ADOPTION

Understanding who adopts and intensively uses FinTech platforms is as important as understanding their aggregate welfare effects. A growing literature has examined the socioeconomic and demographic determinants of digital payment adoption and usage, with findings that directly inform the present study's analytical design. Generational cohort is an underexplored but theoretically important dimension of FinTech adoption. The survey's generational categorization, Gen Z (born 1997–2012), Millennials (born 1981–1996), Gen X (born 1965–1980), and Boomers (born before 1965) reflects a theoretically grounded expectation that digital nativity, technological comfort, and smartphone fluency vary systematically across these cohorts. Gen Z respondents, who have grown up with smartphones and digital interfaces as ubiquitous tools, are likely to use UPI with greater frequency and for a wider range of purposes than Boomer respondents, who may have adopted UPI more recently and face higher adaptation costs. This generational heterogeneity in usage intensity has implications for the distributional pattern of UPI's poverty-reducing effects across age groups. Income level and income source composition jointly shape FinTech adoption and welfare impacts. The present study's income source decomposition capturing percentages from salaried employment, business/self-employment, casual labour, agriculture, pension/government transfers, remittances, and others enables a more nuanced analysis of how income informality and diversity interact with UPI usage and financial inclusion. Households with predominantly

salaried income are likely to have more regular digital payment exposure and stronger formal financial connections, while households dependent on casual labour or agriculture may use UPI primarily for merchant payments or DBT receipts, with different implications for financial inclusion outcomes.

Education is consistently identified as a predictor of digital financial service adoption. Higher education levels are associated with greater comfort with digital interfaces, higher trust in institutional financial systems, and better awareness of available financial products the last of which is captured in the financial inclusion item "I am able to provide verifiable financial records of my earnings and transactions when required by any organization." The present survey's seven-category education scale from no schooling through postgraduate enables examination of education gradients in UPI usage and financial inclusion outcomes.

Gender is a particularly salient dimension of digital financial exclusion, as documented by Chen et al. (2021) and Duvendack et al. (2023). The present survey's binary gender variable (male/female) enables the examination of gender differentials in UPI usage intensity and in the poverty-reducing effects of financial inclusion, contributing to the evidence base on the gendered distributional effects of digital finance in India.

Trust in digital financial systems is a behavioural determinant that cuts across income, education, and generational groups. Asif et al. (2023) found that perceived security was among the strongest predictors of FinTech adoption in India. The present study operationalizes trust as a core dimension of UPI usage intensity rather than treating it as an external determinant, consistent with the study's focus on the behavioural quality of digital payment engagement rather than mere adoption.

2.5 DIRECT BENEFIT TRANSFERS, INCOME SOURCES, AND WELFARE DELIVERY

The Direct Benefit Transfer (DBT) program, launched in 2013, represents one of the largest applications of digital financial infrastructure for welfare delivery globally. DBT routes subsidies, pensions, scholarships, and welfare benefits directly to

Aadhaar-linked bank accounts, eliminating intermediary layers and reducing leakage and corruption.

The integration of UPI with DBT has created a powerful synergy for the specific income segment captured by the survey's income source question households deriving income from "pension/government transfers." For these households, UPI provides not merely a payment channel but a formal financial footprint: regular DBT receipts through UPI-linked accounts generate verifiable transaction records that can support credit applications and insurance enrolment. The poverty outcome item "Government support programs have improved my household's living conditions" (Section F, item 4) directly captures whether this DBT-UPI integration is translating into household welfare improvement. The income source decomposition also enables an examination of whether households with casual labour income characteristically informal, irregular, and difficult to document benefit from UPI's verifiable transaction record function. Workers in the informal economy who adopt UPI for daily transactions thereby generate a digital income history that can substitute for formal income documentation in credit assessment, representing a formal sector bridge that cash-based informal transactions cannot provide.

Remittance-receiving households (captured as a separate income source category) face a specific financial inclusion challenge: domestic remittances through informal channels involve significant fees and delays, while UPI enables instant, fee-free domestic transfers. For households dependent on remittances, common among migrant worker families in Delhi UPI's adoption represents a direct welfare improvement through reduced remittance costs and faster fund access, independent of any financial deepening effects.

2.6 GENDER, EDUCATION, AND DIGITAL FINANCE OUTCOMES

The distributional effects of digital financial expansion across gender and education groups are central to an inclusive development agenda. The survey's demographic design capturing both gender and a seven-level education scale enables examination of these distributional effects in the Delhi context.

Suri and Jack (2016) found that the poverty-reducing effects of M-Pesa in Kenya were significantly stronger for female-headed households, operating through enhanced savings and occupational mobility. In the Indian context, however, the gender gap in financial inclusion remains substantial despite PMJDY's expansion of account ownership. Duvendack et al. (2023) found that less-educated women derived smaller benefits from India's digital financial expansion, a finding that underscores the importance of jointly examining gender and education as distributional dimensions.

The present survey's Section F poverty outcome item on food security ("My household has sufficient food and nutrition throughout the year") is particularly relevant in the gender context: food insecurity in low-income Indian households disproportionately affects women and children, and improvements in household financial security enabled by UPI-mediated financial inclusion may have gender-differentiated welfare implications.

Education is an important intermediary between the gender and digital finance relationship. Women who have a higher education scale in the survey have a higher likelihood to own smartphones, confidently use digital payment interfaces, and know about formal financial products. This dual burden of low educational attainment for women to obtain welfare benefits from UPI is a research challenge as well as a policy issue that is well captured by the present study's demographic design.

2.7 RESEARCH GAP AND CONCEPTUAL FRAMEWORK

Gap 1: The absence of household-level empirical evidence on UPI usage intensity measured across multiple behavioural dimensions (frequency, accessibility, time efficiency, cash substitution, trust) as a determinant of poverty outcomes in India.

Gap 2: The failure to model financial inclusion measured comprehensively across credit, insurance, savings, cash-flow management, digital access, verifiable records, service registration, and 24/7 transactional access, explicitly as a mediating mechanism between UPI usage and poverty.

Gap 3: The lack of generational and income-source analysis in UPI-poverty research, which limits understanding of distributional effects across age cohorts and livelihood types.

Gap 4: The predominance of income-based poverty measures in FinTech research, compared to the multidimensional framework capturing food security, housing, healthcare, government support, and financial security used in this study.

The conceptual model of this study considered the use of UPI as the exogenous variable, the financial inclusion as the mediating variable, and the endogenous variable of primary interest as MPI and LPS. These relationships are moderated by socioeconomic control variables: generational cohort, gender, education, monthly income, and type of income source. The conceptual framework of this study (see Fig. 2.1) shows the theoretical links between the three main constructs: UPI Usage Intensity (UUI), Financial Inclusion (FI) and Multidimensional Poverty and Living Standards (MDP). The framework is based on the usage-intensity paradigm, which suggests that it is not only access to the digital financial tools but the intensity, extent, and frequency of the usage that affect the welfare outcomes of a household. Additionally, five socioeconomic control variables (generational cohort, gender, education level, monthly income, and the composition of income sources) are included as moderating factors because of the sample population's heterogeneity.

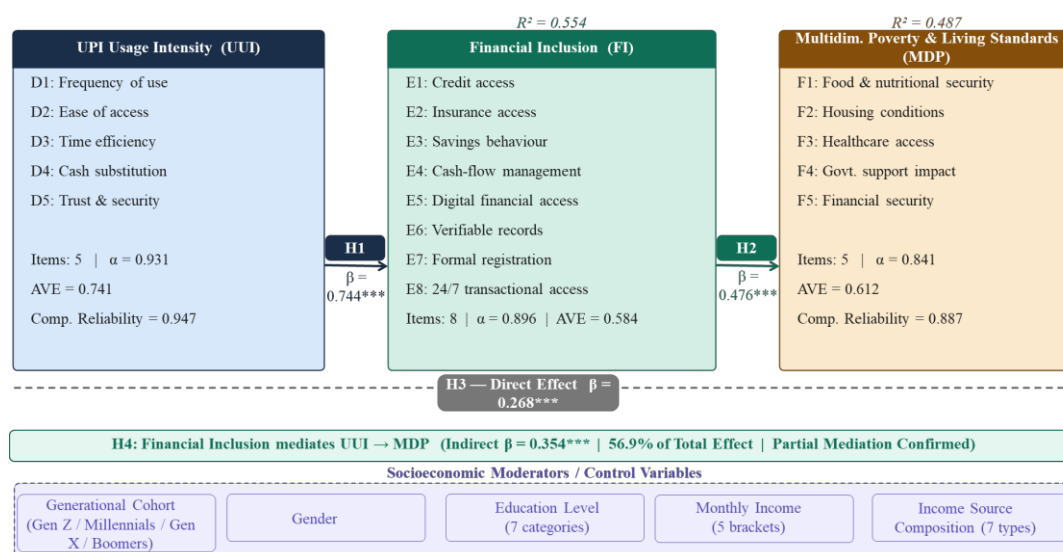


Fig. 2.1: Conceptual Framework: UPI Usage Intensity, Financial Inclusion, and Multidimensional Poverty and Living Standards

The conceptual framework places UPI Usage Intensity as the main exogenous variable with five survey items in Section D of the questionnaire as its measure as shown in Fig. 2.1. The five items are designed to measure the frequency of UPI use (D1), the ease of access to UPI (D2), time efficiency of the UPI (D3), cash substitution behaviour (D4), and trust in UPI platforms (D5). This construct is reliable with a Cronbach's alpha of 0.931 and Average Variance Extracted (AVE) of 0.741, which are both greater than the recommended value of 0.70 and 0.50, respectively. Financial Inclusion is conceived as the mediator variable which was measured using 8 items in the questionnaire in section E. The items collectively reflect the depth and the quality of the formal financial engagement, including the availability of formal credit (E1), insurance coverage (E2), regular savings behaviour (E3), cash-flow management through formal support (E4), improved access to digital financial resources (E5), the capacity to maintain verifiable financial records (E6), ease of formal service registration (E7), and capacity to make financial transactions round the clock (E8). The Cronbach's alpha and AVE of this construct were 0.896 and 0.584, respectively, indicating good reliability and convergent validity. Multidimensional Poverty and Living Standards is treated as the most important endogenous variable shown by means of five questions from Section F of the questionnaire. They reflect household welfare in five areas: food security and nutrition (F1), housing (F2), health care without excessive financial burden (F3), government welfare programs and their impact on household welfare (F4), and financial security compared to the past (F5). Cronbach's alpha and AVE for this construct were 0.841 and 0.612 respectively. The framework proposes four scenarios: Based on this framework, four hypothetical relationships are proposed: Here, the first hypothesis H1 assumes that there is a significant positive association between UPI Usage Intensity and Financial Inclusion, and as the households use UPI more intensely on the five behavioural dimensions, they become more formally financially included. Second, according to Hypothesis H2, there is a causal link between Financial Inclusion and meaningful improvement in poverty outcomes and living

standards of the household. Third, UPI Usage Intensity is also directly positively associated with household welfare, which is mediated by other channels like efficiency gains in transactions, facilitation of domestic remittance, and access to digital markets, as hypothesized by Hypothesis H3. Finally, and most critical, Hypothesis H4 posits that Financial Inclusion is an important and significant mediator between the use of UPI and the benefits to household welfare, as the main pathway through which intensive UPI usage brings welfare gains to households. Control variables shown at the top of the framework (generational cohort, gender, education, monthly income, and income source composition) are included to control for socioeconomic diversity of the sample.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

This study was conducted using a quantitative approach and cross-sectional research design with primary data obtained through a household survey. The quantitative approach is appropriate because the research objective involves aspects that could be quantified and the research model involves the testing of causal relationships that have been thoroughly sound in statistics. The research is explanatory rather than descriptive, going beyond merely explaining the dynamics of the use of UPI to understand how the more or less intensity of use leads to welfare gains of multiple dimensions, with financial inclusion acting as a mediator. This study has a positivist epistemological approach which is supported by the fact that the study used the hypothesis-testing method. The structured questionnaire instrument, systematic sampling and statistical analysis will all produce evidence which can be judged against accepted criteria for reliability and validity.

3.2 STUDY AREA AND POPULATION

As the study is conducted in the NCT of Delhi, it has diverse income groups and ranges from affluent urban professional to government employees who are on the payroll, informal workers, daily wage labourers, domestic workers, and migrant population, which makes it an ideal area where the effect of the use of UPIs can be studied among different groups, income levels, and generations. The target population is the four generations, Gen Z (1997-2012), Millennials (1981-1996), Gen X (1965-1980) and Boomers (before 1965), who are household members who have used UPI for financial transactions within six months of the survey.

3.3 SAMPLING DESIGN

For the primary survey 400 households were selected using a stratified random sampling method. Stratification was done for the two major dimensions: generational cohort (as defined in Section B of the questionnaire) and income level (as defined in Section C of the questionnaire Question 5, 5 income brackets, ranging from less than ₹10,000 per month to more than ₹60,000 per month). Purposive selection of localities with an established UPI usage was followed by random selection of households within localities to minimise selection bias within each stratum.

Table 3.1: Sample Distribution by Generation and Income Stratum

Generation	Income Below 10k	₹10K- ₹20K	₹20K- ₹40K	₹40K- ₹60K	Above ₹60K	Total
Gen Z (1997-2012)	10	15	20	12	8	65
Millennials (1981-1996)	18	28	38	24	14	122
Gen X (1965-1980)	22	32	40	28	16	138
Boomers (Before 1965)	20	20	18	10	7	75
Total	70	95	116	74	45	400

The overrepresentation of Gen X and Millennials reflects their dominant share of the economically active, UPI-using adult population in Delhi. The inclusion of both Gen Z and Boomer respondents enables generational comparison of UPI usage intensity and welfare outcomes.

3.4 DATA COLLECTION INSTRUMENT

The Household Survey Questionnaire, which is reproduced in Appendix-I, is divided into seven sections, and the data was collected by developing the questionnaire for this study.

Administrative and Geographic Information: Survey ID, Date, Place of Survey (for administrative tracking and geographic analysis).

Section B: Basic Demographic Information: Three questions capturing the respondent's generational cohort (Gen Z / Millennials / Gen X / Boomers), gender (Male / Female), and highest level of education completed (seven categories from no schooling to post graduate and above).

Household Economic Status: Two questions on (i) the percentage of annual household income from seven sources such as salaried work, business/self-employment, casual labour, agriculture, pension/government transfers, remittances, and others and (ii) approximate monthly household income for five categories ranging from below ₹10,000 to above ₹60,000.

Section D: FinTech / UPI Usage (5 items; Likert 1–5): Five items that measure the UPI Usage Intensity construct in terms of frequency, accessibility, time efficiency, cash substitution, and trust.

Section E: Financial Inclusion (8 items, Likert 1–5): Eight items to measure the Financial Inclusion construct in terms of credit access, insurance access, savings behaviour, cash-flow management, digital financial access, verifiable records provision, formal service registration, and 24/7 transactional access.

Five items in the construct of Multidimensional Poverty and Living Standards, on the dimensions of food and nutritional security, housing condition, access to health care, impact of government support programs, and improvement of financial security.

Section G: End of Survey: Enumerator and Respondent signature space for data quality assurance. Trained field enumerators interviewed the respondents using an interview mode questionnaire. It was prepared and translated into Hindi. The main

survey was preceded by a pilot test, which confirmed clarity and internal consistency with 40 households.

3.5 MEASUREMENT OF VARIABLES

3.5.1 UPI Usage Intensity (UII): Section D

UPI Usage Intensity was measured as a reflective latent variable with five items directly scaled from the items in Section D of the survey. The items reflect five theoretically different aspects of digital payment engagement that were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 3.2: Section D: UPI Usage Intensity: Measurement Items

Item Code	Survey Statement	Dimension Captured
D1	I frequently use UPI for my daily financial transactions.	Frequency of use
D2	UPI is easy for me to access and use for payments and transfers.	Ease of access
D3	Using UPI reduces the time and effort required for financial transactions.	Time and effort efficiency
D4	I rely more on UPI than cash for making payments.	Cash substitution
D5	I trust UPI-based platforms to handle my money securely.	Trust and security

The five-item structure covers not only behavioural engagement with the UPI (D1 and D4) but also the perceived functional and affective aspects of UPI engagement (D2, D3, and D5), and was a more comprehensive operationalisation of UPI usage intensity than that found in past studies that used one-item frequency measures.

3.5.2 Financial Inclusion (FI): Section E

Financial Inclusion was defined as an eight-item reflective latent construct, which was directly based on the items in Section E of the survey. The items reflect eight separate aspects of formal financial sector involvement, on a scale of 1–5 Likert scale.

Table 3.3: Section E: Financial Inclusion: Measurement Items

Item Code	Survey Statement	Dimension Captured
E1	I can access loans or credit from banks or registered financial organizations and apps.	Formal credit access
E2	I have access to insurance policies (health, life, property, goods, business) through banks or similar organizations.	Insurance access
E3	My household is able to save money regularly to meet future needs and benefit from those savings.	Savings behaviour
E4	I can manage household or business cash-flow needs because of financial support from formal organizations or apps.	Cash-flow management
E5	Digital financial services have improved my access to formal financial resources.	Digital financial access
E6	I am able to provide verifiable financial records of my earnings and transactions when required by any organization.	Verifiable financial records
E7	I can easily register for formal financial services or businesses when required.	Formal service registration
E8	I can carry out financial transactions 24/7 and access markets or services online through	24/7 transactional

	formal platforms.	access
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The Financial Inclusion construct consists of eight items reflecting the formal financial engagement in line with the multidimensional conceptualisations of financial inclusion in the academic literature (Demirgüç-Kunt et al., 2018; Inoue, 2019), but anchored in the specific institutional and digital context of the UPI-integrated financial services in India.

3.5.3 Multidimensional Poverty and Living Standards (MDP): Section F

The five items in Section F of the survey were used directly as indicators of Multidimensional Poverty and Living Standards and served as a reflective latent construct. This construct is scored on a 1–5 Likert scale with higher scores denoting better living standards and a lesser multidimensional poverty.

**Table 3.4: Section F: Multidimensional Poverty & Living Standards:
Measurement Items**

Item Code	Survey Statement	Poverty Dimension
F1	My household has sufficient food and nutrition throughout the year.	Food and nutritional security
F2	My housing conditions meet basic living standards.	Housing conditions
F3	I can access healthcare without major financial difficulty.	Healthcare access and affordability
F4	Government support programs have improved my household's living conditions.	Government welfare delivery
F5	My household is financially more secure than in the past.	Overall financial security trajectory

The instrument consists of five indicators, which reflect the four most widely recognised dimensions of the Multidimensional Poverty Index (nutrition, housing,

health, living standards) and a fifth (financial security trajectory), reflecting the dynamics of welfare improvement encapsulated in the study's causal model. Notably, the survey's data on income component F4 (government support program impact) directly links the survey data on income sources with the welfare outcomes, allowing analysis of whether DBT-related UPI engagement results in welfare gains that can be measured as a separate dimension in the poverty measure.

Table 3.5: Operationalization and Coding of All Constructs

Construct	Section	Items	Scale	Coding
UPI Usage Intensity (UII)	D	D1-D5	Likert 1–5	Higher score = greater usage intensity
Financial Inclusion (FI)	E	E1-E8	Likert 1–5	Higher score = greater financial inclusion
Multidimensional Poverty & Living Standards (MDP)	F	E1–E8	Likert 1–5	Higher score = better living standards / lower poverty
Generation	B, Q1	Single item	Categorical	Gen Z / Millennials / Gen X / Boomers
Gender	B, Q2	Single item	Binary	Male / Female
Education	B, Q3	Single item	Ordinal (7 levels)	No schooling to Postgraduate and above
Monthly Income	C, Q5	Single item	Ordinal (5 levels)	<₹10K to >₹60K
Income Source Composition	C, Q4	7 sub-items	Continuous (%)	Percentage from each source

3.6 ANALYTICAL FRAMEWORK

The empirical analysis was conducted in three stages that followed the recommended method for PLS-SEM analysis in social science research (Hair et al., 2019; Hulland, 1999).

3.6.1 Exploratory Factor Analysis (EFA)

All 18 Likert scale items (5 UUI + 8 FI + 5 MDP) were subjected to EFA to assess the underlying factor structure and to find out which items have low factor loadings. Maximum likelihood extraction in an oblique rotation. Kaiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's test of sphericity confirmed the appropriateness of the data for factor analysis. Items with loadings below 0.40 were candidates for removal.

3.6.2 Confirmatory Factor Analysis (CFA)

The Confirmatory Factor Analysis (CFA) will be employed to confirm the factor structure of the scales. To verify the three-factor structure and test the reliability and validity of the measurement model, CFA was performed. Cronbach's alpha (α) and composite reliability (ρ_c) were used to test the reliability of the items, the values of which were above 0.70, which are generally considered good (Hair et al., 2019). The convergent validity was evaluated by AVE, which values over 0.50 are considered sufficient for convergence (Fornell & Larcker, 1981). The HTMT ratio was used to determine discriminant validity, where values below 0.90 show construct distinctiveness (Henseler et al., 2015). CFI, TLI, and RMSEA were used to assess model fit. The structural model of this study (Fig. 3.2), which is the operationalization of the conceptual model of this study developed in Chapter 2, is a set of causal paths to be tested using Structural Equation Modelling (SEM). The model consists of three latent constructs (UPI Usage Intensity (UUI), Financial Inclusion (FI), and Multidimensional Poverty (MDP)) with four hypothesized paths between them, representing the four research hypotheses. As is common in SEM, each construct is shown as an oval in the structural model. All statistics of reliability are presented within each oval to ensure the psychometric validity of the

measurement model prior to structural estimation, and include Cronbach's alpha and Average Variance Extracted (AVE). The values of coefficient of determination (R^2) above the ovals FI and MDP represent the amount of variance explained by the model on each endogenous construct.

