

# Analysis of Microcredit Programs in Bangladesh

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## 1 Memorandum

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Overcoming Poverty is not a gesture of charity. It is the protection of a fundamental human right, the right to dignity and a decent life.

-Nelson Mandela

### 1.1 Objective

Through a statistical analysis of the effects of microcredit programs in Bangladesh, we have examined four specific perspectives to gain deeper understanding of the effects of microcredit programs on participants and their households. In our examination, wealth is a reflection of the log of total household expenditure per capita as increases in expenditure indicates a household's opportunity for financial growth and escape of poverty as a benefit of microcredit programs.

The four perspectives mentioned above include the following questions:

*What is the effect of having a male-only microcredit program in the village?*

*What is the effect of having a female-only microcredit program in the village?*

*What is the effect of having a male from the household participate?*

*What is the effect of having a female from the household participate?*

## 1.2 Results & Recommendations

### **What is the effect of having a male-only microcredit program in the village?**

Having a male-only microcredit program in the village was shown to be negatively related to wealth—households in a village with a male-only microcredit program are expected to spend less than households without a male-only microcredit program located in their village.

### **What is the effect of having a female-only microcredit program in the village?**

Having a female-only microcredit program in the village was shown to be positively related to wealth—households in a village with a female-only microcredit program are expected to spend less than households without a female-only microcredit program located in their village.

### **What is the effect of having a male from a household participate?**

Having a male in a household participate in a microcredit program does not have a statistically significant relationship to wealth in comparison to not having a male in a household participate in a microcredit program in the village.

### **What is the effect of having a female from a household participate?**

Having a female in a household participate in a microcredit program was shown to be positively related to wealth—households with a female participant are expected to spend more than households in a village without a female participant.

### **Recommendations**

If the goal of establishing microcredit programs in villages is to facilitate households' abilities to escape poverty, then these microcredit programs should be targeted towards female household members and heads, as those groups were shown to have a positive relationship between spending and microcredit opportunity. This positive relationship results in an increase in spending, indicating the ability for households to escape poverty. Further research and data may be conducted to better understand such a relationship.

## 2 Appendix

### ➤ *Statistical Analysis and Interpretation of the 5 Regression Models*

Descriptive statistics					
	N	Mean	St. Dev.	Min	Max
<b>HH Male Participant</b>	1,129	0.19	0.40	0	1
<b>HH Female Participant</b>	1,129	0.53	0.50	0	1
<b>Village Males Only</b>	1,129	0.60	0.49	0	1
<b>Village Females Only</b>	1,129	0.94	0.24	0	1
<b>Log of HH per capita total expenditure</b>	1,129	8.45	0.51	7.09	10.78
<b>Village price of wheat: Tk./kg</b>	1,129	7.47	0.85	5.41	9.47
<b>Village price of milk: Tk./liter</b>	1,129	10.90	3.38	6.77	20.30
<b>Village price of egg: Tk./4 counts</b>	1,129	1.95	0.37	1.35	2.71
<b>Village price of edible oil: Tk./kg</b>	1,129	39.40	4.01	23.01	50.75
<b>Number of HH members</b>	1,129	5.30	2.21	1	18
<b>Age of HH head: years</b>	1,129	46.01	12.68	18	95
<b>Education of HH head: years</b>	1,129	2.32	3.48	0	16
<b>Log of HH lands: acres</b>	1,129	0.38	0.51	0.002	3.76
<b>Gender of HH head: 1=Male, 0=Female</b>	1,129	0.91	0.29	0	1
<b>Village is accessible by road all year: 1=Yes, 0=No</b>	1,129	0.84	0.37	0	1
<b>Proportion of village land irrigated</b>	1,129	0.56	0.33	0.00	0.99

### Method

Omitted variables include: year, village id, thana id, household land, household assets, food and nonfood expenditures, weight, rive, and potato. Test variables include 4 dummy variables: household has male microcredit participant, household has female participant, village has male-only microcredit program, and village has only female microcredit program. Finally, rice and potato variables were excluded as their presence in the model reduced the statistical significance of wheat, and their coefficient values were insignificant and had a detrimental impact to the  $R^2$  value.

