

Digital Financial Literacy and Gender Disparities: Insights from Punjab

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Abstract

Digital financial literacy, which refers to the knowledge and use of digital means for economic transactions, is an important determinant of inclusive growth. This study aims to quantify the level of digital financial literacy among people across different areas of rural Punjab. For this purpose, 500 respondents from 27 villages across three different districts are randomly selected. The study identifies three key elements of digital financial literacy, including awareness, attitude and usage aspects and a composite index is formulated. The statistical analysis shows a significant gender disparity across all these elements. Disparity in the access and use of digital tools is also observed. The element-wise analysis indicates a significantly low level of digital financial usage among both genders. The findings suggest that employment status, education level, and household income are crucial in determining digital financial literacy.

Keywords: Digital financial literacy, Gender disparity, Literacy index, Punjab

JEL Classification: G53, J16, O33

Introduction

Over the past few decades, the world has witnessed rapid digital transformation across almost all sectors of the economy. This is the new era in which technologies are profoundly transforming human lives at a much faster pace, leading to the 5th industrial revolution through the intelligent networking of machines and processes across industries, and through harmonious human-machine collaboration. The use of computers and the internet has fueled the digital revolution. Various international organizations are also promoting digital technologies for equitable and sustainable growth.

According to the Organisation for Economic Co-operation and Development, the widespread use of digital technologies can help in achieving sustainable development goals (Camodeca and Almici, 2021). The United Nations Development Programme (UNDP) launched its first digital plan in 2019 to harness widespread digital transformation and attain the goals of universality and equality (UNDP Digital Strategy, 2019). The OECD's 'Going Digital' project, the World Economic Forum's EDISON Alliance, and UNDP's strategic digitalization plan 2022-25 all focus on digital transformation and on developing appropriate policies for a bright digital future (OECD, 2017; Tedeneke, 2021; UNDP Digital Strategy, 2022-25). The Government of India is also working on digital empowerment and the knowledge economy through its 'Digital India' program

2015. This program is centered on three vision areas, viz., providing digital infrastructure, ensuring good governance, and empowering citizens digitally through enhancing digital literacy and knowledge.

Digital financial literacy (DFL) encompasses knowledge of digital financial products and services, a positive attitude, confidence, and skills for their actual use, as well as awareness of the risks associated with digital transactions. The inability to access or use digital products and services, lack of infrastructure, lack of knowledge and skills, illiteracy, and resistance to change are major challenges to digitalization and have become barriers to the country's economic development. Different studies have measured the level of DFL across regions, age groups, occupations, and genders at both national and international levels. Some studies have found an association between knowledge and the use of digital financial services. These studies also found a relationship between respondents' education level and their use of banking and other financial services. It has also been found that, compared with male respondents, females have less exposure to digital platforms, and the situation is even worse for women aged over 35 (Prasad and Meghwal, 2017; Saini, 2019; Dutta *et al.*, 2022).

Studies conducted to measure DFL across different age groups revealed that the younger male generation is more technologically knowledgeable in using digital products and services (George, 2020; Vani, 2020). It is reported that education level, income, gender, region, etc., affect the degree

of awareness, knowledge, and usage of digital financial services (Prasad and Meghwal, 2017; Azeez and Akhtar, 2021). Individuals in rural regions are significantly less digitally financially literate and have a negative attitude towards digital finance (Azeez and Akhtar, 2020). It was found that the resistance to change, lack of trust, lack of literacy and inadequate infrastructure are the main hurdles in DFL (Kaul and Mathur, 2017). The major reasons for gender disparity in digitalization are: lack of financial and digital literacy among women, rural infrastructural constraints, and patriarchal socio-cultural norms that discourage women from using cellular phones, the internet, and other digital financial services (Dutta *et al.*, 2022).

The present study is a contribution to the existing literature and provides a comprehensive assessment of DFL

across age groups, education levels, genders, income groups, and occupations. The main focus is on measuring the level of DFL and DFL-related gender disparity in the state of Punjab, India. The effects of ownership and use of major digital financial tools have also been examined to further elaborate and support the findings.

