**Assessing Financial Literacy Levels and Determinants Among Farmers in Punjab, India**

**ABSTRACT**

**Abstract-** The study aims to assess the level of financial literacy and the factors influencing the financial literacy of the farmers in Punjab.

**Study design-** The study collected primary data from 400 farmers in three districts of Punjab, namely, Gurdaspur, Bhatinda, and Ludhiana, through an interview schedule using a multistage sampling technique.

**Place and duration of the study-** The study was conducted in three districts of Punjab, namely Gurdaspur, Ludhiana, and Bhatinda, from August to December 2023.

**Methodology-** The study validated the financial literacy scale using exploratory factor analysis (EFA) with tetrachoric correlation. Furthermore, to identify factors influencing financial literacy, we employed an ordinal logit regression model.

**Results-** The findings revealed that 47.5% of the farmers had low, 20% had moderate, and 32.5% had high levels of financial literacy. Farmers performed relatively well in terms of financial behavior and financial knowledge, whereas the poorest performance was found in the case of financial attitude. Significant disparities in financial literacy were also observed across socio-economic groups. The results of regression analysis revealed that marital status, social category, age, education, income, occupation, and size of landholding are significant predictors of financial literacy.

**Conclusion-** The study showed that overall, the financial literacy among the farmers in the study area is low. It found that most of the farmers lacked a positive financial attitude. Additionally, the study concluded that engaging in both farming and non-farming occupations increases the likelihood of being financially literate for farmers.

**Keywords:** Financial literacy, Financial inclusion, Farmers, Exploratory factor analysis, Ordinal logit, India.

**JEL Classification Code:** C38, D14, G53, Q14

**1. INTRODUCTION**

Agriculture in India remains a key pillar of the economy, with almost 20% contribution to GDP and employing 46.1% of the population (GOI, 2025). Besides contributing to food production, it also serves as a key employment provider in rural areas. Over time, agriculture has witnessed significant transformation, but the challenges for farmers have only increased over the years. The continuous challenges posed by climate change, pests and diseases, and stabilizing productivity and income have only added to the financial vulnerability of the farmers (Yang et al., 2022). Financial challenges posed by financial risks can have a severe effect on the welfare of the farmers (Yusuf et al., 2024). As the challenges mount, the need for access to inclusive finance becomes even more important in the absence of internal financial resources. Access to financial resources remains a key strategy to cope with the challenges, and without access to these resources, farmers are left disadvantaged. Policymakers worldwide have tried to support farmers through supply-side measures to mitigate these challenges by providing affordable access to finance. However, the efforts have not been successful to the desired extent. Researchers have argued to complement supply-side measures with demand-side initiatives, such as equipping farmers with financial literacy to help them mitigate these challenges (Cole et al., 2011; Pomeroy et al., 2020). Therefore, alongside access to finance, farmers must possess the ability to efficiently manage and allocate financial resources to the best use possible.

Financial literacy is characterized as the necessary awareness, knowledge, skill, attitude, and behavior to make prudent financial decisions (Atkinson & Messy, 2013). Its vitality throughout individuals' lives for making informed financial choices and promoting financial well-being is extensively acknowledged in academic literature. Financial literacy gained recognition as an essential means for instilling financial discipline following the financial crisis of 2008. Policymakers worldwide have made numerous attempts to increase financial literacy through various measures. However, the studies have highlighted widespread financial illiteracy, with approximately 3.5 billion adults classified as financially illiterate globally, residing predominantly in developing countries, with underprivileged socioeconomic groups being most affected (Klapper & Lusardi, 2020). Poor financial literacy is often linked to imprudent financial decisions and waste of financial resources (Capuano & Ramsay, 2011). Thus, the need for financial literacy becomes even greater to promote individuals' overall financial well-being. Research further emphasizes its contribution to greater savings, investment, financial inclusion, financial well-being, financial resilience, and efficient money management (Hamid & Loke, 2021; Kass-Hanna et al., 2021; Morgan & Long, 2020; Taft et al., 2013).

Punjab is known for its remarkable journey and achievements during the Green Revolution, achieving high levels of productivity and farm income. However, the farmers in the state are facing an agricultural crisis, leading to mounting levels of farm debt to sustain their livelihoods, contributing to their financial vulnerability (Mann & Chauhan, 2023). High indebtedness at exorbitant interest rates from informal financial sources highlights the formal financial system’s inadequacy in meeting farmers’ needs. Literature highlights several barriers to access to a formal financial system, including a lack of collateral, complex procedures, and inadequate financial literacy. Research consistently points to poor financial literacy as a critical constraint in access to finance in various studies (Ansar et al., 2023; Jana et al., 2019; Nkundabanyanga et al., 2014). The existing studies underscore the importance of investigating the present levels and determinants of financial literacy for targeted intervention. Therefore, this research seeks to explore the level of financial literacy and its determinants among farmers in Punjab.

