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Only Bank Account is Not Sufficient: An Empirical Evidence of Gender Gap in Financial Inclusion in Remote Hilly India

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Abstract: **Purpose**-The study attempts to explore the determinants of demand side of financial inclusion; it examines the gender gap in financial inclusion in the hilly remote of India.

Design/methodology/approach- the study has used demand side determinant of financial inclusion to measure gender gap using 400 samples in the hilly remote district of Uttarkashi in India. This research has used both descriptive and exploratory research design. The primary data has been collected using structured questionnaire using multistage stratified random sampling. Logistic regression is performed to describe the gender gap and impact of other independent variable on usage determinant of financial inclusion.

Findings- Out of ten logistic regression models to determine gender gap in financial seven were statistically significant to explain the gender gap. In addition to gender the other factors like income, education, employment and density of financial institutions were statistically significant for the financial inclusion in remote hilly region in India.

Research limitations/implications- the outcome of research will assist the stakeholders, policy makers and researchers to reorient their views towards financial inclusion and its relationship with gender and other variables. It will also help them to enact policy guideline towards gender in financial inclusion initiative

Originality/value-Density of financial institution do play an important role in financial inclusion. This paper has also given more weightage to digital aspects of financial inclusion. This study will thus add a new dimension in determining financial inclusion and will enhance the literature of financial inclusion.

Keywords- *Financial Inclusion, Gender Gap, Usage, Financial Literacy, Logistic Regression.*

1. Introduction

The word development is one which cannot be neglected in a civilized society. There is no corner on this earth that does not aspire to be in developed league. It is the buzz word that every policy maker, institutions and researcher peeks into and sustainable development goal is one such initiative at global level to see this world at higher platform. Thinking of development without financial inclusion is like sailing a boat without rudder in fact financial inclusion has been recognized as an enabler of around forty percent of sustainable development goal and World Bank has acknowledge that poverty cannot be reduced without enabling financial inclusion.Having a transaction account is the first step towards financial inclusion as a transaction account opens all other door for financial services. However, having only a transaction account cannot be the bliss point of financial inclusion. Financial inclusion is a continuous process that need to inculcate all other service that improves individual and business financial status. Sustainable development goal also include gender equality and gender inequality in financial inclusion is one of the major concerns for the world today. Though the gender gap in transaction

account has reduced but there are huge gaps in availing other services relating to financial inclusion and this scenario the gender gap became more prominent in the region which are remote and hilly. This paper is quite unique in its approach as it is including the study of financial inclusion in remote hilly region of India in the gender perspective by collecting primary data from the respondent already holding at least a bank account. This paper will add to literature of financial inclusion and attempt to find gender gap in other services of financial inclusion excluding account ownership.

This research paper has been shaped into eight sections namely introduction, review of literature, research design and hypothesis formation, research methodology, data analysis and result, discussion, research implication and finally pointing out limitations and future research directions.

2. Review of literature

2.1 Review of literature on financial inclusion

There are many definitions of financial inclusion but their crux is to provide adequate and appropriate financial service to the excluded individuals or businesses at affordable cost, on time and in transparent manner through formal financial institutions,(Srivastava and Ojha, 2020).(Allen *et al*.,2015) in their study found that financial inclusion is mostly associated with lower account costs, greater proximity of financial institutions, stronger legal rights and more politically stable environment. The study of (Khandari, 2020) is finding the extent of financial inclusion in selected district of Uttrakhand, India by formulating financial inclusion index on basis of fours dimensions and these data is compared with all India rural household to find the extent of financial exclusion in hilly region.as per the recent study of CRISIL there is large geographical disparity of financial institutions with heavy concentration in large cities. In addition to supply side problem there exist a large demand side constraint as there is no enough money in people's hand to put it into bank account. Infrastructure like roads does paly important role in financial inclusion in addition to labour force participation and regional disparity (Dangi and Kumar,2013) as per (Bhanot*et al*.,2012)nearness to financial institutions and terrain of the region are some of the important factors that also decides the extent of financial inclusion.

