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Financial Inclusion and Welfare: Comparison between Male-Headed and Female-Headed Households

ABSTRACT

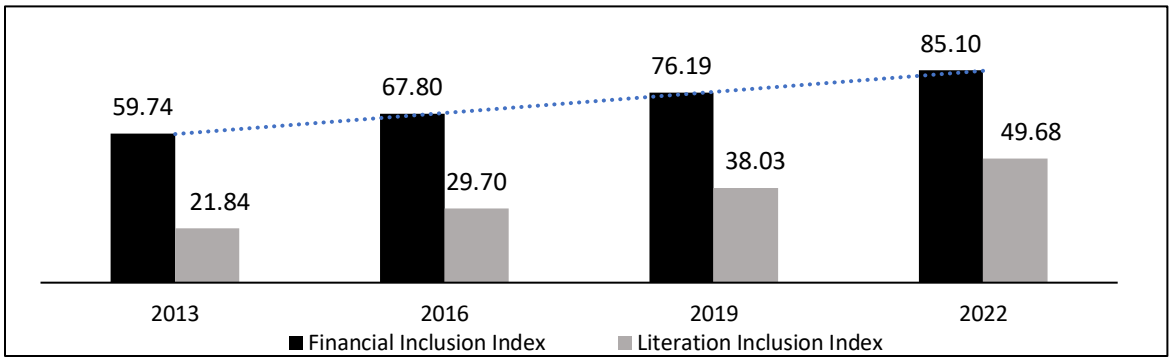
Indonesia's Vision 2045 aims to become a high-income country by boosting per capita income and ensuring inclusivity. Financial inclusion is a key national strategy to drive economic growth and equitable welfare. This study examines the influence of household characteristics on financial inclusion and its impact on the welfare of male-headed and female-headed households, using SUSENAS data. Logistic regression and Propensity Score Matching methods were used. The findings reveal that productive mobile phone ownership, non-food expenditure proportion, higher education, productive-age members, social assistance, microenterprises, and urban residence increase the probability of financial inclusion, while agricultural sectors and older household heads reduce it. Financial inclusion positively affects welfare, with greater benefits observed among female-headed households. This study provides insights for policymakers to design more effective financial inclusion strategies to enhance household welfare.

Keywords: *financial inclusion, gender, propensity score matching, household*
JEL Classification: G21, J16, C21, D14

INTRODUCTION

One of the visions of *Indonesia Emas 2045* (Golden Indonesia 2045) is to become a high-income country. In July 2023, the World Bank categorized Indonesia as an upper-middle-income country. Indonesia has 21 more years to achieve this target. One of the efforts to reach this goal is through inclusivity, meaning that no individual or group is excluded based on gender, physical condition, or region. Indonesia has integrated financial inclusion into its national targets to drive economic growth.

Figure 1. Financial Inclusion and Financial Literacy Index in Indonesia (%)



Source: OJK, 2022 (processed)

Figure 1. also shows that there is still a gap between the financial literacy index and financial inclusion. Financial inclusion has reached 85.1 percent, but the financial literacy index is still below 50 percent, at 49.68 percent. The significant gap between financial inclusion and financial literacy indicates that many people already have access to and use financial products and services, but do not fully understand the financial products and services they access. The lack of financial knowledge makes people more vulnerable to fraud (SNKI, 2022).

Low financial literacy is partly driven by the socioeconomic condition of households, particularly in the lower socioeconomic class. Inclusive finance promotes improved welfare and fosters sustainable and inclusive growth (Badan Kebijakan Fiskal, 2022). This means that equitable financial inclusion can influence decisions and attitudes in managing finances. This plays a crucial role in the well-being of a household.

Figure 2. Financial Inclusion and Financial Literacy Index by Province in Indonesia (%)

Source: OJK, 2022 (processed)

The high financial inclusion and literacy index is predominantly concentrated in Java, Bali, and West Nusa Tenggara (NTB). Java is the country's industrial hub, while Bali and NTB are well-known for tourism, where accommodation transactions and other digital payments are widespread.

If analyzed more closely, Indonesia's financial inclusion index, which has already reached a relatively high level of 85.10 percent, does not yet reflect equal distribution across all segments of society. From a gender perspective, in 2022, the financial inclusion index for women was 83.88 percent, while for men, it was 86.28 percent.