This study is organized as follows: firstly, the theoretical framework and review of relevant studies, followed by the materials and methods, which include the data sources, measurement of financial literacy, EFA, and model specification; afterward, the results and discussion, and finally, the conclusions drawn from the study.

**2. LITERATURE REVIEW**

Researchers have defined and assessed financial literacy through several concepts and metrics based on different contexts and research. It is often used as a parallel word for financial knowledge in the literature (Huang et al., 2013; Lusardi & Mitchell, 2011b). Lusardi & Mitchell (2013) defined it as having financial knowledge and making informed decisions. Atkinson & Messy (2012) outlined it as an amalgamation of awareness, knowledge, behavior, attitude, and skills. Others have articulated it as literacy related to debt and making informed decisions related to debt (Lusardi & Tufano, 2015). Whereas Hung et al. (2009) defined financial literacy as the ability to manage money efficiently for prolonged financial well-being.

Extensive research has documented financial literacy’s influence on several financial outcomes. Morgan & Long (2020), while examining financial literacy in Laos, observed it to be linked with saving behavior and financial inclusion. Similarly, a favorable effect of financial literacy in the areas of wealth accumulation, stock market participation, financial inclusion, financial discipline, and rational choice-making was also reported by several studies (Behrman et al., 2012; Sabri & Juen, 2014; Hasan et al., 2021; Sekita, 2013). Afrin et al. (2017) pointed out its role in increasing the efficiency and yield of paddy crops for farmers in Bangladesh, while Das & Maji (2023) associated it with positive saving behavior among farmers. Akoto et al. (2017) demonstrated its role in facilitating sound financial decision-making among farmers. Others have emphasized its link to improved credit access, financial performance, and increased insurance adoption for farmers (Gine et al., 2013; Onah et al., 2024).

Numerous studies have attempted to assess financial literacy levels globally, revealing significant disparities across different socioeconomic groups. Klapper & Lusardi (2020) in their work found that two-thirds of adults worldwide lack financial literacy, with the majority residing in developing countries. The studies also noted disparities among various socioeconomic groups in terms of financial literacy (Lusardi & Mitchell, 2011a). Agarwalla et al. (2015), in their research conducted in India, revealed that almost half of the working young respondents failed to meet the OECD average, and a significant proportion struggled with financial knowledge and financial attitude. Similarly, Maji and Laha (2022) found that over two-thirds of the farmers in India had poor financial literacy levels.

Several studies have documented various factors influencing the financial literacy of individuals. Age has been shown to have a non-linear association with financial literacy, as both younger and older respondents display low financial literacy levels (Lusardi & Mitchell, 2011a; Potrich et al., 2015). Gender disparities have also been noted, with females generally exhibiting lower financial literacy than males (Bansal & Kaur, 2023; Lusardi & Mitchell, 2011b). As evidenced by Anshika et al. (2021), education also emerged as a significant positive predictor of financial literacy. Financial literacy is also observed to be low among individuals in lower-income groups in comparison to individuals in the higher-income group (Atkinson & Messy, 2012; Lusardi & Tufano, 2015). Maji & Laha (2023) discovered that farmers' financial literacy is determined by ownership of the farm, financial inclusion, and agricultural productivity. Additionally, Yoshino et al. (2017) showed that financial literacy also varies by occupation, with certain occupational groups reflecting greater financial literacy levels.

**3. METHODOLOGY**

**3.1 SAMPLE AND DATA COLLECTION**

The present study utilized primary data as its main source. An interview schedule was crafted and pre-tested for further reliability, and then the data was collected using a multistage sampling technique. Among the six categorized agro-climatic zones in Punjab, three agro-climatic zones, i.e., Sub-Mountain Undulating Zone, Central Plain Zone, and Western Zone, were selected, and three districts, i.e., Gurdaspur, Ludhiana, and Bhatinda, from each agro-climatic zone were selected at random, respectively. Two tehsils from each district, i.e., Gurdaspur and Batala from Gurdaspur, Ludhiana West, and Jagraon from Ludhiana, and Bhatinda, and Phul from Bhatinda, were selected randomly. Furthermore, three villages from each Tehsil were selected. The data was distributed proportionately between the Tehsils based on the Agricultural Census 2015-16. A total sample of 400 farmers was collected from the study area.