2.2 Review of literature on gender and financial inclusion

In the study of (Ozsuca, 2019) it was found that men exhibit higher saving and formal credit then women and employment and education are marking factors for this gap however this study also mention that income plays a minimum role in explaining gender gap. In contrary to this (Swamy, 2014) finds that income plays an important role in financial inclusion of women.In the study of (Sioson, 2019) it has been mentioned that despite women holding a bank account there still exist gender gap and distance from bank, family or work responsibility and mind set towards financial institution are some of the reasons for this. The gender gap in financial inclusion exist in many aspects of financial inclusion. In a study by (Musa *et al*., 2015) confirms the gender gap in Nigeria, it used binary Probit model and Fairlie decomposition method on Global Findex 2011 data set and found that better education, high income and youthful age improves the chances of financial inclusion.The result of study on India's flagship financial inclusion programme PMJDY by (Bhatia and Singh 2019) confirmed that financial inclusion has a positive influence on social, political and economic dimensions of women empowerment. The study of (Aterido*et al*., 2013) confirms the existence of gender gap in financial inclusion in sub-Saharan Africa due to lower income, education and employment status. As per the study of (Shetty and Hans, 2018) financial inclusion will empower women and study of (Goeland Madan, 2019) has also pointed out that financial inclusion will enhance the entrepreneur character among women. According to the study of (Shetty and Hans,2018) downgraded conditions of women in the Indian society is one of main challenge to financial inclusion as women contribution in economy is equal but there decision-making right is relatively less than men. The result of study of (Mndolwa and Alhassan,2020) has supported the gender disparity in financial inclusion in dimensions like formal saving, formal account, and mobile account and this study evidence that reason of this disparity is lower level of education, income and overdependence of women on men.

2.3 Research gap and study objective

After evaluation of prior studies in the domain of financial inclusion, it was observed that most of the studies in India were oriented on dimension of financial inclusion in formulating index, studying particular scheme or finding gender gap with traditional dimensions like account ownership, owing credit account or perception analysis but very few studies were found on financial inclusion pertaining to gender gap with dimensions relevant in present scenario of digitalisation of financial services. The present study thus emphases on the gaps in literature of financial inclusion in respect of gender gap in insurance cover, usage of digital transaction modes and usage of banking correspondents in remote hilly district of India. Considering these gaps, the present study is directed to achieve two objectives. (1) To explore the determinant of usage dimension of financial inclusion. (2) To find the gender gap in context of financial inclusion.

3. Research Design and Hypothesis Formation

3.1 Proposed research model

The model that has been used in this study is developed based on empirical support from the literature survey and empirical studies of financial inclusion. Based on the current research requirement, earlier research work and a set objective of this study a well financially include person is one which poses a credit account, at least one insurance policy, saving in formal financial institution, have account in multiple financial institution and use ATM, banking correspondent, cheque book, mobile app and online banking for transaction.

3.2 Hypothesis formulation

Based on the literature review, it is most likely in addition to other factors gender is one of the factors that impacts financial inclusion.Below mention are some of the hypothesesformulated based on the items of financial inclusion from different studies including G20 financial inclusion indicator and requirement of the study in the region.

H1. There is significant relation between loan account ownership and gender

H2. There is significant relation between having an insurance policy and gender

H3. There is significant relation between saving in formal financial institution and gender

H4. There is significant relation between having account in multiple institution and gender

H5. There is significant relation between usage of ATM and gender

H6. There is significant relation between branch base transaction and gender

H7. There is significant relation between cheque used for transaction and gender

H8. There is significant relation between transaction using banking correspondent and gender

H9. There is significant relation between transaction using mobile app and gender

H10. There is significant relation between internet/mobile banking and gender

4. Research methodology

4.1 Sampling procedure

Sampling design for this study was framed based on the previous empirical studies. The primary data were collected by using multistage stratified random sampling(NABARD,2016). The sampling unit consistof population above 15 years holding a bank account (G-20 and World Bank). The data were collected using structured questionnaire. The demographic profile of the respondent is presented in Table 1

