



Socioeconomic Determinants of Digital Financial Inclusion in Indonesia

Rodhiah Umaroh*, Dania Hellin Amrina, Faizatu Almas Hadyantari, Budi Purnomo Saputro, Laely Andriani, Siti Mamlukhatun, Muhammad Furqan Albarkah

Universitas Pembangunan Nasional “Veteran” Yogyakarta, Indonesia

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Abstract

This study examines the socioeconomic and digital connectivity determinants of digital financial inclusion in Indonesia. Using individual-level data from the Global Findex 2025, digital financial inclusion is defined as ownership of a digitally enabled financial account. This measure captures whether an individual has a mobile money account or a financial institution account used to make digital payments through a card or mobile phone. The study applies weighted logistic regression and reports marginal effects to estimate how gender, age, education, income, employment status, urban-rural residence, internet use, mobile phone ownership, and smartphone use are associated with digital financial inclusion. The results found that Education (secondary: 9.9pp; tertiary: 18.0pp), income (highest quintile: 20.6pp), and employment (11.6pp) significantly boost digital inclusion. Critically, internet use predominantly benefits women (18.6pp) while smartphone and mobile ownership benefit men (22.0pp and 23.6pp respectively), revealing gendered technology pathways. Urban residence becomes insignificant after controlling for these factors, indicating that infrastructure alone is insufficient. These findings suggest that digital financial inclusion in Indonesia is shaped not only by access to digital infrastructure, but also by socioeconomic resources, labor market participation, digital connectivity, and gendered patterns of technology use.

Keywords: *Digital Financial Inclusion, Socioeconomic Determinants, Digital Connectivity, Global Findex 2025, Logistic Regression.*

INTRODUCTION

Digital financial inclusion marks a fundamental paradigm shift in the contemporary economy by moving financial services away from conventional brick-and-mortar banking channels toward mobile networks and internet platforms. This structural transformation changes how individuals manage their financial resources, execute daily transactions, and accumulate savings (Fengler & Joseph, 2021; Isayev, 2025; Lenka & Barik, 2018; Tang, 2024). The rapid expansion of mobile banking and electronic wallets provides a vital mechanism to lower transaction friction and expand access to affordable financial products, especially for vulnerable populations previously underserved by formal commercial networks (Kapoor, 2024; van Niekerk & Phaladi, 2021). By integrating these digital systems, individuals gain the necessary tools to participate more fully in modern economic activities.

However, the extent to which these technological opportunities translate into actual financial participation depends on the socioeconomic and infrastructural environment in which individuals live. Indonesia provides an important setting for examining digital financial inclusion because its archipelagic geography creates substantial variation in access to financial institutions, telecommunications infrastructure, and digital services. Although the expansion of mobile technology and financial technology platforms has created new opportunities for financial participation, these opportunities are not distributed evenly across regions and socioeconomic

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Corresponding author's email: rodhiah.umaroh@upnyk.ac.id

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groups. Infrastructure constraints, differences in digital literacy, and unequal access to appropriate devices may limit individuals' ability to convert technological availability into meaningful financial participation, particularly in rural and remote areas (Alfrianti et al., 2025; Nahwan, 2025). Therefore, identifying which individuals adopt digitally enabled accounts and which socioeconomic and technological resources support such adoption is essential for designing financial inclusion policies suited to Indonesia's diverse geographic and socioeconomic conditions

Despite the widespread proliferation of fintech applications, digital financial integration remains highly unequal across different demographic and social segments. While the existing body of economic literature heavily examines general financial inclusion or the aggregate adoption of digital technologies, empirical studies rarely isolate digitally enabled account ownership from traditional banking arrangements (Adhikari & Adhikari, 2025; Nagpal et al., 2019; Shah, 2024). This omission creates a significant empirical gap because merely holding a conventional commercial bank account does not guarantee active participation in the digital financial ecosystem (Azeez et al., 2024). Many formal accounts remain dormant or limited to traditional cash withdrawals, meaning that raw institutional access does not automatically translate into active digital utilization.

