

ORIGINAL ARTICLE

Microeconomic Determinants of Financial Inclusion in Peru

Determinantes microeconómicos de la inclusión financiera en el Perú

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Abstract

Financial inclusion is a central component of economic development, particularly in economies characterized by high levels of informality and inequality. This study identifies and quantifies the microeconomic determinants of financial inclusion in Peru, defined as holding at least one account in the formal financial system, corresponding to the access dimension proposed by Demirgüç-Kunt et al. (2022). Using ENAHO 2024 microdata, a Logit model with average marginal effects is estimated. The results show that the educational attainment of the household head is the strongest predictor of financial inclusion, followed by effective internet use and labor status. Rural residence and membership in a linguistic minority significantly reduce the probability of financial inclusion, highlighting persistent territorial and cultural gaps. After controlling for observable characteristics, women exhibit a slightly higher probability of being financially included than men. The departmental analysis reveals substantial territorial heterogeneity, with predicted probabilities ranging from 35.2% in Madre de Dios to 67.0% in Amazonas. These findings are consistent with empirical evidence for developing economies and suggest that effective digital connectivity, rather than mere device availability, is a key channel for formal financial integration. The results are robust to a Probit specification. The study concludes that progress in financial inclusion requires integrated policies combining educational capital, high-quality digital connectivity, and the reduction of territorial and cultural barriers.

Keywords: financial inclusion; ENAHO; Logit model; average marginal effects; digital connectivity; Peru.

JEL Classification: D14, G21, O16

Resumen

La inclusión financiera constituye un componente central del desarrollo económico, especialmente en economías con elevados niveles de informalidad y desigualdad. Este estudio identifica y cuantifica los determinantes microeconómicos de la inclusión financiera en el Perú, definida como la tenencia de al menos una cuenta en el sistema financiero formal, correspondiente a la dimensión de acceso propuesta por Demirgüç-Kunt et al. (2022). Para ello, se emplean microdatos de la ENAHO 2024 y se estima un modelo Logit con efectos marginales promedio. Los resultados muestran que el nivel educativo del jefe de hogar es el factor con mayor incidencia sobre la probabilidad de inclusión financiera, seguido por el uso efectivo de internet y la condición laboral. La residencia en zonas rurales y la pertenencia a minorías lingüísticas reducen significativamente dicha probabilidad, evidenciando brechas territoriales y culturales persistentes. Una vez controladas las demás características observables, las mujeres presentan una probabilidad ligeramente mayor

de inclusión que los hombres. El análisis departamental revela heterogeneidad territorial significativa, con probabilidades predichas que oscilan entre 35,2 % (Madre de Dios) y 67,0 % (Amazonas). Los hallazgos son consistentes con la literatura empírica sobre economías en desarrollo y sugieren que la conectividad digital efectiva, más que la mera disponibilidad de dispositivos constituye un canal determinante para la integración financiera formal. Los resultados son robustos frente a una especificación Probit. Se concluye que el avance de la inclusión financiera requiere políticas integrales que articulen el fortalecimiento del capital educativo, la expansión de conectividad de calidad y la reducción de brechas territoriales y culturales.

Palabras clave: inclusión financiera; ENAHO; modelo Logit; efectos marginales; conectividad digital; Perú.

Clasificación JEL: D14, G21, O16

1. Introduction

Financial inclusion is widely regarded as a key pillar of economic development and social cohesion, as it facilitates broader access to savings, credit, and formal payment services (Fonseca and Matray, 2024). In recent years, significant progress has been observed globally, driven primarily by the expansion of digital financial services. According to the World Bank's Global Findex, in 2024, 40% of adults in developing economies saved in a formal account, representing a 16-percentage-point increase compared to 2021, the largest increase recorded in over a decade (World Bank, 2025). However, more than one billion people remain excluded from the formal financial system. Furthermore, although nearly 75% of adults in low and middle-income economies have a bank account, only 42% made digital payments to retailers in 2024, suggesting that digital progress does not necessarily translate into equitable access to financial services.

In Peru, recent progress in financial inclusion coexists with persistent structural inequalities. According to data from the National Household Survey (ENAHO) for the first quarter of 2024, about 60% of the population aged 18 and older has at least one account in the financial system, a figure that represents an increase of 2.6 percentage points compared to the same quarter of 2023 (National Institute of Statistics and Informatics [INEI], 2024a). However, significant gaps persist between urban and rural areas: while access in urban areas reaches 64.8%, in rural areas it drops to 37.2%, despite the expansion of digital banking over the past five years.

Access to technology has emerged as a central element in the process of financial inclusion. According to the ENAHO, 58.4% of Peruvian households have internet access, and 91% of users access the internet via a mobile phone. Likewise, 77.7% of the population uses the internet, representing an increase of 2.7 percentage points compared to the previous year (INEI, 2025b). While this expansion promotes the use of mobile banking and electronic payments, it also highlights the persistence of a digital divide that limits the participation of rural and lower-income households in the formal financial system. However, challenges related to regulation, cybersecurity, and financial education (Díaz et al., 2023) persist, as do gaps in the digital skills needed to take advantage of fintech services (Gomber et al., 2017).

In addition, inequalities related to gender and educational attainment continue to affect access to the financial system. The Superintendency of Banking, Insurance, and Pension Fund Administrators (2023) identifies significant differences in participation in formal financial products, particularly in savings and credit. Furthermore, the ENAHO shows that 98.4% of people with a college education have internet access, compared to 52.5% of those with only a primary school education (INEI, 2024b). These disparities underscore the importance of education and financial literacy as fundamental mechanisms for reducing inclusion gaps (León-Gómez et al., 2021).

Institutional trust is another key factor in the process of financial inclusion. According to the results of the 2024 Financial Inclusion Index compiled by Credicorp and Ipsos, only 31% of Peruvians say they fully trust traditional financial institutions, while 57% consider digital wallets to be more secure (Stakeholders Perú, 2025). This shift in perceptions reflects a growing preference for more agile and accessible fintech services.