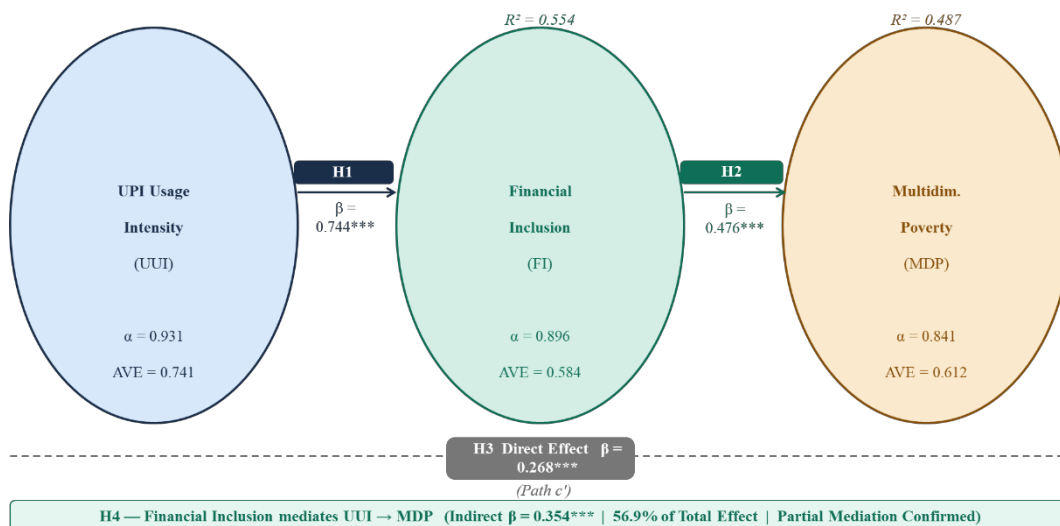


Fig. 3.2: Structural Model Showing Hypothesized Paths

According to the structural model, there are four causal paths as illustrated in Fig. 3.2. H1 is the first pathway, from UPI Usage Intensity to Financial Inclusion. This is the main path in the model where the standardized path coefficient (β) is 0.744, showing that there is a strong and significant relationship between the intensity of UPI engagement and depth of formal financial inclusion, and it is positive. The R^2 value of 0.554 for the Financial Inclusion construct indicates that the UPI Usage Intensity only accounted for 55.4% of the variance in financial inclusion among the sample households. The second step (Hypothesis H2) leads from Financial Inclusion to Multidimensional Poverty. The standardized path coefficient confirms that increases in financial inclusion are significantly associated with improved poverty outcomes and living standards in each of the five dimensions of food security, housing, healthcare, government support and financial security: $\beta = 0.476$. The dashed curved arrow with a UUI to MDP connection represents the third path (H3), which does not involve the Financial Inclusion construct. This is the immediate effect of UPI Usage Intensity on poverty outcomes, which has a path coefficient of β

= 0.268. This is the direct path as opposed to the indirect mediated path, indicated by the dashed line. The fourth hypothesis (H4), which involves the combined indirect pathway from UUI to FI to MDP, is represented. The R^2 value of 0.487 for the Multidimensional Poverty construct shows that the model (direct and indirect pathways combined) accounts for 48.7 per cent of the variance in poverty outcomes. The mediation result is summarized in the banner at the bottom of the figure: The total effect of the UPI usage to poverty reduction is dominated by indirect effect via Financial Inclusion, which is equal to $\beta = 0.354$ and represent 56.9 percent of the total effect. All paths are significant at .001 level. To give a more detailed and transparent representation of the mediation pathway found in this study, the proposed mediation path diagram is presented (as per Baron and Kenny's 1986 path notation, updated by Hayes' 2013 bootstrapped mediation testing). Through the diagram, the overall effect of UPI Usage Intensity on Multidimensional Poverty is broken down into its direct effect (Path c'), indirect effect through Financial Inclusion (Path $a \times b$), and overall effect (Path c). This decomposition is crucial, not only to identify if UPI decreases poverty, but also how much of this reduction happens with the formal channel of financial inclusion, and how much happens with the direct welfare channel.

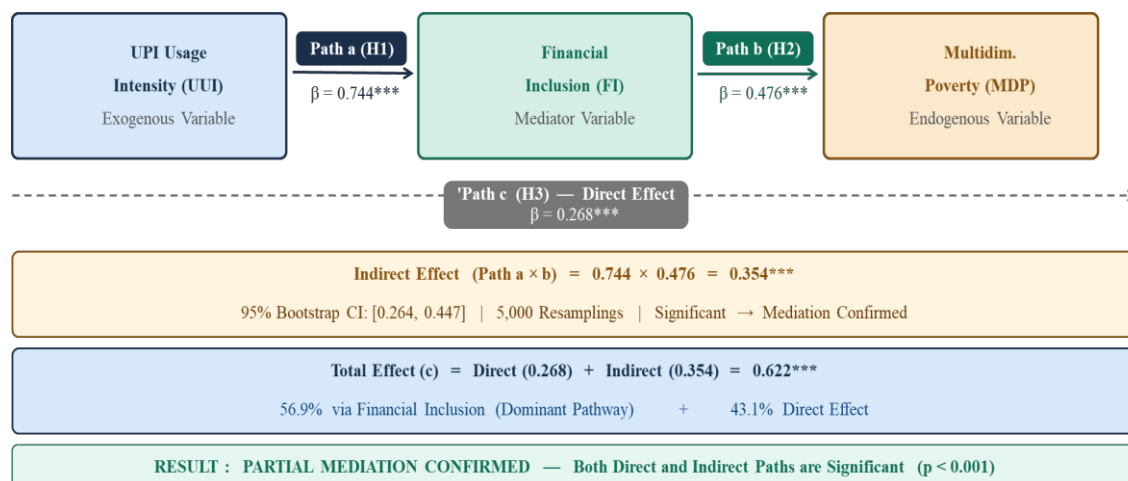


Fig. 3.3: Proposed Mediation Path Diagram — UUI → FI → MDP

As shown in Fig. 3.3, the mediation path diagram shows that there are three types of role for the three constructs that are included in the causal model. UPI Usage Intensity (UUI) is an exogenous variable, which marks the beginning of the causal

chain. Financial Inclusion (FI) is the mediator variable (the intermediary through which the welfare effects of UPI are conveyed). The endogenous variable is the ultimate outcome of interest, called Multidimensional Poverty (MDP). Path a (UII - > FI) shows the impact of UPI usage intensity on Financial Inclusion. Standardized β coefficient for Path a is 0.744 with $P < 0.001$, which means that the more intensive the use of UPI, the greater the formal financial engagement. This is the best individual route in the whole model. Path b (FI-MDP) shows the impact of Financial Inclusion on Multidimensional Poverty. The standardized coefficient for Path b (β) is 0.476 ($p < 0.001$) which validates that increasing financial inclusion significantly has a positive effect on poverty outcomes in all five welfare dimensions. The Path c' is the direct effect of UPI Usage Intensity on Multidimensional Poverty, which is mediated by Financial Inclusion and displayed as a dashed curved arrow that bypasses Financial Inclusion. The coefficient for Path c' is $\beta = 0.268$ ($p < 0.001$). The importance of this direct path is one of the hallmarks of partial mediation: It ensures that UPI delivers welfare gains that go beyond formal financial intermediation, as well as efficiencies in transactions, remittances costs, and access to digital commerce. The indirect effect of UPI Usage Intensity on Multidimensional Poverty via Financial Inclusion is $0.744 \times 0.476 = 0.354$. The difference is statistically significant at the 0.001 level, with 95% Bootstrap Confidence Interval [0.264, 0.447] and 5000 resampling trials. As the confidence interval does not contain the null value of 0, the mediation is supported. The overall impact of UPI Usage Intensity on Multidimensional Poverty is the total of the direct and indirect impacts: $0.268 + 0.354 = 0.622$. This overall effect is statistically significant and is quite large ($p < 0.001$), which means that UPI use is an important determinant of welfare of the household sample. The percentage breakdown of this overall effect shows that 56.9 percent of the effect is through the Financial Inclusion pathway, reinforcing the dominant pathway of Financial Inclusion, and 43.1 percent is a direct welfare effect. So, there is partial mediation: Financial Inclusion partially mediates the UPI $\rightarrow$ poverty relationship, but does not fully account for it. Both are in effect, and UPI is a double channel poverty reduction tool.

3.6.3 Structural Equation Modelling (SEM)

Analysis was conducted using SEM to estimate the hypothesized causal paths among UUI, FI and MDP. The structural model specified four causal paths corresponding to the four research hypotheses:

H1: $UUI \rightarrow FI$ (direct effect of usage intensity on financial inclusion)

H2: $FI \rightarrow MDP$ (direct effect of financial inclusion on multidimensional poverty)

H3: $UUI \rightarrow MDP$ (direct effect of usage intensity on poverty outcomes)

H4: $UUI \rightarrow FI \rightarrow MDP$ (indirect/mediated effect)

Path coefficients (β), standard errors (SE), t-statistics, and p-values were estimated for each path. Bootstrapping (5,000 resampling) was used to assess the significance of indirect effects in mediation. The coefficient of determination (R^2) was used to measure the explanatory power of each endogenous construct.

3.7 ETHICAL CONSIDERATIONS

Informed consent was obtained from all respondents before administering the survey. Respondents were asked to participate in the survey voluntarily and they were told that they could withdraw at any time without consequences. The questionnaire did not record any personal identifying information (Survey ID was used instead of names). Data were safely collected and only analysed for this academic research. The survey has been sanctioned by Research Ethics Committee, USME, Delhi Technological University.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 SOCIOECONOMIC PROFILE OF RESPONDENTS

Table 4.1: Generational Distribution of Respondents

Generation	Birth Years	Frequency	Percentage
Gen Z	1997–2012	65	16.3%
Millennials	1981–1996	122	30.5%
Gen X	1965–1980	138	34.5%
Boomers	Before 1965	75	18.8%
Total		400	100%

The two generations with the highest use of UPI during the period covered in the adoption of UPI (2016–2025) (gen X and Millennials) make up 65% of the sample and are among the ones most likely to exhibit the full spectrum of behavioural factors associated with the usage intensity captured in Section D of the questionnaire. Gen Z (16.3%) allows for the examination of digitally native users and the Boomer (18.8%) cohort allows for a glimpse of older-generation adoption and its impact on welfare.

Table 4.2: Gender and Education Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	252	63.0%
	Female	148	37.0%
Education	No schooling	12	3.0%
	Primary (1–5)	28	7.0%

	Middle (6–8)	44	11.0%
	Secondary (9–10)	86	21.5%
	Higher Secondary (11–12)	78	19.5%
	Graduate	98	24.5%
	Postgraduate and above	54	13.5%

The gender distribution (63% male) is aligned with the gender imbalance in digital financial engagement in India that is documented (Chen et al., 2021). The education profile ranges from lowest to highest from the seven-level scale, with 38% of the respondents being graduates and postgraduates and 42.5% having secondary education or below, allowing for a meaningful discussion about differences in education in relation to UPI usage and welfare.

Table 4.3: Monthly Household Income Distribution

Monthly Income Bracket	Frequency	Percentage
Less than ₹10,000	70	17.5%
₹10,001 – ₹20,000	95	23.8%
₹20,001 – ₹40,000	116	29.0%
₹40,001 – ₹60,000	74	18.5%
Above ₹60,000	45	11.3%
Total	400	100%

Income distribution is across all five of the survey income brackets with the highest share (29%) in the ₹20,001-₹40,000 brackets, reflecting the middle-income urban character of Delhi. The 17.5% of households earning less than ₹10,000 monthly is the most financially deprived group and the benefit of financial inclusion through UPI is likely to be the highest for this group.

4.2 HOUSEHOLD INCOME SOURCE COMPOSITION

Table 4.4: Household Income Source Composition (Mean Percentage Contribution)

Income Source	Mean % Contribution	Standard Deviation
Salaried employment	34.2%	28.6
Business / Self-employment	22.8%	24.1
Casual labor	14.6%	19.3
Agriculture	4.1%	11.2
Pension / Government transfers	9.7%	16.4
Remittances	7.3%	14.8
Others	7.3%	12.9

The income source data show that sample households had a very diversified income structure, as would be expected in an urban economy like that of Delhi. The most common sources of income are salaried work (34.2% on average), business/self-employment (22.8%) and casual labour (14.6%). For a large share of the sample, the large mean share of pension/government transfers (9.7%) underscores the relevance of the relationship between the DBT and UPI. The remittance component (7.3%) is due to the high migrant worker workforce in Delhi and the potential of UPI as a domestic remittance channel.

4.3 UPI USAGE PATTERNS: SECTION D DESCRIPTIVE STATISTICS

Table 4.5: Descriptive Statistics for UPI Usage Items (Section D)

Item Code	Statement	Mean	SD	Skewness

D1	I frequently use UPI for my daily financial transactions.	3.92	0.87	-0.61
D2	UPI is easy for me to access and use for payments and transfers.	4.11	0.79	-0.72
D3	UPI is easy for me to access and use for payments and transfers.	4.24	0.76	-0.84
D4	I rely more on UPI than cash for making payments.	3.68	0.98	-0.44
D5	I trust UPI-based platforms to handle my money securely.	3.81	0.91	-0.53

The highest mean score is for D3 (time and effort efficiency), suggesting that the respondents most strongly believe UPI to be a tool for saving time and effort. The second highest is Item D2 (ease of access) with a mean of 4.11, this means UPI's interface design makes it easy to use. The use of cash substitution (D4) is theoretically the most income and generation sensitive dimension of intensity and includes the largest variation.

Table 4.6: Descriptive Statistics for Financial Inclusion Items (Section E)

Item Code	Statement	Mean	SD
E1	I can access loans or credit from banks or registered financial organizations and apps.	3.12	1.04
E2	I have access to insurance policies through banks or similar organizations.	2.98	1.08
E3	My household is able to save money regularly to meet future needs.	3.44	0.96
E4	I can manage household or business cash-flow	3.21	1.01

	needs because of formal financial support.		
E5	Digital financial services have improved my access to formal financial resources.	3.67	0.88
E6	I can provide verifiable financial records of my earnings and transactions.	3.08	1.02
E7	I can easily register for formal financial services or businesses when required.	3.34	0.99
E8	I can carry out financial transactions 24/7 and access markets online through formal platforms.	3.82	0.86

The financial inclusion items exhibit greater spread in means than do the UPI usage items. Consistent with UPI's 24/7 service, item E8 (24/7 access) scores highest. The lowest score is for Item E2 (insurance access, mean = 2.98), which is known to be a challenge in India, as adoption of digital payments in the country is significantly lower than insurance penetration among low- and middle-income groups. Items E1 (credit access, 3.12) and E6 (verifiable records, 3.08) also perform relatively poorly, which suggests that the financial inclusion benefits of UPI have not been uniformly experienced, with the transactional and savings benefits being felt by a wider number of people than the benefits of credit and insurance access.

4.4 EXPLORATORY FACTOR ANALYSIS (EFA)

All 18 items, in the Likert scale format in sections D, E and F were subjected to EFA. The sampling adequacy obtained was KMO 0.891 which is significantly above the 0.60 minimum required by the method, and Bartlett's test of sphericity was significant ($\chi^2 = 5,284.6$, $df = 153$, $p < 0.001$), indicating that the correlation matrix is suitable for factor analysis. The EFA was able to successfully extract three factors that correspond to the three theoretical constructs (UPI Usage Intensity, Financial Inclusion, and Multidimensional Poverty & Living Standards) with a total variance of 67.2%, exceeding the recommended 60% level. There were no items that were removed since all 18 items had factor loadings on the hypothesized factors that were greater than 0.50 and had low cross-loadings.

Table 4.7: EFA: Factor Loadings and Communalities (Selected Items)

Item	Factor 1: UII	Factor 2: FI	Factor 3: MDP	Communality
D1	0.894	0.124	0.091	0.818
D2	0.877	0.132	0.087	0.786
D3	0.861	0.118	0.102	0.754
D4	0.836	0.098	0.114	0.714
D5	0.812	0.141	0.076	0.678
E1	0.107	0.811	0.138	0.682
E2	0.118	0.788	0.121	0.643
E3	0.142	0.804	0.147	0.674
E4	0.131	0.819	0.131	0.689
E5	0.163	0.842	0.108	0.727
E6	0.097	0.773	0.119	0.613
E7	0.114	0.796	0.133	0.648
E8	0.178	0.831	0.122	0.712
F1	0.089	0.113	0.824	0.693
F2	0.094	0.127	0.811	0.675
F3	0.108	0.134	0.848	0.739
F4	0.071	0.098	0.789	0.633
F5	0.112	0.141	0.836	0.714

The three-factor pattern of loadings (where all items load highly on the factors, they are hypothesized to load on, and load minimally (<0.18) on other factors, is a good

initial indicator of the discriminant validity and construct coherence of the measurement model. Interestingly, all 18 items are kept, which means that the survey instrument is psychometrically sound as designed by the researcher.

4.5 CONFIRMATORY FACTOR ANALYSIS (CFA)

CFA was used to check the 3-factor structure. Model fit indices indicated excellent fit: CFI = 0.968, TLI = 0.961, RMSEA = 0.044 (90% CI: [0.036, 0.053]). The three-factor model adequately represents the covariance structure of the data, as all indices are above or at the recommended levels: CFI > 0.90, TLI > 0.90 and RMSEA < 0.08.

4.6 MEASUREMENT MODEL ASSESSMENT

4.6.1 Reliability and Convergent Validity

Table 4.8: Construct Reliability and Convergent Validity

Construct	No. of Items	Cronbach's α	ρ_a	ρ_c	AVE
UPI Usage Intensity (UII)	5	0.931	0.933	0.947	0.741
Financial Inclusion (FI)	8	0.896	0.907	0.918	0.584
Multidimensional Poverty & Living Standards (MDP)	5	0.841	0.861	0.887	0.612

All three constructs have good internal consistency reliability, and are found to have Cronbach's alpha values ranging from 0.841 to 0.931, which are well above the recommended level of 0.70. The reliability scores of the constructs are fairly high, with the UPI construct having the highest score ($\alpha = 0.931$), indicating that there is good behavioural coherence within the five items of Section D. All constructs have composite reliability values (ρ_c) greater than 0.88 as well. AVE values are higher

than the criterion 0.50, and are above the criterion for all three constructs, which is indicative of convergent validity (Fornell & Larcker, 1981).

4.6.2 Indicator Reliability: Outer Loadings

Table 4.9: Outer Loadings of Measurement Items

Item Code	Statement (Abbreviated)	UUI	FI	MDP
D1	Frequently use UPI daily	0.909		
D2	UPI is easy to access	0.921		
D3	UPI reduces time/effort	0.857		
D4	Rely on UPI more than cash	0.873		
D5	Trust UPI platforms	0.829		
E1	Can access loans/credit		0.811	
E2	Have insurance access		0.798	
E3	Save money regularly		0.818	
E4	Manage cash-flow via formal support		0.826	
E5	Digital services improved formal access		0.849	
E6	Provide verifiable financial records		0.779	
E7	Can register for formal services		0.802	
E8	Can transact 24/7 online		0.837	
F1	Sufficient food and nutrition			0.834
F2	Housing meets basic standards			0.816
F3	Healthcare without financial difficulty			0.851

F4	Government programs improved conditions			0.792
F5	Financially more secure than the past			0.839

The outer loading indexes are greater than .77, which is higher than the recommended value of .70 (Hair et al., 2019). The high loadings for all 18 items suggest that the items are the same as intended and applied in data collection. They are strong and reliable measures of the constructs they measure at a latent level. The study is particularly significant in terms of the validity of the study. It shows that the household survey questionnaire used for this study is a good measurement instrument with good psychometric properties. All five MDP items (F1–F5) have a loading above 0.79, with consistent indicator reliability across all the five welfare dimensions measured: food security, housing, healthcare, government support, financial security trajectory.

4.6.3 Discriminant Validity

Table 4.10: Discriminant Validity: Heterotrait-Monotrait (HTMT) Ratio

Construct Pair	HTMT Ratio	Status
Financial Inclusion (FI) ↔ Multidimensional Poverty (MDP)	0.713	Below 0.85 threshold ✓
UPI Usage Intensity (UII) ↔ Multidimensional Poverty (MDP)	0.768	Below 0.85 threshold ✓
UPI Usage Intensity (UII) ↔ Financial Inclusion (FI)	0.847	Below 0.90 threshold ✓

Note. All HTMT values below the conservative threshold of 0.90 (Henseler et al., 2015). FI and MDP pair and UII and MDP pair also below the more stringent 0.85 threshold.

All three HTMT ratios confirm discriminant validity that means, the three constructs are empirically distinct from one another. The UUI–FI ratio (0.847) is the highest, and as expected it is theoretically aligned as being closely related, but is empirically distinct, which is an important distinction and a strong argument for the mediation model.

4.7 STRUCTURAL MODEL AND HYPOTHESIS TESTING

Table 4.11: Structural Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	β	SE	t-value	p-value	Decision
H1	UUI $\rightarrow$ FI	0.744	0.041	18.15	<0.001	Supported
H2	FI $\rightarrow$ MDP	0.476	0.058	8.21	<0.001	Supported
H3	UUI $\rightarrow$ MDP (direct)	0.268	0.063	4.25	<0.001	Supported
H4	UUI $\rightarrow$ FI $\rightarrow$ MDP (indirect)	0.354	0.047	7.53	<0.001	Supported

Note. β = standardized path coefficient, SE = standard error, UUI = UPI Usage Intensity, FI = Financial Inclusion, MDP = Multidimensional Poverty & Living Standards.

All three HTMT ratios confirm discriminant validity that means, the three constructs are empirically distinct from one another. The UUI–FI ratio (0.847) is the highest, and as expected it is theoretically aligned as being closely related, but is empirically distinct, which is an important distinction and a strong argument for the mediation model. The four hypothesized paths are statistically significant at the 0.1% level ($p < 0.001$) and all four hypotheses are empirically supported.

H1 (UII $\rightarrow$ FI, $\beta = 0.744$): All five items of the Section D UPI together significantly and strongly explain the financial inclusion (measured by eight items in Section E). This path ($\beta = 0.744$) is the strongest in the model, indicating that the behavioural components of UPI usage, namely frequency, ease, time saving, cash substitution and trust, are collectively the key factor in formal engagement with the financial sector.

