

## The Influence of Financial Inclusion and Internet Access on the Income of Poor Households

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*Received: January 2024 | Revised: May 2024 | Accepted: July 2024*

### Abstract

The province of West Java is the most populous province and has high levels of unemployment and poverty in Indonesia. This research analyzes the impact of financial inclusion and internet access on poor households' income in West Java. The study uses data from the March 2022 Social and Economic Survey by the Indonesian Central Bureau of Statistics and applies an econometric model. The analysis introduces a novel approach by categorizing poverty based on the poverty line, specifically targeting the lowest 20% and 40% of income-earning households. This method allows for a deeper understanding of the impact of financial inclusion and internet access on these specific segments. The findings highlight that financial inclusion and internet access positively influence the income of poor households. Specifically, savings ownership increases the income of poor households. Access to credit positively affects income for the lowest 40% income bracket. However, internet access mainly influences sales and purchases within the 40% lowest income group, with limited use in purchasing activities.

**Key Words:** financial inclusion; internet access; income; poverty

**JEL classification:** I32

**How to Cite:** Hermawan W., Heriyaldi H., Tjahjawardita A. (2024). The Influence of Financial Inclusion and Internet Access on the Income of Poor Households, 25(1), 84-104. doi:<https://doi.org/10.23917/jep.v25i1.23517>

**DOI:** <https://doi.org/10.23917/jep.v25i1.23517>

### 1. Introduction

From various issues in development, the significant growth of the population has contributed to the emergence of many problems related to the limited resources to support it. These problems include unemployment, adequate income and livelihood, housing, poverty, environmental degradation, health, social protection, fertility and mortality, migration, and other social issues, including politics. Data from many countries indicate that higher population growth in a country will be accompanied by lower per capita income. From a political perspective, a larger population also makes it increasingly difficult to represent the entire society in the political process and, in turn, makes it difficult to measure the degree of democracy (Dyson, 2010).

In 2019, 47 percent of the world's poor population reached 3.64 billion out of its 7.74 billion inhabitants (based on the poverty line of PPP \$6.85/person/day). Despite various policy mixtures to alleviate poverty such as improving access to credit, promoting saving movements, supporting gender equality, and enhancing decent living conditions, microfinance funding has not yet been able to significantly contribute to poverty alleviation. In sub-Saharan Africa, which is dominated by low-income countries, excluding high-income ones, only 43.6 percent of the poorest 40 percent of the population have access to financial institutions or mobile payment services. The situation is relatively better in East Asia and the Pacific, where 74.7 percent of the poorest 40 percent of the population have bank accounts or access to mobile payment services. Access to financial services plays a crucial role in poverty alleviation efforts because it enables poor communities to have access to poverty reduction programs and to initiate/develop their own businesses (Chibba, 2009). Financial inclusion through mobile phone subscription also has showed positive impact on poverty alleviation in 123 countries, enables remittance inflows (Inoue, 2024).

In India, the microfinance program model which refers to the Grameen Bank and self-help group (SHG) financing model where funding and program implementation are carried out by the central government involving National Bank for Agriculture and Rural Development (NABARD), UNICEF, and other institutions is the most widely used model. Unlike other models, this model is relatively successful because it can identify multidimensional poverty issues faced by the target communities of this program. Generally, the program participants are rural women who voluntarily participate in the program and are motivated to run micro-enterprises. The program offers training and support for various types of businesses such as food production, daily consumer goods, agriculture and animal husbandry for food security, information technology education, waste management, tourism, health services, and others. While this program can improve the entrepreneurial skills of the participants, it is limited by the lack of market access for larger-scale businesses. Therefore, a marketing program should be implemented to ensure the absorption of the participants' production outputs (Deepika & Sigi, 2014).

The data collected by Fungáčová & Weill (2015) from the Global Findex database indicates that the considerations of the public in owning and using financial services are limited funds, distance, account ownership costs, documentation completeness, trust issues, religious teachings, and the presence of family members who already have access. For the Brazilian community, religious teachings and the presence of family members with bank accounts are the two biggest factors (14.51 percent) that prevent them from having an account in a formal financial institution. For the Chinese community, the highest factor is religious teachings (14.42 percent) and the second is lack of funds (14.35 percent). For the Indian community, the primary factor is lack of funds (14.44 percent) and the second is the distance of financial services from their residence (14.34 percent). The same second factor is also faced by the Russian community (14.81 percent). For the Russian community, the first factor is a lack of documentation (14.82 percent). Lastly, for the South African community, distance, documentation, trust, lack of funds, and religious teachings are all equally ranked as the top barriers (14.32 percent). Overall, the lack of funds is the primary barrier (14.45

percent), and the second is distance (14.41 percent). The research also shows that owning bank accounts and loans in formal financial institutions are influenced by the middle and tertiary education levels (higher education). Meanwhile some empirical evidence shows positive impact of financial inclusion on wage or income and/or poverty alleviation, a study base of middle-income and low-income countries shows insignificant impact of financial inclusion on employment (Lenka, 2024).