**3.2 MEASUREMENT OF FINANCIAL LITERACY**

In order to assess farmers’ financial literacy levels in the study region, we used an interview schedule comprising 19 items. The financial literacy scale used for the present study, Atkinson & Messy (2012), NCFE-FLIS (2019), was adapted and modified for farmers. The original financial literacy scale consisted of 20 items; however, since our study concentrated on farmers responsible for financial management, the financial behavior item measuring responsibility of financial management became redundant; therefore, we proceeded with the 19-item financial literacy scale. The scale comprises three dimensions: financial knowledge, which captures the individual’s knowledge of financial concepts; financial behavior, which captures individuals’ behavior in executing financial knowledge into financial decisions; and financial attitude, which reflects individuals’ outlook towards financial matters. Each item was scored as 1 for the correct response and 0 otherwise. The scores were summed for financial literacy and each component, and final scores were expressed as a percentage of correct responses. Following Ergün (2018), financial literacy was classified into three levels: low (≤60% correct responses), moderate (61%- 80% correct responses), and high (>80% correct responses).

* 1. **SCALE VALIDATION USING EFA**

Initially, reliability was tested using Cronbach's alpha, and subsequently, EFA was performed to check the suitability of the items in measuring the financial literacy construct through the tetrachoric correlation using the ‘Psych’ package in R Studio.

**3.4 REGRESSION ANALYSIS**

This study employed an ordinal logit model to identify the factors influencing the financial literacy of the farmers. The study used financial literacy, having three levels, low, moderate, and high financial literacy, as a dependent variable, while gender, marital status, social category, age, education, occupation, income, occupation, size of landholdings, district of domicile, and distance from the bank were used as an independent variable in the study.

**3.5 ROBUSTNESS CHECK**

We conducted two regression analyses on the same dependent and independent variables to ensure the robustness of our estimates. Firstly, we applied an ordinary least squares (OLS) regression, and secondly, we used an ordinal logit model while limiting the effect of age outliers by dropping the top 10% and bottom 10% age values from the samples.

**Ethical Consideration:**

The study adhered to ethical guidelines to minimize potential harm or undue risk to individuals involved.

**4. RESULTS AND DISCUSSION**

**4.1 DESCRIPTIVE STATISTICS**

The socioeconomic demographic characteristics of the respondents revealed the predominance of male participants (98%), with the majority of farmers being 46 years or older (Table 1). Marital status indicated a majority of married participants (93.50%), while others (6.50%) were unmarried. Most participants belonged to the general category (96%). Regarding education, 26.25% had completed primary or less, 63.50% had attained higher secondary, and only 10.25% of the farmers were graduates or held higher degrees. Income distribution showed that more than two-thirds of the respondents (68.18%) earned less than 5 lakhs per annum. As far as the size of landholdings was concerned, 39% were marginal and small farmers, 36.75% were semi-medium, and only 2.50% were large farmers

**Table 1.** **Distribution of sample on socio-economic variables**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Options** | **Frequency** | **Percentage** |
| Gender | Male | 392 | 98.00 |
| Female | 8 | 2.00 |
| Age group | 18-30 Years | 23 | 5.75 |
| 31-45 Years | 87 | 21.75 |
| 46-60 Years | 132 | 33.00 |
| More than 60 years | 158 | 39.50 |
| Marital status | Married | 374 | 93.50 |
| Others | 26 | 6.50 |
| Social category | Other backward classes | 5 | 1.25 |
| General | 384 | 96.00 |
| Scheduled caste | 11 | 2.75 |
| District | Bhatinda | 145 | 36.25 |
| Ludhiana | 126 | 31.50 |
| Gurdaspur | 129 | 32.25 |
| Education | Primary or less | 105 | 26.25 |
| Higher secondary | 254 | 63.50 |
| Graduation or above | 41 | 10.25 |
| Income | Less than 250000 | 143 | 36.11 |
| 250001-500000 | 127 | 32.07 |
| 500001-750000 | 68 | 17.17 |
| More than 750000 | 58 | 14.65 |
| Size of the landholding | Marginal and small | 156 | 39.00 |
| Semi-medium | 147 | 36.75 |
| Medium and large | 97 | 24.25 |