4.2 Development of measurement items

The measurement variables considered for the study have been taken from the previous literature. Ten variables to measure financial inclusion are presented in the table 2. The measurement item referred in this study are taken from various literatures with special focus on G 20 financial inclusion indicators considering the nature of region in study. These indicators are also supported by other literatures (NABARD, 2016, Bhanot, *et al*., 2012)

4.3 Data analysis tools

In order to analyse the primary data collected for the study multivariate analysis method like logistic regression is used. The nature of this study is such that the outcome or dependent variables listed in table 2 are categorical /dichotomous. Other regression model like Ordinary Least Square (OLS) is not appropriate in this study as it interrupts linearity assumption and also leads to heteroscedasticity of residuals. Binary logistic regression is used to find the significant relation between dependent variable and explanatory variables in which the outcome or dependent variable has dichotomous outcome like Yes/No and it is scored as 1 or 0.The data analysis was performed using statistical package for social science(SPSS version 22.0).

5. Data analysis and result

Table 1 Demographic profile of respondent

Demographic characteristic	**Percentage**	**Total**	**Female**	**Male**
Gender				
Male	51.7	207	-	-
Female	48.3	193	-	-
Age				
Young (15-34)	20.8	83	49	34
Middle (35-59)	60.0	240	107	133
Old (above 60)	19.2	77	37	40
Marital status				
Unmarried	11.5	46	24	22
Married	74.3	297	126	171
Widow	14.2	57	43	14
Education				
Illiterate	10.5	42	37	5
No formal education	11.3	45	29	16
Primary	6.5	26	13	13
Secondary	13.0	52	25	27
Senior secondary	30.5	122	58	64
Graduate	28.2	113	31	82
Employment status				
Unemployed	31.5	126	95	31

Casual wages	20.8	83	51	32
Self-employed/Farmer	37.5	150	24	126
Salaried	10.2	41	23	18
Income				
Below 5000	52.8	211	136	75
5000-10000	15.5	62	26	36
10000-15000	10.2	41	15	26
Above 15000	21.5	86	16	70

Source(s): Author's compilation based on primary data

Preliminary analysis was conducted using descriptive statistics to compare the usage dimension of financial inclusion across gender group. A more robust analysis was conducted through inferential statistics using ten econometric models. The models were used to capture the effect of gender on usage dimension of financial inclusion keeping unchanged other factors such as employment, income, age, marital status, education level. The study has utilised the primary data to look at usage dimensions of financial inclusion.

Descriptive statistics in Table 2 confirmed difference between male and female in terms of usage dimension of financial inclusion that includes loan, insurance, saving, account in multiple institution and transaction using ATM, cheque, mobile app, Banking correspondents, Branch based and online.

Table 2 Descriptive statistics

Description	**Total %**	**Male %**	**Female %**	**Significance**
Having a loan account	22	16	6	*
Having at least an insurance policy	39.3	28.5	10.8	*
Saving in formal financial institution	42.3	30.5	11.8	*
Having account in multiple institution	19.3	16.8	2.5	*
Doing at least one transaction through ATM in last three months	21.3	16.3	5.0	*
Doing at least one branch-based transaction in last three month	92.0	48.8	43.3	***
Doing at least on cheque-based transaction in last three months	26.3	22.5	3.8	*
Doing at least one Banking correspondent-based transaction in last three month	13.8	6.8	7.0	****
Doing at least one mobile app-based transaction in last three month	12.5	5.3	7.2	****
Doing at least one mobile/internet banking transaction in last three months	10.0	8.0	2.0	****

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

As repeated in table 2the gender gap in having a loan account, insurance policy, saving in formal financial institution, ATM transaction and transaction using cheque is clearly visible and when we disaggregate the elements of the above mention dimension it became clear that female own less loan account, less insurance policy, low saving, less ATM transaction and less cheque-based transaction when compare to male and this difference is significant.