Learning from the experiences of several countries, especially India which has experience in implementing the largest microcredit poverty alleviation program in the world, Ghosh (2014) suggests that microcredit programs for poverty alleviation should be tightly regulated to ensure they are not profit-oriented, but socially oriented. Subsidies for transaction costs should be limited to certain sectors to prevent excessive lending, avoid political interference, and recognize that access to financial services is only one of many factors that play a role in poverty reduction.

Income is an important factor in reducing the number of poor people and income inequality. An increase in income, especially among the 40% of the population with the lowest income, is expected to improve their well-being, which in turn reduces the number of poor people and income inequality (Fitrawaty et al., 2018). One important variable in increasing income is the increase in employment absorption with high productivity. In 2022, West Java Province has an unemployment rate of 9.8%, which is a high unemployment rate in Indonesia (BPS Provinsi Jawa Barat, 2022). The role of family members, especially the head of the household, in finding employment and providing family income sources becomes crucial. The head of the household is the main family member who provides for the family and is the primary source of family income. Based on the Social and Economic Survey data in March 2022, 41% of the heads of households in West Java Province were not working as employees. This figure indicates that the employment absorption rate for heads of households as workers in West Java Province is less than 50%, so the role of heads of households who have businesses is quite dominant and has a high role in providing household income.

In the present era, the use of the internet has become an integral part of daily life. This is evidenced by the March 2022 Susenas data, which shows that internet usage reached 85.14% of all households with mobile phones in West Java Province. The use of the internet has also encompassed electronic marketing (e-marketing), which includes online buying and selling (Irawan, 2020). However, the use of the internet for sales activities by household heads is only 6.92% or only 2.17% compared to all residents of West Java Province who have mobile phones. For online purchases, household heads account for around 16.5% of all households with mobile phones or only 5.07% of all residents of West Java Province who have mobile phones. The internet literacy of household heads is still low, but it can be a valuable asset for productive internet use.

Household heads who are self-employed or assisted by workers have low internet literacy, resulting in low utilization of internet media for production processes. Low production, which contributes to poverty, is also influenced by the low access to capital experienced by families, especially poor families in Indonesia (Widodo, 2011). Understanding financial management, including financial sources and use, or financial literacy for

household heads who are self-employed tends to be low (Soraya & Lutfiati, 2020); (Sumani & Roziq, 2020). Combining internet literacy and financial literacy can increase family business productivity and provide income levels that can lift families out of poverty (Ramadhan & Asandimitra, 2019).

Based on Financial Services Authority of Indonesia, Regulation No. 76/POJK.07/2016 on the Improvement of Financial Literacy and Inclusion in the Financial Services Sector for Consumers and/or Society, financial literacy is knowledge, skills, and confidence that affect attitudes and behaviors to improve decision-making and management quality, with the aim of achieving well-being. Meanwhile, financial inclusion is the availability of access to financial institutions, products, and services in accordance with the needs and abilities of the community in order to improve their welfare. In addition, the OJK (Financial Services Authority) has a strong commitment to increasing the national financial literacy and inclusion index, which is reflected in the Indonesian National Strategy for Financial Literacy and Inclusion (SNLIK) 2021 – 2025. The objective of this strategy is to achieve sustainable financial well-being. This is in line with research conducted by (Bakar & Sulong, 2018), which shows that financial inclusion has an important role in solid policy planning to achieve sustainable growth. An empirical study conducted by Sethi & Acharya, 2018) reveals the same results, that there is a long-term positive relationship between financial inclusion and economic growth in 31 countries around the world. Kim et al (2018), researched the positive impact of financial inclusion on economic growth with data from 55 countries in the Organization of Islamic Cooperation (OIC).

Financial inclusion also directly impacts community welfare, which is in line with the influence of financial inclusion on economic growth. Financial inclusion can help reduce poverty and inequality by helping people invest for the future, stabilizing consumption, and managing financial risks. In addition, access to formal financial services allows communities to carry out financial transactions more efficiently and safely and helps the poor to escape poverty by allowing them to invest in education and business (Demirguc-Kunt et al., 2017). Research conducted by Addury (2019) analyzed the role of financial inclusion by considering the influence of the amount of credit and savings/investment on household income, consumption expenditure, and living facilities. The data was taken from the Indonesian Family Life Survey (IFLS) for the years 2000, 2007, and 2014. The results of the study found that there was a significant influence of the amount of credit on household income and a significant influence of the amount of credit and savings/investment on household consumption expenditure. A recent study with a sample from Indonesia was conducted by Wardhono et al (2022), which stated that the variables that significantly influence the level of rural community consumption are savings ownership, financial literacy, market access, income, ownership of assets in the form of houses and buildings, and age. A similar study was also conducted by Ibrahim et al (2019) with a sample from Nigeria, which showed the same results, that financial inclusion has a significant positive effect on household welfare. However, the decomposition analysis showed that middle and high-income households benefit more from financial inclusion than low-income households.

