

Attitudes and cooperation: does gender matter in community-based forest management?

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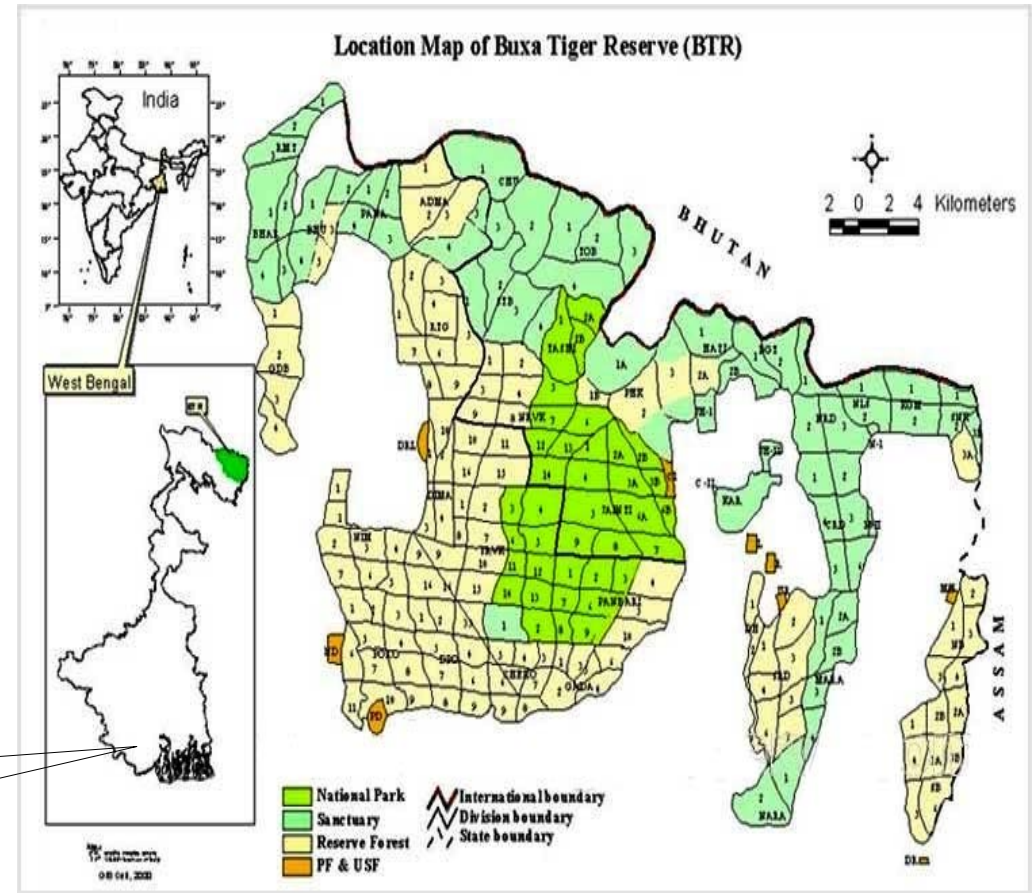
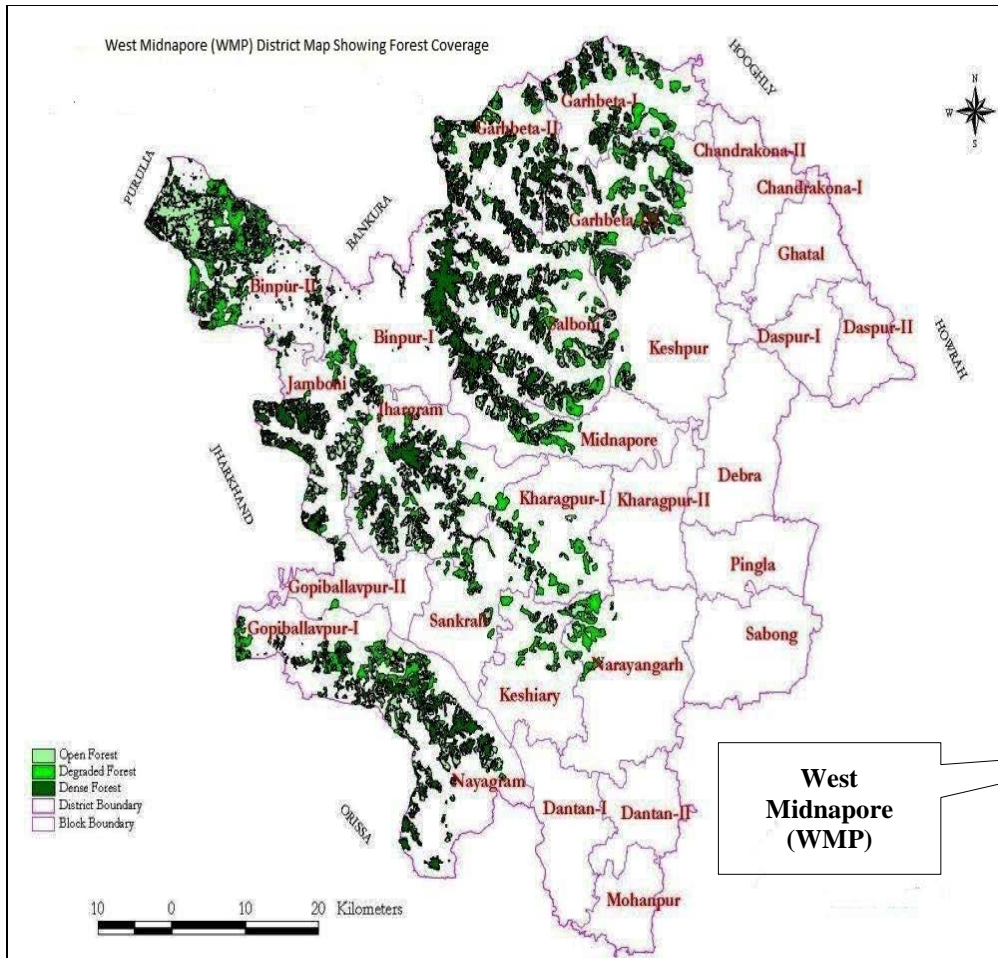
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Online Appendices



