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Impact of socio-economic variables on parameters of financial inclusion via binary logistic regression in Haryana, India

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Abstract

Financial inclusion is one of the prime initiatives to increase financial growth of an economy. Formal financial institutions especially banks have taken the pace for lending money to each and every section of the society. Financial parameters in the economy are important so that amendments can be made to increase the status of financial inclusion. For present study four important parameter viz. fixed deposits, insurance, net banking and loan were considered for the sampled respondents in study area. Binary logistic regression was performed to examine the impact of socio-economic variables on the undertaken parameters among the selected sample of households in both the districts. The results concluded effective the impact of education, income, occupation etc. on these parameters.

Keywords: Financial inclusion, rural households, loan, logistic regression, socio-economic variables

Introduction

The government is making huge efforts in creating the whole country a digital economy but still it is lacking in literacy. Absence of technical knowledge is a huge barrier in getting the basic facilities for poor and rural households. To serve this aspect the government has set the target of inclusive India. Financial inclusion is mainly associated to linking of every section of society with banking services at low and affordable prices. Financial inclusion may be defined as “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost.” -(Committee of Rangarajan, 2008) ^[10] Here, the financial services were related to the facilities provided by the banks to the common people such as bank account, debit card, money transfer, loan facility, insurance etc. There are multiple facilities like overdraft, no-frill accounts, insurance and pension benefits etc. are provided by banks especially to the low-income households with the help of schemes under financial inclusion. “Financial inclusion is the art of providing basic financial products and services to all community members in a timely and transparent manner and at an affordable cost” -(Sarma, 2008) ^[11]. Murari and Didwania (2010) ^[5] elaborated financial inclusion as a delivery mechanism of formal financial services at a reasonable cost to the vast sections of the underprivileged and low-income groups. Here formal financial services are referred as the services provided by banks. Dr. Raghuram Rajan (2016) ^[9] described financial inclusion as “the universal access to a wide range of financial services at a reasonable cost.” There are multiple parameters of measuring financial inclusion such as savings,

fixed deposits, loan, insurance etc. For present study, four parameters namely fixed deposits, insurance, net banking and loan are taken for consideration among the various parameters of financial inclusion. Further, socio-economic variables namely gender, education, occupation, landholding and income were considered to see their impact on these financial parameters. Results in detail are discussed below further.

Materials and Methods

Sample size: Study area was selected from the state of Haryana. Two districts namely Hisar and Kaithal were selected for the research purpose as they have the same lead bank. Sampled respondents’ size was one hundred and twenty from each district, which means total respondents were two hundred and forty.

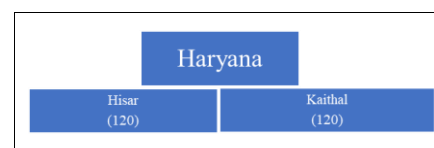


Fig 1: Sample size for the study

Data collection: The present study is based on primary data. A pilot survey was conducted on fifty respondents before conducting the original survey. Thereafter, a structured schedule was prepared to collect data from the sampled respondents. Further impact of socio-economic variables was analysed to see their influence on financial parameters namely fixed deposits, insurance, net banking and loan.

Methodology: Binary logistic regression was used to identify the parameters of financial inclusion. Logistic regression analysis is an extended technique of multiple regression. It is mainly applied where dependent variable is binary such as success or failure, present or absent, yes or no etc. Binary logistic regression examines the influence of independent variables on dichotomous dependent variable by estimating the probability of occurrence of event. It establishes the relationship between dependent variable and explanatory variables. Exp (β) is interpreted in terms of changing odds. If the odds ratio is 1 then there is equal probability of occurrence as well as non-occurrence of event. If the odds ratio is more than 1 then there is probability of the event to occur likely. If the odds ratio is less than 1 then there is probability that occurrence of event is unlikely. In order to know the effect of one unit change in a predictor on the odds ratio, we subtract one from the antilogarithm of the parameter estimate (last column) and multiply by 100 after subtracting one to get the percent effect on the odds ratio. The value of coefficient β determines the direction of the relationship between independent variables and logit of dependent variable (Peng, Lee, & Ingersoll, 2002) [7]. The β values are logistic coefficients that are used to create a predictive equation. In the present study, Binary logistic regression model was used for analysis of data.