5.2 Econometric model result

The result of binary logistic regression is presented in the table 3 to table 12 where the relation between gender and financial inclusion indicatorsareanalysed by considering dependent variables listed in Table 2 while keeping unchanged the explanatory variables like age, employment status, income, density of financial institution (Block), social category, education, marital status.

Gender and loan account

Our first analysis involved determining the effect of gender on loan account ownership where we have variable "Having a loan account" capturing those have loan account in formal financial institution. A logistic regression was carried out to assess the effect of gender on having a loan account and the result for the same is presented in Table 3.

Table 3 Logistic regression output: Gender and Loan account

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Having a loan account	0.789*	-0.096****	0.407*	0.318*	-0.213*	-0.101****	-0.124****	0.074****	-1.907****
Odds	2.201	0.908	1.502	1.375	0.808	0.904	0.883	1.077	0.148
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	76.8		50.914		8	0.120		0.183	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =50.914, p<0.001), explained 18.3 percent of the variation of having a loan account (Negelkerke R^2) and correctly predicted 76.8 percent of cases. Status of employment (p<0.001), income (p<0.001), Density of financial institution(p<0.001) were significant. However,age(p=0.720), social category(p=0.482) and marital status(p=0.831) were not. The odds of gender are 2.20 which indicate the likelihood of male having a loan account is 2.2 times more than the female. Another independent variable like employment and income has significant and positive relation with having a loan account however, density of institution has significant but negative relation with the same.

Gender and insurance

Our second analysis involved determining the effect of gender on insurance ownership where we have variable "Having at least one insurance policy" capturing those have at least one insurance policy on his/her name in formal financial institution. A logistic regression was carried out to assess the effect of gender on having an insurance policy and the result for the same is presented in Table 4.

Table 4 Logistic regression output: Gender and Insurance policy

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Having at least one insurance policy	0..673*	0.329***	0.319***	0.806*	0.131***	0.277**	0.212**	-0.123***	-5.785**
Odds	1.959	1.389	1.375	2.239	1.140	0.1.320	1.236	0.722	0.003
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	78		160.484		8	0.330		0.446	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =160.484, p<0.001), explained 44.3 percent of the variation of having an insurance policy (Negelkerke R^2) and correctly predicted 78 percent of cases. Status of income (p<0.001), education(p<0.040) was significant. However, age(p=0.245), employment (p<0.062), density of institution (p=0.100), social category(p=0.062) and marital status(p=0.722) were not. The odds of gender are 1.959 which indicate the likelihood of male having aninsurance policy is 1.959 times more than the female. Another independent variable like education and income has significant and positive relation with having an insurance policy suggesting that with the increase of income and level of education chances of having an insurance policy increase.

Gender and saving

Our third analysis involved determining the effect of gender on saving in formal financial institution where we have variable "Saving in formal financial institution" capturing those that save in formal in formal financial institution. A logistic regression was carried out to assess the effect of gender on saving in formal financial institution and the result for the same is presented in Table 5.

Table 5 Logistic regression output: Gender and saving

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Saving in formal financial institution	0.746*	-0.025****	-0.259****	1.585*	-0.138****	0.235****	0.287**	0.416****	-5.785**
Odds	2.109	0.975	0.772	4.878	1.140	0.1.320	1.236	0.722	0.003
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	82.5		221.136*		8	0.425		0.571	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, (x^2(8) =221.136, p<0.001), explained 57.1 percent of the variation of saving in formal financial institution (Negelkerke R^2) and correctly predicted 82.5 percent of cases. Status of income (p<0.001), education(p<0.011) was significant. However, age(p=0.935), employment (p<0.165), density of institution (p=0.122), social category(p=0.155) and marital status(p=0.259) were not. The odds of gender are 2.109 which indicate the likelihood of male saving in formal financial institution is 2.109 times more than the female. Another independent variable like education and income has significant and positive relation with saving in formal financial institution suggesting that with the increase of income and level of education chances of saving in formal financial institution increases. The odds of income are 4.878 suggesting that relation of income and saving is quite strong which also harmonises with other literatures.