Against this background, this study addresses three research questions: (1) Which socioeconomic characteristics are associated with ownership of a digitally enabled financial account in Indonesia? (2) To what extent are internet use, mobile phone ownership, and smartphone use associated with digital financial inclusion after socioeconomic characteristics are taken into account? and (3) What gender-specific patterns emerge in the associations between these three digital connectivity factors and digitally enabled financial account ownership? Accordingly, this study aims to identify the socioeconomic characteristics associated with digital financial inclusion, estimate the associations between digital connectivity and digitally enabled financial account ownership, and examine how the patterns of these associations vary across female and male subsamples. Using individual-level data from the Global Findex Database 2025, the study applies weighted logistic regression to the full sample and gender-specific subsamples and reports average marginal effects to provide nationally representative and directly interpretable empirical evidence.

LITERATURE REVIEW

Sociodemographic characteristics heavily shape the individual adoption of digital financial services. Higher education pathways provide the critical digital and financial literacy required to navigate modern fintech platforms smoothly. Conversely, individuals with lower educational attainment face intense entry barriers due to their limited technical knowledge and lack of exposure to digital applications (Mishra et al., 2024; Mose et al., 2024). Beyond education, household income and formal employment status determine the long-term economic capacity to adopt these services. Higher income levels and stable employment allow individuals to easily afford digital hardware, continuous internet access, and recurring transaction fees associated with electronic accounts (Amaghous & Elmasmari, 2024; Kapoor, 2024; Mose et al., 2024). Furthermore, persistent gender and age gaps remain highly prevalent within contemporary digital ecosystems. Women and older adults often face specific sociocultural barriers, weaker digital skills, and greater risk aversion, which collectively limit their regular use of commercial digital banking networks (Amaghous & Elmasmari, 2024; Ba & Dieng, 2025; Rašticová et al., 2025).

Beyond social characteristics, physical digital connectivity is an indispensable foundation for complete financial inclusion. Continuous access to the internet and widespread smartphone ownership significantly expand the probability of utilizing mobile banking applications, digital wallets, and online payment mechanisms (Warburton, 2024). Within the specific context of Indonesia, structural gaps in technological infrastructure, functional literacy, and consumer trust

continue to depress aggregate adoption rates, particularly across deep rural and urban divides (Alfrianti et al., 2025; Puspitasari, 2025; Winarni & Akbar, 2025; Yasrizal et al., 2025). These infrastructure challenges are heavily pronounced in remote regions where the unique archipelagic geography of the country restricts physical access to telecom networks and formal financial service providers (Nahwan, 2025). Therefore, individual socioeconomic resources and institutional trust must actively interact with raw digital connectivity to achieve meaningful digital financial inclusion.

Although previous studies frequently emphasize infrastructure and connectivity barriers, particularly in rural areas, the capability approach suggests that the availability of technology alone may not be sufficient to produce meaningful financial participation. From this perspective, access to the internet or a mobile device represents a resource, while digital financial inclusion depends on an individual's capability to convert that resource into actual financial use (Sen, 1999). Education may provide the literacy required to navigate digital platforms, while income and employment may increase the affordability of devices, internet services, and financial transactions. Digital financial inclusion may therefore reflect the interaction between technological access and socioeconomic capabilities rather than infrastructure or geographic location alone. Building on this theoretical tension, the present study examines whether urban residence remains associated with digitally enabled account ownership after education, income, employment status, and digital connectivity are taken into account.

RESEARCH METHODOLOGY

Data

This study uses individual-level microdata for Indonesia from the Global Findex Database 2025. Although the database was released in 2025, the underlying survey data for Indonesia were collected between May 1 and December 31, 2024. The target population comprised individuals aged 15 years or older. The Global Findex survey was administered through face-to-face interviews in Indonesia using an area-frame sampling design intended to produce a nationally representative sample (Development Research Group & Finance and Private Sector Development Unit, 2025).