Procedure: Hypotheses were drawn for both the districts to foresee the impact of socio-economic variables namely gender, education, occupation, landholding and income on loan parameter among rural households in both the districts. The dependent variable taken here was 'loan'. Independent variables taken for study were A1= gender, A2= education, A3= occupation, A4= landholding and A5= income. To know the impact of above mentioned variables on loan parameter, binary logistic regression was used and responses were recorded in the form of '1' indicating 'Yes' and '0' indicating 'No'.

Results and Discussion

The impact of socio-economic variables namely gender, education, income, occupation and landholding size was analysed on the financial parameters for Hisar and Kaithal districts through logistic regression. The hypotheses drawn were as under:

1) a) Parameter= Fixed deposits (Hisar)

Hypothesis 1.1

H₀- There is no impact of socio-economic variables on fixed deposits among rural households in Hisar.

H₁- There is impact of socio-economic variables on fixed deposits among rural households in Hisar.

Table 1: Maximum likelihood estimates for fixed deposits parameter in Hisar district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-11.56	3.18	13.18	0.000	0.000
Gender	-1.09	0.62	3.05	0.08	0.33
Education	0.07	0.17	0.18	0.67	1.07
Occupation	0.52	0.16	10.28	0.001*	1.69
Landholding	-0.86	0.42	4.12	0.04*	0.42
Income	3.90	1.10	12.46	0.000*	49.41

*- Significant at 5% level

R-sq. (N)- 0.54

The results in the Table 1 revealed that null hypothesis was rejected with respect to the variables viz. occupation and income as they had significantly positive impact on the fixed deposits parameter in Hisar district. The exp (β) value associated with the income was 49.41. Thus, if there is an increase of ₹1,000 in the income of households then odds ratio in fixed deposits can be increased by 49 times, keeping other variables fixed. The exp (β) value associated with the employment was 1.69. Thus, if there is an increase in the level of employment then odds ratio in fixed deposits can be increased by 2 times, keeping other variables fixed. While landholding variable had significantly negative impact on fixed deposits parameter as it has exp (β) value less than 1, it shows that there is less association between the variable and prediction. Nagelkerke R² had the value of 0.54 which showed 54 per cent association between the predictors and prediction.

1) b) Parameter= Fixed deposit (Kaithal)

Hypothesis 1.2

H₀- There is no impact of socio-economic variables on fixed deposits among rural households in Kaithal.

H₁- There is impact of socio-economic variables on fixed deposits among rural households in Kaithal.

Table 2: Maximum likelihood estimates for fixed deposits parameter in Kaithal district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-14.01	3.94	12.59	0.000	0.000
Gender	-0.04	0.77	0.003	0.95	0.95
Education	0.17	0.26	0.46	0.49	1.19
Occupation	1.27	0.26	22.67	0.000*	3.58
Landholding	0.72	0.53	1.84	0.17	2.06
Income	2.96	1.35	4.76	0.02*	19.30

*- Significant at 5% level.

R-sq. (N)- 0.75

The outcome of the Table 2 stated that null hypothesis was rejected with respect to the occupation and income variables as they had shown significantly positive impact on the fixed deposits parameter in Kaithal district. The exp (β) value associated with the income was 19.30. Accordingly, if there is an increase of ₹1,000 in the income of households then odds ratio in fixed deposits can be augmented by 19 times, keeping other variables fixed. The exp (β) value associated with the occupation was 3.58. Consequently, if there is an increase in the level of employment then odds ratio in fixed deposits can be increased by 4 times, keeping other variables fixed. Nagelkerke R² was found to be 0.75 which showed 75 per cent association between the predictors and prediction.

Henceforth, it can be inferred from the Table 1 and Table 2 that income and occupation had direct and positive impact on the fixed deposit parameter in both the districts. Thus, higher employment and more income will ultimately lead to more fixed deposits in the bank accounts of the respondents.