The following is a review of the empirical evidence supporting the hypotheses proposed.

1.1 Literature Review

Empirical literature identifies age as a relevant determinant of access to the financial system, although its effect is not necessarily homogeneous across contexts. The Superintendency of Banking, Insurance and Pension Funds (SBS, 2023) documents a positive relationship between age and financial inclusion, associated with higher levels of economic stability and financial experience. However, in rural areas this relationship may weaken or even reverse, given that younger populations exhibit a greater propensity to join the financial system through digital channels. In line with this, BBVA Research (2021) reports that although the highest levels of financial inclusion are concentrated among individuals aged 30 to 44, during 2021 there was a significant increase of nearly 9% in financial inclusion among young people between 18 and 29 years old.

In the territorial dimension, Anaya and Romero (2018), through an econometric analysis based on a Probit model applied to the city of Sincelejo (Colombia), identify those socioeconomic variables, including age, sex, poverty status, geographic location, and educational attainment, exert a statistically significant influence on the use of financial products. Their findings highlight that the physical distance between financial institutions and households operates as a relevant barrier to access, by increasing transaction costs and discouraging the use of formal financial services. Likewise, the authors point out that the years of schooling of the household head constitute the factor with the greatest explanatory power regarding access to the financial system.

Complementarily, the empirical evidence consistently shows that disparities between urban and rural areas limit access to financial services because of insufficient banking infrastructure, high mobility costs, and deficiencies in digital connectivity (Ñáñez et al., 2024). This latter element is particularly relevant, given that internet use constitutes the predominant channel for financial digitalization by facilitating inclusion through mobile banking and digital platforms (Aurazo and Gasmi, 2024). In this context, the expansion of Fintech firms has been identified as a key mechanism for extending the reach of digital financial services toward populations previously excluded from the formal financial system (Gomber et al., 2018).

Regarding connectivity, Samper (2022), in a study focused on Colombia, emphasizes the importance of implementing public policies aimed at expanding internet coverage as a means of promoting access to credit and deposit services. Although connectivity exhibits a statistically significant effect, the author warns that limited coverage in remote territories constrains its potential impact on financial inclusion levels.

For their part, Quispe et al. (2024) and Boitano and Abanto (2020) agree that variables such as educational attainment, internet use, and area of residence explain a significant proportion of the variability in the ownership of financial products. From a comparative perspective, Zins and Weill (2016), using microdata from African countries, find that educational attainment, income, age, and area of residence constitute key determinants of financial inclusion, while labor informality and territorial disparities significantly limit access to formal financial services, findings that resemble the evidence observed in developing economies.

Overall, the reviewed literature highlights that financial inclusion responds to a multidimensional dynamic in which socioeconomic, technological, and territorial factors interact. Financial education exhibits a positive association with both the ownership and appropriate use of financial products. West and Friedline (2016), when examining the relationship between financial capabilities and behaviors among low-income young adults, show that higher levels of financial literacy are associated with greater financial well-being, whereas deficits in such training increase the probability of suboptimal financial decisions or long-term indebtedness problems. Similarly, Álvarez et al. (2020), in their analysis of millennial youth in Spain, document that lower levels of financial literacy are associated with deficient payment practices and deterioration in credit history.

Finally, the gender dimension has consistently been identified as a relevant determinant of access

to the financial system. In the Latin American context, and particularly in Peru, structural inequalities persist that limit women's participation in terms of income, education, economic autonomy, and access to formal financial services (Hendriks, 2019). In this regard, Sotomayor et al. (2018) point out that the availability and use of technological tools, such as internet access and mobile telephony, play a fundamental role in reducing these gaps. Recent studies confirm that the gender gap in financial access persists even after controlling for socioeconomic characteristics and is more pronounced in economies with higher levels of female labor informality (Aterido et al., 2013).

Despite the extensive literature on financial inclusion in Peru, recent empirical evidence analyzing its determinants from a microeconomic perspective using post-pandemic data remains limited. Previous studies such as those by Boitano and Abanto (2020) and Sotomayor et al. (2018) constitute relevant references, but they rely on data predating the accelerated digital expansion driven by the pandemic and do not simultaneously incorporate variables related to effective connectivity and belonging to linguistic minorities as determinants of financial access. Although Quispe et al. (2024) are more recent, they do not evaluate the marginal effect of effective internet use on the ownership of formal financial products. Within this framework, the present study contributes updated evidence by simultaneously quantifying the effect of effective internet use, belonging to linguistic minorities, and employment status on the probability of financial inclusion in Peru, using ENAHO 2024 microdata and evaluating predictive performance through average marginal effects and ROC curves.

The theoretical foundations underlying these empirical findings are developed in the following section.

1.2 Theoretical framework

1.2.1 Financial Inclusion, Financial Literacy, and Institutional Approaches

The theoretical literature on financial inclusion has evolved from approaches centered on physical access to financial services toward broader frameworks incorporating institutional, educational, and distributive dimensions. Ozili (2020) systematizes these approaches by identifying, among others, public good theory, vulnerable groups theory, and systems theory. From the public good perspective, formal financial services generate positive externalities by promoting macroeconomic stability, reducing inequality, and strengthening social cohesion. In this sense, financial inclusion transcends the individual sphere and acquires collective relevance.

In turn, vulnerable groups theory emphasizes that financial exclusion is not random, but disproportionately affects historically marginalized populations, such as women, young people, and rural inhabitants. Under this approach, financial inclusion policies should be oriented toward correcting structural inequalities that limit effective access to the formal financial system.

In subsequent developments, Ozili (2023) formulates the institutional theory of financial inclusion, emphasizing the relevance of norms, organizations, and the regulatory environment in determining levels of access to and use of financial services. Under this framework, financial inclusion is not explained exclusively by the technical availability of financial products, but rather by the institutional capacity to design and sustain stable, transparent, and trustworthy regulatory frameworks that encourage economic agents to participate in the formal financial system.