Gender and accounts in multiple institutions

Ourfourth analysis involved determining the effect of gender on bank accounts inmultiple financial institution where we have variable "Have bank account in multiple institution" capturing those that have bank account in multiple financial institution formal in formal financial institution. A logistic regression was carried out to assess the effect of gender on having bank account in multiple financial institution and the result for the same is presented in Table 6.

Table 6 Logistic regression output: Gender and multiple account

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Have bank account in multiple institutions	1.474*	-0.172****	0.062****	0.903*	0.219**	-0.463**	0.122****	0.199****	-5.091*
Odds	4.365	0.842	1.064	2.468	1.245	0.629	1.130	1.220	0.006
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	85		142.573*		8	0.300		0.480	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, (x^2(8) =142.573, p<0.001), explained 48.0 percent of the variation of account in multiple financial institutions (Negelkerke R^2) and correctly predicted 85 percent of cases. Status of income (p<0.001), density of financial institution(p<0.038) and social category(p=0.006) was significant. However, age(p=0.611), employment (p<0.802), education (p=0.385), and marital status(p=0.668) were not. The odds of gender are 4.365 which indicate that likelihood of male having account in multiple financial institution is 4.365 times more than the female. Another independent variable income and density of financial institution has significant and positive relation with having account in multiple financial institution suggesting that with the increase of income and density of financial institution the chances of having account in multiple financial institution increases. However, having account in multiple institution has shown a negative but significant relation with social category indicating that having account in multiple institution decreases with increase in social exclusion.

Gender and ATM transaction

Our fifth analysis involved determining the effect of gender on transaction using ATM where we have variable "Did at least one transaction in last three months using ATM" capturing those that have done at least one transaction using ATM in last three months. A logistic regression was carried out to assess the effect of gender on transaction using ATM and the result for the same is presented in Table 7.

Table 7 Logistic regression output: Gender and ATM transaction

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one transaction in last three months using ATM	0.739*	-0.384****	0.457**	0.085****	0.041****	-0.028****	0.473*	0.171****	-5.0*
Odds	2.094	0.681	1.579	1.089	1.042	0.972	1.605	1.186	0.007
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	79		72.311*		8	0.165		0.257	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, (x^2(8) =72.311, p<0.001), explained 25.7 percent of the variation of transaction using ATM (Negelkerke R^2) and correctly predicted 79 percent of cases. Status of employment (p<0.024)and education (p=0.001) was significant. However, age(p=0.179), income (p<0.561), density of financial institution (p=0.628), social category (p=0.846) and marital status(p=0.654) were not. The odds of gender are 2.094indicating that likelihood of male doing an ATM transaction in last three months is 2.094 times more than the female. Another independent variable employment and education has significant and positive relation with transactions using ATM suggesting that with the increase of employment andeducation the chances of transaction using ATM increases.

Gender and branch-based transaction

Our Sixth analysis involved determining the effect of gender on branch-based transactions where we have variable "Did at least one branch-based transaction in last three months" capturing those that have done at least one branch-based transaction in last three months. A logistic regression was carried out to assess the effect of gender on branch-based transaction and the result for the same is presented in Table 8.

Table 8 Logistic regression output: Gender and branch-based transaction

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one branch-based transaction in last	0.247*****	-0.772*****	0.707**	-0.252*****	-0.188*****	-0.184*****	-0.123*****	-0.380*****	2.406*****

three months									
Odds	1.280	2.165	2.028	0.777	0.829	0.832	0.884	0.684	11.090
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	92		17.814**		8	0.044		0.102	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =17.814, p<0.023), explained 10.2 percent of the variation of branch-based transaction (Negelkerke R^2) and correctly predicted 92 percent of cases. Status of employment (p<0.021) was significant. However, gender (p=0.592), age(p=0.087), education (p=0.448) income (p<0.349), density of financial institution (p=0.120), social category (p=0.415) and marital status(p=0.446) were not. The gender gap of branch-basedtransaction was not significant.