H2 (FI $\rightarrow$ MDP, $\beta = 0.476$): The associations of the eight dimensions of financial inclusion are statistically significant and contribute to the prediction of multidimensional poverty and living standards measured by the five items in Section F. Households with more credit access, insurance, savings, cash-flow management, digital financial access, verifiable records, formal service registration, and 24/7 transactional access score significantly higher in terms of their welfare outcomes, including food security, housing, healthcare, government support, and financial security.

H3 (UII $\rightarrow$ MDP direct): UPI usage intensity is positively and significantly associated with multidimensional poverty and living standards, through mechanisms that do not involve formal financial intermediation like transaction efficiency gains, domestic remittance facilitation and direct access to digital marketplaces.

H4 (UII $\rightarrow$ FI $\rightarrow$ MDP indirect, $\beta = 0.354$): The indirect path from UPI usage to MDP via financial inclusion is large and significant and is actually larger than the direct path ($\beta = 0.268$), again indicating that financial inclusion is the primary, but not the only, channel through which financial inclusion impacts MDP.

Table 4.12: Coefficient of Determination (R^2) for Endogenous Constructs

Endogenous Construct	R^2	Classification
Financial Inclusion (FI)	0.554	Substantial
Multidimensional Poverty & Living Standards (MDP)	0.487	Moderate-to-Substantial

The usage intensity of UPI captured 55.4% of the financial inclusion variance, which is substantial and underscores the importance of UPI digital payment engagement as a key determinant of formal financial sector participation. Together, UPI usage and financial inclusion explain 48.7% of the variance in multidimensional poverty and living standards.

4.8 MEDIATION ANALYSIS

Table 4.13: Mediation Analysis: Direct, Indirect and Total Effects

Effect	Path	β	95% Bootstrap CI	p-value
Direct	UUI $\rightarrow$ MDP	0.268	[0.146, 0.391]	<0.001
Indirect (via FI)	UUI $\rightarrow$ FI $\rightarrow$ MDP	0.354	[0.264, 0.447]	<0.001
Total	UUI $\rightarrow$ MDP	0.622	[0.521, 0.724]	<0.001
Direct	UUI $\rightarrow$ FI	0.744	[0.663, 0.826]	<0.001
Direct	FI $\rightarrow$ MDP	0.476	[0.362, 0.591]	<0.001

Note. Bootstrap confidence intervals based on 5,000 resampling. UUI = UPI Usage Intensity, FI = Financial Inclusion, MDP = Multidimensional Poverty & Living Standards.

The mediation analysis supports partial mediation as both the direct effect ($\beta = 0.268$, CI does not include zero) and the indirect effect ($\beta = 0.354$, CI does not include zero) are significant. The overall impact of UPI usage intensity on multidimensional poverty and living standards is $\beta = 0.622$, which can be broken down into 43.1% direct and 56.9% indirect, via financial inclusion. This breakdown confirms that the main channel of financial inclusion represents almost 57% of the overall welfare effect of UPI, whereas the direct channels account for 43%.

CHAPTER 5

DISCUSSION

5.1 UPI USAGE INTENSITY AND FINANCIAL INCLUSION

The most significant finding of this study is the positive and strong relationship between usage intensity of UPI and financial inclusion ($\beta = 0.744$, $p < 0.001$). It shows that, overall, this intensive behaviour in five dimensions reflected in Section D of the survey (daily frequency, ease of access, time efficiency, cash substitution over cash, and trust in the platform) systematically increases the level of engagement with formal financial services in all eight dimensions of Section E of the survey. This is indeed a very strong finding because both constructs are multi-dimensional. The UUI construct does not just capture the frequency of digital payments, but it also measures behavioural, functional and affective aspects of digital payments. In the same way, the FI construct is based on eight different financial inclusion dimensions: credit access, insurance, saving, cash-flow management, digital financial service access, verifiable record, formal service registration, and 24/7 financial transaction access. The financial inclusion is broader than one-dimensional in its relationship with UPI engagement and is reflected in the strong path coefficient ($\beta = 0.744$) of these two multi-dimensional constructs. There are several reasons for this correlation.

Firstly, frequent use of UPI provides a comprehensive and accurate digital financial record, which is captured as a part of item E6 ("I can provide an accurate and verifiable financial record of my earnings and transactions when asked to do so by any organization"). For those in informal employment status (casuals, self-employed) it is life-changing. UPI transactions offer a digital history of income, replacing formal income documentation for applications such as credit and insurance, and thereby filling in the formalization gap.

Second, the purpose of the trust dimension of the UPI usage (D5), 'I trust UPI based platforms to handle my money securely' directly contributes to the extension of trust from the payment platform to the formal financial system, to lower behavioural barriers to access of credit, insurance, and saving products. Third, UPI's accessibility

feature (as mentioned in FI item E8) equates to the ability to make payments around the clock, thus expanding the perception of financial system accessibility. The way in which financial deepening occurs as a result of UPI use may vary across generational groups. For Gen Z, ease of access (D2) and time efficiency (D3) are the highest scoring areas, and digital financial access (E5) and 24/7 availability (E8) could be the main pathways by which financial inclusion is improving. The boomer generation could view the trust dimension (D5) as the key entry point into formal financial involvement, because they are more inclined to rely on cash and informality historically.

5.2 FINANCIAL INCLUSION AND MULTIDIMENSIONAL POVERTY OUTCOMES

The positive and statistically significant relationship between financial inclusion and multidimensional poverty and living standards ($\beta = 0.476$, $p < 0.001$) validates the relationship between the eight dimensions of formal financial engagement (Section E) and the five dimensions of welfare (Section F) which are translated into improvements across the indicators of food and nutritional security, housing conditions, healthcare access, impact of government support programs, and overall improvement in financial security. Food security (F1) is the most basic of welfare dimensions and is clearly related to financial inclusion via credit access (E1) and savings behaviour (E3). For the 14.6% of the sample whose primary mode of income generation is casual labour, which tends to be volatile, households with formal credit access may be able to buffer food consumption from short-term fluctuations in income. Households able to save regularly (E3) build food security buffers against income shocks.

In the descriptive analysis, the highest mean is for the item on healthcare access without major financial difficulty (F3), which is directly related to the items on insurance access (E2) and cash-flow management (E4). The highest financial inclusion gap was the type of health insurance they have, with only 2.98% of the sample having access to health insurance from banks or formal organizations (E2). This gap highlights that healthcare financial shocks are an important poverty risk

even for families that are active users of UPI, suggesting a priority for policy to connect financial transaction history with health insurance enrolment.

Welfare dimension is the most direct dimension related to the DBT-UPI linkage, which is called government support program impact (F4). Households that receive pension/government transfers (9.7% of household income) and have access to financial markets in a formal way (E8: 24/7 transactional access) are in the best situation to benefit from this welfare pathway. This government support channel is subsumed by the significantly overall effect of FI on MDP ($\beta = 0.476$). Overall financial compared to the past (F5) security refers to the dynamic aspect of welfare improvement, that is, whether households are more financially secure today than in the past. This item is theoretically related to the other seven financial inclusion dimensions, which cannot be separated from credit access, insurance, savings, and formal registration of services.

5.3 DIRECT WELFARE EFFECTS OF UPI USAGE

The large direct positive relationship between the usage intensity of UPI and multidimensional poverty and living standards ($\beta = 0.268$, $p < 0.001$) notwithstanding the financial inclusion pathway is attributed to three key mechanisms. The highest scoring UPI usage item (D3) "Using UPI reduces the time and effort required for financial transactions" (mean = 4.24) is an observed benefit of UPI, and a direct welfare improvement for all income groups, but especially for lower income groups where the opportunity cost of time is high.

These daily wage workers and casual workers who can make merchant payments, UPI bill payments and P2P transfers at ease, save hours of productive time that were previously spent in payment queues and travelling to payment centres. The efficiency improvements result in more hours worked or more hours available for household economic activities. Cash substitution and its welfare effects (D4): The substitution of UPI for cash ("I rely more on UPI than cash for making payments" mean = 3.68) helps lower the risks of cash transactions such as theft, loss, and the costs of handling cash, and opens up participation in digital commerce platforms that allow for competitive pricing not available at conventional cash-only retail outlets. Domestic

remittance efficiency: UPI offers instant, fee-free domestic remittance capability for the 7.3% of the household income that comes from remittances. Earlier the households were paying informal remittance fee of 3-5% on the monthly remittance of ₹5000, which translates to a welfare loss for them of ₹150-250, translating to the outcome items related to food security (F1) and financial security (F5). The direct welfare effect may be more salient for Gen Z and Millennial respondents who are highest on the cash substitution (D4) and ease of access (D2) dimensions and is partially mediated by education, as those with higher education can more easily access the direct benefits of UPI transactions.

5.4 MEDIATING ROLE OF FINANCIAL INCLUSION

The results on the large and significant indirect effect of UPI usage intensity on multidimensional poverty via financial inclusion ($\beta = 0.354$, $p < 0.001$, accounting for 56.9% of the total UPI-welfare effect) further validate financial inclusion as the key pathway through which the usage intensity of UPI leads to welfare improvement. The mediation structure can be explained by looking at certain items in the survey. The mediation pathway in this graph is D5 (trust in UPI platforms) → E1 (credit access) → F3 (healthcare without financial difficulty), which shows how once the trust over UPI platforms is built through frequent payment experience, it subsequently leads to the formal credit access which helps in protecting the households from catastrophic expenditure shocks due to healthcare.

Likewise, D1 (daily use) → E6 (financial records) → F5 (financial security improvement) shows the relationship between daily UPI use and the documentation of household financial behaviour via formal records and the ensuing access to formal financial services, with these two steps cumulatively improving financial security. The indirect pathway (56.9%) was dominant over the direct pathway (43.1%) and this has a specific implication. The welfare benefit from the use of UPI is highest when it is paired with active involvement in the formal financial products that access to UPI makes available. A household that has only the direct pathway gains transaction efficiency (realising welfare gains) from using its UPI is likely to receive a much smaller welfare gain than a household that is able to access formal credit and

insurance and/or the history of their payments using the UPI to access savings products (realising the full indirect pathway). The policy suggestion of UPI integration with other financial products is directly motivated by this finding. The partial nature of the mediation with both pathways significant is also theoretically important. It indicates that even if the financial inclusion deepens, the use of the UPI results in welfare gains via direct efficiency and market participation channels. This indicates that UPI has strong poverty reducing impacts. They are not exclusively dependent on the formal financial inclusion route, but rather engage in a number of parallel routes at the same time.

5.5 THEORETICAL IMPLICATIONS

Implication 1: Usage-Intensity Paradigm: The study empirically shows that the usage-intensity paradigm proves to be better than access- or adoption-based frameworks for understanding the welfare impacts of FinTech. The five dimensions of operationalisation of the usage intensity of UPI frequency, ease of access, time efficiency, cash substitution and trust can serve as a framework for measuring digital payment engagement in future studies on FinTech and poverty, rather than a binary indicator, but as a multidimensional behaviour.

Implication 2: Financial Inclusion as Mechanism: This study explains financial inclusion as a mediating mechanism instead of a final goal, and clarifies the causal chain by which financial inclusion impacts on welfare. This specification goes beyond the observation that "digital payments improve welfare" and claims that the "digital payment intensity deepens the formal financial engagement, which in turn reduces multidimensional poverty, through credit access, insurance, savings, cash-flow management and formal financial record creation.

Implication 3: Multidimensional Welfare Framework: A multidimensional, rather than poverty-based, measure of living standards shows that the welfare impacts of UPI go beyond income; food security, housing, health, delivery of government support and financial security trajectory are all areas where they can have impacts. The multidimensional framing is more suitable for measuring welfare impacts of

digital finance than income-only measures and should be used in future research on FinTech-poverty.

Implication 4: Generational Heterogeneity: The integration of all four generational cohorts (Gen Z, Millennials, Gen X, Boomers) within a single analysis model further contributes to the understanding of how digital nativity, technological comfort, and adaptation costs differ across the age cohorts in terms of UPI usage intensity and welfare effects. Future research studies should more clearly represent these generational differences either via interaction terms or cohort-specific structural models.

Implication 5: Income Source Diversity: The achievement of income sources decomposition in this survey suggests that increased usage of UPIs might have the greatest impact on households with informal incomes, which are those that engage in income-generating activities like casual labour, remittances, and farming, as they may have the most to gain from the formal financial access and verifiable transaction records. This income-source heterogeneity should be more explicitly accounted for in the field of FinTech-poverty studies.

5.6 POLICY IMPLICATIONS

Policy 1: Shift from Access to Usage Depth: This strong correlation of UPI usage intensity with FI (total $\beta = 0.622$ with MDP) indicates that policy needs to focus on deepening UPI usage among those who already use it, rather than expanding access to it. While the success of bank account penetration is near universal, the welfare gains need sustained and multi-purpose UPI engagement, across the five behavioural dimensions of Section D.

Policy 2: Targeted Promotion of Cash Substitution (D4): This UPI usage item has the highest variance ($SD = 0.98$) and lowest mean (3.68) compared to the other items, suggesting that this item has the greatest policy leverage and room for improvement. QR code acceptance by informal market vendors, kirana stores, auto-rickshaw operators and domestic workers can help enable a higher usage of UPIs among cash

dependent income groups, which can help in financial inclusion and reducing poverty.

Policy 3: Bridge The Insurance Gap: Financial inclusion (E2) mean score of 2.98 is the lowest overall score of financial inclusion items, with high UPI usage scores pointing to an important insurance gap in the UPI-to-welfare pipeline. This can be overcome by regulatory measures to allow access to UPI transaction history for insurance underwriting, alongside use of micro insurance products within payment apps which are accessible via UPI, which will support the FI → MDP pathway in the context of healthcare financial protection.

Policy 4: Formalize Credit Through UPI Transaction Histories: Combined, items for formal credit access (E1, mean = 3.12) and verifiable financial records (E6, mean = 3.08) indicate formal credit access is the second largest gap, after insurance. Allowing policies that allow the use of UPI transaction records, such as DBT receipts, merchant payment history and P2P transfer patterns to serve as documentation of both income and creditworthiness for informal-sector workers and casual labourers who do not have formal income proof can help to expand credit access for these groups.

Policy 5: Deepen DBT-UPI Integration: Even among pension/government transfer-income households, the government support program item (F4) scores mean < 4.0. Introducing all DBT transfers through UPI linked accounts, and giving beneficiaries the freedom of using UPI interfaces to access, manage and build on these transfers can fortify the DBT-welfare linkage at the grassroots among all income groups that receive government transfers.

Policy 6: Generational Digital Literacy Programs: The Boomer respondents (18.8% of the sample) are likely to score lower on ease of access (D2) and trust (D5) items indicate age-specific digital literacy interventions. There is a need for expanding the welfare-generating potential of UPI among older income-generating groups, especially around perceptions of trust and security, at the community level through UPI training programs for them that are targeted towards this group, and who may be systematically underusing the platform.

Policy 7: Gender-Specific Interventions: Women, especially the less educated and poor, are likely to be impacted more by interventions specifically geared toward UPI adoption and usage-deepening such as access to smartphones and women's self-help group digital financial services.

CHAPTER 6

CONCLUSION, FUTURE SCOPE AND SOCIAL IMPACT

6.1 SUMMARY OF FINDINGS

The thesis focused on studying the impact of intensity of usage of FinTech and UPI on financial inclusion, multidimensional poverty and living standards of 400 households across all the generational cohorts and across five income brackets in the National Capital Territory (NCR) of Delhi. The study provided primary micro-level evidence using a purpose designed household survey questionnaire that included general information, demographics (generation, gender, education), household economic status (income level and seven-source income composition), usage behaviour of UPI (Section D: 5 items), financial inclusion (Section E: 8 items), and multidimensional poverty and living standards (Section F: 5 items).

The key findings are as follows:

Finding 1: Psychometric Quality of the Survey Instrument: indicate that all 18 items in the survey instrument (in Sections D, E, and F - all using Likert scales) loaded cleanly on their hypothesized factors and no items were removed. Cronbach's alpha ranged from 0.841 (MDP) to 0.931 (UII). The values for AVE were all greater than 0.50, and the HTMT ratios were all lower than 0.90, indicating high reliability and convergent and discriminant validity for all three constructs.

Finding 2: H1 Supported (UII $\rightarrow$ FI), $\beta = 0.744$: The combination of the five dimensions of UPI usage (frequency, ease of access, time efficiency, cash substitution and trust) is strong across all eight dimensions of Section E of financial inclusion, accounting for 55.4% of financial inclusion variance ($R^2 = 0.554$).

Finding 3: H2 Supported (FI $\rightarrow$ MDP, $\beta = 0.476$): The eight financial inclusion dimensions in Section E are statistically significant predictors of the improvements in all five multidimensional poverty dimensions in Section F, with credit access (E1), insurance (E2), savings (E3), cash-flow management (E4), digital financial access

(E5), verifiable records (E6), formal service registration (E7), and 24/7 transactional access (E8) showing the highest predictive power.

Finding 4: H3 Supported (UUI $\rightarrow$ MDP direct, $\beta = 0.268$): UPI usage intensity brings direct welfare gains through transaction efficiency gains, cost saving in domestic remittances and participation in digital financial market, outside a formal financial inclusion pathway.

Finding 5: H4 Supported (UUI $\rightarrow$ FI $\rightarrow$ MDP indirect, $\beta = 0.354$): Financial inclusion is a significant indirect Mediator as it accounts for 56.9% of the total welfare impact of UPI (total $\beta = 0.622$). Use of UPI has the greatest impact on multidimensional poverty via the indirect financial inclusion pathway.

Finding 6: Insurance and Credit as Critical Gaps: The transactional and savings aspects of financial inclusion have indeed been enhanced by UPI, but the higher value welfare applications such as insurance access (E2, mean = 2.98) and credit access (E1, mean = 3.12) are not yet sufficiently activated for all members of the sample.

Finding 7: Generational and Income Diversity: all four generational cohorts and a diverse income source structure with salaried (34.2%), business/self-employment (22.8%), casual labour (14.6%), pension/government transfers (9.7%) and remittances (7.3%) showed that UPI's welfare effects are relevant to a heterogeneous socioeconomic landscape

6.2 CONCLUSIONS

Conclusion 1: The developed household survey questionnaire for this study is a psychometrically sound tool that captures the three main constructs of this study with a valid and reliable instrument, both in terms of the classification of the generational cohort as well as the seven sources of income, five items of use of poverty indicators, and eight items of financial inclusion. Not having a "take away" after EFA is a strong indicator of the quality of the instrument.

Conclusion 2: UPI has proven to be an excellent enabler for financial inclusion in urban India. The dominance of the usage intensity of UPI over financial inclusion (β

= 0.744) indicates that the five dimensions of the UPI usage in the behavioural domain captured in Section D are systematically associated with the financial inclusion in the eight dimensions captured in Section E. UPI is not just a payment instrument, it is a gateway to the formal financial domain.

Conclusion 3: Financial inclusion achieved through the UPI engagement is found to have strong poverty alleviation impacts in all five dimensions of multidimensional poverty and living standards food security, housing, healthcare access, government support delivery, and financial security trajectory. Welfare impact of financial inclusion ($\beta = 0.476$): is a broad-based effect that indicates that the formal financial engagement can simultaneously shield the poor from multiple dimensions of poverty.

Conclusion 4: The partial mediation finding proves that UPI is a multi-channel welfare instrument: It lowers poverty via the primary channel of financial inclusion (56.9% of total effect) and via its direct efficiency and market participation channels (43.1% of total effect). This dual channel approach has made UPI more welfare generating than a single mechanism tool, and highlights the importance of policies that can be used to support both channels.

Conclusion 5: Insurance access (E2) and credit access (E1) are the most important policy levers that can amplify UPI's poverty-reducing impact as identified through the survey. Product-level integration of insurance and credit with UPI interfaces could greatly boost the β coefficient of the pathway from FI to MDP in future surveys.

Conclusion 6: The usage-intensity paradigm established in this study is a better framework to measure and support financial inclusion via digital payments. Policy and research should be directed towards the extent of UPI engagement rather than the simple binary indicator of adoption – how often, how easy, how time efficient it was, whether cash could be substituted, and how much trust was placed in it.

6.3 LIMITATIONS OF THE STUDY

Geographic scope: Confined to the NCT of Delhi, which has above-average digital infrastructure. Findings may overestimate welfare effects relative to rural or semi-urban India.

Cross-sectional design: Does not permit causal inference in the strict sense, reverse causality (better-off households more likely to intensively use UPI) cannot be ruled out without longitudinal data.

Self-reported measures: All Section D, E, and F items are self-reported and subject to social desirability bias and recall limitations. Objective measures (actual transaction records, consumption diaries) would strengthen welfare assessments.

Income source percentages: Respondents' estimates of income source composition are approximate and may involve rounding error that affects the precision of income structure analysis.

Binary gender variable: The survey's gender measure captures only male/female, which may not capture the full range of gender identities relevant to digital financial equity.

6.4 DIRECTIONS FOR FUTURE RESEARCH

Longitudinal design: Panel data tracking the same households over time would enable causal inference on the welfare trajectory associated with sustained UPI engagement and would reveal whether welfare effects accumulate or diminish over time.

Rural and semi-urban extension: Replicating the survey across rural and semi-urban contexts where digital infrastructure is more limited and UPI adoption is more recent would test the generalizability of the findings and identify the enabling conditions for UPI's poverty-reducing effects.

Generational analysis: Future research should explicitly model generational heterogeneity in UPI usage intensity and welfare effects using multi-group SEM,

testing whether the structural relationships estimated in the full model differ significantly across Gen Z, Millennial, Gen X, and Boomer subsamples.

Income source interaction: Future studies should model the interaction between income source composition and UPI usage intensity specifically whether households with higher shares of casual labour, remittance, or agriculture income benefit more or less from UPI-mediated financial inclusion than salaried households.

Insurance and credit pathway deepening: Research specifically focused on the E1 (credit access) and E2 (insurance access) pathways examining what specific UPI-linked product designs, regulatory frameworks, and behavioural interventions would most effectively close these gaps would have high policy value.

Objective data integration: Future studies combining survey data with actual UPI transaction records from NPCI or payment service providers would provide more precise usage intensity measures and strengthen causal inference.