Appendix A1. Location of the study JFMCs in West Bengal, India

Appendix A2. *Instructions of the trust game*

Instructions

Welcome to all of you. Today we will play a game. In the game, you may earn some money or you may not. There are no winners and losers in the game, but how much you earn will depend on how you play the game. However, only the people that attend the full session, follow our instructions and understand the game are allowed to play for real money. The objective of the game is purely research. The local people, political parties and government offices have no role in this event. To ensure that you do not go home empty-handed, we will give everyone of you Rs. 50 at the end of the game as a show up fee. For this, you have to follow our instructions strictly and participate in a short interview or fill up a questionnaire.

Now we would like to explain the game to you. You will play the game in groups both as SENDER and as RETURNER in two consecutive sessions. In one session, you will play one role. Suppose your group members are playing the role of senders in session 1 paired with a returner group, then in session 2 your group will play the role of returners and the other group will play the role of senders. But there is no guarantee that the same two groups will be paired again in session 2. So, it is a GROUP-BASED GAME. SENDERS and RETURNERS will be kept in two separate rooms for anonymity. Everybody within a SENDER group will be assigned the role of SENDERS; in the RETURNER group, everybody will be assigned the role of RETURNER. Within a session, there will be no mix of SENDERS AND RETURNERS in a group. Each group will comprise 2 or 3 members. The members comprise your villagers, male and female both. You will play the game with some group from the other room. Number of group members will be same for the paired groups. That is, a two-member SENDER group will play against a two-member RETURNER group and a three-member senders' group against a three-member returner group. This will hold for both sessions. So, if you are assigned the role of SENDERS, you will play with some group in the other room who has been assigned the role of RETURNERS. If you are RETURNER, you will play the game with some other group in the other room who has been assigned the role of SENDER. Group identity will be kept anonymous so that no groups will know with which group they are playing the game. So, Senders' groups will stay in this room, Returners' groups will go to another room.

Next, in session 1, we will give Rs 50 per members to senders' groups only. Now, suppose your group is a SENDER group and consists of three members. That means your group has to start the game and decide how much of the total endowment of Rs 150 you want to send to the RETURNER GROUP in the other room. We will triple all the money you send to the RETURNER in the other room. All the money you keep is for yourself. So, if your group sends Rs 10, it keeps Rs 140 and your partner group in the other room receives Rs 30. If your group sends Rs 20, your group will hold Rs. 130 and your partner group in the other room receives Rs 60.