Data Sources and Methodology

Primary data were collected in the year 2021-22 from three districts of Punjab using a stratified proportional random sampling method. The selection of districts was based on two key factors influencing DFL i.e. general literacy levels and the bank branch network. All the districts were ranked as per the average scores of these two indicators using secondary data from the District Census Handbook, Punjab, published

Table 1: Questions to measure different elements of DFL

DFL elements	Questions	Score
Digital financial awareness	Awareness about the digital transfer of money without using cash	1
	Awareness about the transfer of money without visiting a bank	1
	Checking your bank balance by using mobile phone	1
	Awareness regarding UPI payments	1
	Awareness about debit card and its usage	2
	Awareness about digital payment of utility bills	1
	Awareness about credit card and credit score	2
	Awareness about online fund transfer methods	1
	Awareness about mobile wallets	1
	Awareness about one-time password (OTP)	1
	Awareness about digital frauds	1
Digital financial attitude and behavior	Do you currently have an active bank account?	1
	Is your smartphone linked to your bank account?	1
	Do you think digital payments are safe and convenient?	1
	For cash withdrawal, do you prefer ATM or cash from the bank?	1
	For payments, would you like to use cash or online transfer?	1
	Do you own a debit card?	1
	Do you own a credit card?	1
	Do you have any mobile payment applications on your phone?	1
	Is net banking activated on your bank account?	1
Digital financial usage	Do you use your debit card for financial transactions?	1
	Do you use credit card for making payments?	1
	Do you use mobile phone (UPI) for financial transactions?	1
	Do you transfer money online through net-banking?	1
Total score		26

in the Census of India (2011) report. Based on these rankings, three districts, Mohali, Amritsar, and Mansa were chosen representing the highest, middle, and lowest average scores, respectively. A total of 500 respondents were proportionally selected based on the rural populations of these districts, resulting in 150 from Mohali, 250 from Amritsar, and 100 from Mansa district. Respondents were randomly selected and interviewed using a well-structured schedule, ensuring gender balance across various demographic groups.

There are multiple components of DFL, including awareness of digital financial products and services, practical skills, attitudes and behavior, and understanding of financial risks (Morgan and Trinh, 2019; Rajdev *et al.*, 2020; Lyons and Kass-Hanna, 2021; Azeez and Akhtar, 2021; Rahim *et al.*, 2022). Based on a comprehensive review of national and international studies, this study focuses on three key elements of DFL, viz. Digital financial awareness, Digital financial attitude and behavior, and digital financial usage. These elements represent the core dimensions essential for understanding and evaluating DFL. The Digital financial awareness refers to an individual's knowledge and understanding of digital financial products, services, payment methods, and tools, along with their benefits, risks, and safe usage. Digital financial attitude and behavior refers to an individual's willingness, confidence, trust, and preparedness to use digital financial services and technologies. Digital financial usage refers to the actual use of digital financial services and tools, such as online banking, digital payments, mobile payment apps, and online fund transfers, in day-to-day financial activities. In order to evaluate DFL, an index was prepared, incorporating these three key elements. The index included 24 questions, with 11 questions on the Digital financial awareness element, 9 on Digital financial attitude and behavior, and 4 related to the Digital financial usage element, with total scores ranging from 0 to 26 as shown in Table 1.

The scores obtained by each respondent were then standardized into a dimension index ranging from 0 to 1. The formula used to convert the actual score of each respondent into a dimension index score is given below:

$$\text{Dimension Index Score} = \frac{\text{Actual score} - \text{Minimum score}}{\text{Maximum score} - \text{Minimum score}}$$

This standardization transforms the actual scores into a common scale, where 0 represents the minimum attainable score and 1 represents the maximum score. To classify respondents according to their level of DFL, the dimension index was divided into three equal intervals using the equal interval classification method. Since the dimension index ranges from 0 to 1, the total range is 1, and each class interval width is 0.33. Accordingly, the three categories were defined as given in Table 2.