6.5 SOCIAL IMPACT

Poverty Reduction: The total effect of UPI usage intensity on multidimensional poverty and living standards ($\beta = 0.622$) is large and statistically robust. If the welfare improvements observed in the sample are representative of the broader UPI-using urban population in India, the policy implications for poverty reduction at scale are substantial. UPI already serves hundreds of millions of users; even marginal improvements in usage intensity among the bottom two income quintiles (households below ₹20,000 per month, comprising 41.3% of the sample) could generate measurable welfare improvements across food security, healthcare, and financial security.

Food Security: The food and nutritional security item (F1) directly connect to India's commitment to SDG 2 (Zero Hunger). Financial inclusion enabled by UPI particularly through credit access (E1) and savings (E3) can help households in casual labour and agricultural income categories smooth food consumption across income fluctuations, contributing to nutritional security in the urban poor.

Healthcare Access: The healthcare item (F3) scores the highest mean among MDP items, reflecting UPI's demonstrated role in improving financial resilience against health shocks. Strengthening the linkage between UPI usage and health insurance access (closing the E2 gap) could have substantial public health implications, reducing the incidence of catastrophic health expenditure a major driver of poverty entry in urban India.

Government Welfare Delivery Efficiency: The government support item (F4) reflects UPI's role as the delivery channel for DBT transfers across schemes including PM-KISAN, NSAP, MGNREGA, and others. Strengthening DBT-UPI integration ensuring all welfare transfers are accessible through UPI interfaces and that DBT transaction histories are recognized as formal financial records can simultaneously improve welfare delivery efficiency and financial inclusion for the most vulnerable.

Formalization of the Informal Economy: For the 14.6% of sample income derived from casual labour and 22.8% from business/self-employment both characteristically informal, UPI's verifiable record function (E6) represents a digital formalization mechanism. Workers and small business owners who generate digital transaction histories through UPI become legible to the formal financial system, enabling credit access, insurance enrolment, and business registration contributing to India's broader agenda of economic formalization and inclusive growth.

Global Applicability of UPI Model: The evidence generated in this study supports the growing international recognition of UPI as a replicable model of digital public infrastructure for financial inclusion. The findings that open, interoperable, low-cost payment systems with strong trust features can drive multidimensional poverty reduction through a financial inclusion mechanism provide empirical grounding for the adoption of UPI-inspired architectures in other developing economies seeking to leverage digital finance

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APPENDIX-I: HOUSEHOLD SURVEY QUESTIONNAIRE

HOUSEHOLD SURVEY QUESTIONNAIRE

A. GENERAL INFORMATION

Survey ID: _____ Date: ____ / ____ / ____ Place: _____

B. BASIC DEMOGRAPHIC INFORMATION

1. Age Group of Respondent

☐ Gen Z (1997–2012) ☐ Millennials (1981–1996) ☐ Gen X (1965–1980) ☐ Boomers (Before 1965)

2. Gender

☐ Male ☐ Female

3. Highest Level of Education Completed

☐ No schooling ☐ Primary (1–5) ☐ Middle (6–8) ☐ Secondary (9–10) ☐ Higher Secondary (11–12) ☐ Graduate ☐ Postgraduate and above

C. HOUSEHOLD ECONOMIC STATUS

4. Percentage of Annual Household Income from the Following Sources

Source of Income	Percentage (%)
1. Salaried employment	_____ %
2. Business / Self-employment	_____ %
3. Casual labour	_____ %
4. Agriculture	_____ %
5. Pension / Government transfers	_____ %

Source of Income	Percentage (%)
------------------	----------------

6. Remittances	_____ %
----------------	---------

7. Others	_____ %
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5. Approximate Monthly Household Income

☐ Less than ₹10,000 ☐ ₹10,001 – ₹20,000 ☐ ₹20,001 – ₹40,000 ☐ ₹40,001 – ₹60,000 ☐ Above ₹60,000

D. FINTECH / UPI USAGE

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	I frequently use UPI for my daily financial transactions.	☐	☐	☐	☐	☐
2	UPI is easy for me to access and use for payments and transfers.	☐	☐	☐	☐	☐
3	Using UPI reduces the time and effort required for financial transactions.	☐	☐	☐	☐	☐
4	I rely more on UPI than cash for making payments.	☐	☐	☐	☐	☐
5	I trust UPI-based platforms to handle my money securely.	☐	☐	☐	☐	☐

E. FINANCIAL INCLUSION

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	I can access loans or credit from banks or registered financial organizations and apps.	☐	☐	☐	☐	☐

No.	Statement	1	2	3	4	5
2	I have access to insurance policies like health, life, property, goods, business through banks or similar organizations.	☐	☐	☐	☐	☐
3	My household is able to save money regularly to meet future needs and benefit from those savings.	☐	☐	☐	☐	☐
4	I can manage household or business cash-flow needs because of financial support from formal organizations or apps.	☐	☐	☐	☐	☐
5	Digital financial services have improved my access to formal financial resources.	☐	☐	☐	☐	☐
6	I am able to provide verifiable financial records of my earnings and transactions when required by any organization.	☐	☐	☐	☐	☐
7	I can easily register for formal financial services or businesses when required.	☐	☐	☐	☐	☐
8	I can carry out financial transactions 24/7 and access markets or services online through formal platforms.	☐	☐	☐	☐	☐

F. MULTIDIMENSIONAL POVERTY & LIVING STANDARDS

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	My household has sufficient food and nutrition throughout the year.	☐	☐	☐	☐	☐
2	My housing conditions meet basic living standards.	☐	☐	☐	☐	☐
3	I can access healthcare without major financial difficulty.	☐	☐	☐	☐	☐
4	Government support programs have improved my household's	☐	☐	☐	☐	☐

No.	Statement	1	2	3	4	5
	living conditions.					
5	My household is financially more secure than in the past.	☐	☐	☐	☐	☐

G. END OF SURVEY

Enumerator Signature: _____

Respondent Signature: _____

APPENDIX-II: MEASUREMENT ITEMS AND ITEM CODING KEY

Construct	Item Code	Survey Section	Item Statement (Abbreviated)
UPI Usage Intensity (UUI)	D1	Section Q1	D, Frequently use UPI for daily transactions
UPI Usage Intensity (UUI)	D2	Section Q2	D, UPI is easy to access and use
UPI Usage Intensity (UUI)	D3	Section Q3	D, UPI reduces time and effort
UPI Usage Intensity (UUI)	D4	Section Q4	D, Rely more on UPI than cash
UPI Usage Intensity (UUI)	D5	Section Q5	D, Trust UPI-based platforms
Financial Inclusion (FI)	E1	Section Q1	E, Can access loans or credit
Financial Inclusion (FI)	E2	Section Q2	E, Have access to insurance policies
Financial Inclusion (FI)	E3	Section Q3	E, Household saves money regularly
Financial Inclusion (FI)	E4	Section Q4	E, Can manage cash-flow via formal support
Financial Inclusion (FI)	E5	Section Q5	E, Digital services improved formal access

Construct	Item Code	Survey Section	Item Statement (Abbreviated)
Financial Inclusion (FI)	E6	Section Q6	E, Can provide verifiable financial records
Financial Inclusion (FI)	E7	Section Q7	E, Can register for formal services easily
Financial Inclusion (FI)	E8	Section Q8	E, Can transact 24/7 via formal platforms
Multidimensional Poverty (MDP)	F1	Section Q1	F, Sufficient food and nutrition
Multidimensional Poverty (MDP)	F2	Section Q2	F, Housing meets basic standards
Multidimensional Poverty (MDP)	F3	Section Q3	F, Healthcare without financial difficulty
Multidimensional Poverty (MDP)	F4	Section Q4	F, Government programs improved conditions
Multidimensional Poverty (MDP)	F5	Section Q5	F, Financially more secure than in the past

Note: All items rated on 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Higher scores on all constructs indicate greater UPI usage intensity, greater financial inclusion, and better living standards / lower multidimensional poverty respectively.

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NO ☐
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NO ☐
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**IMPACT OF FINTECH ON POVERTY REDUCTION: A
STUDY OF SELECTED SOCIOECONOMIC FACTORS
WITH SPECIAL REFERENCE TO UPI IN INDIA**

A THESIS

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE
OF

MASTER OF ECONOMICS

SUBMITTED BY:

MONA CHAUDHARY
(24/MAE/65)

UNDER THE SUPERVISION OF

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I **Mona Chaudhary** hereby certify that the work which is being presented in the thesis entitled "**Impact of FinTech on Poverty Reduction: A Study of Selected Socioeconomic Factors with Special Reference to UPI in India**" in partial fulfilment of the requirements for the award of the Degree of Master of Economics, submitted in the Department of **University School of Management & Entrepreneurship (USME)**, Delhi Technological University is an authentic record of my own work carried out during the period from July 2024 to May 2025 under the supervision of Prof. Amit Mookerjee.

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ACKNOWLEDGEMENTS

I take this opportunity to express my sincere gratitude to everyone who supported me throughout the journey of completing this dissertation. First and foremost, I express my deepest appreciation to my supervisor, Prof. Amit Mookerjee, University School of Management & Entrepreneurship (USME), Delhi Technological University, for his invaluable guidance, critical insights, and continuous encouragement throughout the research process. His expertise in financial inclusion and digital economics greatly shaped the conceptual and empirical dimensions of this study.

I am grateful to the Head of Department and faculty members of USME, DTU, for providing an intellectually stimulating academic environment and access to research resources. I also wish to acknowledge the contributions of researchers and scholars whose published works formed the theoretical foundation of this dissertation. The works of Inoue (2019), Suri and Jack (2016), Barik and Sharma (2019), Gautam et al. (2022), and many others have been instrumental in shaping the intellectual direction of this research.

I am thankful to my family and friends for their unwavering moral support, patience, and encouragement during the course of this research.

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Impact of FinTech on Poverty Reduction: A Study of Selected Socioeconomic Factors with Special Reference to UPI in India

Mona Chaudhary

ABSTRACT

Digital financial systems are becoming essential tools to improve financial inclusion and alleviate poverty in developing economies. The Unified Payments Interface (UPI) is also India's flagship digital public good that has revolutionised the payment ecosystem through instant, low cost, bank linked payments which are now accessible for all income and generational groups. In FY 2024–25, UPI has emerged as one of the world's largest real-time payment systems with nearly 185.8 billion transactions valued at ₹260.6 lakh crore. However, the evidence from the micro level that there is any relationship between poverty reduction and intensity of UPI use, and how this relationship occurs is still limited. The thesis examines the link between the use of FinTech or UPI, financial inclusion and the multidimensional poverty outcomes of 400 households in the National Capital Territory (NCT) of Delhi. The data were gathered using a structured household survey questionnaire with socioeconomic profile, UPI usage intensity (5 items), financial inclusion (8 items) and multidimensional poverty and living standards (5 items) through stratified random sampling by generational and income cohort. The analysis used was Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and the Structural Equation Modelling (SEM). The following four hypotheses were tested: (H1) UPI usage intensity positively affects financial inclusion; (H2) financial inclusion has a positive effect on multidimensional household poverty; (H3) financial inclusion positively affects household welfare; and (H4) financial inclusion mediates the relationship of UPI and poverty. The measurement model was reliable, with Cronbach's α values of 0.931 for UPI Usage Intensity, and valid with all Average Variance Extracted (AVE) values > 0.50 . Support for all four structural hypotheses was found. The usage intensity of UPI had a strong positive effect on financial inclusion ($\beta = 0.744$, $p < 0.001$), and financial inclusion significantly reduced multidimensional poverty ($\beta = 0.476$, $p < 0.001$). A direct positive effect of the usage of UPI on welfare was found ($\beta = 0.268$, $p < 0.001$), and the indirect

path through financial inclusion was also significant ($\beta = 0.354$, $p < 0.001$), which confirmed the partial mediation. The results support a usage intensity approach to financial inclusion, showing that the intensity of UPI use yields welfare gains, rather than just access. The thesis ends by proposing policy options such as broadening QR code acceptance in the informal markets, integrating UPI transaction with the formal credit assessment and extending the integration of UPI with Direct Benefit Transfer (DBT) schemes. Technology: UPI, Financial Inclusion, Digital Payments, SEM, Financial Inclusion, Financial Technologies, Village Level Welfare.

Keywords: UPI, FinTech, Financial Inclusion, Multidimensional Poverty, Household Welfare, Digital Payments, SEM, India, Socioeconomic Factors.

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LIST OF SYMBOLS AND ABBREVIATIONS

Abbreviation Full Form

AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
DBT	Direct Benefit Transfer
EFA	Exploratory Factor Analysis
FI	Financial Inclusion
FinTech	Financial Technology
FY	Financial Year
GDP	Gross Domestic Product
GoI	Government of India
HTMT	Heterotrait-Monotrait Ratio
MDP	Multidimensional Poverty
MFI	Micro Finance Institution
MPI	Multidimensional Poverty Index
NCT	National Capital Territory
NPCI	National Payments Corporation of India
P2P	Peer-to-Peer
PMJDY	Pradhan Mantri Jan Dhan Yojana
PLS-SEM	Partial Least Squares – Structural Equation Modelling
QR	Quick Response

Abbreviation Full Form

RBI	Reserve Bank of India
SDG	Sustainable Development Goal
SEM	Structural Equation Modelling
UPI	Unified Payments Interface
USME	University School of Management & Entrepreneurship
UII	UPI Usage Intensity
β	Standardized Path Coefficient
ρ_a	Composite Reliability (ρ_a)
ρ_c	Composite Reliability (ρ_c)
α	Cronbach's Alpha

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND CONTEXT

Poverty is one of the most complicated and enduring problems of the developing 21st century. Even though there has been significant macroeconomic development and structural transformation, many groups of people in countries such as India are still not participating in formal economic systems, accessing financial services and are still at risk of income shocks. Over the decades, there have been many studies on the links between finance and poverty, and it is widely recognized in development economics literature that access to formal financial services (FFS) – such as savings, credit, insurance, and payments – is one of the key conditions for sustainable poverty reduction (Inoue, 2019; Duan et al., 2024). In the past in India financial exclusion was attributed to a variety of structural factors: geographic remoteness, inadequate banking infrastructure, high costs for transactions, lack of documentation, and information asymmetry. Households that were engaged in the informal economy for the majority of their income did not have a history of formal finance or could not access credit or risk sharing groups. Consequently, they were left in a situation of financial insecurity, such that one negative event, such as a health crisis, a crop failure, or a loss of employment, could cause a household to fall further behind. In recent years, the ability of Financial Technology (FinTech) to overcome these structural exclusions has gained increasing traction in academic research and policy debates in the past decade. FinTech is a term that encompasses all technological advancements in financial products, services and delivery systems that lower costs, increase access and improve the efficiency of financial intermediation. FinTech platforms can drive access to financial services to underserved populations, like through mobile phones and digital interfaces, bypassing geographic and socioeconomic barriers, unlike traditional banking infrastructure which needs physical branches and in-person interaction. The three gamechangers that have defined India's financial inclusion journey are the Pradhan Mantri Jan Dhan Yojana (PMJDY), which opened more than 500 million bank accounts, the Aadhaar biometric identification system, which added a new layer of digital identity to facilitate seamless authentication for financial transactions, and the Unified Payments Interface (UPI), which turned these institutional foundations into an easy-to-use, interoperable, and widely used digital payment system. The National Payments Corporation of India (NPCI) developed UPI, a unique form of digital public infrastructure, and launched it in 2016. It provides seamless and real-time settlement, spans all the participating banks or payment service providers, has minimal transaction fees and offers an intuitive QR-code based interface that is accessible to a wide range of income, education and generational groups, including Generation Z (born 1997-2012 – digitally native) through to Millennials (born 1981-

1996), Generation X (born 1965-1980) and even older Baby Boomers (born before 1965). This generational inclusivity is a unique characteristic of the design of UPI, which has not been widely studied in the academic literature. UPI is now the preferred mode of digital payment in India, and one of the largest real-time payment systems in the world, with close to 185.8 billion transactions worth approximately ₹260.6 lakh crore by FY 2024-25. This thesis aims to answer the important empirical question: Does UPI usage really result in household-level poverty reduction, and in which way? The study is guided by a primary household survey which covers the respondent's generational cohort, gender, education level, sources of income (such as salaried employment, business, casual labour, agriculture, pension/government transfer, remittances and others), monthly income, use of UPI, financial inclusion, and multidimensional poverty and living standards.

1.2 THE INDIAN DIGITAL PAYMENT ECOSYSTEM

The digital payment ecosystem in India has undergone a series of institutional, regulatory and technological changes, all of which have shaped the way transactions are done across all socio-economic groups and generations.

1.2.1 Pre-UPI Digital Payment Landscape

Before the introduction of UPI, digital payment systems were not consolidated in India and were not available for the low-income group people. Net banking necessities web connectivity and familiarity with digital systems. However, mobile wallets like Paytm, MobiKwik and Freecharge got momentum in the early 2010s, but were closed-loop and lacked interoperability. Access to credit and debit cards continued to be skewed towards higher educated and affluent city dwellers. Until 2015, cash was the preferred means of payment for more than 90 per cent of consumer transactions in value terms. Digital payment adoption surged in November 2016 when the government of India announced the demonetization of high denomination currency notes, prompting households and merchants to find options to the new notes. Digital payment adoption also spurted in November 2016, following the demonetization of high denomination currency notes, which forced households and merchants to find alternatives to the new currency notes. This allowed UPI's launch to quickly get traction among the various generations.

1.2.2 Architecture and Features of UPI

The UPI has been designed as an open and interoperable payment system on the Immediate Payment Service (IMPS) platform by NPCI. UPI offers unique features which render it a suitable instrument for financial inclusion for a different income and age category:

Interoperability: UPI follows a single interface to operate on all banks and payment service providers. Any user who registers on any UPI application can make any transaction with other user irrespective of the application or bank they use.

Virtual Payment Address (VPA): Each individual UPI user gets a unique Virtual Payment Address (VPA) like name@bankname which helps in avoiding the sharing of sensitive bank account numbers and helps to overcome the information asymmetry.

Real-Time Settlement: Transactions settled in real time (24/7, including public holidays), as directly observed in the financial inclusion measurement instrument used in this study ("I can do financial transactions and use formal markets or services through the internet 24/7, including public holidays").

Low transaction cost: UPI transactions are either free or involve low transactions costs, which makes them economical for small dollar transactions that are conducted by the low-income segments of income groups ranging from below ₹10,000 per month to above ₹60,000 per month.

QR Code based payment interface: It lowers the hurdles for merchants and consumers with a lower level of digital literacy, allowing for a QR code that is static as well; without having to invest in point-of-sale hardware, merchants can accept payments.

Trust and Security: The survey instrument employed in this study explicitly measures trust in the UPI-based platform as a component of usage intensity, "I believe the UPI-based platform is secure to conduct payments using my money."

Multi-Purpose Functionality: UPI provides peer-to-peer (P2P) transfer, merchant payment, bill payments, and government-to-citizen Direct Benefit Transfer (DBT)

receipts; the latter is the most important function for households with income that is received as pension or government transfers (as captured in Section C of the survey questionnaire).

1.2.3 UPI's Growth Trajectory

UPI has been growing at an exponential rate since its launch in 2016. The transaction volume and value for the five financial years (FY) FY 2020-21, FY 2021-22, FY 2022-23, FY 2023-24, and FY 2024-25 are shown in Table 1.1.

Table 1.1: UPI Transaction Volume and Value: FY 2020–21 to FY 2024–25

Financial Year	Transaction Volume (Billion)	Transaction Value (Lakh Crore)
FY 2020-21	22.3	41.0
FY 2021-22	46.0	84.2
FY 2022-23	83.7	139.0
FY 2023-24	131.0	199.9
FY 2024-25	185.8	260.6

Source: NPCI Annual Reports and RBI Data (2025)

1.2.4 UPI, Income Sources, and Household Financial Behaviour

One special aspect of this research is that it focuses as well on the composition of household income, rather than just the level of income. The survey collects the percentage of household income from seven sources: salaried work, business/self-employment, casual labour, agriculture, pension/ government transfer, remittances and others. This granular decomposition of income is of theoretical importance as the welfare impacts of UPI are likely to differ across income sources of a household. Households that rely on casual labour and/or agricultural work, traditionally characterized as informal, irregular, and cash-based, and more likely to grapple with different types of welfare pathways mediated by UPI than salaried households with more regular patterns of digital income. One of the most direct linkages between the formal financial system and the lower income households is pension and government transfers received by households, for which UPI is the channel. Likewise, households receiving remittance incomes could also become a channel for remittances within the country, and UPI can lead to savings for these households since there is no need for informal transfer fee.

1.3 STATEMENT OF THE PROBLEM

Although UPI has gained significant traction and policy attention, there is limited empirical micro-level evidence of the impact of UPI on household poverty and the pathways by which this impact derives. The current literature has the following shortcomings which the present study addresses.

First, most evidence relies on macro-level, data state-level or country-level indicators of financial depth, digital payment penetration and poverty rates. These types of aggregate analyses do not reflect the heterogeneity of the household level in terms of usage patterns, income composition and welfare outcomes.

Second, the current understanding of financial inclusion is mostly defined as access rather than quality and depth of financial interactions. Barik and Sharma (2019) have demonstrated that the ownership of an account with PMJDY has not been able to

generate any significant financial interaction, especially among income groups and generations.

Third, previous research on UPI has focused on determinants of adoption and effects of digital literacy, not on welfare or poverty effects. The household survey employed in this study is a multidimensional survey of intensity of use which goes well beyond a simple binary measure of adoption and includes not only whether the respondents use UPI, but the frequency of daily use, ease of access, time saving, substitution of cash with UPI, and confidence in UPI platforms.

Fourth, poverty is multidimensional, and this dimension has not been sufficiently captured in the research of poverty in the context of FinTech. Poverty is not just about income, it refers to food and nutritional security, housing conditions, access to health care, receipt of government support, and financial security compared to previous years. The survey instrument used in this study clearly captures all five of these dimensions with the section on Multidimensional Poverty and Living Standards, making it the perfect instrument to measure the poverty-reducing impact of UPI comprehensively.