*Source:* *Compiled by authors*

**4.2 SCALE VALIDATION USING EFA**

The adapted scale for financial literacy was validated using EFA. At first, the reliability of the scale was tested using Cronbach's alpha. Thereafter, the preconditions for performing EFA, including Kaiser-Mayer-Olkin (KMO) test of sample adequacy and Bartlett’s test of sphericity, were checked. The reliability test and EFA resulted in the deletion of a few items due to low reliability and low KMO values, resulting in a new scale consisting of 14 items (Table A1). The new scale reflected sufficient reliability for financial knowledge (0.713), financial behavior (0.891), and financial attitude (0.753). Furthermore, the scale showed an adequate KMO value (0.59) and statistical significance of Bartlett’s test (Chi-2= 7261.993, df=91, *P*<0.001), confirming adequate sample adequacy and rejecting the possibility of an identity matrix respectively. The rotated component matrix suggested three factors to retain, having eigenvalues of 4.72, 3.57, and 2.89 and explaining 34%, 26%, and 21% respectively (Table A2). Additionally, the screeplot also confirmed the retention of 3 factors (Figure A1). Therefore, EFA produced a new financial literacy scale with 14 items, with financial knowledge having 6 items, financial behavior having 5 items, and financial attitude having 3 items, which was used for subsequent analysis.

**4.3 DISTRIBUTION OF FINANCIAL LITERACY LEVELS**

**Table 2. The overall distribution of levels of financial literacy and its components**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Overall** | **Mean** | **Low** | **Moderate** | **High** |
| Financial knowledge | 70.75 | 39.50 | 21.25 | 39.25 |
| Financial behaviour | 56.79 | 45.00 | 9.25 | 45.75 |
| Financial attitude | 50.50 | 49.25 | 19.25 | 31.50 |
| Financial literacy | 60.43 | 47.50 | 20.00 | 32.50 |

*Source:* *Compiled by authors*

The percentage distribution of responses concerning overall financial literacy and its components in the study area is reported in Table 2. The overall financial literacy of the farmers in the study area was low, with an average score of 60.43%. Only 32.50% of the farmers could achieve high financial literacy levels, while 47.50% exhibited low, and 20% fell into the moderate category. Farmers demonstrated better performance in financial knowledge, answering 70.75% of the questions correctly, in comparison to 56.79% in financial behavior. We observed that farmers performed poorly when it comes to financial attitude, as nearly half of the respondents (49.25%) had a low financial attitude.

**Table 3. Distribution of levels of financial literacy across socioeconomic demographics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Categories** | **Mean** | **Low** | **Moderate** | **High** |
| Gender | Male | 60.02 | 47.96 | 20.41 | 31.63 |
| Female | 80.36 | 25.00 | 0.00 | 75.00 |
| Age group | 18-30 Years | 95.03 | 0.00 | 8.70 | 91.30 |
| 31-45 Years | 81.03 | 17.24 | 17.24 | 65.52 |
| 46-60 Years | 61.90 | 48.48 | 25.00 | 26.52 |
| More than 60 years | 42.81 | 70.25 | 18.99 | 10.76 |
| Marital status | Married | 59.63 | 48.40 | 21.39 | 30.21 |
| others | 71.98 | 34.62 | 0.00 | 65.38 |
| Social category | Other backward classes | 40.00 | 80.00 | 20.00 | 0.00 |
| General | 60.90 | 46.88 | 19.79 | 33.33 |
| Scheduled caste | 53.25 | 54.55 | 27.27 | 18.18 |
| Education | Primary or less | 29.25 | 93.33 | 6.67 | 0.00 |
| Higher secondary | 67.46 | 36.22 | 27.56 | 36.22 |
| Graduation or above | 96.69 | 0.00 | 7.32 | 92.68 |
| Income | Less Than 250000 | 42.31 | 72.03 | 13.99 | 13.99 |
| 250001-500000 | 66.42 | 40.16 | 21.26 | 38.58 |
| 500001-750000 | 70.48 | 32.35 | 33.82 | 33.82 |
| More Than 750000 | 81.16 | 18.97 | 17.24 | 63.79 |
| Size of landholdings | Marginal and small | 49.59 | 63.46 | 15.38 | 21.15 |
| Semi-medium | 65.01 | 41.50 | 23.13 | 35.37 |
| Medium and large | 70.91 | 30.93 | 22.68 | 46.39 |
| Occupation | Farming | 55.99 | 53.61 | 18.56 | 27.84 |
| Non-farming | 72.28 | 31.19 | 23.85 | 44.95 |
| District | Bhatinda | 57.09 | 55.86 | 20.69 | 23.45 |
| Ludhiana | 56.97 | 49.21 | 25.40 | 25.40 |
| Gurdaspur | 67.55 | 36.43 | 13.95 | 49.61 |