This difference can have implications for household welfare, especially when a woman is the head of the household. Limited access to certain financial services, such as credit, insurance, and investment, can hinder business development and women's empowerment, even though women's financial literacy is already relatively good.

Currently, the government has implemented a policy by developing a Learning Management System (LMS) module that is accessible to the public for free (SNKI, 2022). The LMS is an integrated learning and training system for financial education. Additionally, the government has been doing educational initiatives in collaboration with various stakeholders.

The materials presented in the program include an introduction to financial products and services from various types of financial institutions, personal financial planning, awareness of investment risks, and illegal online lending. From the financial inclusion perspective, the government launched the One Student, One Account Program (Indonesian: *Program Satu Rekening Satu Pelajar/KEJAR*) to encourage students in Indonesia to have a bank account. As a supporting measure, the government has also issued a Circular Letter (SE) to strengthen the implementation of this program. The main objective of this program is to cultivate the habit of saving from an early age.

Based on the existing background and considering the importance of government policies for equitable financial inclusion, the relatively high financial inclusion index does not fully reflect the conditions across all segments of society. Therefore, improvements must be accompanied by the equal

distribution of financial inclusion across all regions of Indonesia to enhance societal welfare. According to Zhang and Posso (2019) household characteristics can be a factor influencing household financial inclusion. Therefore, the first objective of this study is to examine how household characteristics (such as education, employment, business ownership, region, and other characteristics) affect financial inclusion in households in Indonesia.

Furthermore, although the financial inclusion index is relatively high, women's access to certain financial products remains more limited compared to men. Factors such as the absence of official identification documents, social norms, and cultural barriers often discourage women from using financial products.

These limitations can affect income, especially when a household is headed by a woman who is responsible for financial decision-making. From a welfare perspective, according to the World Bank (2011), female-headed households tend to be more vulnerable to poverty compared to male-headed households.

Although there are still limitations in access to financial products, research supported by Muhammad Yunus (Nobel Peace Prize laureate) indicates that providing loans to women is quite effective in improving the community's economy, as women have advantages in financial management (Rafsanjani *et al.*, 2017). The differing effects of financial inclusion can affect welfare in both male-headed households and female-headed households. Therefore, the second objective is to analyze the effect of financial inclusion on household welfare in Indonesia, the effect of financial inclusion on the welfare of male-headed and female-headed households, and whether financial inclusion has a greater effect on the welfare of female-headed households.

According to research by Rini and Rahadiantino (2023) business ownership and mobile phone ownership have a positive effect on financial inclusion. Households with mobile phones and

internet access are better able to access formal financial products or services compared to those without internet access and without a business. Furthermore, according to Demirguc-Kunt et al. (2018), mobile phones are directly linked to digital financial inclusion. The research results by Zhang and Posso (2019) indicate that financial inclusion has a strong positive effect on household income. In addition, studies by Azimi (2022), Chipunza and Fanta (2023), Hodula (2023), Hu, Guo, et al. (2023), Hu, Zhai, et al. (2023), Sohrab et al. (2024), Lee et al. (2023) also show the positive effects of financial inclusion on household income and welfare.

RESEARCH METHOD

The analysis of the effect of household characteristics on financial inclusion and the impact on welfare is conducted using logit regression estimation and propensity score matching. This study utilizes cross-sectional secondary data sourced from the National Socioeconomic Survey conducted by BPS (Statistics Indonesia). The total sample in this study comprises 341,802 households to address the first research objective. To answer the second research objective, the sample is divided into two groups: 289,932 households led by men and 51,870 households led by female. This study consists of three types of variables: Covariate variables, Treatment variables, and Outcome variables. The treatment variable is financial inclusion, which is constructed from four dimensions. There is a modification in the approach to financial inclusion in this study by considering the availability of data and the definition concepts used in the National Socioeconomic Survey.

Table 1. Dimensions Forming the Financial Inclusion Variable

No.	Dimension	Weight and Description
(1)	(2)	(3)
1	Savings	If the household has a savings account in a financial institution, weight: ¼; if not: 0
2	Credit	If the household has or receives credit, weight: ¼; if not: 0
3	Insurance	If the household has insurance or health coverage, weight: ¼; if not: 0
4	Transactions	If the household uses financial facilities (E-Banking) or makes digital payments (purchases and sales), weight: ¼; if not: 0

Source: Zhang and Posso (2019), modified by the author.