If your group sends Rs 150, the other group receives Rs 450, and your group keeps Rs 0. Your group also can send nothing and keep the Rs 150 to yourselves. Then your partner group in the other room receives nothing. (All of these rules are both delivered verbally and written on the black board in front of the participants). Please note that you will be given 10-15 minutes to decide the amount you want to send or return. The contributions will be equally shared by the members of the groups.

Instruction to the returners

Suppose you are a RETURNER group. That means you receive money that has been sent to

you by a SENDER group in the other room. You have to decide how much of this money you want to send back to the SENDER group.

Suppose SENDER group has sent you Rs. 10. We will triple this amount, and send the tripled money to your group. So you receive Rs 30. Of these Rs 30, you can send back Rs. 0, 10, 20 or 30.

Suppose the SENDER group has sent you Rs 20. That means that you receive Rs 60. Of these Rs 60, you can send back Rs. 0, 10, 20...60.

Suppose SENDER group has sent you Rs. 30. That means that you receive Rs 90. Of these Rs 90, you can send back Rs. 0, 10, 20....90.

Suppose SENDER group has sent you 40 Rs. That means you receive Rs 120. Of these Rs 120, you can send back Rs. 0, 10, 20...120.

Suppose SENDER group has sent you Rs. 50. That means that you receive Rs 150.

Of this Rs 150, you can send back Rs. 0, 10, 20....., 150.

SENDER group can also decide to send your group nothing, which means that your group receives nothing and therefore returns nothing.

Your total group earnings if your group is assigned the role of SENDERS then equals the amount of money you started out with (Rs 150 for a three-member group or Rs. 100 for a two-member group), minus the amount of money you have sent to RETURNER group, plus the amount of money RETURNER group has sent back to you. If you are a RETURNER group, your total earnings is equal to the amount of money you have received from your SENDER group, minus the amount of money you have sent back to your SENDER group. In all cases, no matter whether you are a sender or a receiver you will get an extra 50 Rs as a show up fee as promised.

Whatever you earn, your group earnings will be equally divided between your group members. Suppose now that you are a two-member returner group and that the two-member sender group has sent to you Rs. 10. So, each sender contributes 10 divided by 2 =5 Rs. As receivers, you receive Rs. 30 and sent back, say, Rs. 10. So, each sender get back 10 divided by 2 =5 Rs from returners. Then individual payoff of senders will be = 50- 5 (amount sent by him/her) +5 (per member amount received from receivers) =50. Again, returner group keeps 30-10= 20 Rs. So, individual returner's payoff will be 20 Rs divided by the number of group members = 20/2= Rs.10 each.

Suppose now that you are a three-member returner group and that the three-member sender group has sent to you Rs. 30. So, each sender contributes 30 divided by 3 =10 Rs. As receivers, you receive Rs. 90 and sent back, say, Rs. 60. So, each sender get back 60 divided by 3 =20 Rs from returners. Then individual payoff of senders will be = 50- 10 (amount sent by him/her) +20 (per member amount received from receivers) =60. Again, the returners' group holds 90-60 =30 Rs. So, each returner's payoff will be 30 divided by number of group members= 30/3= Rs.10 each.

[This way we illustrated exhaustively all the possible payoffs to the players]

To make sure you understand the game, our assistants will now act out with paper money how the game will be played. (On one side of the room SENDER and on the other side of the room RETURNER).

Both receive a big white envelope, in the SENDER'S envelope, you will find two pieces of yellow paper with identical number. RETURNER will have two pieces of white paper with identical number. Please note that numbers allotted to SENDERS and RETURNERS are unique and therefore do not match. SENDER groups, show there is Rs 50 per member inside the envelope. SENDER group takes money from the white envelope and gives the rest to our assistant. He takes it out of the envelope, triples it and puts it in a box. He brings it to

RETURNER group. RETURNER group opens the envelope and takes out what the group wants to keep for itself. The assistant collects the box with the remaining money. The assistant takes it out of the envelope, puts it in the original white envelope and gives it back to SENDER group. SENDER group and RETURNER group now both show how much money they have. REPEAT 6 times for the options SENDER has (Rs 0, 10, 20, 30, 40, 50). Now, we will test each of you individually to see whether you have understood the game. Only if you understand the game will you be allowed to play. If you have any doubts, please clear them now.