## 2.1 Determinants of Expenditure

### *Determining a Base Model*

<b><u>Base Model Regression Results</u></b>	<b>Coefficient (Nearest 4 Decimals)</b>	<b>P-Value</b>	<b>Significance Level</b>
Intercept	7.4912	$< 2e^{-16}$	***
Price of Wheat (Tk./kg)	-0.0313	0.05787	.
Price of Milk (Tk./liter)	0.0202	0.00029	***
Price of Eggs (Tk./4 counts)	0.1509	0.00148	**
Price of Edible Oil (Tk./kg)	0.0106	0.00224	**
Number of Household Members	-0.0440	$3.43e^{-11}$	***
Age of Household Head	0.0052	$4.20e^{-06}$	***
Education of Household Head (years)	0.0493	$< 2e^{-16}$	***
Log of Household Head lands (acres)	0.1847	$3.20e^{-10}$	***
Gender of Household Head: 1=Male, 0=Female	0.0019	0.96868	
Village is accessible by road all year: 1=Yes, 0=No	-0.0128	0.73259	
Proportion of village land irrigated	0.1400	0.00238	**

Significance. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4521 on 1117 degrees of freedom

Multiple R-squared: 0.2335, Adjusted R-squared: 0.2259

F-statistic: 30.93 on 11 and 1117 DF, p-value:  $< 2.2e^{-16}$

### Results

The base model is valid for estimating expenditure because the F-statistics is 30.93, which is different from zero, and statistically significant with a p-value of less than  $2.2e^{-16}$ .

Furthermore, the adjusted R-squared value indicates that approximately 22.59% of the variation in the log of household expenditure per capita is explained by the variation in the explanatory variables included in the model. Variables that can be considered statistically significant in predicting the log of total household expenditure per capita are: price of milk, price of eggs, price of edible oil, number of household members, age of household head, education of household head, log of household head lands, and proportion of village land irrigated—along with price of wheat at the 10% significance level.

## Interpretation of Coefficients

For each increase by 1 Tk./kg of the price for wheat, total household expenditure per capita decreases by 3.13% on average and holding all other variables constant.

For each increase by 1 Tk./liter of the price for milk, total household expenditure per capita increases by 2.02% on average and holding all other variables constant.

For each increase by 1 Tk./4 counts of the price for eggs, total household expenditure per capita increases by 15.09% on average and holding all other variables constant.

For each increase by 1 Tk./kg of the price for edible oil, total household expenditure per capita increases by 1.06% on average and holding all other variables constant.

For each additional member in a household, total household expenditure per capita decreases by 4.40% on average and holding all other variables constant.

For each additional year in age of the household head, total household expenditure per capita increases by 0.52% on average and holding all other variables constant.

For each additional year of education earned by the household head, total household expenditure per capita increases by 4.93% on average and holding all other variables constant.

For each percent increase in the acres possessed by the household head, total household expenditure per capita increases by 0.1847% on average and holding all other variables constant.

Total expenditure per capita of a household with a male head is, on average and holding all other variables constant, 0.19% larger than that of a household with a female head.

Total expenditure per capita of a household in a village accessible by road year-round is, on average and holding all other variables constant, 1.28% less than a household in a village without year-round access to a road.

For each percent increase in the proportion of village land irrigated, total household expenditure per capita increases by 14.00% on average and holding all other variables constant.