The sampling procedure involved several stages. In the first stage, primary sampling units were identified and stratified according to population size, geographic location, or both. Where reliable population information was available, these units were selected using probabilities proportional to population size; otherwise, simple random sampling was applied. Sampled households were subsequently selected using random-route procedures. Within each household, all eligible members aged 15 years or older were listed, and one individual was randomly selected for interview using a handheld survey device. Unless an outright refusal occurred, interviewers made up to three attempts to contact and interview the selected household. These attempts were conducted at different times of the day and, where possible, on different days to increase the likelihood of contact and survey completion. When an interview could not be completed at an initially selected household, a predefined substitution procedure was used to select a replacement household.

The public-use Indonesian microdata contain 1,117 completed interviews. However, the released dataset does not provide information on the total number of households initially contacted, outright refusals, unsuccessful contact attempts, or replacement households specifically for Indonesia. Consequently, a conventional survey response rate cannot be independently calculated from the public-use microdata. Of the 1,117 completed interviews, 1,116 observations are included in the regression analysis. One observation is excluded because information on educational attainment is missing. Thus, the final analytical sample retains approximately 99.9 percent of the completed interviews. This percentage represents analytical-sample retention and should not be interpreted as the original survey response rate.

Data weighting is applied to ensure that the estimates are nationally representative. The final survey weight consists of a base sampling weight and a poststratification weight. The base sampling weight corrects for unequal selection probabilities associated with household size, while the poststratification weight adjusts for sampling and nonresponse errors. Poststratification is based on national population distributions by gender and age and, where reliable information is available, education or socioeconomic status. Sampling weights are applied in the descriptive and regression analyses.

The dependent variable is digital financial inclusion, defined as ownership of a digitally enabled financial account. It is coded as 1 if the respondent has a mobile money account or a financial institution account used to make digital payments through a card or mobile phone, and 0 otherwise. This measure distinguishes digitally enabled financial participation from general financial account ownership, because having a conventional account does not necessarily indicate active participation in the digital financial ecosystem.

The explanatory variables are divided into socioeconomic characteristics and digital connectivity indicators. The socioeconomic variables include gender, age, educational attainment, household income quintile, employment status, and urban residence. Gender is represented by a binary indicator for female respondents, while age is measured in years. Educational attainment is classified into primary education or less, secondary education, and tertiary education or higher. Household income is measured using within-economy income quintiles, ranging from the lowest to the highest quintile. Employment status indicates whether the respondent is in the workforce, while urban residence distinguishes respondents living in urban areas from those living in rural areas.

Digital connectivity is measured using three indicators: internet use, mobile phone ownership, and smartphone use. Internet use indicates whether the respondent used the internet during the three months preceding the survey. Mobile phone ownership identifies respondents who personally own a mobile phone that can be used to make and receive calls. Smartphone use indicates whether the respondent's main mobile phone is a smartphone rather than a basic phone. The definitions and coding of all variables are summarized in Table 1.

Table 1. Definition of Variables

Variables	Definition and Coding	Data Type
Digital Financial Inclusion	Digital financial inclusion refers to whether an individual has a digitally enabled financial account. =1 if the respondent has a mobile money account or a financial institution account used to make digital payments through a card or mobile phone, and 0 otherwise.	Dummy
Gender	Gender refers to the respondent's sex. Female = 1 and Male = 0.	Dummy
Age	Age refers to the respondent's age in years.	Continuous
Education	Education refers to the respondent's highest level of educational attainment. 1 = primary education or less, 2 = secondary education, and 3 = tertiary education or more.	Categorical
Income Quintile	Income quintile refers to the respondent's within-economy household income quintile (1-5). 1 = lowest income quintile and 5 = highest income quintile.	Categorical
Employment Status	Employment status refers to whether the respondent is part of the workforce. = 1 if in the workforce and = 0 if out of the workforce.	Dummy
Urbanicity	Urbanicity refers to the respondent's place of residence. Urban = 1 and Rural = 0.	Dummy

Variables	Definition and Coding	Data Type
Internet Use	Internet use refers to whether the respondent used the internet within the past three months. 1 = yes and 0 = no.	Dummy
Mobile Phone Ownership	Mobile phone ownership refers to whether the respondent owns a mobile phone used to make and receive personal calls. yes = 1 and no = 0.	Dummy
Type of Phone	Type of phone refers to the main type of mobile phone used by the respondent. smartphone = 1 and basic phone = 0.	Dummy