Now take a break please. Have tea and snacks. [Once the tea time is over, we proceeded to the actual play of the game.]

Implementation of the game

WELCOME back to all of you. Now, we will play the game. We would like you to take the game seriously and we would like to ask you not to talk to other participants during the entire event. Now, you will play for real money.

Now we request you to come here and pick an envelope within which you will find two yellow or two white papers and also information about how many males and females are playing in the group your group has been paired with. Our assistants will ask you to show your papers to them. A number is written on each of the two papers, so that they can register it. Please do not show the number to the other participants. Now we will flip a coin and if Head appears those of you with a yellow paper will form the senders' group, those of you with a white paper will play as the receivers' group. The people who draw a yellow paper will stay here with the envelope. This room is the senders' room. Those who have drawn a white paper will go to another room with their envelope. That room is the returners' room. Are there any questions or doubts? If not, we would like to ask you one by one to come forward and draw an envelope.

Instructions 1: Senders' group

Senders, I request you to follow our instructions. Please do not communicate during the game. Anybody who is found to have communicated during the game will be punished by not receiving Rs 50 at the end. We would like one representative from each sender group to come forward and pick one group ID marked big white envelope containing for each member a small white envelope and Rs 50 (five 10-rupee notes), and information on how many male and females are playing in the paired group. That is, if you are a two-member group, there will be two 50 Rs envelopes and one small white envelope. If your group is a three-member group, your big envelope will contain three 50 Rs envelopes plus one small white envelope. Please check if any of these items are missing.

The small envelope is unmarked. It is empty and you can use it for the money you want to keep for yourself. So, all money that you put in the small envelope you keep for your group for certain. So, the representative members of each sender groups, please go with the big envelope to the backside-curtained place, take out the money, come back to your group and jointly decide (within 10-15 minutes) how much to send per member and how much to keep for yourselves in the small envelope, and put the remaining amount in the big envelope. Please also put one of the yellow small papers on each of which a number is given in relevance with your group ID marked on the big envelope and keep the remaining piece of yellow paper to you. Do not lose it. Seal the big envelope (even if you send nothing) and drop it into the box, and go back to your seat. Our assistant will go there, take the box, open the envelope, write down what you have sent to your partner group, will triple it and seal the big envelope again and carry the box to the recipients' room.

Instructions to the receivers

[After instructing the senders, the experimenter goes to the Receivers' Room.]

Welcome to all of you to the Receivers' Room. Now you will play the role of RETURNER. The players of the other room are SENDERS. One such representative SENDER will send you money. As already mentioned, you will select a representative RETURNER that will play the game with the representative SENDER of the senders' group you are paired with. As a representative RETURNER, you will receive a big envelope from him. In this envelope, you will find the money SENDER has sent you. You have to jointly decide with your group members how much of this money you want to send back to the representative SENDER. Go to the backside-curtained place, open the big envelope, and take out the money from the big envelope and come back to your group and jointly decide (within 10-15 minutes) how much to return per member and how much to keep for yourselves. Keep the money for your group in your pocket and put the remaining amount in the big envelope. Put one of the two small white papers you collected at the start of the experiment into the big envelope. Both have a number written on them. Seal the big envelope (even if you return nothing) and put it into the box kept there. The money you leave in the big envelope will go back to the representative sender who has sent you the money from the other group. Once done please go back to your seat and do not talk to anybody. Our assistant will collect the box and open the big envelope, write down the amount you have returned and your code number on a registrar, seal the big envelope again. He will then write the code of the sender on the envelope and then send back the box to the senders' room. The representative senders are called one by one at the backside of the senders' room and asked to pick the envelope whose code number matches with his code to collect his appropriate envelope and pocket keep their partner has sent back to your group. Now please take your seat.

Instructions 3: Role reversal session

The first session of the game is now finished and the money you hold is yours. Please do not leave your seat. You will play the second session of the game just after the tea break.