Table 2: DFL categories on the basis of dimension index

score

Dimension index score	DFL category
0.00 - 0.33	Low
0.34 - 0.66	Moderate
0.67 - 1.00	High

Thus, each category represents approximately one-third of the total possible range of the dimension index, thereby providing a systematic and consistent basis for assessing and comparing respondents' levels of digital financial literacy. Respondents with dimension index scores between 0 and 0.33 were classified as having low digital financial literacy, those with scores between 0.34 and 0.66 were categorized as having moderate digital financial literacy, and respondents with scores between 0.67 and 1 were considered to have high digital financial literacy.

Various statistical techniques, including simple averages, percentages, and chi-square test, were employed for data analysis. Chi-square test was applied to examine the null hypothesis that there is no significant gender disparity in the digital financial literacy of male and female respondents. The test statistic was computed using the following formula:

$$\chi^2 = \frac{\sum (O - E)^2}{E}$$

Where χ^2 represents the calculated chi-square value, and O and E represent observed and expected frequencies, respectively. For the purpose of hypothesis testing, the calculated chi-square value is compared with the Chi-square distribution table value at a chosen level of significance and calculated degree of freedom. If the calculated chi-square value exceeds the specific table value, the null hypothesis is rejected, signifying gender disparity in DFL among male and female respondents. Otherwise, the null hypothesis is accepted. Microsoft Excel and IBM SPSS 25 software have been used for data analysis.

Results and Discussion

Element-wise measurement of DFL

A dimension index for DFL was created for all three elements: digital financial awareness, digital financial attitude and behavior, and digital financial usage. For each element, the level of DFL is classified into three categories: low, moderate, and high, as represented in Table 3.

Table 3 shows that 28.6 per cent of respondents fall into the category of low 'digital financial awareness', whereas 44 per cent and 27.4 per cent are in the moderate and high categories of digital financial awareness, respectively. Across all districts, the largest number of respondents falls in the moderate category. Regarding 'digital financial attitude and behavior', 45.2 per cent, 27.6 per cent, and 27.2 per cent of the respondents fall into the low, moderate, and high categories,

Table 3: Elements of digital financial literacy and their scores

S. No.	Elements of DFL		Number of respondents			Punjab
			Mohali	Amritsar	Mansa	
1	Digital financial awareness	Low (0 - 0.33)	22 (14.6)	82 (32.8)	39 (39)	143 (28.6)
		Moderate (0.34 - 0.66)	82 (54.7)	96 (38.4)	42 (42)	220 (44)
		High (0.67 - 1)	46 (30.7)	72 (28.8)	19 (19)	137 (27.4)
2	Digital financial attitude and behavior	Low (0 - 0.33)	52 (34.7)	111 (44.4)	63 (63)	226 (45.2)
		Moderate (0.34 - 0.66)	40 (26.7)	78 (31.2)	20 (20)	138 (27.6)
		High (0.67 - 1)	58 (38.7)	61 (24.4)	17 (17)	136 (27.2)
3	Digital financial usage	Low (0 - 0.33)	83 (55.3)	187 (74.8)	82 (82)	352 (70.4)
		Moderate (0.34 - 0.66)	32 (21.3)	52 (20.8)	16 (16)	100 (20)
		High (0.67 - 1)	35 (23.4)	11 (4.4)	2 (2)	48 (9.6)

Note: Figures in parentheses indicate percentages to the total

respectively. In the ‘digital financial usage’ element, the overall condition of Punjab is comparatively weak, as 70.4 per cent of the total respondents are under the low category, and just 9.6 per cent are in the high digital financial usage category. It has been observed that the Mohali district is comparatively in a better position, but in the Mansa and Amritsar districts, the digital financial usage is significantly low. The element-wise DFL scores of the respondents are shown in Figure 1.