*Source:* *Compiled by authors*

The distribution of financial literacy levels across various socioeconomic demographics is shown in Table 3. We reported that financial literacy was higher for females (80.36%) compared to males (60.02%), with a larger proportion of females (75%) falling into the high financial literacy category. Younger respondents (18-30 years) demonstrated the highest financial literacy (95.03%), while those aged 60 or above showed the lowest levels (42.81%). The findings indicated that financial literacy was lower for married (59.63%) respondents than their counterparts (71.98%). When it comes to the social category, Other backward classes exhibited the lowest levels of financial literacy, with 80% of the farmers in the social group having low financial literacy levels. Financial literacy tended to improve with increasing education levels, with 92.68% of the graduates demonstrating high levels of financial literacy. No farmer having a primary or less education could obtain higher levels of financial literacy in the study area. Income also positively influenced financial literacy, with an almost 39% gap between the lowest-income group (42.31%) and the highest-income group (81.16%). Furthermore, regarding the size of landholdings, farmers having medium and large size of landholdings (70.91%) demonstrated the highest level of financial literacy than the rest of the farmers. Farmers engaged in both farm and non-farm activities showed higher financial literacy (72.28%) than farmers who relied primarily on farming activities (55.99%). Concerning the district of domicile, the highest financial literacy was found in the Gurdaspur district (67.55%), followed by Bhatinda (57.09%) and Ludhiana (56.97%).

**4.4 REGRESSION ANALYSIS**

The regression analysis showed that the effect of gender was insignificant, indicating the insignificance of gender in predicting financial literacy in the study area (Table 4). We observed that the married respondents were less likely to be highly financially literate. When it comes to the social category, farmers belonging to other backward classes showed a lower likelihood of being highly financially literate compared to their general category counterparts, whereas the scheduled caste category did not show a significant effect. Concerning the age group of the farmers, the findings exhibited that farmers across all age groups had a lower probability of achieving high financial literacy than the farmers in the 18-30 years age group, but older farmers, in particular, exhibited a stronger tendency to have lower financial literacy levels. Higher education levels were linked to increased financial literacy for both farmers with higher secondary and with graduation or above. However, the effect was significantly larger in the case of farmers with a graduation or higher. Furthermore, the effect of occupation was statistically significant, highlighting that farmers engaged in both farm and non-farm activities are more likely to achieve high financial literacy than farmers engaged solely in farming occupations. Another observation from the study that we captured was that higher income levels correspond with greater financial literacy among farmers. Additionally, in terms of size of landholding, both semi-medium and medium-to-large farmers showed a higher probability of being financially literate compared to marginal and small farmers, however, the effect was only significant for semi-medium farmers in the presence of other control variables, whereas medium and large farmers showed significantly stronger effect when analyzed separately. Our study highlighted that the district of domicile and distance from the bank did not exhibit a statistically significant association with farmers' financial literacy levels.

**Table 4.** **Determinants of financial literacy**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Category** | **Low** | **Moderate** | **High** |
| Gender | Female | -0.135 (0.101) | 0.006 (0.010) | 0.130 (0.106) |
| Marital status | Married | 0.131\*\* (0.062) | -0.032 (0.020) | -0.099\*\* (0.043) |
| Social category | Other backward classes | 0.138\*\* (0.046) | -0.031\*\* (0.013) | -0.107\*\* (0.034) |
| Scheduled caste | -0.037 (0.082) | 0.004 (0.007) | 0.033 (0.074) |
| Age group | 31-45 Years | 0.110\*\* (0.048) | 0.076\* (0.039) | -0.186\*\* (0.086) |
| 46-60 Years | 0.368\*\*\* (0.053) | 0.112\*\* (0.036) | -0.480\*\*\* (0.084) |
| More than 60 years | 0.549\*\*\* (0.053) | 0.061 (0.038) | -0.610\*\*\* (0.080) |
| Education | Higher secondary | -0.400\*\*\* (0.042) | 0.149\*\*\* (0.024) | 0.251\*\*\* (0.026) |
| Graduation or above | -0.736\*\*\* (0.047) | -0.010 (0.041) | 0.747\*\*\* (0.068) |
| Occupation | Both farm and non-farm | -0.035 (0.047) | 0.005 (0.007) | 0.030 (0.041) |
| Income | Log income | -0.148\*\* (0.047) | 0.021\*\* (0.009) | 0.127\*\* (0.043) |
| Size of landholdings | Semi-medium | -0.159\*\* (0.049) | 0.029\* (0.015) | 0.130\*\*\* (0.037) |
| Medium and large | -0.106 (0.068) | 0.022 (0.017) | 0.084 (0.052) |
| District | Ludhiana | 0.044 (0.034) | -0.007 (0.006) | -0.037 (0.028) |
| Gurdaspur | -0.027 (0.034) | 0.002 (0.003) | 0.025 (0.031) |
| Distance from a bank | Continuous (in km) | -0.012 (0.010) | 0.002 (0.002) | 0.010 (0.008) |