For savings, SUSENAS data does not include the ownership of time deposits, bonds, or stock trading accounts, so it uses an account ownership approach, which is closely related to savings (Despard et al., 2020).

For credit, in the microeconomic approach, measurement can be based on whether a household or an individual has a loan. For the insurance dimension, the microeconomic approach measures insurance by determining whether a household has access to insurance services (Rini and Rahadiantino, 2023). For the transaction dimension, this study does not use the current account ownership approach as in previous research (Zhang and Posso, 2019). Financial transactions can be measured using the digital payment approach (Akyuwen, 2018). An example of a transaction is digital payment using Brizzi, Flazz, e-Money, GoPay, OVO, and similar platforms.

If the total value of the four dimensions is equal to or greater than 0.50 (50 percent), the household is categorized as financially included. Conversely, if the total value is less than 50 percent, the household is classified as financially

excluded. The table includes a modification related to the categorization of financial inclusion codes, where code 1 represents financial inclusion and code 0 represents financial exclusion. Next, the covariate variables used in this study are as follows:

Table 2. Covariate Variables

Variable		Description
(1)		(2)
X_1	Mobile Phone	1: Owns or can operate a mobile phone used for purchasing goods/services, selling goods/services, or financial facilities (E-banking). 0: Does not own or operate a mobile phone used for purchasing goods/services, selling goods/services, or financial facilities (E-banking).
X_2	Non-Food Expenditure Proportion	Total non-food expenditure divided by total household expenditure.
X_3	Education	1: The head of the household has a minimum senior high school diploma. 0: Below senior high school.
X_4	Working-Age Household Members	Total household members aged 15–64 years.
X_5	Employment by Sector	1: The head of the household works in the agricultural sector. 0: Works outside the agricultural sector.
X_6	Social Assistance	1: Receives social assistance (PKH or BPNT). 0: Does not receive social assistance.
X_7	Micro Business	1: At least one household member owns a micro business. 0: No household members own a micro business.
X_8	Age	Age of the household head.
X_9	Regional Classification	1: Urban. 0: Rural.
X_{10}	Gender	1: Male-headed household. 0: Female-headed household.

Source: Sosio-economic Survey 2023

For the outcome variable, household welfare is proxied by the variable of household per capita expenditure.

For the first method, logistic regression is used. The logit model is a model in which the error distribution follows a logistic distribution. The logit model is a model for binary response, where the

response probability is a logit function evaluated on a linear function of explanatory variables (Wooldridge, 2004). Through logit regression, the probability of a household being categorized as financially included based on household characteristics can be determined. The following is the logit model equation:

$$L_j=\ln\left(\frac{P_j}{1-P_j}\right) = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k + u_j$$

Description:

P_j : Probability value ranging between 0 and 1

u_j: *Error term*

The research model equation is as follows:

$$L_j=\ln\left(\frac{P_j}{1-P_j}\right) = \beta_0 + \beta_1 MobilePhone_j + + \beta_2 NonFoodExpenditureProportion_j + \beta_3 Education_j + \beta_4 WorkingAgeHouseholdMembers_j - \beta_5 EmploymentSector_j + \beta_6 SocialAssistance_j + \beta_7 MicroBusiness_j - \beta_8 Age_j + \beta_9 RegionalClassification_j + \beta_{10} Gender_j$$

Explanation:

L_j : Natural logarithm of the odds ratio between households categorized as financially included and financially excluded

β_0 : Intercept or constant in the household equation model

$\beta_1, \ldots, \beta_{10}$: Slope coefficients in the household equation model for each independent variable

In the logit model, interpretation is not based directly on the coefficient values of the model because the logit model is nonlinear with respect to its parameters. Instead, interpretation is conducted using the marginal effect, which describes the effect of each significant predictor variable on the probability of each category in the response variable or independent variable. The following table presents the marginal effects of the logit model:

$$\frac{\partial F(x'\beta)}{\partial x} = \frac{e^z}{(1+e^z)^2}\beta_i$$

Explanation:

e : Exponential constant

β_i : Coefficient of variable x_i

$z = x'\beta$: Linear combination of parameters and predictors.