Estimation Strategy

Based on this measurement framework, the analysis next specifies the empirical model used to estimate the associations between these explanatory variables and digitally enabled financial account ownership. Since the dependent variable in this study is binary, the analysis employs a logistic regression model. The dependent variable takes the value of 1 if the respondent has a digitally enabled financial account and 0 otherwise. Logistic regression is appropriate because it estimates the probability that an individual is digitally financially included as a function of socioeconomic and digital connectivity characteristics (Zaidi & Luhayb, 2023). The model specifies individual socioeconomic determinants as follows:

$$Pr(DFI_i = 1) = F(\alpha + \beta_1 Female_i + \beta_2 Age_i + \beta_3 Educ_i + \beta_4 IncQ_i + \beta_5 Emp_i + \beta_6 Urban_i + \beta_7 Internet_i + \beta_8 Phone_i + \beta_9 Smartphone_i + \epsilon_i) \quad (1)$$

Where DFI_i denotes digital financial inclusion for individual i . $Female_i$ represents gender, Age_i refers to the respondent's age, $Educ_i$ represents educational attainment, $IncQ_i$ refers to income quintile, Emp_i represents employment status, and $Urban_i$ captures whether the respondent lives in an urban or rural area. In this model, $Internet_i$ indicates whether the respondent used the internet within the past three months, $Phone_i$ indicates mobile phone ownership, and $Smartphone_i$ indicates whether the respondent's main phone is a smartphone.

Sampling weights are applied in all estimations to ensure that the results are nationally representative. The Global Findex provides a weight variable which accounts for unequal probabilities of selection and adjusts for sampling and nonresponse errors.

In addition to estimating the model for the full sample, separate weighted logistic regressions are estimated for female and male respondents to identify gender-specific patterns in the associations between socioeconomic characteristics, digital connectivity, and digitally enabled financial account ownership. These subsample estimates are interpreted as descriptive evidence of potentially different patterns rather than as formal statistical tests of coefficient differences between women and men.

Methodological Limitations

Several methodological limitations should be considered when interpreting the estimates. First, the binary measure of digital financial inclusion captures whether an individual owns a mobile money account or a financial institution account used for digital payments, but it does not measure the frequency, intensity, diversity, or quality of digital financial service use. Second, the Global Findex 2025 provides cross-sectional data; consequently, the estimated relationships should be interpreted as associations rather than causal effects. Third, reverse causality may affect the digital-connectivity variables. Smartphone and internet access may facilitate digital financial inclusion, but financially included individuals may also be more likely to acquire smartphones or use the internet. Fourth, the reported marginal effects are model-based changes in predicted

probability and may conceal heterogeneous effects across individuals with different characteristics. Finally, the relatively modest pseudo-R-squared values indicate that other factors not observed in the dataset, such as financial literacy, trust in financial institutions, service quality, local network coverage, transaction costs, and sociocultural norms, may also influence digital financial inclusion.

FINDING AND DISCUSSION

Table 2 presents the descriptive statistics for the 1,117 respondents included in the Indonesian sample. Overall, 37.9 percent of respondents are classified as digitally financially included. The sample is relatively balanced by gender, with women accounting for 49.6 percent of observations, while the respondents have a mean age of 39.3 years and range from 15 to 88 years. Regarding educational attainment, 38.3 percent completed primary education or less, 55.4 percent completed secondary education, and 6.4 percent attained tertiary education or higher. Respondents are also evenly distributed across the five income quintiles. In terms of socioeconomic characteristics, 60.4 percent participate in the labor force and 47.4 percent reside in urban areas. Digital connectivity is relatively widespread, as 80.8 percent own a mobile phone, 74.3 percent use a smartphone, and 70.8 percent use the internet. Nevertheless, the proportion of respondents achieving digital financial inclusion remains substantially lower than the proportions using the internet or smartphones, suggesting that access to digital technology alone does not necessarily translate into participation in digitally enabled financial services.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Digital financial inclusion	1117	0.379	0.485	0	1
Female	1117	0.496	0.500	0	1
Age	1117	39.301	15.751	15	88
Educ					
Primary education or less	1116	0.383	0.486	0	1
Secondary education	1116	0.554	0.497	0	1
Tertiary education or more	1116	0.064	0.244	0	1
Income quintile					
1	1117	0.206	0.405	0	1
2	1117	0.205	0.404	0	1
3	1117	0.194	0.396	0	1
4	1117	0.199	0.399	0	1
5	1117	0.196	0.397	0	1
Employment (In the workforce)	1117	0.604	0.489	0	1
Urban	1117	0.474	0.500	0	1
Internet use (Yes)	1117	0.708	0.455	0	1
Mobile phone ownership (Yes)	1117	0.808	0.394	0	1
Type of phone (smartphone)	1117	0.743	0.437	0	1