*Note:* *Table 4 contains the estimated coefficient of marginal effects estimated using an ordinal logit model with robust standard errors in parentheses using financial literacy as the dependent variable. Male, others, general category, 18-30 years, primary or less, farm occupation, marginal & small farm, and Bhatinda are taken as base categories of independent variables for gender, marital status, social category, age group, education, occupation, size of landholdings, and district. \*\*\* P<0.01, \*\* P<0.05, \* P<0.1.*

Our research sought to assess farmers' financial literacy levels and determinants in the Punjab state of India. The construct validity of the financial literacy scale was checked using EFA with tetrachoric factor analysis using the ‘psych’ package in R Studio (Revelle, 2024). Due to the insufficiency of the KMO value, we performed the remedial measures suggested by Cerny & Kaiser (1977), Dziuban & Shirkey (1974), and Kaiser (1970). The results yielded sufficient scale reliability, while KMO and Bartlett's test statistics met the required criteria for performing EFA (Hair et al., 2009; Tabachnick & Fidell, 2013; Terwee et al., 2007). Aligning with prior research, we observed overall financial literacy among farmers to be low (Twumasi et al., 2021; Maji & Laha, 2023). Additionally, we applied the hierarchical ordinal logit model to inspect the determinants of financial literacy. The findings indicated gender as a significant predictor, with women exhibiting higher financial literacy compared to men, which contrasts with the majority of prior studies that report men as more financially literate (Chen and Volpe 2009) and coincides with those of Wagland & Taylor (2009), who observed greater financial literacy among women. Similar to the findings of Abreu & Mendes (2010), our study found married farmers to be less financially literate compared to unmarried, widowed, or separated. We observed financial literacy to decline with age, which is likely due to deteriorating cognitive ability among old-age respondents (Dell’Ariccia & Pence, 2009; Finke et al., 2017). Another likely reason that we observed from the field survey is that older farmers tend to be less educated, which could also limit their ability to comprehend financial concepts. The study highlighted that the social category significantly correlates with financial literacy. The findings revealed that individuals belonging to the other backward classes and scheduled caste categories were more likely to be low financially literate. Similar findings were observed in the United States, where underprivileged social groups like blacks and Hispanics exhibited lower financial literacy compared to their white counterparts (Angrisani et al., 2021; Lusardi & Mitchell, 2011b). The results suggest that socio-cultural settings significantly shape financial literacy. Education emerged as a major driver of financial literacy. Aligning with the research published so far, our study also reflects that individuals with secondary or higher education exhibit higher financial literacy due to their capability to grasp advanced financial literacy concepts (Anshika et al., 2021; Lusardi & Mitchell, 2011b). Additionally, the coefficient of income was positive and significant for high financial literacy, indicating an improvement in financial literacy with the rise in income (Atkinson & Messy, 2012; Lusardi & Tufano, 2015). The size of landholdings was also revealed to be significantly correlated with financial literacy (Aggarwal et al., 2014). We found that both semi-medium and medium and large farmers had a higher probability of achieving high financial literacy, but the effect of medium and large was insignificant. Farmers engaged in both farming and non-farming occupations exhibited higher financial literacy compared to those engaged in the farming occupation solely, likely due to additional interaction, exposure to financial information, and steadier income flow (Choudhary & Kamboj, 2017; Lachance, 2014). Furthermore, we found that factors such as being engaged in non-farm employment, distance from the bank, and belonging to a different district do not affect financial literacy.

**6. ROBUSTNESS CHECK**

We conducted two regression analyses on the same dependent and independent variables to ensure the robustness of our estimates. Firstly, we applied an OLS regression, and alternatively, to eliminate the effect of outliers on our model by age, we kept the age sample between the top 10% and bottom 10% and ran the ordinal logit model. The results of the robustness check largely showed strong support for our estimates discussed above (Table A3).