Several goodness-of-fit criteria in the logistic regression model include

Correctly Classified, which measures how accurately the model predicts the correct category or class for each observation in the dataset (Wooldridge, 2004). In the Correctly Classified metric, a sensitivity value will appear to assess the model's ability to correctly identify individuals classified as financially included (coded as 1). In addition to sensitivity, the model will also produce a precision value, which indicates the efficiency of the model in generating correct positive predictions. Since this study focuses on financially included households, precision is particularly relevant.

Next, the Receiver Operating Characteristic Curve, as described by Hosmer and Lemeshow (2000) ROC is a method for evaluating the performance of a classification model, especially in the case of binary variables. The value provides a comprehensive overview, whereas if the area under the ROC curve gets closer to one, the model is considered good (Hosmer & Lemeshow, 2000). The criteria for the Area Under the ROC Curve are as follows:

ROC = 0.5 : No discrimination

0.7 < ROC < 0.8 :Acceptable discrimination

0,8 < ROC < 0.9 : Good discrimination

ROC ≥ 0.9 : Excellent discrimination

In addition, goodness of fit can also be assessed using the Pseudo R-squared value. This criteria represents the proportion of variance in the dependent variable that can be explained by the independent variables. In logistic regression estimation, a simultaneous test (F-test) will also be conducted to determine the effect of all explanatory variables on the response variable. Additionally, a t-test will be performed to examine whether each explanatory variable significantly affects the response variable.

The next research model is Propensity Score Matching (PSM). PSM is a method used to determine the magnitude of the effect of financial inclusion on household welfare. The use of the PSM method refers to previous studies and this method can be applied to cross-sectional data. Specifically, it follows the approach used by Zhang and Posso (2019) for selecting the PSM method.

The first step is to determine the propensity score, which is calculated using the logit model. The propensity score is defined as the conditional probability of receiving treatment (Fj = 1) versus being in the control group (Fj = 0), based on the observed covariate characteristics xi. According to Guo and Fraser (2015), the propensity score is defined as follows:

$e(x_j) = P(F_j = 1|X_j = x_j)$

Explanation:

$e(x_j)$: Propensity score, which represents the probability that household j experiences financial inclusion based on the condition of the independent variables.

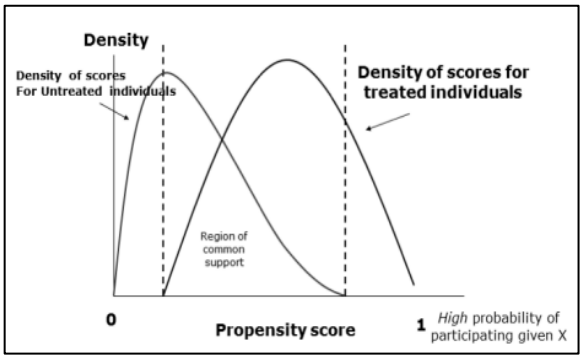
F_j :Indicator variable that shows whether household j xperiences financial inclusion (1 if yes, 0 if no).

X_j : A set of independent variables

x_j :Specific value of the independent variables

In the PSM method, there is an assumption that must be met, namely the common support assumption. The following is an illustration of the common support area*:*

Figure 3. Common Support Area



Source: Sulistyaningrum (2005)

Common support is a condition where there is an overlap between the treated and untreated groups, indicating that there is a similarity in the distribution of propensity scores, thus allowing for a valid comparison between the two groups.

The steps of Propensity Score Matching (PSM) according to Caliendo and Kopeinig (2005) include: (1)

Determining covariates based on theory or empirical evidence for propensity score estimation; (2) Estimating the propensity score and using it in the matching process; (3) Performing matching using methods such as nearest neighbor, radius and caliper, kernel, or local linear regression (LLR), while considering the common support region to assess the overlap between the treatment and control groups; (4) Evaluating the quality of matching through propensity score distribution and bias reduction; and (5) Calculating the Average Treatment Effect on the Treated (ATT) to estimate the treatment effect. The general outcome equation model for households is as follows:

$Y_{j,L} = c_{j,L} + \delta_L F_{j,L} + \gamma_L X_{j,L} + \varepsilon_{j,L}$

$Y_{j,P} = c_{j,P} + \delta_P F_{j,P} + \gamma_P X_{j,P} + \varepsilon_{j,P}$

Explanation:

Y_j: Outcome variable

c_j: Intercept or constant

δ: Measures the treatment effect

F_j: Probability of treatment

γ: Vector of covariate coefficients

ε_j: *Error term*

L : Household with a male-headed

P : Household with a female-headed

Then, after obtaining the ATT (Average Treatment Effect on the Treated), a robustness check is conducted.