By using different approaches (Zia & Prasetyo, 2018), the study provides a comprehensive understanding of how expanding access to financial services can contribute to reducing poverty and addressing income inequality across various regions in Indonesia. The results show that financial inclusion negatively affects poverty, meaning that higher financial inclusion leads to lower poverty levels.

An interesting research finding was conducted by N'dri & Kakinaka (2020) on the impact of financial inclusion through digital money in Burkina Faso. The research confirmed the important role of financial inclusion in reducing poverty, especially when individuals access financial services through digital money. Mobile-based financial services have also become an important tool for facilitating financial inclusion for previously unbanked populations in developing countries.

A study conducted by Kim et al (2018), used a systematic review of 54 academic research papers on the relationship between mobile phone-based financial services and financial inclusion. This study contributed to understanding existing research on mobile phone-based financial services for financial inclusion in developing countries. Systematic review methods were also used by Duvendack & Mader (2020) through 32 systematic reviews that have been identified, stating that the evidence of systematic reviews is not convincing enough to show the impact of financial inclusion. The main finding is that the impact is more likely to be positive than negative, but it varies. The effect on women's empowerment in general has a positive impact, but it depends on programs that are often beyond financial services, as well as cultural and geographical contexts. Access to savings has a small but consistent positive effect on the poor.

Research conducted by Soraya & Lutfiati (2020) shows that gender, student achievement values, family background, and work experience are variables that affect financial literacy. On the other hand, Iskhak (2021) studied the level of financial literacy for accounting knowledge and gender, where gender has no effect on financial literacy compared to accounting ability. Financial knowledge has a significant influence on people's financial behavior, and some things to look at are educational backgrounds, family backgrounds, and opportunities to get training (Sumani & Roziq, 2020). The influence of financial literacy is also reinforced by Anggita et al (2020) during the COVID-19 pandemic in 2020 on the role of housewives in managing family finances.

The massive use of the internet lately has influenced human behavior in daily life, including running a business (Irawan, 2020). Internet marketing provides product satisfaction to customers easily, quickly, and efficiently, so that relationships with customers are easier and maintained (Irawan, 2020). E-Marketing, which is a modern transaction method, also increases customer satisfaction in terms of value compared to conventional transactions (Dehkordi et al., 2012).

The relationship between financial literacy and internet literacy provides a strong relationship to increase productivity. This is shown by Adiyanta (2019) in millennials in Surabaya, where financial knowledge and behavior are strongly supported by internet literacy. Increasing financial inclusion with the Internet as a driver is a concern of the

research by Noor et al., (2020), where gender, age, education, and respondents' fields of work are the basis for behavior that can increase financial inclusion and internet technology.

The analysis conducted by Chunfang et al (2022), examines the impact of internet usage on household consumption expenditures based on data from the China Family Panel Studies (CFPS) over three periods, namely 2014, 2016, and 2018. The research findings indicate that internet usage significantly increases household consumption. A similar study was also conducted by Ma et al (2020), which investigates the effects of internet usage on rural household income and expenditure using a sample of households from China. The findings show that internet usage significantly increases both household income and expenditure.

The study by Ratnasari (2021) highlights how internet use leads to an 11.8% increase in income for entrepreneurs in the informal sector. The income increase due to internet usage was found to be 12% higher for entrepreneurs in non-Java regions compared to Java regions. Similarly, the research by Kharisma et al (2021) demonstrates that internet use negatively affects poverty, indicating its role in enhancing income and economic stability in West Java Province.

Based on the various descriptions and literatures above, a large percentage of people in Indonesia do not have access or opportunities to work as employees but have their own businesses or receive assistance in running their businesses. Business activities carried out by household heads are still limited to using the internet, which has great potential in increasing business productivity. Access to and literacy of financial inclusion are also low among low-income communities. Therefore, this study aims to measure the relationship between financial inclusion, internet access, and low-income household in Indonesia. This paper introduces a novel approach by categorizing poverty based on the poverty line, specifically targeting the lowest 20% and 40% of income-earning households. This method allows for a deeper understanding of the impact of financial inclusion and internet access on these specific segments.

## 2. Research Method

### 2.1 Econometric Models

The selection of variables is based on the concept of financial inclusion proposed by Nababan (2013), which includes the variables of savings, type of business field, and receipt of credit from financial institutions. For demographic and social variables, by (Soraya & Lutfiati, 2020); (Iskhak, 2021); (Sumani & Roziq, 2020) use variables such as age, education, number of family members, and also add the rural variable to indicate the influence of geography. Regarding internet access (Irawan, 2020); (Noor et al., 2020), use variables such as ownership of mobile phones, internet usage, internet usage for sales, and internet usage for purchases. The various variables formed in these econometric models are expected to provide an overview of the impact of financial inclusion and internet access on various spending categories of low-income households.