2) a) Parameter= Insurance (Hisar)

Hypothesis 2.1

H₀- There is no impact of socio-economic variables on insurance among rural households in Hisar.

H₁- There is impact of socio-economic variables on insurance among rural households in Hisar.

Table 3: Maximum likelihood estimates for insurance parameter in Hisar district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-11.68	2.64	19.54	0.000	0.000
Gender	-0.01	0.68	0.000	0.98	0.98
Education	1.68	0.33	25.03	0.000*	5.40
Occupation	0.30	0.20	2.29	0.12	1.35
Landholding	0.42	0.53	0.63	0.42	1.52
Income	1.73	0.75	5.30	0.02*	5.68

*- Significant at 5% level

R-sq. (N)- 0.67

The results in the Table 3 highlighted that null hypothesis was rejected with respect to the variables namely education and income as they had shown significantly positive impact on insurance parameter in Hisar district. The exp (β) value associated with the income was 5.68. Thus, if there is an increase of ₹1,000 in the income of the households then odds ratio in insurance can be increased by 6 times, keeping other variables fixed. The exp (β) value associated with the education was 5.40. Thus, if there is an increase in level of education then odds ratio in insurance can be increased by 5 times, keeping other variables constant. Nagelkerke R^2 was found to be 0.67. It showed 67 per cent association between the predictors and prediction.

2) b) Parameter= Insurance (Kaithal)

Hypothesis 2.2

H₀- There is no impact of socio-economic variables on insurance among rural households in Kaithal.

H₁- There is impact of socio-economic variables on insurance among rural households in Kaithal.

Table 4: Maximum likelihood estimates for insurance parameter in Kaithal district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-11.04	3.50	9.90	0.001	0.000
Gender	-1.36	0.85	2.56	0.10	0.25
Education	0.65	0.25	6.49	0.01*	1.92
Occupation	0.55	0.23	5.79	0.01*	1.74
Landholding	-0.39	0.48	0.65	0.41	0.67
Income	3.36	1.26	7.05	0.007*	28.93

*- Significant at 5% level

R-sq. (N)- 0.53

The results in the Table 4 stated that null hypothesis was rejected with respect to the variables viz. education, occupation and income as they had significantly positive impact on insurance parameter in Kaithal district. The exp (β) value associated with the income was 28.93. Thus, if there is an increase of ₹1,000 in the income of households then odds ratio in insurance can be increased by 29 times. The exp (β) value associated with the occupation was 1.74. Thus, if there is an increase in the level employment then odds ratio in insurance can be increased by 2 times. The exp (β) value associated with the education was 1.92. Thus, if there is increase in education level then odds ratio in insurance can be increased by 2 times. Nagelkerke R^2 was found to be 0.50 which showed 50 per cent association between the predictors and prediction.

Henceforth, it can be inferred from the Table 3 and 4 that education and income had direct and positive impact on insurance parameter in study area. While, occupation was

significant in case of Kaithal district. Thus, increase in education level will raise financial education which will encourage the importance of insurance among the rural households. Also, rise in income level and employment will lead to increase in insurance parameter in both the districts.

3) a) Parameter= Net/ Mobile banking (Hisar)

Hypothesis 3.1

H₀- There is no impact of socio-economic variables on net/ mobile banking among rural households in Hisar.

H₁- There is impact of socio-economic variables on net/ mobile banking among rural households in Hisar.

Table 5: Maximum likelihood estimates for net/ mobile banking parameter in Hisar district

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-17.97	3.75	22.86	0.000	0.000
Gender	0.64	0.79	0.65	0.41	1.90
Education	2.37	0.48	24.31	0.000*	10.79
Occupation	-0.02	0.22	0.01	0.91	0.97
Landholding	0.99	0.67	2.18	0.13	2.70
Income	2.97	0.97	9.27	0.002*	19.61

*- Significant at 5% level

R-sq. (N)- 0.78

The results in the Table 5 showed that null hypothesis was with respect to education and income variables as they had significantly positive impact on net/ mobile banking parameter in Hisar district. The exp (β) value associated with the income was 19.61. Thus, if there is an increase of ₹1,000 in the income of households then odds ratio in net/ mobile banking can be increased by 20 times. The exp (β) value associated with the education was 10.79. Thus, if there is an increase in education level then odds ratio in net/ mobile banking can be increased by 11 times. Nagelkerke R^2 was found to be 0.78 which showed that 78 per cent association between the predictors and occurrence of event.