Having established the distribution of the main variables, the analysis next examines whether these characteristics remain associated with digital financial inclusion when considered jointly. Table 3 reports the marginal effects from the weighted logistic regressions for the full sample and gender-specific subsamples. In the full sample, each additional year of age is associated with a 0.2-percentage-point reduction in the probability of digital financial inclusion; however, this

relationship is statistically significant only among men. This finding suggests that older men may face greater age-related and technological barriers to adopting digital financial services, highlighting the importance of strengthening digital capabilities among older adults (Gao, 2025; Goyes & Suarez, 2025).

Education and income are positively associated with digital financial inclusion. Compared with respondents who completed primary education or less, those with secondary and tertiary education are 9.9 and 18.0 percentage points more likely to be digitally financially included, respectively. Secondary education shows a stronger association among women, whereas tertiary education is significant for both genders, reflecting the importance of financial literacy and digital capabilities (Chhillar et al., 2024; GÜZ & Poyraz, 2024; Widyastuti et al., 2024). Income effects are concentrated in the fourth and fifth quintiles, with membership in the highest quintile increasing the inclusion probability by 20.6 percentage points, suggesting that affordability remains an important barrier to digital financial participation.

Labor market status constitutes another critical factor explaining individual account ownership. Respondents active in the workforce are more likely to be digitally financially included than those outside the labor force. This trend shows that active employment generates direct structural incentives to adopt digital tools, especially for receiving electronic wages, executing business transactions, and managing household savings (Mose et al., 2024), reinforcing how financial technology integration yields superior employment outcomes for youth and women (Elmasmari & Amaghous, 2024; Song et al., 2024). Conversely, urbanicity proves to be statistically insignificant across all specifications. This finding demonstrates that spatial infrastructure alone is insufficient. Physical access must be coupled with localized financial literacy initiatives, consumer trust, and affordable service ecosystems to drive actual adoption (Siddiqui & Prakash, 2025).

Digital connectivity is positively associated with digital financial inclusion, although the gender-stratified estimates indicate potentially different patterns. In the full sample, internet use is associated with an 11.3-percentage-point increase in the probability of digital financial inclusion. The association reaches 18.6 percentage points among women but is not statistically significant among men. Internet connectivity may provide women with greater access to financial information and digital financial services by reducing their dependence on physical financial institutions (Lenka & Barik, 2018; Soekarno & Setiawati, 2020; Widyastuti et al., 2024). Nevertheless, differences in statistical significance across the female and male subsamples do not necessarily establish that the magnitude of the association differs significantly between the two groups.

Mobile phone ownership is not statistically significant in the full sample but is associated with an increase in digital financial inclusion among men. Smartphone use is associated with a 22.0-percentage-point increase in the full sample and a 23.8-percentage-point increase among men. Several mechanisms could explain the stronger associations observed among men. These include greater personal control over digital devices, gender-differentiated patterns of technology use, occupational segmentation that increases the need for mobile connectivity, and income differences affecting the ability to purchase smartphones (Ali & Ghildiyal, 2023; Antonijević et al., 2022; Shabir & Ali, 2022). Reverse causality is also possible because financially included individuals may be more likely to purchase smartphones. The present cross-sectional data cannot distinguish among these mechanisms.