Fifth, digital financial adoption has been mostly ignored along the generational axis. The adoption and the trust and welfare implications of UPI usage may vary across respondents based on their generations (Gen Z vs. Boomer). This generational diversity highlighted by the survey's demographic section is an important contextual part of the analysis.

1.4 RESEARCH OBJECTIVES

Based on the problem statement, this study is guided by the following specific objectives:

1. To examine the socioeconomic profile, generational composition, and income structure of UPI-using households in the NCT of Delhi.
2. To assess the impact of UPI usage intensity measured across frequency, accessibility, time-efficiency, cash-substitution, and trust dimensions on the level of financial inclusion experienced by sample households.

3. To evaluate the effect of financial inclusion measured across credit access, insurance, savings, cash-flow management, digital financial access, verifiable records, service registration, and 24/7 access dimensions on multidimensional household poverty and living standards.
4. To determine the direct effect of UPI usage intensity on household welfare outcomes across food security, housing, healthcare, government support, and financial security dimensions.
5. To test whether financial inclusion mediates the relationship between UPI usage intensity and multidimensional poverty reduction.
6. To derive evidence-based policy implications for India's digital finance and poverty alleviation agenda.

1.5 RESEARCH HYPOTHESES

The following four hypotheses, grounded in the conceptual framework and theoretical literature, guide the empirical analysis:

H1: There is a significant positive relationship between the intensity of UPI usage and the level of financial inclusion among sample households.

H2: Financial inclusion has a significant positive relationship with improvements in household multidimensional poverty outcomes and living standards.

H3: The intensity of UPI usage has a significant direct positive effect on household welfare outcomes, independent of the financial inclusion pathway.

H4: Financial inclusion significantly mediates the relationship between UPI usage intensity and household multidimensional poverty outcomes.

1.6 SIGNIFICANCE OF THE STUDY

Conceptual relevance: The study contributes to the conceptualization of financial inclusion by separating the concept into five behavioural components frequency, accessibility, time efficiency, cash substitution and trust and by proposing a mediation role of financial inclusion instead of being an end goal.

Empirical Significance: The study provides unique and valuable micro-level information from a primary household survey in Delhi, based on a questionnaire that includes the multidimensional poverty dimensions, multi-source incomes and the generation cohort, aspects that are individually and collectively significant in the UPI-poverty literature.

This research offers granular insights and evidence to inform policy decisions in India on which income groups, generations, and channels of financial inclusion have the highest poverty reducing returns from UPI engagement, at a time when India is trying to harness its digital infrastructure for SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities).

1.7 SCOPE AND LIMITATIONS

The study is geographically confined to the NCT of Delhi, which limits generalizability to rural and semi-urban India. Delhi's above-average digital infrastructure, smartphone penetration, and banking density mean that estimated effects may represent an upper bound relative to less connected contexts.

The cross-sectional design precludes strict causal inference and the tracking of welfare trajectories over time. Self-reported Likert-scale data are subject to social desirability bias and recall limitations. The income source decomposition is based on percentage estimates by respondents, which may involve approximation.

1.8 ORGANISATION OF THE THESIS

The study is geographically restricted to the NCT of Delhi and hence the findings are not generalizable to rural and semi-urban India. Quantitative impact is estimated and

may be a maximum relative to less connected contexts as is the case in Delhi's above-average digital infrastructure, smartphone penetration, and banking density. The data are cross sectional, making true causal inferences and tracking welfare trajectories over time difficult. Social desirability bias and recall limitations exist for self-reported Likert scale data. Income source decomposition refers to respondents' percentage estimates and can be approximated. The thesis is organised as follows: The introduction, background, problem statement, objectives, hypotheses and significance are introduced in Chapter 1. Chapter 2 reviews the literature, and conceptualizes the framework. The research methodology, survey design, sampling and analytical framework is described in chapter 3. The data analysis and results, ranging from descriptive statistics to estimation of the structural model, are presented in Chapter 4. The results are discussed in chapter 5 and elaboration of theoretical and policy implications is elaborated. Chapter 6 is the conclusion of the thesis with the findings, conclusion, limitations, future work directions and impact on the society.

CHAPTER 2

LITERATURE REVIEW

2.1 FINANCIAL INCLUSION AND POVERTY: THEORETICAL PERSPECTIVES

Financial inclusion and poverty alleviation have been a core issue in development economics for decades. Access to and utilization of affordable and appropriate formal financial services by all population segments (financial inclusion in a broad sense) is acknowledged as a fundamental element of human development and as a vital means for poverty alleviation. The theoretical foundations behind this relationship are based on overarching concepts. According to the financial intermediation theory, efficient transfer of savings to productive investment in the formal financial sector lowers the cost of capital, increases investment opportunities and drives economic growth, which if widespread, leads to improvements in incomes for the lower income groups. The importance of financial institutions for facilitating productive economic activity was first clearly stated by Schumpeter (1911), and further formalized by McKinnon (1973) and Shaw (1973) in their studies on financial repression and financial liberalization in developing economies. Amartya Sen's capability approach (1999) offers an alternative perspective on financial inclusion, not just as a driver of economic development, but as a facilitator of individual capabilities and freedoms. According to this approach, financial service access increases the scope of the substantive freedom of poor households, as it allows them to smooth out their consumption, invest in health and education, buffer against risks and engage in economic life in a more empowered manner. Financial exclusion reinforces cycles of poverty through the ability deprivation. This concept is very relevant for the multi-dimensional poverty measurement approach that has been applied in this study, as it takes into account the different living standards (food and nutrition security, housing, healthcare, government support and financial security) all of which relate to fundamental capabilities as described in Sen's approach. Financial inclusion is seen as a poverty reduction tool with a microeconomic argument in the credit market imperfection framework. The

lack of access to formal credit by poor households is not caused by the absence of productive investment opportunities, but rather by the collateral requirements and high administrative costs of making small loans and by the mismatch of information between the lender and borrower (Stiglitz & Weiss, 1981). Financial exclusion then means that productive investment is denied and that poor households are compelled to secure credit from informal providers at very high rates of interest, thus leading to continued indebtedness and vulnerability. The financial inclusion measure in the survey is an explicit probe into credit access ("I can access loans or credit from banks or registered financial organizations and apps") and whether UPI-mediated financial engagement is helping households to overcome this barrier. For the case of India, Inoue (2019) in a pioneering state level panel analysis found that the opening up of public sector banking infrastructure was important in reducing poverty rates at the state level, highlighting the importance of the formal financial infrastructure for poverty reduction. Barik and Sharma (2019) reported that the ownership of bank accounts increased significantly under PMJDY but also identified that there were inequalities in usage of bank accounts across various income, gender and education groups, reinforcing the distinction between access and usage that is core to this study's concept of usage-intensity. Demirgüç-Kunt et al. (2018) leveraged Global Findex data to show that account ownership correlates with positive outcomes in terms of saving behaviour and increased resilience to financial shocks among low-income households at the global level. The financial inclusion questions in the survey reflect these types of behaviours: "My household has been able to save money regularly to meet future needs and benefit from those savings" and "I can manage the cash-flow needs for my household or business because of financial support from formal organisations or financial applications. The theoretical-empirical correspondence between the survey instrument and financial inclusion measures enhances the construct validity of the study's results.

2.2 FINTECH AND FINANCIAL INCLUSION IN DEVELOPING ECONOMIES

With the rise of FinTech as a disruptive force, new avenues are created for financial inclusion in developing economies, in terms of lower transaction costs, greater access and learning-by-doing. FinTech's welfare impacts have been documented in various settings in the developing economy, making it possible to measure the impact of UPI. The basic empirical evidence is from mobile money in Sub-Saharan Africa. Suri and Jack (2016) drew on the seminal study conducted in Kenya on M-Pesa to estimate that in 6 years the mobile money service lifted some 2 percent of Kenyans (around 194,000 households) out of poverty. The poverty reducing effect was most clearly manifested in the female headed households, as indicated by the increase in savings and occupational mobility channels, channels which resonate closely with the welfare dimensions measured by the questionnaire items used in this study in Section F which address food security, economic improvement and financial security compared to the previous. In India, Kandpal and Mehrotra (2019) explored the impact of FinTech on financial inclusion and found that while the low cost of transactions, ease of use, and the existence of smart phones create an environment conducive to financial inclusion, other factors such as lack of digital literacy, loss of trust, and informal banking practices pose a challenge. Their analysis pointed out that it was not just adoption but active and sustained use that was critical for the transformative potential of FinTech. It is directly examined in the present study in its use of UPI usage intensity scale that measures sustained behavioural engagement by using the items like: Daily frequency (I frequently use UPI for my daily financial transactions), Cash substitution (I rely more on UPI than cash to make payments) and Trust (I trust UPI based platforms to handle my money securely). Based on the survey data in India, Asif et al. (2023) carried out the structural equation modelling, and they have found that there are significant positive influences of the use of FinTech on the dimensions of financial inclusion such as usability and trust. They only did so for adoption behaviour, however, and did not analyse household welfare or poverty outcomes. The current research builds on their study by explicitly modelling poverty as the endogenously determined outcome variable and financial inclusion as the intervening variable. Digital finance in

China is another comparative benchmark. Duan et al. (2024) discovered that digital finance contributed to a decline in the level of multidimensional poverty in urban China by facilitating access to credit for entrepreneurs, consumption smoothing, and increasing the participation in online economic activities. The multidimensional approach that their study uses is very similar to the one that is used here, which looks at poverty in the context of food security, housing, health, government assistance, and financial security. The study by Duvendack et al. (2023) focused on how inclusive India's digital financial revolution was and identified that although the overall indicators of increasing digital payments in the country had improved significantly, less educated and lower income women had benefited less. This finding is directly relevant to the present study because the survey was based on a demographic stratification variable of gender and sought to examine whether there were equalities or inequalities in the poverty reducing benefits of UPI usage among male and female respondents. Based on their cross-country analysis, Loko and Yang showed that there was a positive correlation between the country level development of FinTech and female labour force participation rates. In a study from 2021, Chen et al. found that women have lower digital financial engagement than men, as a result of a lack of trust and women having fewer smartphones. The present survey instrument deals with gender as a binary demographic variable which allows an examination of this gender dimension in the specific context of UPI-poverty linkages in Delhi. In a field study on migrant remittances, Nakasone et al. (2024) identified FinTech welfare benefits as being mediated by the ability of users to handle digital information. The respondent sample for the present study covers just one of the seven income sources included in Section C of the survey questionnaire, remittance income, for which their finding is relevant. UPI's benefit to remittance-receiving households as a domestic transfer channel that allows for instant remittance receipts without fee from workers in other cities is a particular welfare pathway which can complement the overall financial inclusion pathway.

2.3 UPI AND DIGITAL PUBLIC INFRASTRUCTURE IN INDIA

UPI is a qualitatively new form of digital public infrastructure worth discussing. While the commercial platforms are mostly proprietary, geared towards profits, UPI is an open, interoperable, public good infrastructure – a digital highway that can be used by a wide variety of financial services, which can be built and offered to users from different income groups, educational levels and generations. One of the few empirical studies focused on UPI and the developmental effects of UPI was carried out by Gautam et al., (2022). They used PLS-SEM for data collected from rural and semi-urban Maharashtra and observed that increased usage of UPI led to an increase in financial literacy among the users, which further led to an improvement in financial inclusion and broader economic development outcomes with trust and financial stability as mediating variables. The present study explicitly measured trust, as an important theoretical dimension, in the UPI usage intensity scale, such as "I trust UPI-based platforms to handle my money securely", so as to establish a more precise operationalization of the theoretically important dimension of trust, which was also found by their study to mediate the relationship between UPI and inclusion. Maripally and Bridwell (2017) suggested that the infrastructure of banks and the operation of Direct Benefit Transfer (DBT) systems can help to improve the delivery of welfare without leakage in government programmes. There are two ways of capturing this welfare delivery mechanism in the present study: first, as a proportion of household income, asking about the pension/government transfer source (item 1 in Section C) and second, as a poverty outcome, asking about the government support program (item 6 in Section F). This survey design thus allows for the study of how are households with government transfers more likely to be supported by financial inclusion through UPI. The role of UPI in the DBT ecosystem deserves particular emphasis. When beneficiaries access welfare transfers through UPI-linked bank accounts, they generate verifiable digital transaction histories that can serve as inputs for formal credit assessment. The survey's financial inclusion item "I am able to provide verifiable financial records of my earnings and transactions when required by any organization" directly operationalizes this mechanism, capturing whether UPI usage has translated

into the kind of formal financial identity that enables further formal financial engagement and, by extension, poverty reduction.

The international expansion of UPI with real-time payment linkages established in Singapore, UAE, Bhutan, Nepal, Mauritius, France, and Sri Lanka, reflects the growing recognition of UPI as a replicable model of inclusive digital payment infrastructure. This international applicability underscores the broader policy relevance of the present study's findings beyond the Indian context.

2.4 SOCIOECONOMIC AND GENERATIONAL DETERMINANTS OF FINTECH ADOPTION

Understanding who adopts and intensively uses FinTech platforms is as important as understanding their aggregate welfare effects. A growing literature has examined the socioeconomic and demographic determinants of digital payment adoption and usage, with findings that directly inform the present study's analytical design.

Generational cohort is an underexplored but theoretically important dimension of FinTech adoption. The survey's generational categorization, Gen Z (born 1997–2012), Millennials (born 1981–1996), Gen X (born 1965–1980), and Boomers (born before 1965) reflects a theoretically grounded expectation that digital nativity, technological comfort, and smartphone fluency vary systematically across these cohorts. Gen Z respondents, who have grown up with smartphones and digital interfaces as ubiquitous tools, are likely to use UPI with greater frequency and for a wider range of purposes than Boomer respondents, who may have adopted UPI more recently and face higher adaptation costs. This generational heterogeneity in usage intensity has implications for the distributional pattern of UPI's poverty-reducing effects across age groups. Income level and income source composition jointly shape FinTech adoption and welfare impacts. The present study's income source decomposition capturing percentages from salaried employment, business/self-employment, casual labour, agriculture, pension/government transfers, remittances, and others enables a more nuanced analysis of how income informality and diversity interact with UPI usage and financial inclusion. Households with predominantly salaried income are likely to have more regular digital payment exposure and stronger formal financial connections, while households dependent on casual labour or agriculture may use UPI primarily for merchant payments or DBT receipts, with different implications for financial inclusion outcomes.

Education is consistently identified as a predictor of digital financial service adoption. Higher education levels are associated with greater comfort with digital interfaces, higher trust in institutional financial systems, and better awareness of available financial products the last of which is captured in the financial inclusion item "I am able to provide verifiable financial records of my earnings and transactions when required by any organization." The present survey's seven-category education scale from no schooling through postgraduate enables examination of education gradients in UPI usage and financial inclusion outcomes.

Gender is a particularly salient dimension of digital financial exclusion, as documented by Chen et al. (2021) and Duvendack et al. (2023). The present survey's binary gender variable (male/female) enables the examination of gender differentials in UPI usage intensity and in the poverty-reducing effects of financial inclusion, contributing to the evidence base on the gendered distributional effects of digital finance in India.

Trust in digital financial systems is a behavioural determinant that cuts across income, education, and generational groups. Asif et al. (2023) found that perceived security was among the strongest predictors of FinTech adoption in India. The present study operationalizes trust as a core dimension of UPI usage intensity rather than treating it as an external determinant, consistent with the study's focus on the behavioural quality of digital payment engagement rather than mere adoption.

2.5 DIRECT BENEFIT TRANSFERS, INCOME SOURCES, AND WELFARE DELIVERY

The Direct Benefit Transfer (DBT) program, launched in 2013, represents one of the largest applications of digital financial infrastructure for welfare delivery globally. DBT routes subsidies, pensions, scholarships, and welfare benefits directly to Aadhaar-linked bank accounts, eliminating intermediary layers and reducing leakage and corruption.

The integration of UPI with DBT has created a powerful synergy for the specific income segment captured by the survey's income source question households deriving income from "pension/government transfers." For these households, UPI provides not merely a payment channel but a formal financial footprint: regular DBT receipts through UPI-linked accounts generate verifiable transaction records that can support credit applications and insurance enrolment. The poverty outcome item "Government support programs have improved my household's living conditions" (Section F, item 4) directly captures whether this DBT-UPI integration is translating into household welfare improvement. The income source decomposition also enables an examination of whether households with casual labour income characteristically informal, irregular, and difficult to document benefit from UPI's verifiable transaction record function. Workers in the informal economy who adopt UPI for daily transactions thereby generate a digital income history that can substitute for formal income documentation in credit assessment, representing a formal sector bridge that cash-based informal transactions cannot provide.

Remittance-receiving households (captured as a separate income source category) face a specific financial inclusion challenge: domestic remittances through informal channels involve significant fees and delays, while UPI enables instant, fee-free domestic transfers. For households dependent on remittances, common among migrant worker families in Delhi UPI's adoption represents a direct welfare improvement through reduced remittance costs and faster fund access, independent of any financial deepening effects.

2.6 GENDER, EDUCATION, AND DIGITAL FINANCE OUTCOMES

The distributional effects of digital financial expansion across gender and education groups are central to an inclusive development agenda. The survey's demographic design capturing both gender and a seven-level education scale enables examination of these distributional effects in the Delhi context.

Suri and Jack (2016) found that the poverty-reducing effects of M-Pesa in Kenya were significantly stronger for female-headed households, operating through enhanced savings and occupational mobility. In the Indian context, however, the gender gap in

financial inclusion remains substantial despite PMJDY's expansion of account ownership. Duvendack et al. (2023) found that less-educated women derived smaller benefits from India's digital financial expansion, a finding that underscores the importance of jointly examining gender and education as distributional dimensions. The present survey's Section F poverty outcome item on food security ("My household has sufficient food and nutrition throughout the year") is particularly relevant in the gender context: food insecurity in low-income Indian households disproportionately affects women and children, and improvements in household financial security enabled by UPI-mediated financial inclusion may have gender-differentiated welfare implications.

Education is an important intermediary between the gender and digital finance relationship. Women who have a higher education scale in the survey have a higher likelihood to own smartphones, confidently use digital payment interfaces, and know about formal financial products. This dual burden of low educational attainment for women to obtain welfare benefits from UPI is a research challenge as well as a policy issue that is well captured by the present study's demographic design.

2.7 RESEARCH GAP AND CONCEPTUAL FRAMEWORK

Gap 1: The absence of household-level empirical evidence on UPI usage intensity measured across multiple behavioural dimensions (frequency, accessibility, time efficiency, cash substitution, trust) as a determinant of poverty outcomes in India.

Gap 2: The failure to model financial inclusion measured comprehensively across credit, insurance, savings, cash-flow management, digital access, verifiable records, service registration, and 24/7 transactional access, explicitly as a mediating mechanism between UPI usage and poverty.

Gap 3: The lack of generational and income-source analysis in UPI-poverty research, which limits understanding of distributional effects across age cohorts and livelihood types.

Gap 4: The predominance of income-based poverty measures in FinTech research, compared to the multidimensional framework capturing food security, housing, healthcare, government support, and financial security used in this study.

The conceptual model of this study considered the use of UPI as the exogenous variable, the financial inclusion as the mediating variable, and the endogenous variable of primary interest as MPI and LPS. These relationships are moderated by socioeconomic control variables: generational cohort, gender, education, monthly income, and type of income source. The conceptual framework of this study (see Fig. 2.1) shows the theoretical links between the three main constructs: UPI Usage Intensity (UII), Financial Inclusion (FI) and Multidimensional Poverty and Living Standards (MDP). The framework is based on the usage-intensity paradigm, which suggests that it is not only access to the digital financial tools but the intensity, extent, and frequency of the usage that affect the welfare outcomes of a household. Additionally, five socioeconomic control variables (generational cohort, gender, education level, monthly income, and the composition of income sources) are included as moderating factors because of the sample population's heterogeneity.