3) b) Parameter= Net/ Mobile banking (Kaithal)

Hypothesis 3.2

H₀- There is no impact of socio-economic variables on net/ mobile banking among rural households in Kaithal.

H₁- There is impact of socio-economic variables on net/ mobile banking among rural households in Kaithal.

Table 6: Maximum likelihood estimates for net/ mobile banking parameter in Kaithal district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-3.56	1.64	4.72	0.02	0.02
Gender	0.12	0.67	0.03	0.85	1.12
Education	0.56	0.22	6.36	0.01*	1.75
Occupation	0.14	0.16	0.71	0.39	1.15
Landholding	0.03	0.42	0.005	0.93	1.03
Income	0.88	0.69	1.63	0.20	2.42

*- Significant at 5% level

R-sq. (N)- 0.30

The results in the Table 6 highlighted that null hypothesis was rejected with respect to the only one variable i.e. education as it had significantly positive impact on net/ mobile banking parameter in Kaithal district. The exp (β) value associated with the education was 1.75. Thus, if there is an increase in education level then odds ratio in net/

mobile banking can be increased by 2 times. Nagelkerke R^2 was found to be 0.30. It showed 30 per cent association between the predictors and prediction.

Therefore, it can be inferred from Table 5 and 6 that education had direct and positive impact on net/ mobile banking in both the districts, while income had significant impact only in Hisar district. Increase in income level will encourage beneficiaries to enrol in net/ mobile banking so that they can conveniently operate through mobile phones. The nature of net/ mobile banking is digital, which requires technical knowledge to operate. Hence, it can be clearly understood that increase in education level will increase net/ mobile banking in the accounts of beneficiaries.

Hypothesis 4.1

H_0 - There is no impact of socio-economic variables on crop/ other loan among rural households in Hisar.

H_1 - There is impact of socio-economic variables on crop/ other loan among rural households in Hisar.

Table 7: Maximum likelihood estimates for crop/ other loan parameter in Hisar district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-8.53	2.88	8.76	0.003	0.000
Gender	-1.02	1.06	0.93	0.33	0.35
Education	-0.58	0.27	4.36	0.03*	0.55
Occupation	0.40	0.27	2.12	0.14	1.49
Landholding	1.79	0.68	6.83	0.008*	6.02
Income	0.92	0.84	1.20	0.27	2.53

*- Significant at 5% level.

R-sq. (N)- 0.52

The results in the Table 7 stated that null hypothesis was rejected with respect to only one variable *i.e.* landholding, as it had significantly positive impact on crop/ other loan parameter in Hisar district. The exp (β) value associated with the income was 6.02. Thus, if there is an increase of 1 acre in the landholding size of households then odds ratio in crop/ other loan can be increased by 6 times. The exp (β) value associated with the education is 0.55 which is less than 1 which showed that there is less association between the predictor and prediction. Nagelkerke R^2 was found to be 0.52 which showed 52 per cent association between the predictors and prediction.

Hypothesis 4.2

H_0 - There is no impact of socio-economic variables on crop/ other loan among rural households in Kaithal.

H_1 - There is impact of socio-economic variables on crop/ other loan among rural households in Kaithal.

Table 8: Maximum likelihood estimates for crop/ other loan parameter in Kaithal district.

	Coefficient	Standard error	Wald	p-value	exp(β)
Intercept	-7.53	1.93	15.10	0.000	0.000
Gender	0.02	0.88	0.000	0.98	1.02
Education	0.11	0.20	0.29	0.58	1.12
Occupation	0.08	0.20	0.17	0.67	1.09
Landholding	0.85	0.38	4.98	0.02*	2.35
Income	0.98	0.63	2.42	0.11	2.68

*- Significant at 5% level.