More recently, Ozili (2025) integrates financial literacy as a central component of the inclusion process, arguing that the cognitive skills required to understand and use financial products decisively influence economic participation. In this sense, a population with greater financial competencies exhibits a higher propensity to benefit from the formal financial system while simultaneously reducing the risks of exclusion associated with lack of knowledge, misinformation, or distrust toward financial institutions. From the perspective of economic behavior, Lusardi and Mitchell (2014) demonstrate that financial literacy is a robust predictor of participation in formal financial markets, wealth accumulation, and retirement planning, with particularly relevant effects among low-income populations.

These approaches allow financial inclusion to be conceived as a multidimensional phenomenon. Demirgüç-Kunt et al. (2022) distinguish three analytically differentiated dimensions: access, understood

as ownership of at least one account within the formal financial system; usage, which comprises the frequency and variety of transactions carried out; and quality, referring to the adequacy of financial products to users' needs. This distinction makes it possible to precisely situate the scope of empirical studies and avoid interpretations that overestimate or underestimate inclusion levels depending on the dimension analyzed. The present study deliberately focuses on the access dimension, operationalized as ownership of at least one formal financial account, for three reasons: it constitutes the necessary condition for any subsequent use of the financial system (Allen et al., 2016); it is the indicator with the greatest international comparability and the one most widely used in household surveys worldwide (Demirgüç-Kunt et al., 2022); and it represents the dimension with the greatest weight in composite financial inclusion indices, serving as the analytically necessary entry point for understanding participation in the formal financial system in contexts of high exclusion such as Peru, consistent with Sarma (2015).

1.2.2 *Financial Inclusion, Resource Allocation, and Poverty Reduction*

From a macroeconomic perspective, financial inclusion has been approached as a mechanism capable of optimizing resource allocation and contributing to poverty reduction. Zhang (2020) proposes a dynamic general equilibrium model with heterogeneous agents to analyze how access to the financial system affects capital accumulation and aggregate economic performance. Under this framework, financial inclusion goes beyond merely increasing account ownership, as it alters the productive structure of the economy by enabling individuals with limited initial capital but entrepreneurial potential to invest, innovate, and increase productivity.

Within this analytical framework, financial exclusion is interpreted as a source of inefficiency in capital allocation, insofar as investment opportunities become concentrated among agents with preexisting wealth, regardless of their level of skill or talent. By expanding access to credit, savings, and other formal financial services, a more efficient allocation of resources is promoted, human capital accumulation is stimulated, and economic mobility is encouraged. Consequently, financial inclusion becomes a relevant instrument for poverty reduction and the strengthening of social welfare, particularly in economies characterized by high levels of structural inequality (Zhang, 2020).

1.2.3 *Logit Model and Binary Decision Analysis*

The Logit model belongs to the family of qualitative response models and is appropriate when the dependent variable adopts a dichotomous nature, such as the inclusion or exclusion of an individual within a given system. Its theoretical foundation lies in random utility theory, developed by McFadden (1974), which posits that individuals make decisions with the objective of maximizing a utility function that is not fully observable, incorporating a stochastic component that allows the choice between alternatives to be modeled probabilistically.

Unlike linear models, the Logit model does not impose a linear relationship among variables; instead, it employs a logistic function that restricts estimated probabilities to the $[0,1]$ interval, thereby ensuring statistical coherence in estimation (Gujarati and Porter, 2010). This characteristic makes it an appropriate tool for analyzing binary decisions, such as the adoption or non-adoption of formal financial services.

From an applied perspective, the Logit model makes it possible to evaluate how socioeconomic, territorial, and technological factors influence the probability of occurrence of an event. Wooldridge (2016) highlights that this approach provides a more realistic interpretation of individual decision-making processes by expressing results in probabilistic terms. Likewise, Greene (2012) notes that the model presents advantages over linear approaches by avoiding predictions outside the probability range and better fitting the discrete nature of human behavior. These properties have consolidated the Logit model as a widely used tool in empirical studies on access, participation, and inclusion across diverse economic and social contexts (Long and Freese, 2014).

Based on this theoretical framework, the following section describes the empirical strategy and the variables used to test the proposed hypotheses.

2. Materials and methods

2.1 Sample

The population analyzed comprises household heads aged 18 years or older residing in Peru, according to the ENAHO survey. This survey is conducted continuously and employs a probabilistic, stratified, multistage, and geographically independent sampling design. According to its Technical Report (INEI, 2024c), the sample guarantees statistical representativeness at the national, departmental, and urban-rural levels, allowing valid inferences to be made about the country's population.

The study uses cross-sectional information corresponding to the year 2024, integrated from the following ENAHO modules: Housing and Household Conditions, Education, Employment and Income, and Summary (calculated variables).

The unit of analysis corresponds to household heads aged over 18 years, and the analysis is oriented toward examining the socioeconomic, territorial, and technological determinants associated with financial inclusion in Peru. To ensure the representativeness of the results, the expansion factors provided by INEI are employed, allowing correction for differential probabilities of sample selection and ensuring consistency of population-level estimates.

After data cleaning, observations that did not correspond to household heads, those involving individuals younger than 18 years old, and cases with missing information in the variables used in the analysis were excluded. The final sample comprises approximately 33,691 household heads aged over 18 years. Through the application of the expansion factors provided by INEI, this sample represents an estimated population of 10,360,811 households nationwide.

2.2 Variables used in the study

For the present study, the variables described below are considered classified as dependent and independent according to their function within the econometric model. Table 1 presents their definition, measurement type, and identification within the ENAHO 2024 modules.

2.3 Logit model and ROC curve

The empirical approach of the study employs a Logit model, widely used to estimate the probability of dichotomous outcomes such as financial inclusion. This approach allows the relationship between the dependent variable and the set of covariates to be modeled without imposing linearity assumptions, incorporating a logistic function as the link mechanism. In this way, the estimated probabilities are bounded within the theoretical range between zero and one, thereby ensuring statistical consistency in the interpretation of the results.