## Validation

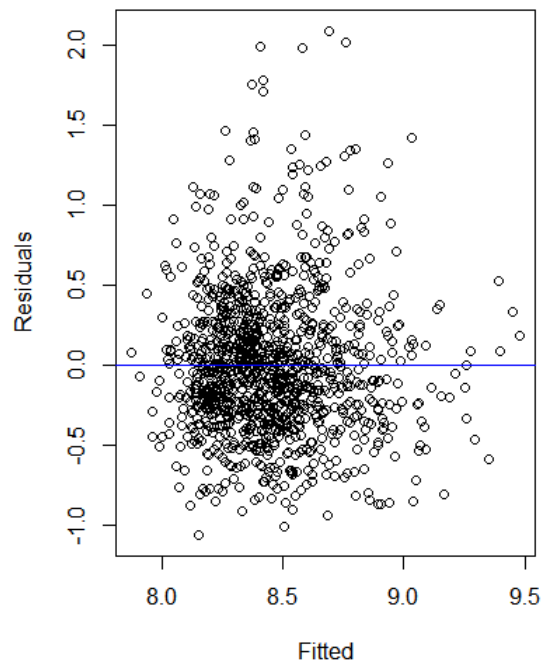
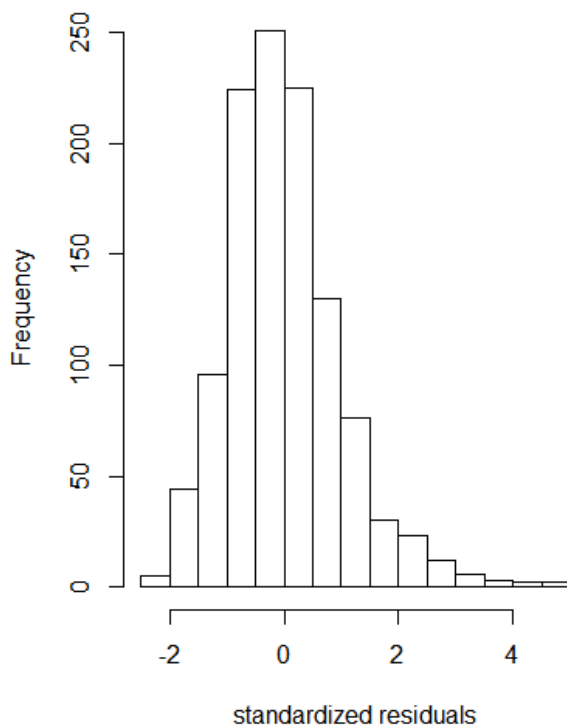
### **Histogram: Basemodel**

The residuals maintain a normal distribution in this histogram, fulfilling the normality assumption—1 of the 4 prerequisites for hypothesis testing and thus inferring from the model.

### **Variance Plot: Basemodel**

Plotting the residuals against the fitted values yields a scatter plot exhibiting homoscedasticity—1 of the 4 prerequisites for hypothesis testing and thus inferring from the model. Furthermore, our functional form seems sound, as the mean of the residuals maintains consistency across the fitted values.

**Histogram of rstandard(basemodel)**



## 2.2 Male only microcredits and Expenditure

### *Examining the Effect of a Male Only Microcredit Program*

<b><u>Effect of Male Only Microcredit Program</u></b>	<b>Coefficient (Nearest 4 Decimals)</b>	<b>P-Value</b>	<b>Significance Level</b>
Intercept	7.5664	$< 2e^{-16}$	***
Microcredit Program for Men (1=Yes,0=No)	-0.0677	0.016532	*
Price of Wheat (Tk./kg)	-0.0310	0.057191	.
Price of Milk (Tk./liter)	0.0210	0.000161	***
Price of Eggs (Tk./4 counts)	0.1368	0.004122	**
Price of Edible Oil (Tk./kg)	0.0106	0.002183	**
Number of Household Members	-0.0446	$1.80e^{-11}$	***
Age of Household Head	0.0051	$6.11e^{-06}$	***
Education of Household Head (years)	0.0491	$< 2e^{-16}$	***
Log of Household Head lands (acres)	0.1918	$7.67e^{-11}$	***
Gender of Household Head: 1=Male, 0=Female	0.0032	0.946609	
Village is accessible by road all year: 1=Yes, 0=No	-0.0173	0.646	
Proportion of village land irrigated	0.1255	0.006797	**

Significance. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4511 on 1116 degrees of freedom

Multiple R-squared: 0.2374, Adjusted R-squared: 0.2292

F-statistic: 28.95 on 12 and 1116 DF, p-value:  $< 2.2e^{-16}$

### Results

The base model is valid for estimating expenditure because the F-statistics is 28.95, which is different from zero, and statistically significant with a p-value of less than  $2.2e^{-16}$ .

Furthermore, the adjusted R-squared value indicates that approximately 22.92% of the variation in the log of household expenditure per capita is explained by the variation in the explanatory variables included in the model. Variables that can be considered statistically significant in predicting the log of total household expenditure per capita are: male only microcredit program, price of milk, price of eggs, price of edible oil, number of household members, age of household head, education of household head, log of household head lands, and proportion of village land irrigated—along with price of wheat at the 10% significance level.