**7. CONCLUSION**

This study explored the farmers' financial literacy levels and their determining factors using data from 400 farmers in Punjab. Our study highlighted that overall financial literacy is low among farmers in Punjab. Our findings revealed that farmers performed better when it came to financial knowledge and financial behavior than financial attitude. Additionally, we employed a hierarchical ordinal logit regression model to identify factors influencing financial literacy. The result of regression analysis revealed that marital status, social category, age, education, income, occupation, and size of landholding were significant predictors of financial literacy. Our study highlighted that farmers who are engaged in both farming and non-farming occupations have an increased likelihood of being financially literate than those engaged solely in farming occupations due to their exposure to various non-farm activities other than income.

**8. LIMITATIONS OF THE STUDY**

Our study highlights valuable insights; however, some limitations must be acknowledged. The cross-sectional design of the study might limit its ability to infer causality. Additionally, EFA resulted in the removal of certain items, which may limit its comparability with other studies. Additionally, our sample comprises a predominance of male participants, which could limit the gender representation of our results; therefore, future studies should aim to address this gap. Moreover, the study focused on socio-economic predictors, leaving out other potential determinants such as financial, psychological, and institutional factors. Future studies should address these gaps for a more nuanced understanding.

**Consent:**

We conducted the survey with informed consent from all participants, ensuring voluntary participation, confidentiality, and minimal risk.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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**Appendix**

**Table A1.** **Financial literacy measurement: items retention status**

|  |  |  |
| --- | --- | --- |
| **Items** | **Questions** | **Remarks** |
| FK1 | A high-return investment usually carries high risk. | Removed |
| FK2 | High inflation leads to a higher cost of farming. | Retained |
| FK3 | It is less likely that you will incur more loss if you engage in the activity of crop diversification. | Retained |
| FK4 | If you have a 500 rupees note and you buy vegetables worth 170 rupees, how much is left with you? | Retained |
| FK5 | If you have 2000 rupees, will you be able to buy more things today or after 5 years with this money? | Retained |
| FK6 | If you take a 10,000-rupee loan, which one is easier to pay back: 10,500 or 10,000 + 3%? | Removed |
| FK7 | Suppose you make a fixed deposit of 10,000 rupees in a bank, and the simple interest rate is 5%. How much money will you get after two years? | Removed |
| FK8 | If INR 1000 is deposited in an account with a 10% compound interest rate, how much would it be after two years including interest? | Retained |
| FB1 | Over the last year, have you saved money in any financial instrument? | Retained |
| FB2 | If you lost your primary source of income, how long could you sustain your expenses without taking a debt? | Retained |
| FB3 | Do you set long-term financial goals and actively work towards achieving them? | Retained |
| FB4 | Do you regularly track and manage your financial affairs? | Retained |
| FB5 | Do you carefully think whether you can afford it before buying something? | Removed |
| FB6 | Do you pay your bills/EMIs on time? | Retained |
| FB7 | Would you consider comparing financial products before buying? | Retained |
| FB8 | Do you feel influenced about your financial decisions from any source of information? | Removed |
| FA1 | I focus on the present and worry less about the future. | Retained |
| FA2 | I get more enjoyment from spending money than saving it for the future. | Retained |
| FA3 | Money is there to be spent. | Retained |

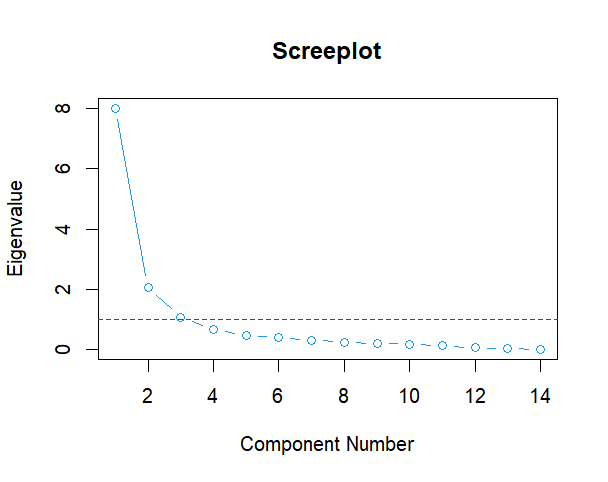
*Source:**Compiled by authors as a result of EFA*

**Table A2.** **Rotated component matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Dimension** | **Items** | **PC1** | **PC2** | **PC3** |
| Financial knowledge | FK2 |  | 0.89 |  |
| FK3 |  | 0.82 |  |
| FK4 |  | 0.58 |  |
| FK5 |  | 0.74 |  |
| FK8 |  | 0.74 |  |
| Financial behaviour | FB1 | 0.96 |  |  |
| FB2 | 0.96 |  |  |
| FB3 | 0.73 |  |  |
| FB4 | 0.80 |  |  |
| FB6 | 0.85 |  |  |
| FB7 | 0.74 |  |  |
| Financial attitude | FA1 |  |  | 0.82 |
| FA2 |  |  | 0.80 |
| FA3 |  |  | 0.82 |
| Eigenvalues |  | 4.72 | 3.57 | 2.89 |
| Percentage of variance explained |  | 34% | 26% | 21% |
| Cumulative variance explained |  | 34% | 60% | 81% |