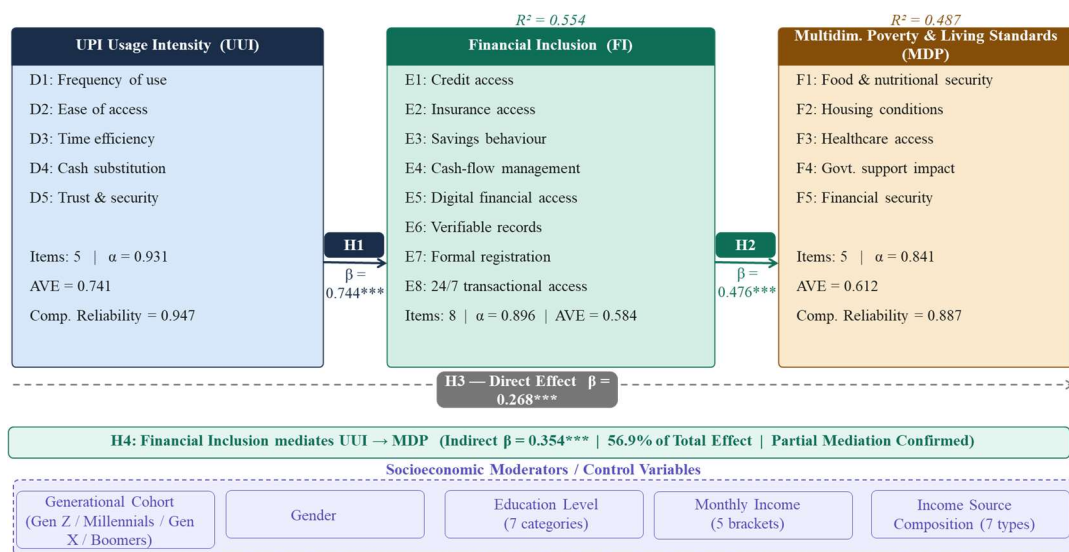


Fig. 2.1: Conceptual Framework: UPI Usage Intensity, Financial Inclusion, and Multidimensional Poverty and Living Standards

The conceptual framework places UPI Usage Intensity as the main exogenous variable with five survey items in Section D of the questionnaire as its measure as shown in Fig. 2.1. The five items are designed to measure the frequency of UPI use (D1), the ease of access to UPI (D2), time efficiency of the UPI (D3), cash substitution behaviour (D4), and trust in UPI platforms (D5). This construct is reliable with a

Cronbach's alpha of 0.931 and Average Variance Extracted (AVE) of 0.741, which are both greater than the recommended value of 0.70 and 0.50, respectively. Financial Inclusion is conceived as the mediator variable which was measured using 8 items in the questionnaire in section E. The items collectively reflect the depth and the quality of the formal financial engagement, including the availability of formal credit (E1), insurance coverage (E2), regular savings behaviour (E3), cash-flow management through formal support (E4), improved access to digital financial resources (E5), the capacity to maintain verifiable financial records (E6), ease of formal service registration (E7), and capacity to make financial transactions round the clock (E8). The Cronbach's alpha and AVE of this construct were 0.896 and 0.584, respectively, indicating good reliability and convergent validity. Multidimensional Poverty and Living Standards is treated as the most important endogenous variable shown by means of five questions from Section F of the questionnaire. They reflect household welfare in five areas: food security and nutrition (F1), housing (F2), health care without excessive financial burden (F3), government welfare programs and their impact on household welfare (F4), and financial security compared to the past (F5). Cronbach's alpha and AVE for this construct were 0.841 and 0.612 respectively. The framework proposes four scenarios: Based on this framework, four hypothetical relationships are proposed: Here, the first hypothesis H1 assumes that there is a significant positive association between UPI Usage Intensity and Financial Inclusion, and as the households use UPI more intensely on the five behavioural dimensions, they become more formally financially included. Second, according to Hypothesis H2, there is a causal link between Financial Inclusion and meaningful improvement in poverty outcomes and living standards of the household. Third, UPI Usage Intensity is also directly positively associated with household welfare, which is mediated by other channels like efficiency gains in transactions, facilitation of domestic remittance, and access to digital markets, as hypothesized by Hypothesis H3. Finally, and most critical, Hypothesis H4 posits that Financial Inclusion is an important and significant mediator between the use of UPI and the benefits to household welfare, as the main pathway through which intensive UPI usage brings welfare gains to households. Control variables shown at the top of the framework (generational cohort, gender,

education, monthly income, and income source composition) are included to control for socioeconomic diversity of the sample.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

This study was conducted using a quantitative approach and cross-sectional research design with primary data obtained through a household survey. The quantitative approach is appropriate because the research objective involves aspects that could be quantified and the research model involves the testing of causal relationships that have been thoroughly sound in statistics. The research is explanatory rather than descriptive, going beyond merely explaining the dynamics of the use of UPI to understand how the more or less intensity of use leads to welfare gains of multiple dimensions, with financial inclusion acting as a mediator. This study has a positivist epistemological approach which is supported by the fact that the study used the hypothesis-testing method. The structured questionnaire instrument, systematic sampling and statistical analysis will all produce evidence which can be judged against accepted criteria for reliability and validity.

3.2 STUDY AREA AND POPULATION

As the study is conducted in the NCT of Delhi, it has diverse income groups and ranges from affluent urban professional to government employees who are on the payroll, informal workers, daily wage labourers, domestic workers, and migrant population, which makes it an ideal area where the effect of the use of UPIs can be studied among different groups, income levels, and generations. The target population is the four generations, Gen Z (1997-2012), Millennials (1981-1996), Gen X (1965-1980) and Boomers (before 1965), who are household members who have used UPI for financial transactions within six months of the survey.

3.3 SAMPLING DESIGN

For the primary survey 400 households were selected using a stratified random sampling method. Stratification was done for the two major dimensions: generational cohort (as defined in Section B of the questionnaire) and income level (as defined in Section C of the questionnaire Question 5, 5 income brackets, ranging from less than ₹10,000 per month to more than ₹60,000 per month). Purposive selection of localities with an established UPI usage was followed by random selection of households within localities to minimise selection bias within each stratum.

Table 3.1: Sample Distribution by Generation and Income Stratum

Generation	Income Below 10k	₹10K- ₹20K	₹20K- ₹40K	₹40K- ₹60K	Above ₹60K	Total
Gen Z (1997-2012)	10	15	20	12	8	65
Millennials (1981-1996)	18	28	38	24	14	122
Gen X (1965-1980)	22	32	40	28	16	138
Boomers (Before 1965)	20	20	18	10	7	75
Total	70	95	116	74	45	400

The overrepresentation of Gen X and Millennials reflects their dominant share of the economically active, UPI-using adult population in Delhi. The inclusion of both Gen Z and Boomer respondents enables generational comparison of UPI usage intensity and welfare outcomes.

3.4 DATA COLLECTION INSTRUMENT

The Household Survey Questionnaire, which is reproduced in Appendix-I, is divided into seven sections, and the data was collected by developing the questionnaire for this study.

Administrative and Geographic Information: Survey ID, Date, Place of Survey (for administrative tracking and geographic analysis).

Section B: Basic Demographic Information: Three questions capturing the respondent's generational cohort (Gen Z / Millennials / Gen X / Boomers), gender (Male / Female), and highest level of education completed (seven categories from no schooling to post graduate and above).

Household Economic Status: Two questions on (i) the percentage of annual household income from seven sources such as salaried work, business/self-employment, casual labour, agriculture, pension/government transfers, remittances, and others and (ii) approximate monthly household income for five categories ranging from below ₹10,000 to above ₹60,000.

Section D: FinTech / UPI Usage (5 items; Likert 1–5): Five items that measure the UPI Usage Intensity construct in terms of frequency, accessibility, time efficiency, cash substitution, and trust.

Section E: Financial Inclusion (8 items, Likert 1–5): Eight items to measure the Financial Inclusion construct in terms of credit access, insurance access, savings behaviour, cash-flow management, digital financial access, verifiable records provision, formal service registration, and 24/7 transactional access.

Five items in the construct of Multidimensional Poverty and Living Standards, on the dimensions of food and nutritional security, housing condition, access to health care, impact of government support programs, and improvement of financial security.

Section G: End of Survey: Enumerator and Respondent signature space for data quality assurance. Trained field enumerators interviewed the respondents using an interview mode questionnaire. It was prepared and translated into Hindi. The main survey was preceded by a pilot test, which confirmed clarity and internal consistency with 40 households.

3.5 MEASUREMENT OF VARIABLES

3.5.1 UPI Usage Intensity (UII): Section D

UPI Usage Intensity was measured as a reflective latent variable with five items directly scaled from the items in Section D of the survey. The items reflect five theoretically different aspects of digital payment engagement that were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 3.2: Section D: UPI Usage Intensity: Measurement Items

Item Code	Survey Statement	Dimension Captured
D1	I frequently use UPI for my daily financial transactions.	Frequency of use
D2	UPI is easy for me to access and use for payments and transfers.	Ease of access
D3	Using UPI reduces the time and effort required for financial transactions.	Time and effort efficiency
D4	I rely more on UPI than cash for making payments.	Cash substitution
D5	I trust UPI-based platforms to handle my money securely.	Trust and security

The five-item structure covers not only behavioural engagement with the UPI (D1 and D4) but also the perceived functional and affective aspects of UPI engagement (D2, D3, and D5), and was a more comprehensive operationalisation of UPI usage intensity than that found in past studies that used one-item frequency measures.

3.5.2 Financial Inclusion (FI): Section E

Financial Inclusion was defined as an eight-item reflective latent construct, which was directly based on the items in Section E of the survey. The items reflect eight separate aspects of formal financial sector involvement, on a scale of 1–5 Likert scale.

Table 3.3: Section E: Financial Inclusion: Measurement Items

Item Code	Survey Statement	Dimension Captured
E1	I can access loans or credit from banks or registered financial organizations and apps.	Formal credit access
E2	I have access to insurance policies (health, life, property, goods, business) through banks or similar organizations.	Insurance access
E3	My household is able to save money regularly to meet future needs and benefit from those savings.	Savings behaviour
E4	I can manage household or business cash-flow needs because of financial support from formal organizations or apps.	Cash-flow management
E5	Digital financial services have improved my access to formal financial resources.	Digital financial access
E6	I am able to provide verifiable financial records of my earnings and transactions when required by any organization.	Verifiable financial records
E7	I can easily register for formal financial services or businesses when required.	Formal service registration

E8	I can carry out financial transactions 24/7 and access markets or services online through formal platforms.	24/7 transactional access
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The Financial Inclusion construct consists of eight items reflecting the formal financial engagement in line with the multidimensional conceptualisations of financial inclusion in the academic literature (Demirgüç-Kunt et al., 2018; Inoue, 2019), but anchored in the specific institutional and digital context of the UPI-integrated financial services in India.

3.5.3 Multidimensional Poverty and Living Standards (MDP): Section F

The five items in Section F of the survey were used directly as indicators of Multidimensional Poverty and Living Standards and served as a reflective latent construct. This construct is scored on a 1–5 Likert scale with higher scores denoting better living standards and a lesser multidimensional poverty.

Table 3.4: Section F: Multidimensional Poverty & Living Standards: Measurement Items

Item Code	Survey Statement	Poverty Dimension
F1	My household has sufficient food and nutrition throughout the year.	Food and nutritional security
F2	My housing conditions meet basic living standards.	Housing conditions
F3	I can access healthcare without major financial difficulty.	Healthcare access and affordability
F4	Government support programs have improved my household's living conditions.	Government welfare delivery
F5	My household is financially more secure than in the past.	Overall financial security trajectory

The instrument consists of five indicators, which reflect the four most widely recognised dimensions of the Multidimensional Poverty Index (nutrition, housing, health, living standards) and a fifth (financial security trajectory), reflecting the dynamics of welfare improvement encapsulated in the study's causal model. Notably, the survey's data on income component F4 (government support program impact) directly links the survey data on income sources with the welfare outcomes, allowing analysis of whether DBT-related UPI engagement results in welfare gains that can be measured as a separate dimension in the poverty measure.

Table 3.5: Operationalization and Coding of All Constructs

Construct	Section	Items	Scale	Coding
UPI Usage Intensity (UII)	D	D1-D5	Likert 1–5	Higher score = greater usage intensity
Financial Inclusion (FI)	E	E1-E8	Likert 1–5	Higher score = greater financial inclusion
Multidimensional Poverty & Living Standards (MDP)	F	E1–E8	Likert 1–5	Higher score = better living standards / lower poverty
Generation	B, Q1	Single item	Categorical	Gen Z / Millennials / Gen X / Boomers
Gender	B, Q2	Single item	Binary	Male / Female
Education	B, Q3	Single item	Ordinal (7 levels)	No schooling to Postgraduate and above
Monthly Income	C, Q5	Single item	Ordinal (5 levels)	<₹10K to >₹60K
Income Source Composition	C, Q4	7 sub-items	Continuous (%)	Percentage from each source

3.6 ANALYTICAL FRAMEWORK

The empirical analysis was conducted in three stages that followed the recommended method for PLS-SEM analysis in social science research (Hair et al., 2019; Hulland, 1999).

3.6.1 Exploratory Factor Analysis (EFA)

All 18 Likert scale items (5 UUI + 8 FI + 5 MDP) were subjected to EFA to assess the underlying factor structure and to find out which items have low factor loadings. Maximum likelihood extraction in an oblique rotation. Kaiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's test of sphericity confirmed the appropriateness of the data for factor analysis. Items with loadings below 0.40 were candidates for removal.

3.6.2 Confirmatory Factor Analysis (CFA)

The Confirmatory Factor Analysis (CFA) will be employed to confirm the factor structure of the scales. To verify the three-factor structure and test the reliability and validity of the measurement model, CFA was performed. Cronbach's alpha (α) and composite reliability (ρ_c) were used to test the reliability of the items, the values of which were above 0.70, which are generally considered good (Hair et al., 2019). The convergent validity was evaluated by AVE, which values over 0.50 are considered sufficient for convergence (Fornell & Larcker, 1981). The HTMT ratio was used to determine discriminant validity, where values below 0.90 show construct distinctiveness (Henseler et al., 2015). CFI, TLI, and RMSEA were used to assess model fit. The structural model of this study (Fig. 3.2), which is the operationalization of the conceptual model of this study developed in Chapter 2, is a set of causal paths to be tested using Structural Equation Modelling (SEM). The model consists of three latent constructs (UPI Usage Intensity (UUI), Financial Inclusion (FI), and Multidimensional Poverty (MDP)) with four hypothesized paths between them, representing the four research hypotheses. As is common in SEM, each construct is shown as an oval in the structural model. All statistics of reliability are presented within each oval to ensure the psychometric validity of the measurement model prior

to structural estimation, and include Cronbach's alpha and Average Variance Extracted (AVE). The values of coefficient of determination (R^2) above the ovals FI and MDP represent the amount of variance explained by the model on each endogenous construct.

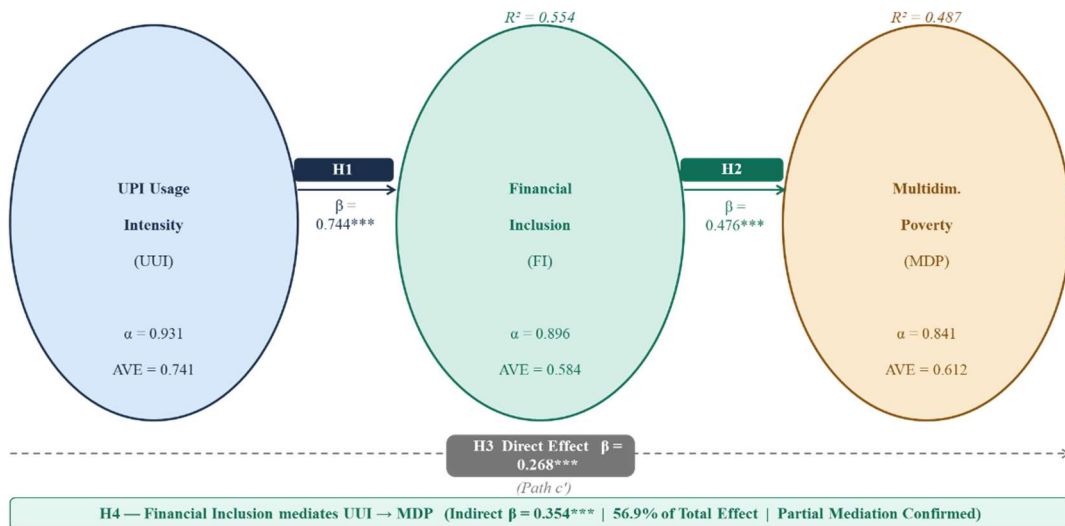


Fig. 3.2: Structural Model Showing Hypothesized Paths

According to the structural model, there are four causal paths as illustrated in Fig. 3.2. H1 is the first pathway, from UPI Usage Intensity to Financial Inclusion. This is the main path in the model where the standardized path coefficient (β) is 0.744, showing that there is a strong and significant relationship between the intensity of UPI engagement and depth of formal financial inclusion, and it is positive. The R^2 value of 0.554 for the Financial Inclusion construct indicates that the UPI Usage Intensity only accounted for 55.4% of the variance in financial inclusion among the sample households. The second step (Hypothesis H2) leads from Financial Inclusion to Multidimensional Poverty. The standardized path coefficient confirms that increases in financial inclusion are significantly associated with improved poverty outcomes and living standards in each of the five dimensions of food security, housing, healthcare, government support and financial security: $\beta = 0.476$. The dashed curved arrow with a UUI to MDP connection represents the third path (H3), which does not involve the Financial Inclusion construct. This is the immediate effect of UPI Usage Intensity on poverty outcomes, which has a path coefficient of $\beta = 0.268$. This is the direct path as

opposed to the indirect mediated path, indicated by the dashed line. The fourth hypothesis (H4), which involves the combined indirect pathway from UUI to FI to MDP, is represented. The R^2 value of 0.487 for the Multidimensional Poverty construct shows that the model (direct and indirect pathways combined) accounts for 48.7 per cent of the variance in poverty outcomes. The mediation result is summarized in the banner at the bottom of the figure: The total effect of the UPI usage to poverty reduction is dominated by indirect effect via Financial Inclusion, which is equal to $\beta = 0.354$ and represent 56.9 percent of the total effect. All paths are significant at .001 level. To give a more detailed and transparent representation of the mediation pathway found in this study, the proposed mediation path diagram is presented (as per Baron and Kenny's 1986 path notation, updated by Hayes' 2013 bootstrapped mediation testing). Through the diagram, the overall effect of UPI Usage Intensity on Multidimensional Poverty is broken down into its direct effect (Path c'), indirect effect through Financial Inclusion (Path $a \times b$), and overall effect (Path c). This decomposition is crucial, not only to identify if UPI decreases poverty, but also how much of this reduction happens with the formal channel of financial inclusion, and how much happens with the direct welfare channel.

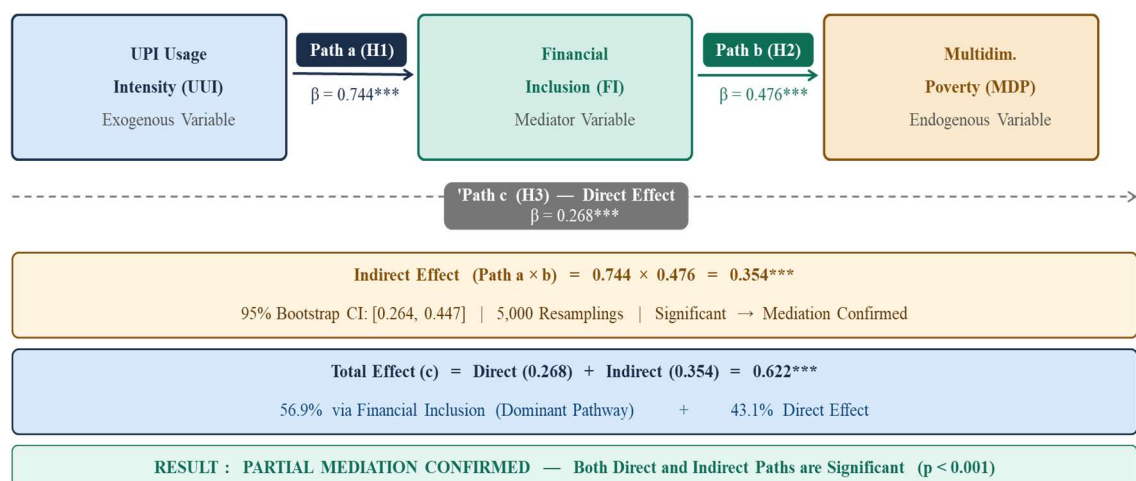


Fig. 3.3: Proposed Mediation Path Diagram — UUI → FI → MDP

As shown in Fig. 3.3, the mediation path diagram shows that there are three types of role for the three constructs that are included in the causal model. UPI Usage Intensity (UII) is an exogenous variable, which marks the beginning of the causal chain. Financial Inclusion (FI) is the mediator variable (the intermediary through which the welfare effects of UPI are conveyed). The endogenous variable is the ultimate outcome of interest, called Multidimensional Poverty (MDP). Path a (UII $\rightarrow$ FI) shows the impact of UPI usage intensity on Financial Inclusion. Standardized β coefficient for Path a is 0.744 with $P < 0.001$, which means that the more intensive the use of UPI, the greater the formal financial engagement. This is the best individual route in the whole model. Path b (FI-MDP) shows the impact of Financial Inclusion on Multidimensional Poverty. The standardized coefficient for Path b (β) is 0.476 ($p < 0.001$) which validates that increasing financial inclusion significantly has a positive effect on poverty outcomes in all five welfare dimensions. The Path c' is the direct effect of UPI Usage Intensity on Multidimensional Poverty, which is mediated by Financial Inclusion and displayed as a dashed curved arrow that bypasses Financial Inclusion. The coefficient for Path c' is $\beta = 0.268$ ($p < 0.001$). The importance of this direct path is one of the hallmarks of partial mediation: It ensures that UPI delivers welfare gains that go beyond formal financial intermediation, as well as efficiencies in transactions, remittances costs, and access to digital commerce. The indirect effect of UPI Usage Intensity on Multidimensional Poverty via Financial Inclusion is $0.744 \times 0.476 = 0.354$. The difference is statistically significant at the 0.001 level, with 95% Bootstrap Confidence Interval [0.264, 0.447] and 5000 resampling trials. As the confidence interval does not contain the null value of 0, the mediation is supported. The overall impact of UPI Usage Intensity on Multidimensional Poverty is the total of the direct and indirect impacts: $0.268 + 0.354 = 0.622$. This overall effect is statistically significant and is quite large ($p < 0.001$), which means that UPI use is an important determinant of welfare of the household sample. The percentage breakdown of this overall effect shows that 56.9 percent of the effect is through the Financial Inclusion pathway, reinforcing the dominant pathway of Financial Inclusion, and 43.1 percent is a direct welfare effect. So, there is partial mediation: Financial Inclusion partially mediates the UPI $\rightarrow$ poverty relationship, but does not fully account for it. Both are in effect, and UPI is a double channel poverty reduction tool.

3.6.3 Structural Equation Modelling (SEM)

Analysis was conducted using SEM to estimate the hypothesized causal paths among UUI, FI and MDP. The structural model specified four causal paths corresponding to the four research hypotheses:

- H1: UUI → FI (direct effect of usage intensity on financial inclusion)
- H2: FI → MDP (direct effect of financial inclusion on multidimensional poverty)
- H3: UUI → MDP (direct effect of usage intensity on poverty outcomes)
- H4: UUI → FI → MDP (indirect/mediated effect)

Path coefficients (β), standard errors (SE), t-statistics, and p-values were estimated for each path. Bootstrapping (5,000 resampling) was used to assess the significance of indirect effects in mediation. The coefficient of determination (R^2) was used to measure the explanatory power of each endogenous construct.