Likewise, the use of the Logit model in applied microeconomic analysis is widely documented in modern econometric literature, particularly for the study of binary decisions in cross-sectional data (Stock and Watson, 2015; Cameron and Trivedi, 2005; Long and Freese, 2014).

The Logit model is initially specified in terms of a latent variable Y_i^* , which reflects the propensity of individual i to be part of a given event. This specification is presented in Equation 1:

$$Y_i^* = \beta_0 + \sum_{k=1}^K \beta_k X_{ki} + \varepsilon_i \quad (1)$$

where ε_i follows a standard logistic distribution with zero mean and constant variance. The observed value of the binary variable Y_i is defined as follows:

$$Y_i = \begin{cases} 1, & \text{si } Y_i^* > 0 \\ 0, & \text{si } Y_i^* \leq 0 \end{cases}$$

Therefore, the probability of the event conditional on the information contained in X_i is expressed as shown in Equation 2:

Table 1. Variables used in the study

Variable	Description	Indicator	Source
Dependent variable			
Inclusion	Indicates whether the household head possesses at least one of the following financial accounts: savings (or payroll) account, fixed-term deposit account, checking account, or compensation for time-of-service account.	Dichotomous variable: 1 = has a financial account, 0 = does not have/use one.	Module 05: Employment and Income
Independent variables			
Education	Highest educational attainment achieved by the household head.	Ordinal categorical variable: 1 = Primary education, 2 = Secondary education, 3 = Non-university higher education, 4 = University education.	Module 03: Education
Age	Age of the household head.	Age of the household head.	Module 03: Education
Gender	Gender of the household head.	Dichotomous variable: 1 = Male, 0 = Female.	Module 03: Education
Area	Identifies whether the household is in a rural or urban area.	Dichotomous variable: 1 = Rural, 0 = Urban	Module 34: Summary
Minority	Indicates whether the household head belongs to a minority group, defined as speaking a language other than Spanish.	Dichotomous variable: 1 = Minority status, 0 = Otherwise	Module 03: Education
Employed	Identifies whether the household head is currently employed (base category: unemployed).	Dichotomous variable: 1 = Employed, 0 = Otherwise (unemployed or outside the labor force).	Module 05: Employment and Income
no_pea	Indicates the labor-force participation status of the household head, distinguishing individuals outside the economically active population (base category: unemployed).	Dichotomous variable: 1 = Outside the labor force, 0 = Economically active population (employed or unemployed).	Module 05: Employment and Income
internet_use	Indicates whether the household head used internet services during the previous month.	Dichotomous variable: 1 = Yes, 0 = No.	Module 1: Housing and Household Conditions

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

$$P_i = \Pr(Y_i = 1|X_i) = \frac{1}{1 + e^{-Z_i}} \quad (2)$$

where:

$$Z_i = \beta_0 + \sum_{k=1}^K \beta_k X_{ki}$$

Furthermore, P_i represents the probability that individual i experiences a given event, X_{ki} denotes the explanatory variables, β_k the parameters to be estimated, and ε_i the error term.

The parameters β are estimated using the Maximum Likelihood (ML) method, which consists of maximizing the following likelihood function, presented in Equation 3:

$$L = L(\beta) = \prod_{i=1}^n P_i^{Y_i} (1 - P_i)^{1 - Y_i} \quad (3)$$

where $Y_i = 1$ if individual i experiences the binary event, and $Y_i = 0$ otherwise. Taking logarithms yields the log-likelihood function shown in Equation 4:

$$\ln[L] = \sum_{i=1}^n [Y_i \ln(P_i) + (1 - Y_i) \ln(1 - P_i)] \quad (4)$$

In this way, the parameter vector is estimated by maximizing the log-likelihood function with respect to the model parameters.

The statistical significance of the individual coefficients is evaluated using Z-statistic tests, while the overall goodness of fit is assessed through the likelihood ratio statistic. Finally, the predictive performance of the model is examined through the Receiver Operating Characteristic (ROC) curve and the specificity and sensitivity analysis, which allow the discriminatory capacity of the model to correctly classify cases of financial inclusion and exclusion to be evaluated.

2.4 Average Marginal Effect

In Logit models, the coefficients β_k do not directly represent the marginal change in the probability of occurrence of the event due to the nonlinear nature of the logistic function. Therefore, the marginal effect (ME) on the probability that the event occurs is calculated while holding the remaining variables constant.

The individual marginal effect of variable X_k for individual i is presented in Equation 5. It is obtained as the partial derivative of probability P_i with respect to X_{ki} :

$$\frac{\partial P_i}{\partial X_{ki}} = \beta_k P_i (1 - P_i) \quad (5)$$

The term $P_i(1 - P_i)$ reflects the sensitivity of the probability to changes in the explanatory variable and depends on the level of Z_i , therefore, marginal effects vary across individuals.

To obtain a global and comparable measure, the Average Marginal Effect (AME) is calculated, defined as the average of the individual effects across the entire sample. This is presented in Equation 6:

$$AME_k = \frac{1}{n} \sum_{i=1}^n \frac{\partial P_i}{\partial X_{ki}} = \frac{1}{n} \sum_{i=1}^n \beta_k P_i (1 - P_i) \quad (6)$$

The AME_k represents the average variation in the probability that the binary event occurs following a one-unit change in X_k , while holding the remaining variables constant. This indicator allows the results to be interpreted in probabilistic terms and facilitates comparisons among variables with different units of measurement. Marginal effects are estimated using the predicted probabilities obtained from the previously fitted Logit model.

3. Results

3.1 Descriptive statistics

This section presents descriptive statistics derived from the 2024 ENAHO microdata, which provide an overview of the household heads analyzed in terms of their engagement with the formal financial system in Peru. Specifically, Table 2 shows the proportion of household heads who have access to the financial system, broken down by gender.