*Source:* *Compiled by authors*

**Figure A1.** **The screeplot of the eigenvalues**



*Source:* *Compiled by authors*

**Table A3.** **Robustness check using Ordinary Least Squares (OLS) and Ordinal logit model, limiting for the effect of outliers by age**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **OLS regression** | | | **Ordinal logit model dropping age outliers** | | | | |
| **Variable** | **Categories** | **Coefficient** | **Variable** | **Categories** | **Low** | **Moderate** | **High** |
| Gender | Female | 0.067 (0.245) | Gender | Female | -0.225 (0.073) \*\* | -0.011 (0.022) | 0.236 (0.090) \*\* |
| Marital status | Married | 0.071 (0.135) | Marital status | Married | 0.276 (0.105) \*\* | -0.097 (0.049) \*\* | -0.179 (0.058) \*\* |
| Social category | Other backward classes | -0.254 (0.149) \* | Social category | Other backward classes | 0.171 (0.057) \*\* | -0.050 (0.023) \*\* | -0.121 (0.037) \*\* |
| Scheduled caste | -0.029 (0.161) | Scheduled caste | 0.008 (0.109) | -0.001 (0.019) | -0.007 (0.091) |
| Age group | 31-45 Years | -0.055 (0.140) | Age group | 46-60 Years | 0.235 (0.040) \*\*\* | 0.028 (0.012) \*\* | -0.264 (0.047) \*\*\* |
| 46-60 Years | -0.665 (0.145) \*\*\* | 60 Years and above | 0.383 (0.047) \*\*\* | -0.007 (0.020) | -0.376 (0.048) \*\*\* |
| 60 Years and above | -0.945 (0.145) \*\*\* | Education | Higher secondary | -0.440 (0.044) \*\*\* | 0.204 (0.032) \*\*\* | 0.236 (0.025) \*\*\* |
| Education | Higher secondary | 0.577 (0.063) \*\*\* | Graduation or above | -0.769 (0.051) \*\*\* | 0.024 (0.052) | 0.745 (0.080) \*\*\* |
| Graduate or above | 1.161 (0.099) \*\*\* | Occupation | Both farm and non-farm | -0.022 (0.053) | 0.003 (0.008) | 0.019 (0.046) |
| Occupation | Both farm and non-farm | 0.096 (0.089) | Income | Log income | -0.194 (0.057) \*\* | 0.031 (0.013) \*\* | 0.163 (0.053) \*\* |
| Income | Log income | 0.231 (0.062) \*\*\* | Size of landholdings | Semi-medium | -0.150 (0.064) \*\* | 0.033 (0.022) | 0.117 (0.045) \*\* |
| Size of landholdings | Semi-medium | 0.317 (0.083) \*\*\* | Medium and large | -0.110 (0.086) | 0.028 (0.025) | 0.082 (0.063) |
| Medium and large | 0.231 (0.108) \*\* | District | Ludhiana | -0.005 (0.040) | 0.001 (0.007) | 0.004 (0.033) |
| District | Ludhiana | 0.003 (0.076) | Gurdaspur | -0.062 (0.041) | 0.007 (0.006) | 0.054 (0.037) |
| Gurdaspur | 0.140 (0.080) \* | Distance from a bank | Continuous (in km) | -0.013 (0.013) | 0.002 (0.002) | 0.011 (0.011) |
| Distance from a bank | Continuous (in km) | 0.025 (0.019) |  |  |  |  |  |
| Constant |  | -1.292 (0.771) \* |  |  |  |  |  |

*Note:* *Table A1 contains the estimated coefficient of the Ordinary Least Squares (OLS) model and estimated coefficients of marginal effects estimated using an ordinal logit model with robust standard errors in parentheses using financial literacy as the dependent variable. Male, others, general category, 18-30 years (30-45 years in case an ordinal logit model due to exclusion of 18-30 years age group while limiting for age outliers), primary or less, farm occupation, marginal & small farm, and Bhatinda are taken as base categories of independent variables for gender, marital status, social category, age group, education, occupation, size of landholdings, and district. \*\*\* P<0.01, \*\* P<0.05, \* P<0.1.*