Levels of digital financial literacy

The level of DFL in Punjab is represented in Table 4. The table shows that 33.4 per cent, 45 per cent and 21.6 per cent of the total respondents fall in the low, moderate and high categories of DFL, respectively. However, 47 per cent

of respondents in the Mansa district are in the low DFL category, as compared to 20 per cent and 36 per cent in the Mohali and Amritsar districts, respectively. Mohali district has the highest percentage of respondents with high DFL, i.e., 29.3 per cent, compared to 21.6 per cent in Amritsar and 10 per cent in Mansa district.

Digital financial literacy and gender disparity

To measure gender disparity, various elements of DFL have been used. The average DFL scores for both genders are calculated, and the gender disparity is determined.

Gender disparity in different elements

The gender disparity in various elements of DFL is illustrated in Table 5. An examination of this table reveals that female respondents consistently lag behind their male counterparts across all elements. Male respondents outperformed female respondents in digital financial awareness, with a maximum gender disparity of 26.8 per cent. Males are found to have a more encouraging attitude and behavior toward digital finance than females.

However, both male and female respondents are found to be weak in the digital financial usage element, with only 12.9 per cent of males and 6.1 per cent of females falling in the high ‘digital financial usage’ category. The gender disparity in overall DFL shows that 45.5 per cent of females have low DFL, compared with 21.6 per cent of males. Whereas, 10.6 per cent of females and 32.3 per cent of males are in the high

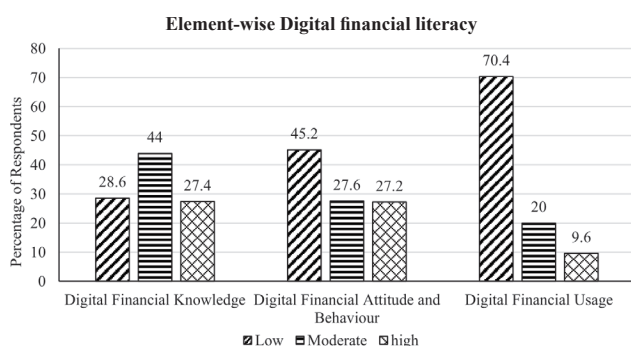


Figure 1: Element-wise scores of DFL

Table 4: Digital financial literacy levels and scores

S. No.	DFL level and scores	Number of respondents			
		Mohali	Amritsar	Mansa	Punjab
1	Low DFL (0 - 0.33)	30 (20)	90 (36)	47 (47)	167 (33.4)
2	Moderate DFL (0.34 - 0.66)	76 (50.7)	106 (42.4)	38 (38)	225 (45)
3	High DFL (0.67 - 1)	44 (29.3)	54 (21.6)	10 (10)	108 (21.6)
	Total	150 (100)	250 (100)	100 (100)	500 (100)

Note: Figures in parentheses indicate percentages to the total

Table 5: Gender disparity in digital financial literacy

DFL elements	DFL Index	Number of respondents		Gender disparity	Chi-square values
		Males n ₁ =254	Females n ₂ =246		
Digital financial awareness	Low	48 (18.8)	95 (38.6)	47 [#] (19.8)	20.56*
	Moderate	103 (40.6)	117 (47.6)	14 [#] (7.0)	
	High	103 (40.6)	34 (13.8)	69 (26.8)	
Digital financial attitude and behavior	Low	89 (35.1)	137 (55.7)	48 [#] (20.6)	9.90*
	Moderate	71 (27.9)	67 (27.2)	4 (0.7)	
	High	94 (37)	42 (17.1)	52 (19.9)	
Digital financial usage	Low	154 (60.6)	198 (80.5)	44 [#] (19.9)	9.50*
	Moderate	67 (26.5)	33 (13.4)	34 (13.1)	
	High	33 (12.9)	15 (6.1)	18 (6.8)	
Digital financial literacy	Low	55 (21.6)	112 (45.5)	57 [#] (23.9)	19.46*
	Moderate	117 (46.1)	108 (43.9)	9 (2.2)	
	High	82 (32.3)	26 (10.6)	56 (21.7)	

Notes: *Significant at 1 per cent level of significance, [#]Represents that the females outnumbered the males, Figures in parentheses indicate percentages