***A male-only microcredit program within a village is negatively related to log of household expenditure per capita. Specifically, households in a village with a male-only microcredit program are expected to spend approximately 6.77% less than households without a male-only microcredit program in their village.***

**Ho:  $B_1 \geq 0$**  (A positive or no effect on log of household expenditure per capita due to a male microcredit program in a village)

**Ha:  $B_1 < 0$**  (A negative effect on log of household expenditure per capita due to a male microcredit program in a village)

Based on t-statistic:  $-2.401 < \text{critical value: } [-1.645]$

We reject the null hypothesis at the 5% level and conclude that a negative relationship exists between log of household expenditure per capita and the presence of male-only microcredit programs.

### Interpretation of Coefficients

Total expenditure per capita of a household in a village with a male only microcredit program is, on average and holding all other variables constant, 6.77% less than that of a household in a village without a male-only microcredit program.

For each increase by 1 Tk./kg of the price for wheat, total household expenditure per capita decreases by 3.10% on average and holding all other variables constant.

For each increase by 1 Tk./liter of the price for milk, total household expenditure per capita increases by 2.10% on average and holding all other variables constant.

For each increase by 1 Tk./4 counts of the price for eggs, total household expenditure per capita increases by 13.68% on average and holding all other variables constant.

For each increase by 1 Tk./kg of the price for edible oil, total household expenditure per capita increases by 1.06% on average and holding all other variables constant.

For each additional member in a household, total household expenditure per capita decreases by 4.46% on average and holding all other variables constant.

For each additional year in age of the household head, total household expenditure per capita increases by 0.51% on average and holding all other variables constant.

For each additional year of education earned by the household head, total household expenditure per capita increases by 4.91% on average and holding all other variables constant.

For each percent increase in the acres possessed by the household head, total household expenditure per capita increases by 0.1918% on average and holding all other variables constant.



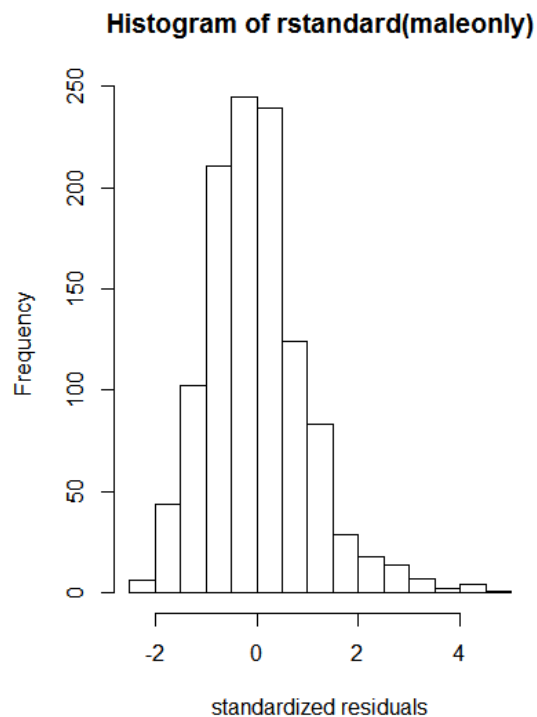
Total expenditure per capita of a household with a male head is, on average and holding all other variables constant, 0.32% larger than that of a household with a female head.

Total expenditure per capita of a household in a village accessible by road year-round is, on average and holding all other variables constant, 1.73% less than a household in a village without year-round access to a road.

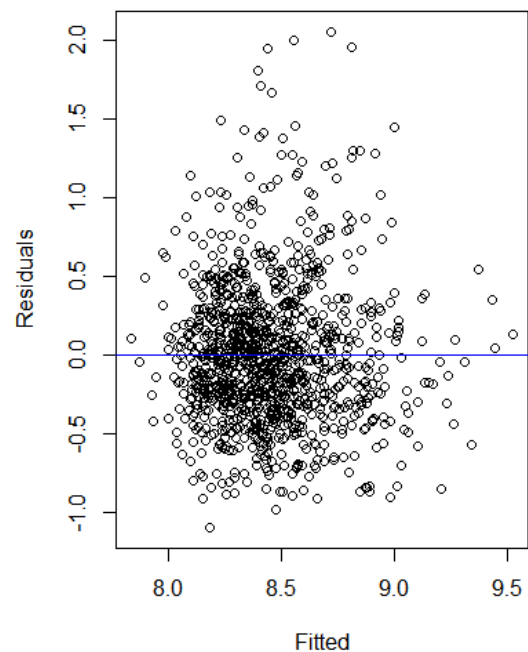
For each percent increase in the proportion of village land irrigated, total household expenditure per capita increases by 12.55% on average and holding all other variables constant.