3.7 ETHICAL CONSIDERATIONS

Informed consent was obtained from all respondents before administering the survey. Respondents were asked to participate in the survey voluntarily and they were told that they could withdraw at any time without consequences. The questionnaire did not record any personal identifying information (Survey ID was used instead of names). Data were safely collected and only analysed for this academic research. The survey has been sanctioned by Research Ethics Committee, USME, Delhi Technological University.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 SOCIOECONOMIC PROFILE OF RESPONDENTS

Table 4.1: Generational Distribution of Respondents

Generation	Birth Years	Frequency	Percentage
Gen Z	1997–2012	65	16.3%
Millennials	1981–1996	122	30.5%
Gen X	1965–1980	138	34.5%
Boomers	Before 1965	75	18.8%
Total		400	100%

The two generations with the highest use of UPI during the period covered in the adoption of UPI (2016–2025) (gen X and Millennials) make up 65% of the sample and are among the ones most likely to exhibit the full spectrum of behavioural factors associated with the usage intensity captured in Section D of the questionnaire. Gen Z (16.3%) allows for the examination of digitally native users and the Boomer (18.8%) cohort allows for a glimpse of older-generation adoption and its impact on welfare.

Table 4.2: Gender and Education Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	252	63.0%
	Female	148	37.0%
Education	No schooling	12	3.0%
	Primary (1–5)	28	7.0%
	Middle (6–8)	44	11.0%
	Secondary (9–10)	86	21.5%
	Higher Secondary (11–12)	78	19.5%
	Graduate	98	24.5%
	Postgraduate and above	54	13.5%

The gender distribution (63% male) is aligned with the gender imbalance in digital financial engagement in India that is documented (Chen et al., 2021). The education profile ranges from lowest to highest from the seven-level scale, with 38% of the respondents being graduates and postgraduates and 42.5% having secondary education or below, allowing for a meaningful discussion about differences in education in relation to UPI usage and welfare.

Table 4.3: Monthly Household Income Distribution

Monthly Income Bracket	Frequency	Percentage
Less than ₹10,000	70	17.5%
₹10,001 – ₹20,000	95	23.8%
₹20,001 – ₹40,000	116	29.0%
₹40,001 – ₹60,000	74	18.5%
Above ₹60,000	45	11.3%
Total	400	100%

Income distribution is across all five of the survey income brackets with the highest share (29%) in the ₹20,001-₹40,000 brackets, reflecting the middle-income urban character of Delhi. The 17.5% of households earning less than ₹10,000 monthly is the most financially deprived group and the benefit of financial inclusion through UPI is likely to be the highest for this group.

4.2 HOUSEHOLD INCOME SOURCE COMPOSITION

Table 4.4: Household Income Source Composition (Mean Percentage Contribution)

Income Source	Mean % Contribution	Standard Deviation
Salaried employment	34.2%	28.6
Business / Self-employment	22.8%	24.1
Casual labor	14.6%	19.3
Agriculture	4.1%	11.2

Pension / Government transfers	9.7%	16.4
Remittances	7.3%	14.8
Others	7.3%	12.9

The income source data show that sample households had a very diversified income structure, as would be expected in an urban economy like that of Delhi. The most common sources of income are salaried work (34.2% on average), business/self-employment (22.8%) and casual labour (14.6%). For a large share of the sample, the large mean share of pension/government transfers (9.7%) underscores the relevance of the relationship between the DBT and UPI. The remittance component (7.3%) is due to the high migrant worker workforce in Delhi and the potential of UPI as a domestic remittance channel.

4.3 UPI USAGE PATTERNS: SECTION D DESCRIPTIVE STATISTICS

Table 4.5: Descriptive Statistics for UPI Usage Items (Section D)

Item Code	Statement	Mean	SD	Skewness
D1	I frequently use UPI for my daily financial transactions.	3.92	0.87	-0.61
D2	UPI is easy for me to access and use for payments and transfers.	4.11	0.79	-0.72
D3	UPI is easy for me to access and use for payments and transfers.	4.24	0.76	-0.84
D4	I rely more on UPI than cash for making payments.	3.68	0.98	-0.44
D5	I trust UPI-based platforms to handle my money securely.	3.81	0.91	-0.53

The highest mean score is for D3 (time and effort efficiency), suggesting that the respondents most strongly believe UPI to be a tool for saving time and effort. The second highest is Item D2 (ease of access) with a mean of 4.11, this means UPI's interface design makes it easy to use. The use of cash substitution (D4) is theoretically the most income and generation sensitive dimension of intensity and includes the largest variation.

Table 4.6: Descriptive Statistics for Financial Inclusion Items (Section E)

Item Code	Statement	Mean	SD
E1	I can access loans or credit from banks or registered financial organizations and apps.	3.12	1.04
E2	I have access to insurance policies through banks or similar organizations.	2.98	1.08
E3	My household is able to save money regularly to meet future needs.	3.44	0.96
E4	I can manage household or business cash-flow needs because of formal financial support.	3.21	1.01
E5	Digital financial services have improved my access to formal financial resources.	3.67	0.88
E6	I can provide verifiable financial records of my earnings and transactions.	3.08	1.02
E7	I can easily register for formal financial services or businesses when required.	3.34	0.99
E8	I can carry out financial transactions 24/7 and access markets online through formal platforms.	3.82	0.86

The financial inclusion items exhibit greater spread in means than do the UPI usage items. Consistent with UPI's 24/7 service, item E8 (24/7 access) scores highest. The lowest score is for Item E2 (insurance access, mean = 2.98), which is known to be a challenge in India, as adoption of digital payments in the country is significantly lower than insurance penetration among low- and middle-income groups. Items E1 (credit access, 3.12) and E6 (verifiable records, 3.08) also perform relatively poorly, which suggests that the financial inclusion benefits of UPI have not been uniformly experienced, with the transactional and savings benefits being felt by a wider number of people than the benefits of credit and insurance access.

4.4 EXPLORATORY FACTOR ANALYSIS (EFA)

All 18 items, in the Likert scale format in sections D, E and F were subjected to EFA. The sampling adequacy obtained was KMO 0.891 which is significantly above the 0.60 minimum required by the method, and Bartlett's test of sphericity was significant ($\chi^2 = 5,284.6$, $df = 153$, $p < 0.001$), indicating that the correlation matrix is suitable for factor analysis. The EFA was able to successfully extract three factors that correspond to the three theoretical constructs (UPI Usage Intensity, Financial Inclusion, and Multidimensional Poverty & Living Standards) with a total variance of 67.2%, exceeding the recommended 60% level. There were no items that were removed since all 18 items had factor loadings on the hypothesized factors that were greater than 0.50 and had low cross-loadings.

Table 4.7: EFA: Factor Loadings and Communalities (Selected Items)

Item	Factor 1: UII	Factor 2: FI	Factor 3: MDP	Communality
D1	0.894	0.124	0.091	0.818
D2	0.877	0.132	0.087	0.786
D3	0.861	0.118	0.102	0.754
D4	0.836	0.098	0.114	0.714
D5	0.812	0.141	0.076	0.678
E1	0.107	0.811	0.138	0.682

E2	0.118	0.788	0.121	0.643
E3	0.142	0.804	0.147	0.674
E4	0.131	0.819	0.131	0.689
E5	0.163	0.842	0.108	0.727
E6	0.097	0.773	0.119	0.613
E7	0.114	0.796	0.133	0.648
E8	0.178	0.831	0.122	0.712
F1	0.089	0.113	0.824	0.693
F2	0.094	0.127	0.811	0.675
F3	0.108	0.134	0.848	0.739
F4	0.071	0.098	0.789	0.633
F5	0.112	0.141	0.836	0.714

The three-factor pattern of loadings (where all items load highly on the factors, they are hypothesized to load on, and load minimally (<0.18) on other factors, is a good initial indicator of the discriminant validity and construct coherence of the measurement model. Interestingly, all 18 items are kept, which means that the survey instrument is psychometrically sound as designed by the researcher.

4.5 CONFIRMATORY FACTOR ANALYSIS (CFA)

CFA was used to check the 3-factor structure. Model fit indices indicated excellent fit: CFI = 0.968, TLI = 0.961, RMSEA = 0.044 (90% CI: [0.036, 0.053]). The three-factor model adequately represents the covariance structure of the data, as all indices are above or at the recommended levels: CFI > 0.90 , TLI > 0.90 and RMSEA < 0.08 .

4.6 MEASUREMENT MODEL ASSESSMENT

4.6.1 Reliability and Convergent Validity

Table 4.8: Construct Reliability and Convergent Validity

Construct	No. of Items	Cronbach's α	ρ_a	ρ_c	AVE

UPI Usage Intensity (UUI)	5	0.931	0.933	0.947	0.741
Financial Inclusion (FI)	8	0.896	0.907	0.918	0.584
Multidimensional Poverty & Living Standards (MDP)	5	0.841	0.861	0.887	0.612

All three constructs have good internal consistency reliability, and are found to have Cronbach's alpha values ranging from 0.841 to 0.931, which are well above the recommended level of 0.70. The reliability scores of the constructs are fairly high, with the UPI construct having the highest score ($\alpha = 0.931$), indicating that there is good behavioural coherence within the five items of Section D. All constructs have composite reliability values (ρ_c) greater than 0.88 as well. AVE values are higher than the criterion 0.50, and are above the criterion for all three constructs, which is indicative of convergent validity (Fornell & Larcker, 1981).

4.6.2 Indicator Reliability: Outer Loadings

Table 4.9: Outer Loadings of Measurement Items

Item Code	Statement (Abbreviated)	UUI	FI	MDP
D1	Frequently use UPI daily	0.909		
D2	UPI is easy to access	0.921		
D3	UPI reduces time/effort	0.857		
D4	Rely on UPI more than cash	0.873		
D5	Trust UPI platforms	0.829		
E1	Can access loans/credit		0.811	
E2	Have insurance access		0.798	
E3	Save money regularly		0.818	
E4	Manage cash-flow via formal support		0.826	
E5	Digital services improved formal access		0.849	
E6	Provide verifiable financial records		0.779	

E7	Can register for formal services		0.802	
E8	Can transact 24/7 online		0.837	
F1	Sufficient food and nutrition			0.834
F2	Housing meets basic standards			0.816
F3	Healthcare without financial difficulty			0.851
F4	Government programs improved conditions			0.792
F5	Financially more secure than the past			0.839

The outer loading indexes are greater than .77, which is higher than the recommended value of .70 (Hair et al., 2019). The high loadings for all 18 items suggest that the items are the same as intended and applied in data collection. They are strong and reliable measures of the constructs they measure at a latent level. The study is particularly significant in terms of the validity of the study. It shows that the household survey questionnaire used for this study is a good measurement instrument with good psychometric properties. All five MDP items (F1–F5) have a loading above 0.79, with consistent indicator reliability across all the five welfare dimensions measured: food security, housing, healthcare, government support, financial security trajectory.

4.6.3 Discriminant Validity

Table 4.10: Discriminant Validity: Heterotrait-Monotrait (HTMT) Ratio

Construct Pair	HTMT Ratio	Status
Financial Inclusion (FI) ↔ Multidimensional Poverty (MDP)	0.713	Below 0.85 threshold ✓
UPI Usage Intensity (UII) ↔ Multidimensional Poverty (MDP)	0.768	Below 0.85 threshold ✓
UPI Usage Intensity (UII) ↔ Financial Inclusion (FI)	0.847	Below 0.90 threshold ✓

Note. All HTMT values below the conservative threshold of 0.90 (Henseler et al., 2015). FI and MDP pair and UII and MDP pair also below the more stringent 0.85 threshold.

All three HTMT ratios confirm discriminant validity that means, the three constructs are empirically distinct from one another. The UUI–FI ratio (0.847) is the highest, and as expected it is theoretically aligned as being closely related, but is empirically distinct, which is an important distinction and a strong argument for the mediation model.

4.7 STRUCTURAL MODEL AND HYPOTHESIS TESTING

Table 4.11: Structural Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	β	SE	t-value	p-value	Decision
H1	UUI $\rightarrow$ FI	0.744	0.041	18.15	<0.001	Supported
H2	FI $\rightarrow$ MDP	0.476	0.058	8.21	<0.001	Supported
H3	UUI $\rightarrow$ MDP (direct)	0.268	0.063	4.25	<0.001	Supported
H4	UUI $\rightarrow$ FI $\rightarrow$ MDP (indirect)	0.354	0.047	7.53	<0.001	Supported

Note. β = standardized path coefficient, SE = standard error, UUI = UPI Usage Intensity, FI = Financial Inclusion, MDP = Multidimensional Poverty & Living Standards.

All three HTMT ratios confirm discriminant validity that means, the three constructs are empirically distinct from one another. The UUI–FI ratio (0.847) is the highest, and as expected it is theoretically aligned as being closely related, but is empirically distinct, which is an important distinction and a strong argument for the mediation model. The four hypothesized paths are statistically significant at the 0.1% level ($p < 0.001$) and all four hypotheses are empirically supported.

H1 (UUI $\rightarrow$ FI, $\beta = 0.744$): All five items of the Section D UPI together significantly and strongly explain the financial inclusion (measured by eight items in Section E). This path ($\beta = 0.744$) is the strongest in the model, indicating that the behavioural components of UPI usage, namely frequency, ease, time saving, cash substitution and trust, are collectively the key factor in formal engagement with the financial sector.

H2 (FI $\rightarrow$ MDP, $\beta = 0.476$): The associations of the eight dimensions of financial inclusion are statistically significant and contribute to the prediction of multidimensional poverty and living standards measured by the five items in Section F. Households with more credit access, insurance, savings, cash-flow management, digital financial access, verifiable records, formal service registration, and 24/7 transactional access score significantly higher in terms of their welfare outcomes, including food security, housing, healthcare, government support, and financial security.

H3 (UUI $\rightarrow$ MDP direct): UPI usage intensity is positively and significantly associated with multidimensional poverty and living standards, through mechanisms that do not involve formal financial intermediation like transaction efficiency gains, domestic remittance facilitation and direct access to digital marketplaces.

H4 (UUI $\rightarrow$ FI $\rightarrow$ MDP indirect, $\beta = 0.354$): The indirect path from UPI usage to MDP via financial inclusion is large and significant and is actually larger than the direct path ($\beta = 0.268$), again indicating that financial inclusion is the primary, but not the only, channel through which financial inclusion impacts MDP.

Table 4.12: Coefficient of Determination (R^2) for Endogenous Constructs

Endogenous Construct	R^2	Classification
Financial Inclusion (FI)	0.554	Substantial
Multidimensional Poverty & Living Standards (MDP)	0.487	Moderate-to-Substantial

The usage intensity of UPI captured 55.4% of the financial inclusion variance, which is substantial and underscores the importance of UPI digital payment engagement as a key determinant of formal financial sector participation. Together, UPI usage and financial inclusion explain 48.7% of the variance in multidimensional poverty and living standards.

4.8 MEDIATION ANALYSIS

Table 4.13: Mediation Analysis: Direct, Indirect and Total Effects

Effect	Path	β	95% Bootstrap CI	p-value
Direct	UUI $\rightarrow$ MDP	0.268	[0.146, 0.391]	<0.001
Indirect (via FI)	UUI $\rightarrow$ FI $\rightarrow$ MDP	0.354	[0.264, 0.447]	<0.001
Total	UUI $\rightarrow$ MDP	0.622	[0.521, 0.724]	<0.001
Direct	UUI $\rightarrow$ FI	0.744	[0.663, 0.826]	<0.001
Direct	FI $\rightarrow$ MDP	0.476	[0.362, 0.591]	<0.001

Note. Bootstrap confidence intervals based on 5,000 resampling. UUI = UPI Usage Intensity, FI = Financial Inclusion, MDP = Multidimensional Poverty & Living Standards.

The mediation analysis supports partial mediation as both the direct effect ($\beta = 0.268$, CI does not include zero) and the indirect effect ($\beta = 0.354$, CI does not include zero) are significant. The overall impact of UPI usage intensity on multidimensional poverty and living standards is $\beta = 0.622$, which can be broken down into 43.1% direct and 56.9% indirect, via financial inclusion. This breakdown confirms that the main channel

of financial inclusion represents almost 57% of the overall welfare effect of UPI, whereas the direct channels account for 43%.

CHAPTER 5

DISCUSSION

5.1 UPI USAGE INTENSITY AND FINANCIAL INCLUSION

The most significant finding of this study is the positive and strong relationship between usage intensity of UPI and financial inclusion ($\beta = 0.744$, $p < 0.001$). It shows that, overall, this intensive behaviour in five dimensions reflected in Section D of the survey (daily frequency, ease of access, time efficiency, cash substitution over cash, and trust in the platform) systematically increases the level of engagement with formal financial services in all eight dimensions of Section E of the survey. This is indeed a very strong finding because both constructs are multi-dimensional. The UUI construct does not just capture the frequency of digital payments, but it also measures behavioural, functional and affective aspects of digital payments. In the same way, the FI construct is based on eight different financial inclusion dimensions: credit access, insurance, saving, cash-flow management, digital financial service access, verifiable record, formal service registration, and 24/7 financial transaction access. The financial inclusion is broader than one-dimensional in its relationship with UPI engagement and is reflected in the strong path coefficient ($\beta = 0.744$) of these two multi-dimensional constructs. There are several reasons for this correlation.

Firstly, frequent use of UPI provides a comprehensive and accurate digital financial record, which is captured as a part of item E6 ("I can provide an accurate and verifiable financial record of my earnings and transactions when asked to do so by any organization"). For those in informal employment status (casuals, self-employed) it is life-changing. UPI transactions offer a digital history of income, replacing formal income documentation for applications such as credit and insurance, and thereby filling in the formalization gap.

Second, the purpose of the trust dimension of the UPI usage (D5), 'I trust UPI based platforms to handle my money securely' directly contributes to the extension of trust from the payment platform to the formal financial system, to lower behavioural barriers to access of credit, insurance, and saving products. Third, UPI's accessibility feature (as mentioned in FI item E8) equates to the ability to make payments around the clock, thus expanding the perception of financial system accessibility. The way in which financial deepening occurs as a result of UPI use may vary across generational groups. For Gen Z, ease of access (D2) and time efficiency (D3) are the highest scoring areas, and digital financial access (E5) and 24/7 availability (E8) could be the main pathways by which financial inclusion is improving. The boomer generation could view the trust dimension (D5) as the key entry point into formal financial involvement, because they are more inclined to rely on cash and informality historically.

5.2 FINANCIAL INCLUSION AND MULTIDIMENSIONAL POVERTY OUTCOMES

The positive and statistically significant relationship between financial inclusion and multidimensional poverty and living standards ($\beta = 0.476$, $p < 0.001$) validates the relationship between the eight dimensions of formal financial engagement (Section E) and the five dimensions of welfare (Section F) which are translated into improvements across the indicators of food and nutritional security, housing conditions, healthcare access, impact of government support programs, and overall improvement in financial security. Food security (F1) is the most basic of welfare dimensions and is clearly related to financial inclusion via credit access (E1) and savings behaviour (E3). For the 14.6% of the sample whose primary mode of income generation is casual labour, which tends to be volatile, households with formal credit access may be able to buffer food consumption from short-term fluctuations in income. Households able to save regularly (E3) build food security buffers against income shocks.

In the descriptive analysis, the highest mean is for the item on healthcare access without major financial difficulty (F3), which is directly related to the items on insurance access (E2) and cash-flow management (E4). The highest financial inclusion gap was the type of health insurance they have, with only 2.98% of the sample having access to health insurance from banks or formal organizations (E2). This gap highlights that healthcare financial shocks are an important poverty risk even for families that are active users of UPI, suggesting a priority for policy to connect financial transaction history with health insurance enrolment.

Welfare dimension is the most direct dimension related to the DBT-UPI linkage, which is called government support program impact (F4). Households that receive pension/government transfers (9.7% of household income) and have access to financial markets in a formal way (E8: 24/7 transactional access) are in the best situation to benefit from this welfare pathway. This government support channel is subsumed by the significantly overall effect of FI on MDP ($\beta = 0.476$). Overall financial compared to the past (F5) security refers to the dynamic aspect of welfare improvement, that is, whether households are more financially secure today than in the past. This item is theoretically related to the other seven financial inclusion dimensions, which cannot be separated from credit access, insurance, savings, and formal registration of services.

5.3 DIRECT WELFARE EFFECTS OF UPI USAGE

The large direct positive relationship between the usage intensity of UPI and multidimensional poverty and living standards ($\beta = 0.268$, $p < 0.001$) notwithstanding the financial inclusion pathway is attributed to three key mechanisms. The highest scoring UPI usage item (D3) "Using UPI reduces the time and effort required for financial transactions" (mean = 4.24) is an observed benefit of UPI, and a direct welfare improvement for all income groups, but especially for lower income groups where the opportunity cost of time is high.

These daily wage workers and casual workers who can make merchant payments, UPI bill payments and P2P transfers at ease, save hours of productive time that were previously spent in payment queues and travelling to payment centres. The efficiency improvements result in more hours worked or more hours available for household economic activities. Cash substitution and its welfare effects (D4): The substitution of UPI for cash ("I rely more on UPI than cash for making payments" mean = 3.68) helps lower the risks of cash transactions such as theft, loss, and the costs of handling cash, and opens up participation in digital commerce platforms that allow for competitive pricing no available at conventional cash-only retail outlets. Domestic remittance efficiency: UPI offers instant, fee-free domestic remittance capability for the 7.3% of the household income that comes from remittances. Earlier the households were paying informal remittance fee of 3-5% on the monthly remittance of ₹5000, which translates to a welfare loss for them of ₹150-250, translating to the outcome items related to food security (F1) and financial security (F5). The direct welfare effect may be more salient for Gen Z and Millennial respondents who are highest on the cash substitution (D4) and ease of access (D2) dimensions and is partially mediated by education, as those with higher education can more easily access the direct benefits of UPI transactions.

5.4 MEDIATING ROLE OF FINANCIAL INCLUSION

The results on the large and significant indirect effect of UPI usage intensity on multidimensional poverty via financial inclusion ($\beta = 0.354$, $p < 0.001$, accounting for 56.9% of the total UPI-welfare effect) further validate financial inclusion as the key pathway through which the usage intensity of UPI leads to welfare improvement. The mediation structure can be explained by looking at certain items in the survey. The mediation pathway in this graph is D5 (trust in UPI platforms) → E1 (credit access) → F3 (healthcare without financial difficulty), which shows how once the trust over UPI platforms is built through frequent payment experience, it subsequently leads to the formal credit access which helps in protecting the households from catastrophic expenditure shocks due to healthcare.