RESULTS AND DISCUSSION

A prominent issue in recent discussions is the Indonesia Emas 2045 agenda. One of the key efforts in achieving this goal is equal financial inclusion, which can drive household welfare. The following provides an overview of financial inclusion and household characteristics that may affect financial inclusion. Descriptive statistics can be seen in Table 3.

Table 3. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation
Financial Inclusion	341,802	71.85	0.449
Mobile Phone	341,802	0.262	0.440
Non-Food Expenditure Proportion	341,802	0.447	0.129
Education	341,802	0.370	0.483
Working-Age Household Members	341,802	2.460	1.231
Employment Sector	341,802	0.513	0.500
Social Assistance	341,802	0.236	0.424
Micro Business	341,802	0.113	0.317
Age	341,802	49.488	13.011
Regional Classification	341,802	0.420	0.494
Gender	341,802	0.848	0.359
Per Capita Expenditure	341,802	1,585,948	1,609,006

Source: Author's calculations

Table 3. shows that 71.85 percent of households in Indonesia, or 245,571 households, are categorized as financially included, while 28.15 percent, or 96,231 households, are still financially excluded. This indicates that more than a quarter of households have not yet been reached by financial inclusion. This finding highlights the need for further government efforts to enhance and expand financial inclusion among households. Additionally, Table 3 also shows that 26.20 percent of households own a mobile phone used for purchasing goods/services, selling goods/services, or utilizing e-banking services. Furthermore, the average proportion of household expenditure allocated for non-food necessities reaches 44.70 percent. In terms of education, 37 percent of household heads have completed senior high school or higher. This means that a significant number of household heads still have a low level of education. The low level of education indicates the need for efforts to enhance financial inclusion at the household level. Furthermore, each household has an average of 2–3 members in the productive age group, which ranges from 15 to 64 years. Additionally, approximately 51.30 percent of household heads in Indonesia work in

the agricultural sector, and around 23.60 percent of the analyzed household sample receives social assistance, which in this study refers to PKH (Family Hope Program) and BPNT (Non-Cash Food Assistance). From a regional perspective, 42.00 percent of households reside in urban areas. In terms of gender, male-headed households dominate, accounting for 84.80 percent. For the outcome variable of welfare, which is proxied by per capita expenditure, the average monthly per capita household expenditure is approximately IDR 1,585,948.

Logit Regression Estimation Results

To address the first research objective, this study uses logistic regression. The following is the logit regression equation:

$$\begin{aligned}\widehat{L_J}(X) = {} & -2.284 + 2.974\,\text{MobilePhone}_j \\ & + 3.440\,\text{NonFoodExpenditureProportion}_j + 0.845\,\text{Education}_j \\ & + 0.299\,\text{WorkingAgeHouseholdMembers}_j \\ & - 0.389\,\text{EmploymentSector}_j \\ & + 2.055\,\text{SocialAssistance}_j \\ & + 0.235\,\text{MicroBusiness}_j \\ & - 0.0004\,\text{Age}_j \\ & + 0.235\,\text{RegionalClassification}_j \\ & + 0.156\,\text{Gender}_j\end{aligned}$$

Next, based on the logit regression estimation results, the goodness of fit of the model is first examined in Table 4. According to the goodness-of-fit criteria, the resulting model is considered adequate. The following table presents the logit regression estimation results:

Table 4. Logit Regression Estimation Results

Variable	Coefficient	Marginal Effect
(1)	(2)	(3)
Mobile Phone	2.974* (0.023)	0.427
Non-Food Expenditure Proportion	3.440* (0.041)	0.494
Education	0.845* (0.011)	0.121
Working-Age Household Members	0.299* (0.004)	0.043
Employment Sector	-0.389* (0.010)	-0.056
Social Assistance	2.054* (0.013)	0.295
Micro Business	0.235* (0.015)	0.034
Household Head Age	-0.0004 (0.0004)	-0.0001
Regional Classification	0.235* (0.010)	0.034
Gender	0.156* (0.013)	0.022
_cons	-2.284* (0.031)	
Correctly Classified		78.39%
Area Under the ROC Curve		0.8378
Pseudo R-Squared		0.2706