## Validation

### **Histogram: Maleonly**



### **Variance Plot: Maleonly**



## 2.3 Female only microcredits and Expenditure

### *Examining the Effect of a Female Only Microcredit Program*

<b><u>Effect of Female Only Microcredit Program</u></b>	<b>Coefficient (Nearest 4 Decimals)</b>	<b>P-Value</b>	<b>Significance Level</b>
Intercept	7.3742	$< 2e^{-16}$	***
Microcredit Program for Women (1=Yes,0=No)	0.1133	0.048376	*
Price of Wheat (Tk./kg)	-0.0317	0.054451	.
Price of Milk (Tk./liter)	0.0201	0.000305	***
Price of Eggs (Tk./4 counts)	0.1478	0.001829	**
Price of Edible Oil (Tk./kg)	0.0107	0.001996	**
Number of Household Members	-0.0441	$3.07e^{-11}$	***
Age of Household Head	0.0053	$2.67e^{-06}$	***
Education of Household Head (years)	0.0490	$< 2e^{-16}$	***
Log of Household Head lands (acres)	0.1869	$1.93e^{-10}$	***
Gender of Household Head: 1=Male, 0=Female	0.0074	0.877575	
Village is accessible by road all year: 1=Yes, 0=No	-0.0052	0.890332	
Proportion of village land irrigated	0.1396	0.002408	**

Significance. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4515 on 1116 degrees of freedom

Multiple R-squared: 0.2362, Adjusted R-squared: 0.2279

F-statistic: 28.75 on 12 and 1116 DF, p-value:  $< 2.2e^{-16}$

### Results

The base model is valid for estimating expenditure because the F-statistics is 28.75, which is different from zero, and statistically significant with a p-value of less than  $2.2e^{-16}$ .

Furthermore, the adjusted R-squared value indicates that approximately 22.79% of the variation in the log of household expenditure per capita is explained by the variation in the explanatory variables included in the model. Variables that can be considered statistically significant in predicting the log of total household expenditure per capita are: female only microcredit program, price of milk, price of eggs, price of edible oil, number of household members, age of household head, education of household head, log of household head lands, and proportion of village land irrigated—along with price of wheat at the 10% significance level.

***A female-only microcredit program within a village is positively related to log of household expenditure per capita.***

*Specifically, households in a village with a female-only microcredit program are expected to spend approximately 11.37% more than households without a female-only microcredit program in their village.*

**$H_0: B_1 \leq 0$**  (A negative or no effect on log of household expenditure per capita due to a female microcredit program in a village)

**$H_a: B_1 > 0$**  (A positive effect on log of household expenditure per capita due to a female microcredit program in a village)

Based on t-statistic:  $1.976 > \text{critical value: } [1.645]$

We reject the null hypothesis at the 5% level and conclude that a positive relationship exists between log of household expenditure per capita and the presence of female-only microcredit programs.

### Interpretation of Coefficients

Total expenditure per capita of a household in a village with a female only microcredit program is, on average and holding all other variables constant, 11.33% greater than that of a household in a village without a female-only microcredit program.

For each increase by 1 Tk./kg of the price for wheat, total household expenditure per capita decreases by 3.17% on average and holding all other variables constant.

For each increase by 1 Tk./liter of the price for milk, total household expenditure per capita increases by 2.01% on average and holding all other variables constant.

For each increase by 1 Tk./4 counts of the price for eggs, total household expenditure per capita increases by 14.78% on average and holding all other variables constant.

For each increase by 1 Tk./kg of the price for edible oil, total household expenditure per capita increases by 1.07% on average and holding all other variables constant.

For each additional member in a household, total household expenditure per capita decreases by 4.41% on average and holding all other variables constant.