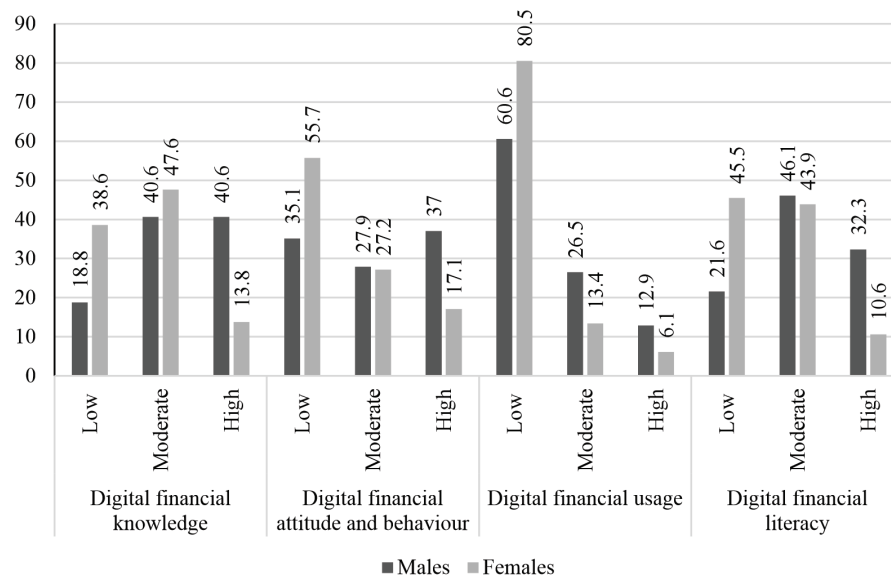


Figure 2: Element-wise gender disparity in DFL

DFL category. A significant gender disparity was observed by the chi-square test across all three elements of DFL. Therefore, the null hypothesis of no significant difference between male and female DFL is rejected. Figure 2 shows a graph of the element-wise gender disparity in DFL.

Gender disparity in DFL scores

The average scores of male and female respondents for various elements of DFL are shown in Table 6. The table shows lower average scores for female respondents across all elements. The overall gender disparity in the DFL scores is 0.15, with males and females scoring 0.52 and 0.37, respectively. The gender disparity is highest in digital financial usage, followed by digital financial attitude and behavior, and digital financial awareness. The digital financial usage aspect is significantly weaker among both males and females, with an overall average score of just 0.22: males score 0.29, and females score 0.14, indicating a gender disparity of 0.15.

Impact of different socio-economic factors

Different socio-economic factors influencing DFL and contributing to the gender disparity have been investigated. These factors have been identified on the basis of analysis

of primary data and other research studies. The main factors are age, education level, household monthly income, and employment status. Table 7 shows the effects of these factors on DFL levels and the associated gender disparity.

The findings of the study reveal that middle-aged individuals (25 to 45 years of age) are more digitally financially literate, with the highest average scores of 0.59 and 0.44 for male and female respondents, respectively. It is found that the gender disparity has increased with age, with the smallest gender divide between young males and females in the 18-25 age group. Young females are improving in digital financial involvement.

It is found that educated respondents, regardless of gender, have higher DFL scores compared to their uneducated counterparts. It is also observed that as the level of education increases, the DFL scores of both genders improve, significantly narrowing the gender disparity by nearly half. It is interesting to note that highly qualified women still lag behind their male counterparts. Household monthly income is also improving the DFL scores of both genders.