Table 2 shows that 56.3% of women have access to the financial system, compared with 55.9% of men. Although the difference is minimal, these results suggest a slightly higher rate of female participation in the use of formal financial products in 2024. Overall, 56.1% of household heads have at least one account in the financial system, reflecting a moderate level of financial inclusion in the country.

Table 2. Access to the financial system by gender in 2024

Gender	No access	Access
Female	43,7 %	56,3 %
Male	44,1 %	55,9 %
Total	43,9 %	56,1 %

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Likewise, Table 3 presents the percentage of households that used the internet in 2024, grouped according to the educational level attained by the head of household.

Table 3. Proportion of Household Heads Using the Internet by Educational Attainment, 2024

Educational Attainment	No Internet Use in the Previous Month	Internet Use in the Previous Month
Primary Education or Less	62,1 %	37,8 %
Secondary Education	17,3 %	82,6 %
Non-University Higher Education	4,5 %	95,5 %
University Higher Education	2,9 %	97,1 %
Total	28,8 %	71,1 %

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Table 3 shows a positive relationship between educational attainment and internet use: the higher the level of education, the greater the proportion of households that used the internet during the previous month. Among households whose heads had only primary education, 37.8% used the internet. This proportion increased to 82.6% among those with secondary education and reached 95.5% and 97.1% among those with non-university higher education and university education, respectively.

Table 4 presents the percentage of household heads who used the internet during the previous month in 2024, categorized according to whether they belonged to a linguistic minority.

Table 4. Internet Use by Linguistic Minority Status, 2024

Linguistic Minority Status	No Internet Use in the Previous Month	Internet Use in the Previous Month
Non-Minority	22,3 %	77,7 %
Minority	47,9 %	52,0 %
Total	28,8 %	71,1 %

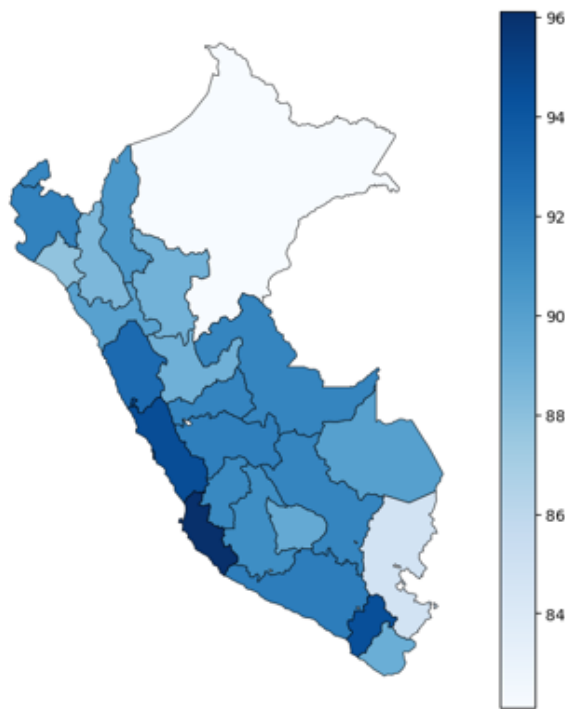
Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Source: Authors' own elaboration based on ENAHO 2024 (INEI). Table 4 shows a negative relationship between belonging to a linguistic minority and internet use. Among household heads who did not belong to a linguistic minority, 77.7% used the internet during the previous month, whereas this percentage declined to 52.0% among those who did belong to a linguistic minority. This finding reveals a digital gap of nearly 26 percentage points associated with membership in minority groups.

The distribution of internet use among household heads by department in 2024 is shown in Figure 1:

The highest connectivity rates are concentrated mainly in the coastal and south-central regions of the country, particularly in departments such as Lima, Arequipa, and Moquegua, where the percentage of households using the internet exceeds 94%. In contrast, the lowest rates are found in the Amazonian and northern regions, such as Loreto and Amazonas, with rates below 86%. This regional disparity highlights a persistent digital divide between urban and rural areas.

Figure 1. Percentage of Household Heads Using the Internet by Department, 2024



Source: Authors' own elaboration based on ENAHO 2024 (INEI).

3.2 Results of logit model

Table 5 presents the results of the Logit model estimation, which was used to analyze the factors influencing the probability of financial inclusion among Peruvian households in 2024.

Table 5. Logit model

Variables	Coefficient	Standard error	Z statistics	P value
education	0.772	0.016	47.67	0.000
age	0.023	0.001	24.71	0.000
gender	-0.228	0.026	-8.91	0.000
area	-0.204	0.029	-7.06	0.000
internet_use	0.584	0.032	18.23	0.000
minority	-0.138	0.028	-5.02	0.000
employed	0.346	0.079	4.38	0.000
no_pea	0.395	0.084	4.68	0.000
Constant	-3.020	0.107	-28.23	0.000

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

The results reported in Table 5 indicate that the educational attainment of the household head emerges as the factor with the greatest influence on integration into the formal financial system, showing a positive and statistically robust effect. Likewise, age is positively associated with financial participation, which is consistent with a process of accumulated experience and greater economic stability throughout the life cycle.

From a sociodemographic perspective, the estimates reveal that men exhibit a lower propensity for financial inclusion compared to women, once the remaining variables in the model are controlled for. In contrast, residence in rural areas and belonging to a linguistic minority are associated with lower

participation in the financial system, reflecting persistent territorial and cultural disparities.

In the digital dimension, the positive and significant coefficient of effective internet use suggests that active connectivity, rather than the mere availability of infrastructure, constitutes the actual channel of access to the digital financial system, which has direct implications for the design of financial inclusion policies. Finally, employment status shows that both employed household heads and those outside the labor force exhibit a greater propensity for financial inclusion than unemployed individuals, a result that reflects the heterogeneity of the population outside the labor force, which includes pension recipients and individuals receiving formally channeled transfers.