Source: Output STATA 17

Robust standard errors in brackets, *p<0.1, **p<0.05, ***p<0.01

The mobile phone variable, with a coefficient value of 2.974, has a positive and significant effect on financial inclusion. Next, for the non-food expenditure proportion variable, the p-value is 0.000. The non-food expenditure proportion variable, with a coefficient value of 3.440, indicates that the proportion of household expenditure on non-food items is positively and significantly related to financial inclusion. Furthermore, higher education, productive-age household members, social assistance, micro businesses, urban residential areas, and male-headed households have a positive and significant effect on household financial inclusion in Indonesia, while the agricultural sector has a significant and negative effect on financial inclusion.

For the marginal effect, the mobile phone variable has a marginal effect value of 0.427, indicating that households in Indonesia that own a mobile phone with internet access and use it for productive financial purposes will have a 42.70 percent higher probability of being categorized as financially included compared to those who do not use it for productive financial purposes, ceteris paribus. In this study, productive purposes refer to

buying/selling goods or services and e-banking.

These findings are consistent with Rini and Rahadiantino (2023) and Asongu et al. (2020) which shows that technological innovation, including mobile device ownership for productive activities, plays a crucial role in financial inclusion.

Furthermore, an increase of one point in the non-food expenditure proportion increases the probability of a household being financially included by 49.40 percent, ceteris paribus. This finding is supported by the study of Hussen and Mohamed (2023) which shows that households with higher non-food expenditures often have better access to financial services. Furthermore, this finding is also consistent with Engel's Law, which states that as income increases, the proportion of expenditure on food tends to decrease, while expenditure on non-food necessities increases. Examples include spending on education, health, entertainment, and financial services, which tend to rise with higher income levels. Additionally, higher education, social assistance, micro businesses, and residing in urban areas increase the probability of a household being financially included.

An additional productive-age household member increases the probability of financial inclusion by 4.30 percent, ceteris paribus. This finding aligns with the study by Bui and Luong (2023) which indicates that productive-age household members or those in the labor force enhance access to financial services. A household head working in the agricultural sector reduces the probability of financial inclusion by 5.60 percent compared to those working in the non-agricultural sector, ceteris paribus. This result is consistent with the study by Hussen and Mohamed (2023) which found that employment in the non-agricultural sector increases the likelihood of household financial inclusion.

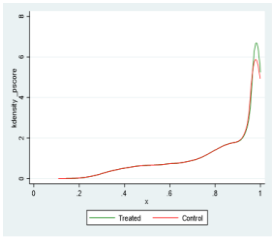
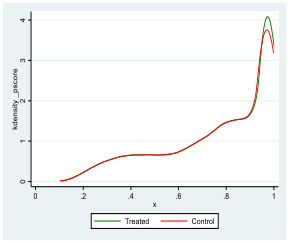
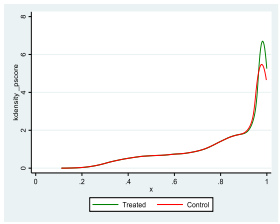
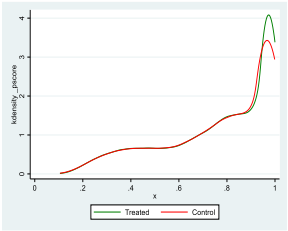
From a gender perspective, a male-headed household increases the probability of financial inclusion by 2.20 percent compared to a female-headed household, ceteris paribus. This finding

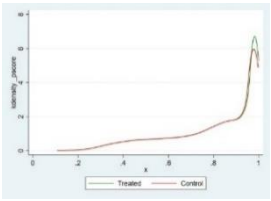
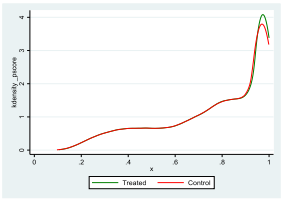
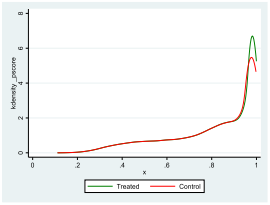
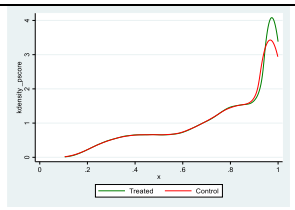
is consistent with the study by Rini and Rahadiantino (2023), which states that male-headed households are more likely to be financially included. Male household heads tend to be more trusted in accessing financial services, such as loans or bank account openings.