The equation for this study can be formulated as follows:

Financial Inclusion Model:

$$LnExp_i = \alpha_0 + \alpha_1 Credit_i + \alpha_2 Saving + \sum_j Z_j X_{i,j} + e_i \quad (1)$$

Internet Access Models:

$$\text{LnExp}_i = \beta_0 + \beta_1 \text{Cellphone}_i + \beta_2 \text{Internet}_i + \beta_3 \text{IntforSale}_i + \beta_4 \text{IntforPur}_i + \sum_j Z_j X_{i,j} + \epsilon_i \quad (2)$$

Expenditure Models:

$$\text{LnExp}_i = \gamma_0 + \gamma_1 \text{Cellphone}_i + \gamma_2 \text{Internet}_i + \gamma_3 \text{IntforSale}_i + \gamma_4 \text{IntforPur}_i + \gamma_5 \text{Credit}_i + \gamma_6 \text{Saving}_i + \sum_j Z_j X_{i,j} + \vartheta_i \quad (3)$$

The dependent variable used is the per capita expenditure of poor households, which is transformed into natural logarithmic form. The equation is divided into three parts to estimate the three main topics that will be examined. The first equation is used to investigate the effect of financial inclusion factors represented by Credit and Saving variables. The variable X is a control variable that consists of demographic variables such as urban-rural, gender, number of household members, and education level of the household head. The second equation is the Internet Access equation, with the main variables being ownership of mobile phones, internet usage, internet usage for sales, and internet usage for purchases. The third equation includes all main variables in equations 1 and 2, as well as control variable X.

## 2.2 Dataset

This paper uses the March 2022 data of Survey Ekonomi dan Sosial (SUSENAS), the large-scale socio-economic survey data collected annually by Indonesian Statistics Office (BPS). This is a large-scale survey conducted by the Indonesian government to collect comprehensive data on the socio-economic status of the country's population. The survey is conducted annually by the Central Bureau of Statistics (BPS) and covers various aspects of life, including income, employment, education, health, and housing. The survey uses a stratified multistage random sampling method to ensure that the data collected is representative of the entire Indonesian population. The sample size is relatively large, with around 339,680 households and over one million individuals surveyed each year. With reference to the objective of this research, only data from the West Java province out of the 33 provinces in Indonesia were utilized. The number of observations used in this study was 25,112 households distributed across 27 regencies and cities in West Java province. The survey questionnaire covers a wide range of topics and is designed to provide a detailed and comprehensive picture of the socio-economic conditions of the population.

To analyze the data, demographic and social data were obtained from the KOR Susenas block, while household expenditure data were obtained from the consumption block. The unit of analysis for the model used in this study is poor households based on the poverty line per district and city in West Java province. To conduct validation tests, low-income groups within the 20% and 40% low-income range were also included. Specifically, only data from working household heads were used to demonstrate the role of household heads in financial inclusion and internet access in relation to household income.

**Table 1. List Variables used for the regression analysis**

No	Variables
1	Expenditure percapita (Rp)
2	Credit recipients of all (1, 0)
3	The head of the household has saving (1, 0)
4	The head of the household has a cell phone (1, 0)
5	The head of the household uses the internet (1, 0)
6	The head of the household uses the internet for sales (1, 0)
7	The head of the household uses the internet for purchases (1, 0)
8	Rural family (1, 0)
9	The gender of the head of the household is male (1, 0)
10	Number of family members (Person)
11	No elementary school (1, 0)
12	Elementary school (1, 0)
13	Junior secondary school (1, 0)
14	Senior secondary school (1, 0)
15	University (1, 0)

### **3. RESULTS AND DISCUSSION**

#### **3.1 Results**

Table 2 presents the estimation results of Model 1: Financial Inclusion Model (equation 1, 4 & 7), Model 2: Internet Access Model (equation 2, 5 & 8), and Model 3: Expenditure Model (equation 3, 6 & 9). Each table shows different categories of poor households to demonstrate the characteristics of increasing income levels in West Java province. The categories of poor households in equation 1 to 3 are based on the Poverty Line categories provided by the Indonesian Statistics Office for each regency and city in West Java province. Equation 4 to 6 and 7 to 9, respectively, are based on the categories of 20% and 40% of households with the lowest income in West Java province.