Subsequently, the average marginal effects of the Logit model are presented, allowing the impact of each explanatory variable on the estimated probability of financial inclusion to be quantified while holding the remaining individual and household characteristics constant.

Table 6. Average marginal effect

Variables	Average marginal effect	Standard error	Z statistic	P value
education	0.161	0.003	54.33	0.000
age	0.005	0.000	25.53	0.000
gender	-0.048	0.005	-8.95	0.000
area	-0.043	0.006	-7.08	0.000
internet_use	0.122	0.007	18.59	0.000
minority	-0.029	0.006	-5.03	0.000
employed	0.072	0.016	4.39	0.000
no_pea	0.082	0.018	4.69	0.000

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

The evidence presented in Table 6 confirms the importance of the socioeconomic, territorial, and digital factors associated with access to the formal financial system. Education exhibits the largest marginal effect in the model (16.1 percentage points), suggesting that cognitive and informational barriers constitute some of the main factors associated with formal financial integration in Peru. This result is not trivial: it indicates that expanding the supply of financial products without parallel investment in human capital may have only limited effects. Age is also positively and significantly associated with financial inclusion, although with a smaller magnitude, such that an additional year of age increases the estimated probability of access to the financial system by approximately 0.5 percentage points.

Regarding sociodemographic characteristics, the marginal effects show that men exhibit an estimated probability of financial inclusion 4.8 percentage points lower than that of women, once the remaining covariates are controlled for. This result is consistent with the descriptive evidence and suggests the persistence of gender gaps in access to formal financial services. Likewise, the 4.3 percentage point reduction associated with rural residence, together with the negative effect of belonging to linguistic minorities (-2.9 percentage points), reveals that territory and cultural identity operate as independent barriers that cannot be explained solely by differences in education or connectivity. This finding calls into question policy approaches that treat rural financial exclusion as an exclusively infrastructural problem.

From the digital perspective, effective internet use significantly increases the probability of integration into the financial system by 12.2 percentage points, reinforcing the role of active connectivity as a channel for access to formal financial services. In turn, belonging to a linguistic or cultural minority reduces the estimated probability of financial inclusion by 2.9 percentage points, highlighting the existence of additional structural barriers. Finally, in terms of employment status, employed household heads exhibit an estimated probability of financial inclusion 7.2 percentage points higher than that of unemployed individuals, while individuals outside the labor force show a probability 8.2 percentage points higher. This result is consistent with the heterogeneity of the population outside the labor force, which includes pension recipients, transfer beneficiaries, and other non-labor income recipients whose resources are channeled through the formal financial system.

Table 7 presents the classification matrix of the Logit model, constructed using a probability cutoff point of 0.5. The results show that the model correctly classifies 65.2% of the observations, achieving a sensitivity of 69.2% and a specificity of 60.2%. Likewise, the positive predictive value reaches 68.1%, while the negative predictive value attains 61.4%, indicating an acceptable balance between both types of classification errors.

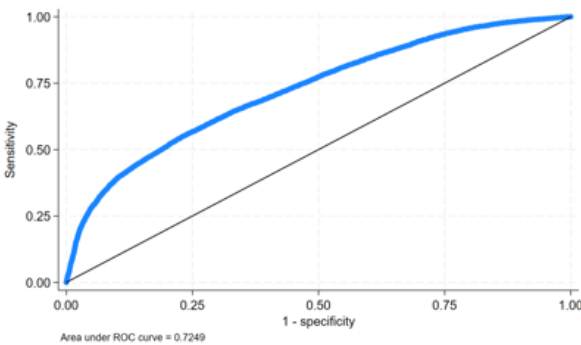
Table 7. Logit Model Classification Matrix (Cutoff Point = 0,5)

Indicator	Value (%)
Sensitivity	69,20
Specificity	60,29
Positive Predictive Value	68,19
Negative Predictive Value	61,41
Correctly Classified Observations	65,20

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Figure 2 presents the ROC curve of the Logit model, which summarizes its ability to discriminate between financially included and non-financially included household heads across different cutoff points. The area under the curve reaches a value of 0.7249, with a 95% confidence interval ranging from 0.711 to 0.736. This result confirms that the model exhibits consistent predictive performance in cross-sectional data and supports the robustness of the determinants identified in the empirical analysis.

Figure 2. Curva ROC



Source: Authors' own elaboration based on ENAHO 2024 (INEI).

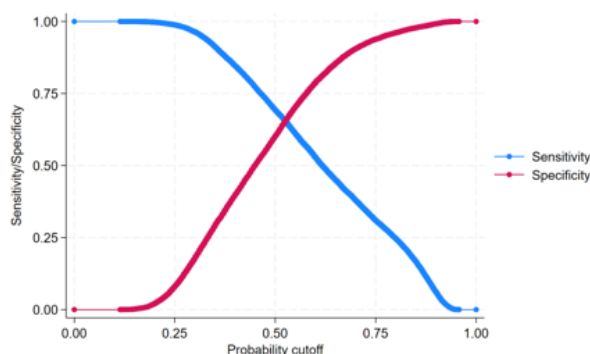
Figure 3 shows the sensitivity and specificity curves of the Logit model across different predicted probability cutoff points.

The characteristic trade-off between both indicators can be observed: as the classification threshold increases, sensitivity decreases while specificity increases. In particular, around the 0.5 cutoff point, a reasonable balance between both criteria is achieved, consistent with the reported classification matrix. This supports the choice of this threshold for evaluating the predictive performance of the model.

3.3 Regional and departmental effects

Table 8 presents the average predicted probabilities of financial inclusion by department obtained from a Logit model incorporating departmental effects and controlling for educational attainment, age, sex, area of residence, internet use, belonging to linguistic minorities, and economic activity status. The reported probabilities correspond to adjusted predictions for each department and therefore reflect territorial differences in financial inclusion after accounting for the individual and socioeconomic characteristics considered in the model. In addition, the estimates were computed using the weighting structure of ENAHO 2024.