R-sq. (N)- 0.27

The results in the Table 8 highlighted that null hypothesis was rejected with respect to only one variable *i.e.* landholding, as it had significantly positive impact on crop/ other loan parameter in Kaithal district. The exp (β) value associated with the landholding was 2.35. Thus, if there is increase of 1 acre in the landholding size of households then odds ratio in crop/ other loan can be increased by 2 times. Nagelkerke R^2 value was found to be 0.27 which showed 27 per cent variation in the dependent variable.

Thus, it can be inferred from Table 7 and 8 that landholding size had positive and direct impact on the loan parameter in both the districts. An increase in landholding size will directly increase the crop loan so that farmers can increase the production level of their crops which will increase the credit/ loan parameter. Bhanot *et al.* (2012) [2] analysed the factors influencing financial inclusion in remote areas of north-east zone via logistic regression and revealed that north-east zone had low degree of financial inclusion. Key factors found for low inclusion were income, education, awareness of self-help groups. Pandey and Raman (2012) [6] revealed the significant factors for financial inclusion in Uttar Pradesh and Bihar. The study disclosed that level of education, income, land and awareness level were significantly correlated with financial inclusion. Siddik *et al.* (2014) [12] revealed in the study that most of the selected districts had a low intensity of financial inclusion except one district *i.e.* Dhaka. The various factors significant for financial inclusion were household size, literacy rate, rural population, infrastructural facilities etc.

Table 9: Impact of socio-economic variables on parameters of financial inclusion.

Parameters	Positive impact (Hisar)	Positive impact (Kaithal)
Fixed Deposits	Occupation, income	Occupation, income
Insurance	Education, income	Education, occupation, income
Net/ Mobile banking	Education, income	Education
Loan	Landholding	Landholding

Source: Primary data.

It can be concluded from the results in the Table 9 that there was significant impact of at least one socio-economic variable on each parameter under the present study in Hisar and Kaithal districts. Income variable had shown significantly positive impact on three parameters *viz.* fixed deposits, insurance and net/ mobile banking. Whereas occupation had shown significantly positive impact on fixed deposits and insurance parameters. Education had also shown the positive impact on insurance and net/ mobile banking parameters. Notably, landholding had significantly positive impact on crop/ other loan parameter in both the districts. Bajrang (2015) [1] highlighted that household income and occupation among the selected socio-economic variables played significant role in decision of opening a bank account at 10 per cent level of significance. Landholding and education were also significant at 5 per cent level of significance. Poonam (2019) [8] found out via binary logistic regression that income had significantly positive effect on the savings in Hisar, Fatehabad and Bhiwani districts. Kandari *et al.* (2021) [3] revealed the significance of socio-economic variables in financial

inclusion by logistic regression model in Uttarakhand state. The study used three parameters viz. ownership of bank account, usage of mobile banking and usage of credit as dependent variables which revealed that age, gender, literacy increased the odds in favour of usage of credit. Lusaya and Mulunda (2022) ^[4] discussed on the factors influencing household savings in Zambia through logit regression model. The study disclosed that there exists a significant and positive association between the household income and savings.

Conclusion

Financial inclusion is one of the prime aspect to include all the segments of the society with formal financial services. There are certain parameters of financial inclusion which show the status of financial inclusion in particular area. For present study, fixed deposits, insurance, net banking and loan parameters were considered to know the status of them in study area viz. Hisar and Kaithal districts. Further impact of socio-economic variables was studied namely gender, education, income, occupation and landholding. Binary logistic regression was applied to know the impact of socio-economic variables on these financial parameters which were dependent variables. The result was positive in case of at least one socio-economic variable with respect to financial parameters taken for study. It can be inferred from the above results that increase in socio-economic variables will increase the financial parameters in the study area which will ultimately increase the financial inclusion in the economy.

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