Table 2. Estimation Results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	lexp	lexp	lexp	lexp	lexp	lexp	lexp	lexp	lexp
Credit recipients of all	-0.004		-0.007	0.008		0.006	0.032 ***		0.029 ***
	(0.013)		(0.013)	(0.007)		(0.007)	(0.006)		(0.006)
	)		)	)		)	)		)
The head of the household has savings	0.048 ***		0.033 **	0.041 ***		0.031 ***	0.071 ***		0.057 ***
	(0.013)		(0.013)	(0.006)		(0.007)	(0.006)		(0.006)
	)		)	)		)	)		)
The head of the household has a cell phone		0.012	0.009		0.022 ***	0.018 **		0.039 ***	0.030 ***
		(0.017)	(0.017)		(0.008)	(0.008)		(0.008)	(0.008)
		)	)		)	)		)	)
The head of the household uses the internet		0.061 ***	0.058 ***		0.027 ***	0.024 ***		0.040 ***	0.032 ***
		(0.017)	(0.017)		(0.008)	(0.008)		(0.008)	(0.008)
		)	)		)	)		)	)
The head of the household uses the internet for Sales		0.027	0.020		-0.004	-0.008		0.036 **	0.029 *
		(0.042)	(0.042)		(0.022)	(0.022)		(0.017)	(0.017)
		)	)		)	)		)	)
The head of the household uses the internet for Purchases		0.074 **	0.073 **		0.044 ***	0.042 ***		0.047 ***	0.041 ***
		(0.030)	(0.030)		(0.014)	(0.014)		(0.011)	(0.011)
		)	)		)	)		)	)
Number of family members	- 0.023 ***	- 0.024 ***	- 0.024 ***	- 0.027 ***	- 0.027 ***	- 0.028 ***	- 0.050 ***	- 0.050 ***	- 0.052 ***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
	)	)	)	)	)	)	)	)	)
The gender of the head of the household is male	-0.006	-0.011	-0.009	0.024 **	0.019 *	0.020 **	0.025 ***	0.015 *	0.016 *
	(0.020)	(0.020)	(0.020)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
	)	)	)	)	)	)	)	)	)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	lexp	lexp	lexp	lexp	lexp	lexp	lexp	lexp	lexp
Rural family	- 0.140 ***	- 0.127 ***	- 0.127 ***	0.007	0.011 *	0.010	0.001	0.007	0.005
	(0.012 )	(0.012 )	(0.012 )	(0.006 )	(0.006 )	(0.006 )	(0.006 )	(0.006 )	(0.006 )
<b>Education of Head of Household:</b>									
Elementary school	0.062 ***	0.046 **	0.045 **	0.040 ***	0.032 ***	0.031 ***	0.045 ***	0.034 ***	0.031 ***
	(0.019 )	(0.019 )	(0.019 )	(0.010 )	(0.010 )	(0.010 )	(0.010 )	(0.010 )	(0.010 )
Junior secondary school	0.107 ***	0.071 ***	0.070 ***	0.045 ***	0.027 **	0.024 **	0.060 ***	0.036 ***	0.030 ***
	(0.022 )	(0.023 )	(0.023 )	(0.012 )	(0.012 )	(0.012 )	(0.011 )	(0.011 )	(0.011 )
Senior secondary school	0.146 ***	0.113 ***	0.107 ***	0.051 ***	0.033 ***	0.029 **	0.088 ***	0.065 ***	0.055 ***
	(0.022 )	(0.023 )	(0.023 )	(0.012 )	(0.012 )	(0.012 )	(0.011 )	(0.011 )	(0.011 )
University	0.092 *	0.062	0.052	0.060 ***	0.045 **	0.036	0.097 ***	0.078 ***	0.059 ***
	(0.049 )	(0.049 )	(0.049 )	(0.022 )	(0.022 )	(0.022 )	(0.018 )	(0.018 )	(0.018 )
Constant	12.96 2***	12.95 9***	12.95 7***	13.14 4***	13.14 5***	13.14 4***	13.41 6***	13.42 1***	13.41 6***
	(0.025 )	(0.024 )	(0.024 )	(0.013 )	(0.013 )	(0.013 )	(0.012 )	(0.012 )	(0.012 )
Observations	1,419	1,419	1,419	4,994	4,994	4,994	10,012	10,012	10,012
R-squared	0.147	0.166	0.170	0.040	0.045	0.049	0.075	0.074	0.085

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10

The estimation was conducted using by applying robust estimation technique, which is sufficient to correct inefficient regression results due to heteroscedasticity and/or autocorrelation problems. This method is called *White standard errors* or *Hubber standard errors* or *heteroscedasticity-robust standard errors* (Wooldridge, 2010). The relatively small coefficient of determination (R2) for all estimation results also indicates the impact of the cross-sectional data used for 27 regencies and cities in West Java province, which have diverse data variations.

### ***Estimation of poor families for categories based on the Poverty Line***

The estimation of poor households based on the Poverty Line categories resulted in a sample of 1,419 poor households across 27 regencies and cities in West Java province. Based on the total sample of the March 2022 SUSENAS data in West Java province, which consists of 25,744 household heads, samples without information on education were dropped, resulting in 25,112 samples. This section analyzes 5.7% of the total poor households.