PSM Estimation Results

In this study, four matching methods are used to analyze the effect of financial inclusion on male-headed and female-headed households. The four matching methods used are nearest neighbor, radius caliper, kernel, and local linear regression. Propensity score matching method is used to address the second objective, which is to examine the impact of financial inclusion on household welfare. In this study, the analysis is divided into two groups: the impact on households with male-headed households and the impact on households with female-headed households. The following table presents the quality of PSM matching results:

Table 5. Propensity Score Distribution After Matching

Male-Headed Households	Female-Headed Households
(1)	(2)
Nearest Neighbor	
	
Radius Caliper	
	
Kernel	

Male-Headed Households	Female-Headed Households
	
Local Linier Regression	
	

Source: Output STATA 17

Based on the propensity score distribution after matching, the kernel method is the most suitable matching method for male-headed and female-headed households. This is because the distribution becomes more similar when using the kernel method. Furthermore, the quality of matching can also be assessed by examining the bias reduction before and after matching, as follows:

Table 6. Reduction Bias

Variable	Male-headed Household		Female-headed Household	
	After	Reduction	After	Reduction
(1)	(2)	(3)	(4)	(5)
Mobile Phone	9.2	90.4	13.7	84.6
Non-Food Expenditure Proportion	4.9	90.3	8.6	76.9
Education	-1.3	97.5	-5.3	89.4
Working-Age Household Members	-4.9	87.2	-8.2	85.3
Employment Sector	3.0	93.4	5.8	83.9
Social Assistance	-5.4	88.9	-9.2	83.7
Micro Business	-4.0	67.9	-5.2	60.6
Household Head Age	0.9	93.3	2.4	91.7
Regional Classification	2.0	95.0	1.4	96.1

Source: Output STATA 17

Based on Table 6, the matching process has generally been successful in reducing bias across most variables, with an average bias reduction greater than 80 percent and post-matching bias of less than 10 percent.

After identifying that kernel matching is the most effective matching method and that bias reduction using this method is also satisfactory, the next step is to estimate the Average Treatment Effect on the Treated (ATT).

Table 7. Estimation Results of Average Treatment Effect on The Treated (ATT)

Method	Male-headed Household		Female-headed Household	
	Observed Coeff.	Std.Err	Observed Coeff.	Std.Err
(1)	(2)	(3)	(4)	(5)
Nearest Neighbor	0.157***	0.010	0.187***	0.024
Radius Caliper	0.155***	0.013	0.194***	0.030
Kernel	0.155***	0.009	0.194***	0.021
Local Linear Regression	0.148***	0.013	0.197***	0.030

Source: Output STATA 17
*p<0.1, **p<0.05, ***p<0.01

The ATT value from matching using the kernel method for male-headed households is 0.155. This means that financial inclusion has a positive effect of 0.155 on the welfare of male-headed households. In other words, for male-headed households that are financially included, household per capita expenditure is approximately 15.50 percent higher compared to financially excluded households. Meanwhile, the ATT value from matching using the kernel method for female-headed households is 0.194. This means that financial inclusion has a positive effect of 0.194 on the welfare of female-headed households. In other words, for female-headed households that are financially included, household per capita expenditure tends to be approximately 19.40 percent higher compared to financially excluded households.

Financial inclusion has a significant positive effect on household welfare for both male-headed and female-headed households. However, the effect is greater for female-headed households, at 19.50 percent, compared to 15.50 percent for male-headed households. These findings are consistent with the

studies by Azimi (2022), Chipunza and Fanta (2023), Hodula (2023), Hu, Guo, et al. (2023), Hu, Zhai, et al. (2023), Sohrab et al. (2024), Lee et al. (2023) which show that financial inclusion positively affects household welfare and income growth. Additionally, business development through various programs, such as providing credit for micro-business expansion, encourages households to participate in financial inclusion. This study is also consistent with the findings of Zhang and Posso (2019); Rini and Rahadiantino (2023) which indicate that financial inclusion has a positive effect on household welfare.