Gender and cheque-based transaction

Our seventh analysis involved determining the effect of gender on cheque-based transactions where we have variable "Did at least one cheque-based transaction in last three months" capturing those that have done at least one cheque-based transaction in last three months. A logistic regression was carried out to assess the effect of gender on cheque-based transaction and the result for the same is presented in Table 9.

Table 9 Logistic regression output: Gender and cheque-based transaction

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one cheque-based transaction in last three months	1.372*	0.145****	0.554**	0.599*	-0.052****	-0.069****	0.415**	0.075****	-6.783*
Odds	3.942	1.156	1.740	1.821	0.949	0.933	1.514	1.078	11.090
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	84		166.304*		8	0.340		0.497	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =166.304, p<0.001), explained 49.7 percent of the variation of cheque-based transaction (Negelkerke R^2) and correctly predicted 84 percent of cases. Status of employment (p<0.013), income (p<0.001)and education (p=0.002) were significant. However, age(p=0.639), density of financial institution (p=0.572), social category (p=0.657) and marital status(p=0.855) were not. The odd of gender is 3.942 indicating that the likelihood of male using cheque for transaction is 3.942 time to that of female. The analysis also summaries that the chances of using cheque for transaction increases with increase in income, education level and employment status.

Gender and transaction using banking correspondent

Our eight-analysis involved determining the effect of gender on transactions using banking correspondent (BC) where we have variable "Did at least one transaction using banking correspondent in last three months" capturing those that have done at least one transaction through banking correspondent in last three months. A logistic regression was carried out to assess the effect of gender on transaction using banking correspondent and the result for the same is presented in Table 10.

Table 10 Logistic regression output: Gender and transaction through BC

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one transaction through BC last three months	0.320****	-0.692**	-0.150****	0.038****	-0.565*	0.547**	-0.055****	1.179*	-2.669**
Odds	1.377	0.500	0.860	1.038	0.568	1.727	0.946	3.251	0.069
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	87.8		61.798*		8	0.143		0.260	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =61.798, p<0.001), explained 26 percent of the variation of transaction through BC (Negelkerke R^2) and correctly predicted 87.8 percent of cases. Status ofage(p=0.039),density of financial institution (p=0.001),social category (p=0.012) and marital status(p=0.004)were significant. However, employment (p<0.515), income (p<0.853) and education (p=0.666) were not. The gender gap of transaction using BC was not significant. The analysis also summaries that increase in density of financial institution discourages the use of BC.However, increase in social exclusion increases the use of BC.

Gender and transaction using mobile application

Our last analysis involved determining the effect of gender transactions using mobile application where we have variable "Did at least one transaction using mobile app in last three months" capturing those that have done at least one transaction through mobile app in last three months. A logistic regression was carried out to assess the effect of gender on transaction using mobile app and the result for the same is presented in Table 11.

Table 11 Logistic regression output: Gender and transaction through mobile app

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one transaction through mobile	-0375*****	-0.171*****	-0.444*****	0.309*****	-0.085*****	0.250*****	-0.079*****	0.301*****	-2.468*****

app last three months									
Odds	0.689	0.843	0.641	1.362	0.918	1.284	1.082	1.351	0.085
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	87.5		8.875****		8	0.022		0.041	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically insignificant when compared to null model, ($x^2(8)$ =8.875, p=0.353), explained 4.1 percent of the variation of transaction through mobile app (Negelkerke R^2) and correctly predicted 87.5 percent of cases. Status of gender (p=0.308), age(p=0.611), density of financial institution (p=0.387), social category (p=0.176) and marital status(p=0.455), employment (p=0.053), income (p=0.129) and education (p=0.529) were insignificant. This logistic regression model is insignificant in explaining the gender gap in transaction through mobile app and other independent variables are also insignificant.

Gender and transaction using mobile/internet banking

Our ninth analysis involved determining the effect of gender on transactions using mobile/internet banking where we have variable "Did at least one transaction using mobile/internet banking in last three months" capturing those that have done at least one transaction through mobile/internet banking in last three months. A logistic regression was carried out to assess the effect of gender on transaction using mobile/internet banking and the result for the same is presented in Table 12.