The financial inclusion model demonstrates that only one main variable, savings ownership within the family, is significant and has a positive influence on the income level of poor families. This ownership can reduce poverty levels (Lyons & Greenlee, 2020). The variable for access to credit did not yield significant results, which differs from the findings of (Lyons & Greenlee, 2020); (Park & Mercado, 2015); (Aliero & Ibrahim, 2012), where a negative relationship between access to credit and income of poor families was identified. Although the credit variable was not significant, it consistently yielded negative results when included in the expenditure model, where its coefficient remained negative and its magnitude was much smaller than that of the savings variable.

The control variable for the number of family members yielded significant and negative results for all three models. The income of poor families becomes more limited as the number of family members increases (Giang & Yan, 2014). This variable displayed a sufficiently robust figure for the financial inclusion, internet access, and expenditure models. Similarly, the demographic variable showed that rural families have a lower income than urban families, particularly for poor families, as more work is done in the agricultural sector, which has a lower added value (Tenzin & Natsuda, 2015). The gender variable did not yield significant results for all three models, although research from (Mulatie & Andualem, 2019); (Posel & Rogan 2009) indicated that male-headed households provide greater opportunities for families to escape poverty than female-headed households.

The second and third models indicate that owning a mobile phone does not have a significant impact on the expenditure of poor families, but the use of the Internet has a significant effect. Research from (Forestier & Kenny, 2002); (Khanal & Koirala, 2015) demonstrates the role of the Internet in poverty alleviation by reducing household costs and narrowing income disparities. This is supported by Bongomin et al (2017), who state that using the Internet for social networking has an impact on information reception that can reduce poverty and increase the involvement of the poor who are excluded from formal finance (Evans & Alenoghena, 2017). The use of the Internet for consumption purposes has a significant positive effect while using it as a sales medium does not yield significant results.

The level of education of the head of the poor family has a positive and significant impact on all levels of education and all models. The coefficient for the level of primary education is the lowest for all models, indicating that the impact of primary education on increasing the income of poor families is the weakest. The higher the level of education, up to the level of high school, the more it increases the income of poor families. The University level of education (diploma to PhD) has a lower coefficient than the junior high school level for all models of expenditure of poor families. The research findings of (Giang & Yan, 2014); (Li & Ma, 2021) confirm this phenomenon.

***Estimation of poor families for categories based on 20% of low-income families***

The second part of the estimation for the three expenditure models is for the category of poor families based on the bottom 20% of income earners in West Java Province. The sample size increased from 1,419 for the Poverty Line category to 4,994 poor families, or a 152% increase. The increased number of observations based on family income rankings resulted in an increase in the average family income. The average income is higher than the Poverty Line category but indicates a lower income level compared to higher quantiles. The average income proxied by the average family expenditure for the first quantile is Rp 2,093,038 with an average per capita income of 497,689, which is much lower than higher quantiles, as shown in Table 3. The per capita income average for the bottom 20% is higher than the per capita income average for the entire West Java Province.

**Table 3. Quantile of Expenditure Susenas March 2022**

Quantile	Observations (Households)	Mean Expenditure (Rp)	Mean Expenditure Per Capita (Rp)
1; 20%	4,994	2,093,038	497,689
2; 20%	5,018	2,902,216	769,842
3; 20%	5,014	3,830,170	1,083,854
4; 20%	5,012	5,299,449	1,592,151
5; 20%	5,074	11,600,000	3,790,938
Total	25,112	5,168,248	1,443,371

Source: Susenas March 2022

The results of the estimation for the financial inclusion model show a much larger coefficient for the main variable Credit, but still consistent for the Savings variable. The Credit variable still shows insignificant results in influencing the income of poor families in the 20% low-income family category (hereinafter referred to as "poor families-20"). The coefficient sign for the Credit variable changes to positive, indicating the impact of increased income for families with credit access (Aliero & Ibrahim, 2012). Families that have savings show a significant influence on increasing the income of poor families-20, in line with the research of (Lyons & Greenlee, 2020). These results emphasize the importance of financial inclusion in increasing the income of poor families-20 (Churchill & Marisetty, 2020); (Ibrahim & Aliero, 2020); (Lyons & Greenlee, 2020 et al., 2020); (Park & Mercado, 2015); (Aliero, & Ibrahim, 2012).

The internet access model shows differences in the category of poverty with the poverty line, where the variable ownership of mobile phones shows a significant influence, as shown by (Evans & Alenoghena, 2017); (Forestier & Kenny, 2002); (Khanal & Koirala, 2015); (Ma et al., 2020). Although it still shows more use for internet and online purchases.

The control variable of the number of family members shows consistency with the Poverty Line category, where it significantly affects the income of poor families with relatively similar coefficient values for all three models (Giang & Yan, 2014). The gender of the household head in the poor families-20 category shows a significant influence at the 10%

alpha level (Mulatie & Andualem, 2019; Posel & Rogan, 2009), while in the Poverty Line category it does not show a significant influence. The geographical variable, in the Poverty Line category, significantly affects income, but in this category, it is only significant in the internet access model, in line with the research of (Tenzin & Natsuda, 2015).