Figure 3. Specificity and sensitivity



Source: Authors' own elaboration based on ENAHO 2024 (INEI).

The results reveal significant territorial heterogeneity in access to the formal financial system within Peru, even after controlling for individual and socioeconomic variables. In particular, departments such as Amazonas (67.0%), Cusco (65.0%), Pasco (62.5%), and Ayacucho (61.9%) exhibit the highest estimated probabilities of financial inclusion, whereas Madre de Dios (35.2%), Apurímac (45.7%), Tacna (45.9%), and Ucayali (46.9%) register the lowest estimated probabilities.

These findings should be interpreted considering the territorial structure of the Peruvian financial system. Boitano and Abanto (2020) find, at the departmental level, that banking concentration constitutes one of the main factors conditioning financial inclusion in Peru. Likewise, Nández et al. (2024) argue that remote rural areas, particularly in the highlands and jungle regions, face a greater risk of financial exclusion due to lower digital literacy, reduced use of digital banking services, limited networks of bank branches and ATMs, and insufficient transport infrastructure. In this context, the differences observed among departments such as Amazonas, Cusco, Pasco, Madre de Dios, and Ucayali suggest that access to the formal financial system retains a substantial territorial component beyond the individual characteristics included in the model.

Table 9 presents the average predicted probabilities of financial inclusion by natural region. The results show moderate differences across the country's macroregions: the Highlands register the highest estimated probability of financial inclusion (56.5%), followed by the Coast (54.7%) and the Jungle (53.8%). Although these differences are not as pronounced as those observed at the departmental level, the findings suggest that territorial disparities in access to the formal financial system persist even after controlling socioeconomic, labor, and digital variables.

These results show that regional differences in financial inclusion do not necessarily follow the pattern observed in traditional indicators of economic development. Although the Coast concentrates a larger share of economic activity and has historically exhibited a stronger presence of the financial system, the Highlands display a slightly higher predicted probability of financial inclusion. This finding may be associated with the recent expansion of financial inclusion mechanisms targeted at populations traditionally excluded from the formal financial system, particularly through cash transfer programs and the opening of simplified bank accounts. In Peru, the National Financial Inclusion Policy recognizes that the expansion of basic accounts and digital channels has been one of the main instruments used to increase financial access in rural and vulnerable areas (MEF, 2022). Likewise, CAF (2023) argues that the recent growth of financial inclusion in Latin America has been driven primarily by basic access products and financial digitalization, especially in territories with limited traditional banking infrastructure. In this sense, considering that the dependent variable used in this study measures financial access through account ownership, the results may primarily reflect processes of expanding formal access to the financial system rather than differences in regional financial depth.

Table 8. Average Predicted Probabilities of Financial Inclusion by Department

Department	Predicted probability	P Value	CI 95%
Amazonas	0.670	0.000	[0.649 ; 0.691]
Áncash	0.548	0.000	[0.529 ; 0.568]
Apurímac	0.457	0.000	[0.428 ; 0.487]
Arequipa	0.538	0.000	[0.516 ; 0.559]
Ayacucho	0.619	0.000	[0.593 ; 0.645]
Cajamarca	0.559	0.000	[0.539 ; 0.579]
Cusco	0.650	0.000	[0.629 ; 0.672]
Huancavelica	0.582	0.000	[0.554 ; 0.609]
Huánuco	0.595	0.000	[0.573 ; 0.616]
Ica	0.516	0.000	[0.494 ; 0.537]
Junín	0.579	0.000	[0.560 ; 0.599]
La Libertad	0.505	0.000	[0.485 ; 0.525]
Lambayeque	0.520	0.000	[0.499 ; 0.541]
Lima	0.547	0.000	[0.530 ; 0.565]
Loreto	0.506	0.000	[0.480 ; 0.531]
Madre de Dios	0.352	0.000	[0.315 ; 0.389]
Moquegua	0.559	0.000	[0.528 ; 0.591]
Pasco	0.625	0.000	[0.595 ; 0.654]
Piura	0.533	0.000	[0.513 ; 0.553]
Puno	0.541	0.000	[0.520 ; 0.563]
San Martín	0.571	0.000	[0.550 ; 0.592]
Tacna	0.459	0.000	[0.427 ; 0.491]
Tumbes	0.494	0.000	[0.462 ; 0.526]
Ucayali	0.469	0.000	[0.441 ; 0.496]

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Table 9. Average predicted probabilities of financial inclusion by region

Region	Predicted probabilities	P value	CI 95%
Coast	0.546	0.000	[0.538 ; 0.554]
Highlands	0.565	0.000	[0.556 ; 0.574]
Jungle	0.537	0.000	[0.526 ; 0.548]

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

4. Robustness analysis

To verify that the results obtained do not depend on the choice of the error-term distribution, a Probit model was estimated using the same variables included in the main model. The Probit model is a binary choice model that, unlike the Logit model, assumes that the error term follows a standard normal distribution; in practice, both models produce similar results given that their distributions are symmetric, with the main distinction being that the logistic distribution exhibits heavier tails (Wooldridge, 2016).

Table 10 presents the average marginal effects of both specifications, allowing for a direct comparison of the magnitude, sign, and statistical significance of each explanatory variable.

The results reported in Table 10 confirm the robustness of the findings. In both models, the eight variables retain the same sign and remain statistically significant at the 1% level. Differences in the marginal effects are minimal and do not exceed 0.002 percentage points in any case. The Pseudo R² is virtually identical (0.1233 in the Logit model versus 0.1236 in the Probit model), indicating that the explanatory power of the model does not vary across functional specifications. Consequently, the results are considered robust to the choice between the logistic and standard normal distributions, and the inferences derived from the Logit model can therefore be regarded as reliable.