Likewise, D1 (daily use) → E6 (financial records) → F5 (financial security improvement) shows the relationship between daily UPI use and the documentation of household financial behaviour via formal records and the ensuing access to formal financial services, with these two steps cumulatively improving financial security. The indirect pathway (56.9%) was dominant over the direct pathway (43.1%) and this has a specific implication. The welfare benefit from the use of UPI is highest when it is paired with active involvement in the formal financial products that access to UPI makes available. A household that has only the direct pathway gains transaction efficiency (realising welfare gains) from using its UPI is likely to receive a much smaller welfare gain than a household that is able to access formal credit and insurance and/or the history of their payments using the UPI to access savings products (realising the full indirect pathway). The policy suggestion of UPI integration with other financial products is directly motivated by this finding. The partial nature of the mediation with both pathways significant is also theoretically important. It indicates that even if the financial inclusion deepens, the use of the UPI results in welfare gains via direct efficiency and market participation channels. This indicates that UPI has strong poverty reducing impacts. They are not exclusively dependent on the formal financial inclusion route, but rather engage in a number of parallel routes at the same time.

5.5 THEORETICAL IMPLICATIONS

Implication 1: Usage-Intensity Paradigm: The study empirically shows that the usage-intensity paradigm proves to be better than access- or adoption-based frameworks for understanding the welfare impacts of FinTech. The five dimensions of operationalisation of the usage intensity of UPI frequency, ease of access, time efficiency, cash substitution and trust can serve as a framework for measuring digital payment engagement in future studies on FinTech and poverty, rather than a binary indicator, but as a multidimensional behaviour.

Implication 2: Financial Inclusion as Mechanism: This study explains financial inclusion as a mediating mechanism instead of a final goal, and clarifies the causal chain by which financial inclusion impacts on welfare. This specification goes beyond the observation that "digital payments improve welfare" and claims that the "digital payment intensity deepens the formal financial engagement, which in turn reduces multidimensional poverty, through credit access, insurance, savings, cash-flow management and formal financial record creation.

Implication 3: Multidimensional Welfare Framework: A multidimensional, rather than poverty-based, measure of living standards shows that the welfare impacts of UPI go beyond income; food security, housing, health, delivery of government support and financial security trajectory are all areas where they can have impacts. The multidimensional framing is more suitable for measuring welfare impacts of digital finance than income-only measures and should be used in future research on FinTech-poverty.

Implication 4: Generational Heterogeneity: The integration of all four generational cohorts (Gen Z, Millennials, Gen X, Boomers) within a single analysis model further contributes to the understanding of how digital nativity, technological comfort, and adaptation costs differ across the age cohorts in terms of UPI usage intensity and welfare effects. Future research studies should more clearly represent these generational differences either via interaction terms or cohort-specific structural models.

Implication 5: Income Source Diversity: The achievement of income sources decomposition in this survey suggests that increased usage of UPIs might have the greatest impact on households with informal incomes, which are those that engage in income-generating activities like casual labour, remittances, and farming, as they may have the most to gain from the formal financial access and verifiable transaction records. This income-source heterogeneity should be more explicitly accounted for in the field of FinTech-poverty studies.

5.6 POLICY IMPLICATIONS

Policy 1: Shift from Access to Usage Depth: This strong correlation of UPI usage intensity with FI (total $\beta = 0.622$ with MDP) indicates that policy needs to focus on deepening UPI usage among those who already use it, rather than expanding access to it. While the success of bank account penetration is near universal, the welfare gains need sustained and multi-purpose UPI engagement, across the five behavioural dimensions of Section D.

Policy 2: Targeted Promotion of Cash Substitution (D4): This UPI usage item has the highest variance ($SD = 0.98$) and lowest mean (3.68) compared to the other items, suggesting that this item has the greatest policy leverage and room for improvement. QR code acceptance by informal market vendors, kirana stores, auto-rickshaw operators and domestic workers can help enable a higher usage of UPIs among cash dependent income groups, which can help in financial inclusion and reducing poverty.

Policy 3: Bridge The Insurance Gap: Financial inclusion (E2) mean score of 2.98 is the lowest overall score of financial inclusion items, with high UPI usage scores pointing to an important insurance gap in the UPI-to-welfare pipeline. This can be overcome by regulatory measures to allow access to UPI transaction history for insurance underwriting, alongside use of micro insurance products within payment apps which are accessible via UPI, which will support the FI $\rightarrow$ MDP pathway in the context of healthcare financial protection.

Policy 4: Formalize Credit Through UPI Transaction Histories: Combined, items for formal credit access (E1, mean = 3.12) and verifiable financial records (E6, mean = 3.08) indicate formal credit access is the second largest gap, after insurance. Allowing policies that allow the use of UPI transaction records, such as DBT receipts, merchant payment history and P2P transfer patterns to serve as documentation of both income and creditworthiness for informal-sector workers and casual labourers who do not have formal income proof can help to expand credit access for these groups.

Policy 5: Deepen DBT-UPI Integration: Even among pension/government transfer-income households, the government support program item (F4) scores mean < 4.0 . Introducing all DBT transfers through UPI linked accounts, and giving beneficiaries the freedom of using UPI interfaces to access, manage and build on these transfers can fortify the DBT-welfare linkage at the grassroots among all income groups that receive government transfers.

Policy 6: Generational Digital Literacy Programs: The Boomer respondents (18.8% of the sample) are likely to score lower on ease of access (D2) and trust (D5) items indicate age-specific digital literacy interventions. There is a need for expanding the welfare-generating potential of UPI among older income-generating groups, especially around perceptions of trust and security, at the community level through UPI training programs for them that are targeted towards this group, and who may be systematically underusing the platform.

Policy 7: Gender-Specific Interventions: Women, especially the less educated and poor, are likely to be impacted more by interventions specifically geared toward UPI adoption and usage-deepening such as access to smartphones and women's self-help group digital financial services.

CHAPTER 6

CONCLUSION, FUTURE SCOPE AND SOCIAL IMPACT

6.1 SUMMARY OF FINDINGS

The thesis focused on studying the impact of intensity of usage of FinTech and UPI on financial inclusion, multidimensional poverty and living standards of 400 households across all the generational cohorts and across five income brackets in the National Capital Territory (NCR) of Delhi. The study provided primary micro-level evidence using a purpose designed household survey questionnaire that included general information, demographics (generation, gender, education), household economic status (income level and seven-source income composition), usage behaviour of UPI (Section D: 5 items), financial inclusion (Section E: 8 items), and multidimensional poverty and living standards (Section F: 5 items).

The key findings are as follows:

Finding 1: Psychometric Quality of the Survey Instrument: indicate that all 18 items in the survey instrument (in Sections D, E, and F - all using Likert scales) loaded cleanly on their hypothesized factors and no items were removed. Cronbach's alpha ranged from 0.841 (MDP) to 0.931 (UII). The values for AVE were all greater than 0.50, and the HTMT ratios were all lower than 0.90, indicating high reliability and convergent and discriminant validity for all three constructs.

Finding 2: H1 Supported (UII $\rightarrow$ FI), $\beta = 0.744$: The combination of the five dimensions of UPI usage (frequency, ease of access, time efficiency, cash substitution and trust) is strong across all eight dimensions of Section E of financial inclusion, accounting for 55.4% of financial inclusion variance ($R^2 = 0.554$).

Finding 3: H2 Supported (FI $\rightarrow$ MDP, $\beta = 0.476$): The eight financial inclusion dimensions in Section E are statistically significant predictors of the improvements in all five multidimensional poverty dimensions in Section F, with credit access (E1), insurance (E2), savings (E3), cash-flow management (E4), digital financial access

(E5), verifiable records (E6), formal service registration (E7), and 24/7 transactional access (E8) showing the highest predictive power.

Finding 4: H3 Supported (UUI $\rightarrow$ MDP direct, $\beta = 0.268$): UPI usage intensity brings direct welfare gains through transaction efficiency gains, cost saving in domestic remittances and participation in digital financial market, outside a formal financial inclusion pathway.

Finding 5: H4 Supported (UUI $\rightarrow$ FI $\rightarrow$ MDP indirect, $\beta = 0.354$): Financial inclusion is a significant indirect Mediator as it accounts for 56.9% of the total welfare impact of UPI (total $\beta = 0.622$). Use of UPI has the greatest impact on multidimensional poverty via the indirect financial inclusion pathway.

Finding 6: Insurance and Credit as Critical Gaps: The transactional and savings aspects of financial inclusion have indeed been enhanced by UPI, but the higher value welfare applications such as insurance access (E2, mean = 2.98) and credit access (E1, mean = 3.12) are not yet sufficiently activated for all members of the sample.

Finding 7: Generational and Income Diversity: all four generational cohorts and a diverse income source structure with salaried (34.2%), business/self-employment (22.8%), casual labour (14.6%), pension/government transfers (9.7%) and remittances (7.3%) showed that UPI's welfare effects are relevant to a heterogeneous socioeconomic landscape

6.2 CONCLUSIONS

Conclusion 1: The developed household survey questionnaire for this study is a psychometrically sound tool that captures the three main constructs of this study with a valid and reliable instrument, both in terms of the classification of the generational cohort as well as the seven sources of income, five items of use of poverty indicators, and eight items of financial inclusion. Not having a "take away" after EFA is a strong indicator of the quality of the instrument.

Conclusion 2: UPI has proven to be an excellent enabler for financial inclusion in urban India. The dominance of the usage intensity of UPI over financial inclusion ($\beta = 0.744$) indicates that the five dimensions of the UPI usage in the behavioural domain

captured in Section D are systematically associated with the financial inclusion in the eight dimensions captured in Section E. UPI is not just a payment instrument, it is a gateway to the formal financial domain.

Conclusion 3: Financial inclusion achieved through the UPI engagement is found to have strong poverty alleviation impacts in all five dimensions of multidimensional poverty and living standards food security, housing, healthcare access, government support delivery, and financial security trajectory. Welfare impact of financial inclusion ($\beta = 0.476$): is a broad-based effect that indicates that the formal financial engagement can simultaneously shield the poor from multiple dimensions of poverty.

Conclusion 4: The partial mediation finding proves that UPI is a multi-channel welfare instrument: It lowers poverty via the primary channel of financial inclusion (56.9% of total effect) and via its direct efficiency and market participation channels (43.1% of total effect). This dual channel approach has made UPI more welfare generating than a single mechanism tool, and highlights the importance of policies that can be used to support both channels.

Conclusion 5: Insurance access (E2) and credit access (E1) are the most important policy levers that can amplify UPI's poverty-reducing impact as identified through the survey. Product-level integration of insurance and credit with UPI interfaces could greatly boost the β coefficient of the pathway from FI to MDP in future surveys.

Conclusion 6: The usage-intensity paradigm established in this study is a better framework to measure and support financial inclusion via digital payments. Policy and research should be directed towards the extent of UPI engagement rather than the simple binary indicator of adoption – how often, how easy, how time efficient it was, whether cash could be substituted, and how much trust was placed in it.

6.3 LIMITATIONS OF THE STUDY

Geographic scope: Confined to the NCT of Delhi, which has above-average digital infrastructure. Findings may overestimate welfare effects relative to rural or semi-urban India.

Cross-sectional design: Does not permit causal inference in the strict sense, reverse causality (better-off households more likely to intensively use UPI) cannot be ruled out without longitudinal data.

Self-reported measures: All Section D, E, and F items are self-reported and subject to social desirability bias and recall limitations. Objective measures (actual transaction records, consumption diaries) would strengthen welfare assessments.

Income source percentages: Respondents' estimates of income source composition are approximate and may involve rounding error that affects the precision of income structure analysis.

Binary gender variable: The survey's gender measure captures only male/female, which may not capture the full range of gender identities relevant to digital financial equity.

6.4 DIRECTIONS FOR FUTURE RESEARCH

Longitudinal design: Panel data tracking the same households over time would enable causal inference on the welfare trajectory associated with sustained UPI engagement and would reveal whether welfare effects accumulate or diminish over time.

Rural and semi-urban extension: Replicating the survey across rural and semi-urban contexts where digital infrastructure is more limited and UPI adoption is more recent would test the generalizability of the findings and identify the enabling conditions for UPI's poverty-reducing effects.

Generational analysis: Future research should explicitly model generational heterogeneity in UPI usage intensity and welfare effects using multi-group SEM, testing whether the structural relationships estimated in the full model differ significantly across Gen Z, Millennial, Gen X, and Boomer subsamples.

Income source interaction: Future studies should model the interaction between income source composition and UPI usage intensity specifically whether households with higher shares of casual labour, remittance, or agriculture income benefit more or less from UPI-mediated financial inclusion than salaried households.

Insurance and credit pathway deepening: Research specifically focused on the E1 (credit access) and E2 (insurance access) pathways examining what specific UPI-linked product designs, regulatory frameworks, and behavioural interventions would most effectively close these gaps would have high policy value.

Objective data integration: Future studies combining survey data with actual UPI transaction records from NPCI or payment service providers would provide more precise usage intensity measures and strengthen causal inference.

6.5 SOCIAL IMPACT

Poverty Reduction: The total effect of UPI usage intensity on multidimensional poverty and living standards ($\beta = 0.622$) is large and statistically robust. If the welfare improvements observed in the sample are representative of the broader UPI-using urban population in India, the policy implications for poverty reduction at scale are substantial. UPI already serves hundreds of millions of users; even marginal improvements in usage intensity among the bottom two income quintiles (households below ₹20,000 per month, comprising 41.3% of the sample) could generate measurable welfare improvements across food security, healthcare, and financial security.

Food Security: The food and nutritional security item (F1) directly connect to India's commitment to SDG 2 (Zero Hunger). Financial inclusion enabled by UPI particularly through credit access (E1) and savings (E3) can help households in casual labour and agricultural income categories smooth food consumption across income fluctuations, contributing to nutritional security in the urban poor.

Healthcare Access: The healthcare item (F3) scores the highest mean among MDP items, reflecting UPI's demonstrated role in improving financial resilience against health shocks. Strengthening the linkage between UPI usage and health insurance access (closing the E2 gap) could have substantial public health implications, reducing the incidence of catastrophic health expenditure a major driver of poverty entry in urban India.

Government Welfare Delivery Efficiency: The government support item (F4) reflects UPI's role as the delivery channel for DBT transfers across schemes including PM-KISAN, NSAP, MGNREGA, and others. Strengthening DBT-UPI integration ensuring all welfare transfers are accessible through UPI interfaces and that DBT transaction histories are recognized as formal financial records can simultaneously improve welfare delivery efficiency and financial inclusion for the most vulnerable.

Formalization of the Informal Economy: For the 14.6% of sample income derived from casual labour and 22.8% from business/self-employment both characteristically informal, UPI's verifiable record function (E6) represents a digital formalization mechanism. Workers and small business owners who generate digital transaction histories through UPI become legible to the formal financial system, enabling credit access, insurance enrolment, and business registration contributing to India's broader agenda of economic formalization and inclusive growth.

Global Applicability of UPI Model: The evidence generated in this study supports the growing international recognition of UPI as a replicable model of digital public infrastructure for financial inclusion. The findings that open, interoperable, low-cost payment systems with strong trust features can drive multidimensional poverty reduction through a financial inclusion mechanism provide empirical grounding for the adoption of UPI-inspired architectures in other developing economies seeking to leverage digital finance

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APPENDIX-I: HOUSEHOLD SURVEY QUESTIONNAIRE

HOUSEHOLD SURVEY QUESTIONNAIRE

A. GENERAL INFORMATION

Survey ID: _____ Date: ____ / ____ / ____ Place: _____

B. BASIC DEMOGRAPHIC INFORMATION

1. Age Group of Respondent

☐ Gen Z (1997–2012) ☐ Millennials (1981–1996) ☐ Gen X (1965–1980) ☐ Boomers
(Before 1965)

2. Gender

☐ Male ☐ Female

3. Highest Level of Education Completed

☐ No schooling ☐ Primary (1–5) ☐ Middle (6–8) ☐ Secondary (9–10) ☐ Higher
Secondary (11–12) ☐ Graduate ☐ Postgraduate and above

C. HOUSEHOLD ECONOMIC STATUS

4. Percentage of Annual Household Income from the Following Sources

Source of Income	Percentage (%)
1. Salaried employment	_____ %
2. Business / Self-employment	_____ %
3. Casual labour	_____ %
4. Agriculture	_____ %
5. Pension / Government transfers	_____ %

Source of Income	Percentage (%)
------------------	----------------

6. Remittances	_____ %
----------------	---------

7. Others	_____ %
-----------	---------

5. Approximate Monthly Household Income

☐ Less than ₹10,000 ☐ ₹10,001 – ₹20,000 ☐ ₹20,001 – ₹40,000 ☐ ₹40,001 – ₹60,000

☐ Above ₹60,000

D. FINTECH / UPI USAGE

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	I frequently use UPI for my daily financial transactions.	☐	☐	☐	☐	☐
2	UPI is easy for me to access and use for payments and transfers.	☐	☐	☐	☐	☐
3	Using UPI reduces the time and effort required for financial transactions.	☐	☐	☐	☐	☐
4	I rely more on UPI than cash for making payments.	☐	☐	☐	☐	☐
5	I trust UPI-based platforms to handle my money securely.	☐	☐	☐	☐	☐

E. FINANCIAL INCLUSION

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	I can access loans or credit from banks or registered financial organizations and apps.	☐	☐	☐	☐	☐

No.	Statement	1	2	3	4	5
2	I have access to insurance policies like health, life, property, goods, business through banks or similar organizations.	☐	☐	☐	☐	☐
3	My household is able to save money regularly to meet future needs and benefit from those savings.	☐	☐	☐	☐	☐
4	I can manage household or business cash-flow needs because of financial support from formal organizations or apps.	☐	☐	☐	☐	☐
5	Digital financial services have improved my access to formal financial resources.	☐	☐	☐	☐	☐
6	I am able to provide verifiable financial records of my earnings and transactions when required by any organization.	☐	☐	☐	☐	☐
7	I can easily register for formal financial services or businesses when required.	☐	☐	☐	☐	☐
8	I can carry out financial transactions 24/7 and access markets or services online through formal platforms.	☐	☐	☐	☐	☐

F. MULTIDIMENSIONAL POVERTY & LIVING STANDARDS

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

No.	Statement	1	2	3	4	5
1	My household has sufficient food and nutrition throughout the year.	☐	☐	☐	☐	☐
2	My housing conditions meet basic living standards.	☐	☐	☐	☐	☐
3	I can access healthcare without major financial difficulty.	☐	☐	☐	☐	☐
4	Government support programs have improved my household's living conditions.	☐	☐	☐	☐	☐

No. Statement**1 2 3 4 5**

5 My household is financially more secure than in the past.

☐ ☐ ☐ ☐ ☐**G. END OF SURVEY**

Enumerator Signature: _____

Respondent Signature: _____

APPENDIX-II: MEASUREMENT ITEMS AND ITEM CODING KEY

Construct	Item Code	Survey Section	Item Statement (Abbreviated)
UPI Usage Intensity (UUI)	D1	Section Q1	D, Frequently use UPI for daily transactions
UPI Usage Intensity (UUI)	D2	Section Q2	D, UPI is easy to access and use
UPI Usage Intensity (UUI)	D3	Section Q3	D, UPI reduces time and effort
UPI Usage Intensity (UUI)	D4	Section Q4	D, Rely more on UPI than cash
UPI Usage Intensity (UUI)	D5	Section Q5	D, Trust UPI-based platforms
Financial Inclusion (FI)	E1	Section Q1	E, Can access loans or credit
Financial Inclusion (FI)	E2	Section Q2	E, Have access to insurance policies
Financial Inclusion (FI)	E3	Section Q3	E, Household saves money regularly
Financial Inclusion (FI)	E4	Section Q4	E, Can manage cash-flow via formal support
Financial Inclusion (FI)	E5	Section Q5	E, Digital services improved formal access

Construct	Item Code	Survey Section	Item Statement (Abbreviated)
Financial Inclusion (FI)	E6	Section Q6	E, Can provide verifiable financial records
Financial Inclusion (FI)	E7	Section Q7	E, Can register for formal services easily
Financial Inclusion (FI)	E8	Section Q8	E, Can transact 24/7 via formal platforms
Multidimensional Poverty (MDP)	F1	Section Q1	F, Sufficient food and nutrition
Multidimensional Poverty (MDP)	F2	Section Q2	F, Housing meets basic standards
Multidimensional Poverty (MDP)	F3	Section Q3	F, Healthcare without financial difficulty
Multidimensional Poverty (MDP)	F4	Section Q4	F, Government programs improved conditions
Multidimensional Poverty (MDP)	F5	Section Q5	F, Financially more secure than in the past

Note: All items rated on 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Higher scores on all constructs indicate greater UPI usage intensity, greater financial inclusion, and better living standards / lower multidimensional poverty respectively.

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3. Dissertation title: Impact of FinTech on Poverty Reduction: A Study of Selected Socioeconomic Factors with Special Reference to UPI in India
4. Degree for which the dissertation is submitted: Master of Arts in Economics
5. Faculty of the University to which the dissertation is submitted: University School of Management & Entrepreneurship
6. Dissertation Preparation Guide was referred to for preparing the dissertation. YES ☐ NO ☐
7. Specifications regarding dissertation format have been closely followed. YES ☐ NO ☐
8. The contents of the thesis have been organized based on the guidelines. YES ☐ NO ☐
9. The dissertation has been prepared without resorting to plagiarism. YES ☐ NO ☐
10. All sources used have been cited appropriately. YES ☐ NO ☐
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6. Preparation Guide was referred to for preparing the dissertation. YES
☐ NO ☐
7. Specifications regarding dissertation format have been closely followed. YES ☐ NO ☐
8. The contents of the thesis have been organized based on the guidelines. YES ☐ NO ☐
9. The dissertation has been prepared without resorting to plagiarism. YES
☐ NO ☐
10. All sources used have been cited appropriately. YES ☐ NO ☐
11. The dissertation has not been submitted elsewhere for a degree. YES
☐ NO ☐
12. All the corrections have been incorporated. YES ☐ NO ☐
13. Submitted 2 hard bound copies plus one CD. YES ☐ NO ☐



Signature of the Supervisor

Dr. Amit Mookerjee

Signature of Candidate

Name: Mona Chaudhary

Roll No: 24/MAE/65