Interesting findings are observed on the variable of household head's education. In the poverty line category, the coefficient for the highest level of education - Higher Education level - is lower than that of the coefficient for Senior High School level. In the poverty-20 category, the education coefficient continues to increase from the Elementary School level to the university Education level with a positive sign. This increase in the coefficient indicates that the higher the level of education of the household head, the higher the income level of the poverty-20 family category (Giang & Yan, 2014); (Li & Ma, 2021). This statement only applies to the Financial Inclusion model, while in the Internet Access and Household Expenditure models, there is a decrease in coefficients at the Junior High School education level. In the expenditure model, the University Education level of education does not show significant results, even though it has a positive sign.

#### ***Estimation of poor families for categories based on 40% of low-income families***

To ensure the consistency of the three models we have built in relation to the expenditures of poor households, we have created a category for the 40% low-income families, which we refer to as 'poor-40' households. As stated by Maipita et al (2016), income can be categorized into three parts, namely 40% low, 40% middle, and 20% high. Based on this larger population category, the consistency of the coefficients of the three models for poor households' expenditures is tested.

The second quantile group of 20% of the lowest-income in West Java province has an average monthly family income that is 39% higher, and 55% higher for per capita monthly income, compared to the first quantile group of 20% of the lowest-income in Table 4. Based on the poverty category, the 'poor-20' category has an average income that is 12% higher than the Poverty Line category, while the 'poor-40' category is 33% higher than the Poverty Line category. Similarly, in terms of per capita income, compared to the 'Poverty Line' category, the 'poor-20' and 'poor-40' households have an income that is 20% and 50% higher respectively, as shown in Table 4.

**Table 4. Poverty Categories of Expenditure in Indonesia 2022**

<b>Poverty Categories</b>	<b>Observations</b>	<b>Mean Expenditure</b>	<b>Mean Expenditure Per Capita</b>
Poverty Line	1,419	1,869,510	415,792
Poor-20	4,994	2,093,038	497,707
Poor-40	10,012	2,488,371	623,241
Total	25,112	5,168,248	1,443,371

Source: Susenas March 2022

The estimation results for the poor-40 household data indicate that all the main variables in the financial inclusion model have a significant positive impact on household

expenditure. The variable related to savings has a twice greater impact compared to the credit variable, even though both have a positive impact on increasing household expenditure. For low-income families in this category, the influence of financial inclusion on income improvement is stronger (Churchill & Marisetty, 2020); (Ibrahim & Aliero, 2020); (Lyons & Greenlee, 2020); (Park & Mercado, 2015); (Aliero & Ibrahim, 2012).

As for the internet access variable, it provides a strong consistency between model 2 and model 3, as seen from the coefficients that are not significantly different. All internet access variables have a significant positive impact on income improvement. This result is consistent with research conducted by (Evans & Alenoghena, 2017); (Forestier & Kenny, 2002); (Khanal & Koirala, 2015); (Ma et al., 2020). The use of the internet for purchasing has a larger coefficient compared to the coefficient for internet selling, which is consistent with the research conducted by (Irawan, 2020).

The control variable for the number of household members for all three models shows robust results with a negative sign, which is consistent with all previous poor household categories. The male gender of the household head shows a significant positive result in increasing the income of poor-40 households, which is in line with research conducted by (Mulatie & Andualem, 2019); (Posel & Rogan 2009). The demographic variable does not show significant results, which indicates that the location of poor households, whether in rural or urban areas, does not affect income, as there may be a greater variation of non-agricultural job opportunities (Tenzin & Natsuda, 2015).

The variable of household head education has a significant positive impact on all models. The coefficient of the education variable in models 1 and 2 is consistent, where the higher the level of household head education, the higher the poor-40 household expenditure (Giang & Yan, 2014); (Li & Ma, 2021). Unlike model 3, the coefficient decreases at the junior high school level of education.

### 3.2 Discussion

Referring to the definition of poverty in Indonesia, where a poor family is defined as a family with income below or equal to the Poverty Line, the category of poor families based on the Poverty Line (hereinafter referred to as "Poor-Poverty Line families") serves as the basis for the discussion analysis here. The results of the estimates in Tabel 3 equation 1 to 3 show that financial inclusion in terms of access to credit has not been able to increase the income of Poor-Poverty Line families, which in turn has not been able to reduce poverty in West Java Province. Access to credit for poor families in both financial inclusion and expenditure models has a negative sign. Although not significant, the negative sign indicates the phenomenon of a negative impact of credit on the income of Poor-Poverty Line families. The income variable is proxied by household expenditure, so the decrease in expenditure may be caused by household credit. As stated by Soraya & Lutfiati (2020), this may be due to poor financial management by poor families. Table 5 shows the institutions that provide credit to poor families in Indonesia. Respondents who received "People's Business Credit" (Kredit Usaha Rakyat = KUR) had the highest percentage of poor families receiving credit. Poor-Poverty

Line families can receive credit not only from one source, so a family can have KUR credit as well as personal and vehicle installment credit.