Table 12 Logistic regression output: Gender and transaction through mobile/internetbanking

Variable	Gender	Age	Emp	Income	Block	Soc.catg	Edu	Marital	Constant
Did at least one transaction through mobile/internet banking in last three months	1.050***	-1.211*	0.224****	0.146****	0.072****	-0.109****	0.572**	0.478****	-5.321**
Odds	2.857	0.298	1.251	1.157	1.074	1.897	0.1.772	1.612	0.005
Statistics	Model classification		Chi- square		df	Cox &snell R square		Negelkerke R square	
Value	90		50.565*		8	0.119		0.248	

Note: * significant at 1% level, ** significant at 5% level, *** significant at 10% level, **** significant at above 10% level.

The overall model was statistically significant when compared to null model, ($x^2(8)$ =50.565, p<0.001), explained 24.8 percent of the variation of transaction through mobile/internet banking (Negelkerke R^2) and correctly predicted 90 percent of cases. Status of gender (p=0.027), age(p=0.003) and education (p=0.012) were

significant. However, density of financial institution (p=0.542), social category (p=0.589) and marital status(p=0.362), employment (p=0.435), income (p=0.461) were not. The odds of gender are 2.857 indicating that the likelihood of male using mobile/internet banking is 2.857 time more than female. The model also explains that age is significantly and negatively related to mobile/internet banking but education is significantly and positively related to the same.

6. Discussion

This paper provides insights into determinant of the gender gap in financial inclusion. It is an addition to the gender and financial inclusion in the hilly and remote region of a developing country like India. Using primary data and logistic regression in the present study examining the association of gender with utilising the service like loan, insurance, saving in formal financial institution, account in multiple institution, ATM usage, branch-based transactions, mobile app usage, transaction through banking correspondent, usage of cheque for transaction and internet banking.

The analysis provides the evidence of existence of gender gap in loan account ownership, insurance ownership, saving, account in multiple institutions, cheque-based transaction and transaction using mobile/internet banking. The gender gap was observed to be higher in having account in multiple institution followed by usage of cheque for transaction, mobile/internet banking, loan account ownership, saving in formal financial institution, usage of ATM and insurance policy respectively. The paper does not find any significant difference in using mobile app, transaction through banking correspondent and branch-based transactions among male and female.

In addition to gender other factor such as income, education and employment significantly affect financial inclusion in the study area. The result of this study is also harmonising with previous study of(Aterido*et al*.,

2013; Swamy,2014; Musa *et al*., 2015; Ozsuca,2019; Sison, 2019).As the study area is a remote and hilly region the density of financial institution is another important factor that also effects financial inclusion of the respondents.

7. Research implications

The result of this study would be useful for policymakers to identify the determinants and barrier of financial inclusion in India. The study recommends policy makers to focus on female population in particularand reduce the gender gap in the factors that affect financial inclusion. Income is one of the main factors that directly impact the inclusion of people to financial institutions. In addition to income the study also finds employment and education equivalent significant for financial inclusion so the policy makerneeds to emphasise simultaneously on these interrelated factors. The study area is hilly region and it has been pointed out in this study that the density of the financial institution is also an important factor for financial inclusion which in fact increases the access of financial services. Policy maker should increase the services of banking correspondents in those area where the density of financial institutions is less. The penetration of digital banking is less in the study area. It is requirement of this area that policy maker should promote banking through digitalization and branchless banking through banking correspondents in the remote and hilly terrain where brick and mortar banking in whole area is not possible.

8. Limitation and future research directions

The study focused on exploring the gender gap in the usage dimension of financial inclusion which is one of the dimensions of financial inclusion in addition to other dimensions. Hence future research can be extended to explore the gender gap in other dimensions. Further this study was totally based on demand side perspective however, future studies can be conducted based on supply side perspective. The study of gender gap in financial inclusion can be extended to financial literacy, affordability, availability andaccessibility of financial services. The present study was limited to one hilly district of India which can be extended to a large region.

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