[After the break]

[In the senders'/returners' room]

Thank you for your cooperation in the first session. Now the second and final session will begin. Now senders (returners), you will play as returners (senders) with players of the other room who will play now as senders (returners). Please note that this time may be your group is paired with a new group due to our ex-ante random matching. Please come one by one and pick a new envelope as before. The game will be played as same as before.

Once the instructions were repeated for the second and final session, players in the new role were instructed and our assistants acted out how in a new role players would play the game. Once doubts were cleared, we started the second half of the game.

Instruction 4. The game is now finished. Thank you for your participation in the game. Now the money you hold is yours. Please do not tell anybody about your codes and payoffs.

Next, we will now ask you to fill up a questionnaire for our research. Please come one by one. In case, if you are not able to write, our assistants will take your interview as per the questionnaire.

[After the entire process ended, the players left the place with their payoffs and show-up fees]

Appendix A3. Comparing IV Interval Regression Results of the determinants of pro-social behaviors with IV 2SLS estimation method ^a

Explanatory Variables	IV model (replicated from Table 4)	IV Interval regression model
	All Sample (n=196)	All Sample (n=196)
Site Dummy (WMP=1)	.425 (.212)**	.2*(.119)
Gender (female=1)	.417***(.013)	.717**(.3)
Education	.0021(.0017)	1.9e-08(1.7e-08)
Caste (upper caste=1)	.309(.188)	.301(.190)
Landholdings	.23*(.126)	.022(.0177)
Livestock unit	.0051(0.0037)	.007(.005)
Non-forest incomes (log transformed)	-.0032(0.0022)	-.31(.27)
Forest income	.476**(.191)	1.26*(.691)
Trust		
Reciprocity		
Age	.407(.330)	.33(.33)
Household constraints to CPR	-1.0043**(.398)	-.661**(.318)
Rule-making (by female=1)	1.533**(.721)	.085(.124)
Transaction cost		
Household perception about JFM benefit (Positive=1)	.1811**(.0723)	.56*(.33)
JFM Awareness (high=1)	.236**(.097)	.00035*(.0002)
Distance to market (km)	.064*(.035)	-8.4e-08(6.6e-08)
Distance to forest (km)	.16*(.089)	.0022(.049)
Conservation attitude (all scale scores of respondent)	.651*(.342)	.022(.016)
Constant	4.73**(.2016)	1.027**(.4122)
R2	.58	
Model Fit	Prob Chi ² >0.0000	Prob Chi ² >0.0000
H ₀ : Non-forest incomes and forest incomes are exogenous regressors Durbin (score) Chi ² (p-value)		11.387 (0.0009)
Durbin-Wu-Hausman Chi ² (p-value)	7.71(0.021)	

^aRobust standard errors reported in parentheses.

Column (2) uses IV interval regression estimator of Bettin and Lucchetti (2012).

Instruments used in both IV and IV interval estimation: prior organizational experience, attendance at community meetings, political participation, good quality land, debt per capita, and occupational pattern.

Transaction cost is not a regressor of pro-social behaviors.

Trust and reciprocity are used to construct the dependent variable and so not considered as regressors in the two models.

Reference for Appendix A3:

Bettin, G. and R. Lucchetti (2012), 'Interval regression models with endogenous explanatory variables', *Empirical Economics* **43**: 475–498.

Appendix A4. Comparing the efficiency gains in joint estimations and IV approaches