Table 3. Logistic regression results (Marginal Effects)

Dependent variable:	(1)	(2)	(3)
Digital financial inclusion	ALL	FEMALE	MALE
Age	-0.00205*	0.00147	-0.00460***
	(0.00108)	(0.00176)	(0.00136)

Dependent variable:	(1)	(2)	(3)
Education (Ref: Primary education or less)			
Secondary education	0.0990*** (0.0328)	0.191*** (0.0502)	0.0316 (0.0418)
Tertiary education or more	0.180*** (0.0615)	0.211** (0.0836)	0.193* (0.0985)
Income quintile (Ref: 1)			
2	0.0151 (0.0424)	0.0717 (0.0614)	-0.0578 (0.0579)
3	0.0234 (0.0425)	0.0449 (0.0613)	-0.00708 (0.0592)
4	0.0851** (0.0424)	0.101* (0.0607)	0.0436 (0.0590)
5	0.206*** (0.0433)	0.191*** (0.0626)	0.209*** (0.0591)
In the workforce	0.116*** (0.0272)	0.100** (0.0399)	0.143*** (0.0412)
Urban (Ref: Rural)	0.00492 (0.0260)	-0.0190 (0.0373)	0.0391 (0.0364)
Internet (Ref: No)	0.113** (0.0494)	0.186** (0.0741)	0.0608 (0.0640)
Mobile phone ownership (Ref: No)	0.0644 (0.0859)	-0.00814 (0.120)	0.236** (0.105)
Smartphone (Ref: basic phone)	0.220*** (0.0779)	0.160 (0.117)	0.238** (0.102)
<i>N</i>	1116	553	563
<i>Pseudo-R</i> ²	0.1890	0.1694	0.2422

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CONCLUSION

This study examines the socioeconomic and digital connectivity factors associated with digital financial inclusion in Indonesia using the Global Findex Database 2025. The weighted logistic regression results indicate that education, income, labor force participation, internet use, and smartphone adoption are positively associated with ownership of a digitally enabled financial account, whereas age is negatively associated with inclusion. The gender-disaggregated results further suggest that women and men experience different digital inclusion pathways. Meanwhile, urban residence is not independently significant after socioeconomic characteristics and digital connectivity are considered.

This study advances the literature by distinguishing digitally enabled account ownership from general financial account ownership and by identifying gender-specific patterns using nationally representative individual-level data. The findings imply that expanding digital infrastructure alone is insufficient. Policymakers should combine infrastructure development with

gender-sensitive digital financial literacy, affordable internet and financial services, simplified account registration, stronger consumer protection, and improved public trust. Interventions should prioritize low-income and less-educated individuals, older adults, and people outside the labor force, who remain particularly vulnerable to digital financial exclusion.

LIMITATIONS AND FURTHER RESEARCH

This study has several limitations. Its cross-sectional design precludes causal inference and may be affected by reverse causality and omitted-variable bias, particularly in the relationship between smartphone ownership and digital financial inclusion. The binary inclusion measure also does not capture the frequency, intensity, diversity, or quality of digital financial service use. Moreover, the binary gender and broad urban–rural classifications may conceal diverse identities and variations in infrastructure, service availability, and economic opportunities. The modest pseudo- R^2 of 0.189 suggests that relevant factors, including financial literacy, institutional trust, risk preferences, transaction costs, and household norms, remain unobserved. Finally, the findings reflect Indonesia’s specific institutional and geographical context and may not be directly generalizable to other countries.

Future research can address these limitations in several ways. First, longitudinal data or quasi-experimental designs should be employed to identify the causal effects of digital connectivity and socioeconomic resources. Second, future studies should incorporate measures of transaction frequency, account activity, service diversity, and transaction value. Third, multilevel or spatial analysis could examine how individual characteristics interact with local infrastructure and financial-service availability. Fourth, qualitative or mixed-method research is needed to investigate gender differences in device ownership, financial decision-making, and technology use. Fifth, comparative research across ASEAN economies could determine whether the patterns observed in Indonesia also apply to countries with different institutional and digital environments.

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