The research findings, which show the positive effect of financial inclusion on household welfare, particularly for female-headed households, align with the primary objective of financial inclusion, which is to improve welfare, as stated by the World Bank (2017). Financial inclusion not only enhances individual and household welfare but also contributes to economic efficiency, financial system stability, and the reduction of gender and income inequality. Financial inclusion enables households to allocate resources more efficiently for productive activities. Additionally, it helps households start small businesses, which can lead to sustainable income growth.

This study is also consistent with Muhammad Yunus, a Nobel Peace Prize laureate, who stated that providing loans to women has proven to be quite effective in driving economic growth in communities. Women who are household heads often face significant challenges in maintaining family economic stability, including limited access to resources and economic opportunities. However, with adequate access to financial services such as micro-business credit, savings, and digital financial services, they are able to run businesses that directly contribute to household income.

This success has a positive effect on household welfare. Additionally, female household heads who have access to financial inclusion are more likely to allocate their time to productive activities, such as running micro-

businesses or engaging in other income-generating work. As a result, the time usually spent on family responsibilities decreases. This is due to women's superior ability in financial management (Rafsanjani *et al.*, 2017). This study is also consistent with the findings of Atta-Aidoo et al. (2023) which show that increased financial inclusion has a more significant positive effect on the welfare of female-headed households compared to male-headed households.

Robustness

For robustness, estimation is conducted using probit regression, following the previous logit regression to obtain the propensity score used for matching. The following table presents the ATT estimation results:

Table 8. Robustness of Average Treatment Effect on The Treated (ATT) Estimation Results

Method	Male-headed Household		Female-headed Household	
	Observed Coeff.	Std.Err	Observed Coeff.	Std.Err
(1)	(2)	(3)	(4)	(5)
Nearest Neighbor	0.155***	0.010	0.198***	0.023
Radius Caliper	0.161***	0.013	0.191***	0.030
Kernel	0.161***	0.009	0.198***	0.020
Local Linear Regression	0.153***	0.013	0.198***	0.030

Source: Output STATA 17
*p<0.1, **p<0.05, ***p<0.01

The ATT values across different matching methods in Table 7 do not show significant differences. This is further confirmed by the robustness test results in Table 8, where the values remain consistent with those in Table 7.

CONCLUSION

Based on the analysis above, it can be concluded that more than a quarter of households are not yet connected to financial services, such as banking or digital payment services. Several factors have proven to have a significant effect on the level of financial inclusion in Indonesia. Mobile phone ownership used for financial activities, such as payments and fund transfers, as well as the proportion of household expenditure on non-food necessities, have a positive effect on access to financial services. An increase in household expenditure on non-food

necessities, which typically occurs alongside income growth, indicates that higher-income households are more likely to have access to financial services. Households with higher income levels have greater flexibility in allocating funds for productive economic activities and other needs, including the use of financial services.

Additionally, a higher education level of the household head, the number of productive family members, and micro-business ownership also increase the probability of being connected to financial services. Government social assistance programs, such as Family Hope Program and Non-Cash Food Assistance, also play a role in enhancing financial inclusion. Meanwhile, urban households have better access to financial services compared to rural households. Gender also affects the level of financial inclusion, with female-headed households showing positive participation in financial services. Conversely, households working in the agricultural sector have lower financial inclusion rates compared to those working in the non-agricultural sector.

For future research, it is recommended to add other relevant control variables related to financial inclusion, such as the distance to financial services, which may affect household accessibility to the formal financial system. This study can also be expanded by extending the research period to obtain more comprehensive information.

To increase financial inclusion and household welfare, the government needs to accelerate the development of digital infrastructure, especially in remote areas. Support for the fintech ecosystem also needs to be strengthened through inclusive regulations and literacy from Financial Services Authority of Indonesia, while Bank Indonesia is expected to expand QRIS socialization and continue strategic initiatives in the Indonesian Payment System Blueprint 2030. Collaboration with the private sector, including fintech, can expand access to financial services, especially for low-income households, by providing a practical

and affordable digital financial platform.

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