	Instrumental Variables (IV) Estimations		Joint Estimations			
Estimation strategy used	IV Tobit (n=196)	IV (n=196)	SURE (n=196)		3SLS (n=196)	
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
<i>Dependent variable</i>	<i>Overall conservation Attitudes</i>	<i>Pro-social Behavior</i>	<i>Overall conservation Attitudes</i>	<i>Pro-social behavior</i>	<i>Overall conservation attitudes</i>	<i>Pro-social Behavior</i>
<i>Explanatory Variables</i>						
Site Dummy (WMP=1)	.50*(.26)	.425**(.212)	.504*(.258)	.431 **(.21)	.31*(.18)	.711*(.42)
Gender (female=1)	.29***(.10)	.417***(.13)	.282***(.0992)	.422***(.128)	.406**(.202)	.56***(.18)
Education	.0078(.0062)	.0021(.0017)	.011*(.006112)	.003*(.00168)	.0092(.008)	.003(.0019)
Caste (upper caste=1)	.218(.198)	.309(.188)	.218(.1861)	.308(.1874)	.399(.246)	.37*(.192)
Landholdings	.371**(.148)	.23*(.126)	.404***(.1463)	.221*(.1251)	.33**(.157)	.298*(.175)
Livestock unit	.0084**(.0038)	.0051(.0037)	.008**(.0036)	.005(.00369)	.0068*(.0037)	.0049*(.0026)
Non-forestry incomes (log transformed)	-.533(.387)	-.0032(.0022)	-.545(.384)	-.0037*(.00216)	-.47(.29)	-.0013(.0042)
Forest income	.934**(.368)	.476**(.191)	.921**(.3671)	.41**(.188)	1.207***(.411)	1.27***(.47)
Trust	1.007***(.382)		1.102***(.3813)		.662**(.31)	
Reciprocity	.421(.260)		.429*(.2552)		1.003(.706)	
Age	.333(.301)	.407(.330)	.333(.3009)	.301(.329)	.552*(.31)	.7(1.02)
Household constraints to CPR	-.891**(.422)	-1.004**(.398)	-.9**(.4172)	-1.12***(.394)	-.96**(.43)	-.62***(.14)

Rule-making (by female=1)	1.53**(.72)	1.533**(.721)	1.534**(.71)	1.623**(.719)	2.04***(.81)	1.23**(.53)
Transaction cost	-1.33**(.63)		-1.473**(.6208)		-1.612**(.85)	
Household perception about JFM benefit (Positive=1)	1.269***(.451)	.1811**(.0723)	1.101**(.4471)	.162**(.07224)	1.77***(.56)	.92**(.44)
JFM Awareness (high=1)	.784**(.373)	.236**(.097)	.817**(.3718)	.203**(.0961)	.687**(.32)	.64*(.34)
Distance to market (km)	.139*(.078)	.064*(.035)	.139*(.0772)	.06*(.0346)	.221(.136)	.33 (.27)
Distance to forest (km)	-.150**(.059)	-.16*(.089)	-.154***(.0581)	-.17*(.0883)	-.92**(.45)	-.42***(.15)
Conservation attitude (all scale scores of respondent)		.651*(.342)		.59*(.34)		.77*(.396)
Constant	7.944***(.998)	4.73**(.2016)	7.001***(.984)	3.41*(2.0021)	6.33**(.2.7)	4.31*(2.26)
JFMC Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R ² or Pseudo R ² , whichever applicable		.58	.55	.59	.53	.49
Model Fit	Prob Chi ² >.0000	Prob Chi ² >.0000	Prob Chi ² >.0000	Prob Chi ² >.0000	Prob Chi ² >.0000	Prob Chi ² >.0000
Other statistics			ρ = Correlation between the residuals =0.14, Breusch-Pagan Test of Independence: χ^2 (1) = 4.07, p=0.044			

Note: Robust standard errors are reported in the parentheses; ***, **, and * represent level of statistical significance at 1, 5 and 10%.

Appendix A5. *Socio-economic differences of the sampled households
by gender and income class*

<i>Variables</i>	<i>Gender</i> ^a		<i>(p value)</i>	<i>Income class</i>		<i>(p value)</i>
	<i>Male</i>	<i>Female</i>		<i>Non-poor</i>	<i>Poor</i>	
Average Age (years)	47.67	42.21	0.132	48.72	45.37	0.11
Education (Avg. School years)	5.5	4.5	0.124	6.8	3.1	.081
Caste: General (Upper caste) =26 families Reserved =170 families	18 86	8 74	0.043 ^b	21 38	5 106	.301 ^b
Landholding per capita (Avg. acre)	.33	.09	0.027	.71	.15	.0372
Livestock holding	4.1	2.7	0.003	5	2.2	0.001
Annual Avg. Forest income per capita (in Rs)	3916.36	2883	0.034	3050	2315	0.204
Annual non-forest income per capita (in Rs.)	6738.46	3909.09	0.017	7540	1950	0.025
Transaction costs borne (labor days spent annually in participation for co-management)	37	61	0.008	42	56	0.039

Notes: N=196 households comprising 104 male-headed and 92 female-headed households.

^a: Males and females represent the male-heads and the female-heads of the sample households

^b: p-values corresponding to caste variable are of χ^2 test while p-values for other variables correspond to t test.