Additionally, the potential presence of multicollinearity among the explanatory variables was assessed using the Variance Inflation Factor (VIF), as reported in Table 11.

The results show that none of the variables presents a VIF greater than 5. Kim (2019) points out

Table 10. Logit and probit model

Variable	Logit		Probit	
	dy/dx	P value	dy/dx	P value
education	0.1609	0.000***	0.1594	0.000***
age	0.0049	0.000***	0.0048	0.000***
gender	-0.0476	0.000***	-0.0475	0.000***
area	-0.0426	0.000***	-0.0447	0.000***
internet_use	0.1218	0.000***	0.1230	0.000***
minority	-0.0288	0.000***	-0.0292	0.000***
employed	0.0722	0.000***	0.0741	0.000***
No PEA	0.0824	0.000***	0.0829	0.000***
Pseudo R ²	0.1233		0.1236	

Note: *** p < 0.01. The omitted category for employment status is unemployed.

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

Table 11. Results for multicollinearity

Variable	VIF
No_pea	4.20
Employed	4.16
Internet_use	1.66
Age	1.46
Education	1.43
Area	1.30
Minority	1.14
Gender	1.05
Average VIF	2.05

Source: Authors' own elaboration based on ENAHO 2024 (INEI).

that when the VIF value lies between 1 and 5, there are no severe multicollinearity problems. In this sense, the findings suggest that the explanatory variables do not exhibit severe multicollinearity capable of distorting the estimates.

The results presented are interpreted and contrasted with the existing literature in the following section.

5. Discussion of results

The predominance of educational attainment as a determinant of financial inclusion, exhibiting the largest marginal effect in the model (16.1 percentage points), is not trivial: it suggests that the human capital associated with higher educational attainment constitutes a key factor for integration into the formal financial system in Peru, above factors related to physical access or banking infrastructure. This finding is consistent with Anaya and Romero (2018), Quispe et al. (2024), and Zins and Weill (2016), and carries direct policy implications: interventions focused exclusively on expanding the supply of financial products will be insufficient unless accompanied by investment in human capital and financial education programs (Lusardi and Mitchell, 2014). The positive effect of age, although smaller in magnitude, reinforces this interpretation: accumulated experience and economic stability throughout the life cycle facilitate sustained interaction with the formal financial system, suggesting that financial inclusion is also a gradual process of institutional learning.

The negative effects associated with rural residence and belonging to linguistic minorities reveal a structural dimension of the problem that goes beyond individual characteristics. The fact that both variables remain significant after controlling for education, labor income, and connectivity indicates that territory and cultural identity operate as independent barriers that cannot be reduced to socioeconomic deficits. These findings challenge policy approaches that treat rural or indigenous financial exclusion as

an exclusively infrastructural or income-related problem. Boitano and Abanto (2020) and Nández et al. (2024) document this persistence at the departmental level, and the results of the present study confirm it at the level of household heads using more recent data.

In the digital sphere, the effect of effective internet use (12.2 percentage points) introduces an analytically relevant distinction relative to the previous literature: it is not device ownership itself, but rather active connectivity, that determines digital financial integration, in line with Aurazo and Gasmi (2024), Samper (2022), and the evidence on digital competencies (West and Friedline, 2016; Álvarez et al., 2020). This implies that policies aimed at distributing devices without guaranteeing high-quality connectivity have only a limited impact on effective financial inclusion. Nevertheless, the absence of a measure of connectivity quality in the available data may underestimate this effect, which constitutes a limitation to be addressed in future research.

Finally, the finding regarding gender, namely, the greater propensity for financial inclusion among women once the remaining variables are controlled for, introduces a nuance that contrasts with the traditional narrative of gender gaps in financial access (Hendriks, 2019; Aterido et al., 2013). One plausible interpretation is that the expansion of conditional cash transfer programs and simplified bank accounts in recent years has disproportionately benefited female household heads by channeling their formal participation into the financial system (Sotomayor et al., 2018). If this hypothesis is correct, the result reflects an initial entry point into the financial system rather than financial depth, a distinction that is particularly relevant given that this study measures the access dimension rather than the usage dimension of financial inclusion.

6. Conclusions

The present study examines the factors associated with financial inclusion in Peru using ENAHO 2024 microdata and a Logit model. Given the cross-sectional nature of the data employed, the results should be interpreted as statistical associations rather than strictly causal relationships. The findings show that educational attainment exhibits the strongest positive association with formal financial inclusion, followed by effective internet use and employment status. Likewise, rural residence and belonging to linguistic minorities are negatively associated with the probability of financial inclusion, even after controlling for individual and socioeconomic characteristics. Finally, women exhibit a slightly higher probability of financial inclusion once the remaining covariates are considered, a result consistent with a possible expansion of initial access to the financial system through transfers and simplified accounts.

These findings carry direct policy implications: expanding the supply of financial products without parallel investment in education and high-quality connectivity will have structurally limited effects. Comprehensive strategies are required that combine the strengthening of human capital, the expansion of digital connectivity in rural areas, and an intercultural approach for household heads belonging to linguistic minorities.

This study measures the access dimension of financial inclusion, operationalized through account ownership, without capturing aspects related to the intensity, frequency, or quality of financial service use. Furthermore, variables such as educational attainment, income, and effective internet use may present potential endogeneity problems due to their possible correlation with unobservable factors simultaneously associated with financial inclusion. Therefore, the results should be interpreted as statistical associations rather than strictly causal relationships. Future research should incorporate panel data, disaggregated indicators of digital use, and methodologies capable of correcting these identification problems, as well as further exploring the role of Fintech firms in consolidating financial inclusion in Peru.

Author contributions

Diego Martínez Maldonado: Conceptualization, formal analysis, writing, methodology, data analysis, and editing

María Ocospoma Ancalli: Research, methodology, background research, visualization, writing, original draft

Luis Mendiola Contreras: Validation, supervision, creation of tables and graphs, review and final editing.

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