The employed respondents have higher levels of DFL than unemployed respondents. Table 7 shows that the average

Table 6: Average DFL scores of both genders

DFL elements	Score range	Average scores			Gender disparity
		Males	Females	Overall	
Digital financial awareness	0 - 1	0.55	0.42	0.49	0.13
Digital financial attitude and behavior	0 - 1	0.55	0.41	0.49	0.14
Digital financial usage	0 - 1	0.29	0.14	0.22	0.15
DFL	0 - 1	0.52	0.37	0.45	0.15

Table 7: Impact of different factors on gender disparity in DFL

Variables			DFL scores					
			Male		Female		Gender disparity	
Age	18 to 25 years		0.49 (17.7)		0.42 (26.4)		0.07 (8.7) [#]	
	25 to 45 years		0.59 (50.4)		0.44 (50.8)		0.15 (0.4) [#]	
	45 to 60 years		0.41 (31.9)		0.19 (22.8)		0.22 (9.1)	
Education	Uneducated		0.36 (9.4)		0.16 (10.9)		0.20 (1.5) [#]	
	Educated	Up to senior secondary	0.53 (90.6)	0.46 (66.9)	0.40 (89.1)	0.35 (68.7)	0.13 (1.5)	0.11 (1.8) [#]
		Graduation and post-graduation		0.75 (23.6)		0.58 (20.3)		0.17 (3.3)
Household monthly income	Less than 10,000		0.38 (14.6)		0.28 (18.7)		0.10 (4.1) [#]	
	10,000 to 30,000		0.50 (59.1)		0.36 (66.3)		0.14 (7.2) [#]	
	30,000 to 50,000		0.55 (17.3)		0.53 (8.9)		0.02 (8.4)	
	More than 50,000		0.75 (9.1)		0.58 (6.1)		0.17 (3.0)	
Employment	Unemployed		0.47 (14.9)		0.34 (71.6)		0.13 (56.7) [#]	
	Employed	Labourer, agriculturalists, and self-employed	0.52 (85.0)	0.46 (62.2)	0.47 (24.4)	0.39 (15.9)	0.05 (60.6)	0.07 (46.3)
		Private and government employees		0.69 (22.8)		0.61 (8.5)		0.08 (14.3)

Note: [#] represents that females outnumbered males; Figures in parentheses indicate percentages to the total

DFL scores for employed and unemployed males are 0.52 and 0.47, respectively. Similarly, for females, these scores are 0.47 and 0.34, respectively. The employment type significantly influences the DFL levels. Both genders in private and government jobs exhibit higher DFL, with no noticeable gender disparity, compared to those working as labourers, agriculturalists, or self-employed. But the study shows that, among males, 85.0 per cent are employed, compared with just 24.4 per cent of females, indicating that women are more involved in household chores and family management. This may be a probable reason for their poor DFL. The perusal of the table reveals that the level of DFL improves with education, employment and household income.

Other factors contributing to gender disparity

The study also explores whether ownership and use of digital financial tools, such as smartphones, bank accounts, and debit and credit cards, influence gender disparities. The respondents' attitudes and concerns regarding the safety of

these digital modes and their use for financial transactions were also analyzed. Table 8 presents the average DFL scores and gender disparities in ownership and usage of these digital financial tools.

A perusal of Table 8 reveals that 79.1 per cent of males and 64.6 per cent of females have a smartphone with internet connectivity, but a very small number of respondents use it for digital financial transactions. The gender disparity is 14.5 per cent in owning a mobile phone, but increases to 20.6 per cent when we consider mobile phone use for financial transactions. But average DFL scores improve from 0.52 to 0.71 with the usage, and the gender disparity reduces to 0.02.

It has been found that 81.8 per cent of respondents have a savings account in a bank, and 69.2 per cent use it regularly, i.e., within last two months. 91.7 per cent of males and 79.7 per cent of females own a bank account, with a gender disparity of 12 per cent. However, this gap widens to 23.4 per cent when considering the frequent usage of a bank