Regarding access to credit for various types of credit distributed to poor families, there are still many issues during repayment (Yunus, 2008). This gives rise to a phenomenon that financial access assistance types must also be accompanied by a social assistance approach (Ghosh, 2013). One of them is in the form of credit provision that can increase income without providing moral hazard for credit consumption for household expenditures, which has an impact on reducing the level of household consumption (Addury, 2019).

**Table 5. Sample of Sources of poor household loans in Indonesia 2022**

Institutions	Debtor (household)	Percentage
KUR credit recipients	2,184	8.70
Others loans recipients	1,251	4.98
Commercial Bank Credit recipients	958	3.81
Cooperative loans recipients	922	3.67
Motor vehicle credit recipients	711	2.83
Personal loans recipients with interest	575	2.29
BPR Credit recipients	286	1.14
Pawnshop loans recipients	121	0.48
Online loans recipients	61	0.24
Bumdes loans recipients	22	0.09

Source: Susenas March 2022

The above analysis indicates the influence of financial inclusion variables on the poorest Poverty Line families, which only account for 5.7% of the sample size. Increasing the sample size with coverage of 20% of the poorest families (poor-20) shows a slightly positive sign for the credit variable, but it remains insignificant. However, increasing it again to 40% of the poorest families (poor-40) shows a significant positive sign for the credit variable. These results suggest that as income coverage increases, the credit variable can affect the income level of the poorest families.

Ownership of savings by the poorest Poverty Line families has a positive impact on increasing their income and is consistent in all models, as conducted by (Duvendack & Mader, 2020). This is reasonable if we understand that savings exist if basic needs expenditures have been met. This indicates increased welfare and suggests that financial inclusion in terms of savings ownership can reduce poverty in West Java. An important question that cannot be explored here is, what are the savings of poor Poverty Line families used for?

The model of internet access used by poor families indicates that owning a mobile phone does not have a significant impact on poverty in West Java, as seen in the poor-PL category. This can be interpreted as mobile phones not being used as a productive tool that can improve the welfare of West Java's population. If the population of poor families is increased up to 20% of the lowest income, it shows that internet use has a significant impact on reducing

poverty in West Java. This is also supported by the significant impact of using the internet for online shopping. Unfortunately, using the internet for selling does not have a significant impact on poverty in West Java, where using the internet for purchasing has a significant impact because of its high level of convenience (Dehkordi et al., 2012). When the population reaches 40% of the lowest income families in West Java, the use of mobile phones begins to have a positive impact both in terms of internet use and internet use for purchasing and selling. Perhaps a policy that can encourage the ownership of mobile phones that can be used to access the internet for the poor in West Java could be a good option to reduce poverty (Evans & Alenoghena, 2017).

Financial inclusion has a strong impact on poverty reduction, as evidenced by the increase in income in low-income households across all categories of the poor (Churchill & Marisetty, 2020); (Hasan et al, 2012); (Ibrahim & Aliero, 2020); (N'dri & Kakinaka, 2020); (Sethi & Acharya, 2018). Similarly, the use of the internet can significantly increase the income and household expenditures of the poor, in line with studies conducted by (Chunfang et al., 2022); (Evans & Alenoghena, 2017); (Ma et al., 2020).

The influence of education control variables has a positive effect and increases relative to the level of education of the household head, but it differs for college education levels, in line with research conducted by (Noor et al., 2020). This suggests that the central government's policy of expanding access to higher education for the poor through the "Kartu Indonesia Pintar Kuliah" (KIP Kuliah) is relatively appropriate. Other control variables, such as domicile, show that poverty in West Java with the lowest income is relatively insignificant in rural and urban areas. On the other hand, if the head of the household is male, their poverty is relatively better than households with female household heads. This indicates that poverty alleviation programs need special treatment when it comes to households with female heads.

#### 4. Conclusions

Financial inclusion for the poor based on the Poverty Line only affects savings ownership, but not access to credit for increasing the income of poor families. Access to credit only has an impact on the income of poor families when it covers 40% of families with the lowest income. Internet access for poor families below the Poverty Line is still limited to increasing information on the internet and purchasing media, indicating a consumptive pattern. Variables indicating internet usage that increase productivity are not yet significant at the level of poor families below the Poverty Line. Population growth up to 40% of low-income families only has an impact on the internet that can increase productivity in terms of its use for sales. Several control variables can increase the income of poor families, such as increasing access to higher education, empowering women for productive family income, and improving productive access in rural areas. Family planning education to limit the number of children also needs to be promoted, as an increase in family members will also increase family expenses.



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