Table 8: Ownership and usage of digital financial tools

S. No.	Category		Average DFL scores			Gender disparity
			Total	Males	Females	
I	Smartphone and internet connection	Ownership	0.52 (72)	0.58 (79.1)	0.46 (64.6)	0.12 (14.5)
		Usage for financial transactions	0.71 (30)	0.71 (40.1)	0.69 (19.5)	0.02 (20.6)
II	Bank account	Ownership	0.48 (81.8)	0.53 (91.7)	0.42 (79.7)	0.11 (12)
		Usage	0.49 (69.2)	0.54 (80.7)	0.44 (57.3)	0.10 (23.4)
III	Debit card	Ownership	0.59 (57.4)	0.60 (71.2)	0.56 (43.1)	0.04 (28.1)
		Usage	0.63 (43.6)	0.63 (60.6)	0.63 (26.1)	0 (34.5)
IV	Credit card	Ownership	0.81 (8.4)	0.82 (12.6)	0.76 (4.1)	0.06 (8.4)
		Usage	0.85 (3.4)	0.89 (4.7)	0.83 (2.1)	0.06 (2.6)
V	Attitude towards digital financial tools	Safe and secure	0.54 (59.2)	0.61 (63.3)	0.45 (54.8)	0.16 (8.5)
		Usage for financial transactions	0.74 (19.4)	0.75 (26.3)	0.71 (12.1)	0.04 (14.2)

Note: Figures in parentheses indicate percentages to the total

account for routine financial transactions. The ownership of debit cards among males is 71.2 per cent in comparison to 43.1 per cent of females. Additionally, the use of debit cards is very low among females (26.1 per cent) compared with 60.6 per cent among males. A large gender disparity of 34.5 per cent is evident in debit card usage among respondents, but the average DFL scores indicate near equality between the genders. Credit card ownership and usage are significantly lower among both genders. Only 4.1 per cent of women have credit cards, and 2.1 per cent actually use them. In contrast, 12.6 per cent of men have credit cards, and 4.7 per cent use them for routine transactions. Average DFL scores are maximum for both males and females in the credit card usage category. Around 59.2 per cent of respondents, including 63.3 per cent of males and 54.8 per cent of females, believe that digital financial tools are safe and secure, while only 19.4 per cent use them for routine financial transactions. Females are less likely to use digital payment modes (12.1 per cent) than males (26.3 per cent).

Overall, the analysis of the table reveals that significant gender disparities prevail in both ownership and actual usage of digital financial tools, but they widen to a greater extent in actual use. It implies that a smaller number of females use digital means for financial transactions, but the average DFL

scores indicate that gender disparity declines significantly as women's use of digital financial tools increases.

Conclusions and Policy Implications

The study focuses on assessing the DFL and gender disparity in Punjab. It reveals a lower level of DFL as well as a significant gender disparity. The female respondents lag behind their male counterparts in all elements of DFL. The DFL index scores averaged 0.52 for males and 0.37 for females, resulting in a gender disparity of 0.15. The study reveals that DFL is significantly impacted by employment type, education level, and household income. The lower level of DFL among women is mainly attributed to their limited education and employment. The study highlights the need to improve employment opportunities for women to reduce gender disparities. It is interesting to note that although education significantly improves the DFL scores of women, highly qualified women still lag behind their male counterparts in DFL. It signifies the necessity for further measures to reduce the gender gap.

A significant gender disparity is found in the ownership and use of digital financial tools such as smartphones, bank accounts, debit cards, and credit cards. The ownership and use of credit cards is very limited among rural respondents.

The study found that 63.3 per cent of males and 54.8 per cent of females consider digital modes safe and secure, but only 26.3 per cent of males and 12.1 per cent of females use these modes for digital financial transactions. Although females lag behind in both ownership and use of digital tools, gender disparity is more pronounced in usage. This shows the limited involvement of women in using digital means for financial transactions, but the average DFL scores highlight that gender disparity reduces significantly when women start using the digital financial tools. An important outcome of this study is that young women with higher DFL scores are more financially involved, indicating a positive sign in overcoming gender inequality.

The findings of the study reveal that there is an urgent need to improve education, employment opportunities with a special attention to women. Therefore, government should increase the number of educational institutions and generate more employment opportunities in rural areas. In order to reduce the gender disparity, policymakers should improve digital awareness, access to digital tools and internet services in rural areas. The government should make the digital transactions fully safe and secure to combat digital scams and to instill faith of people in digital transactions.

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