For each additional year in age of the household head, total household expenditure per capita increases by 0.53% on average and holding all other variables constant.

For each additional year of education earned by the household head, total household expenditure per capita increases by 4.90% on average and holding all other variables constant.

For each percent increase in the acres possessed by the household head, total household expenditure per capita increases by 0.1869% on average and holding all other variables constant.

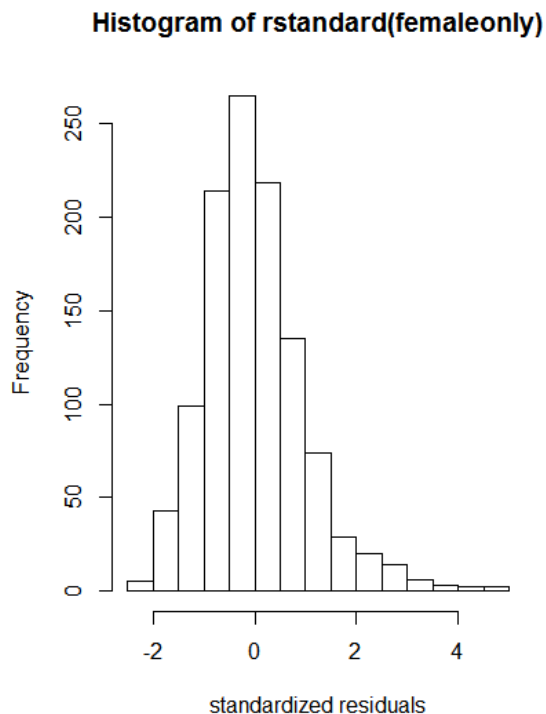
Total expenditure per capita of a household with a male head is, on average and holding all other variables constant, 0.74% larger than that of a household with a female head.

Total expenditure per capita of a household in a village accessible by road year-round is, on average and holding all other variables constant, 0.52% less than a household in a village without year-round access to a road.

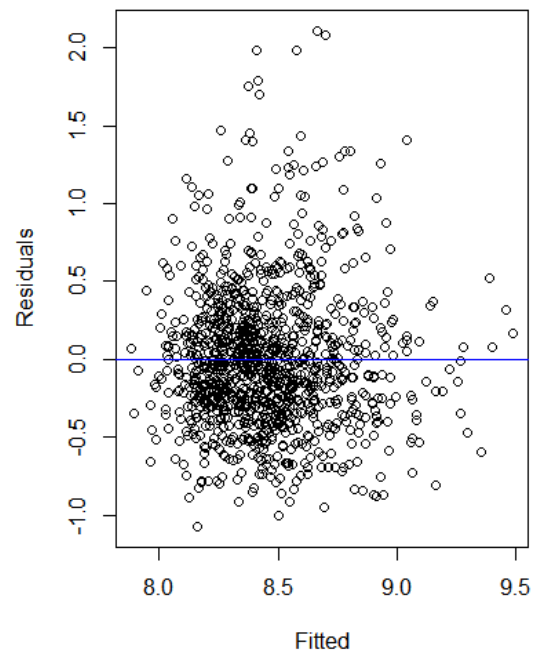
For each percent increase in the proportion of village land irrigated, total household expenditure per capita increases by 13.96% on average and holding all other variables constant.

## Validation

### **Histogram: Femaleonly**



### **Variance Plot: Femaleonly**



## 2.4 Male household participant in Microcredit and Expenditure

### *Examining the Effect of a Male Participant in a Microcredit Program*

<b><u>Effect of Male Participant in Microcredit Program</u></b>	<b>Coefficient (Nearest 4 Decimals)</b>	<b>P-Value</b>	<b>Significance Level</b>
Intercept	7.4921	$< 2e^{-16}$	***
Microcredit Program User Male (1=Yes, 0=No)	-0.0027	0.93773	
Price of Wheat (Tk./kg)	-0.0310	0.0591	.
Price of Milk (Tk./liter)	0.0202	0.000293	***
Price of Eggs (Tk./4 counts)	0.1503	0.001761	**
Price of Edible Oil (Tk./kg)	0.0106	0.002265	**
Number of Household Members	-0.0440	$4.20e^{-11}$	***
Age of Household Head	0.0052	$4.60e^{-06}$	***
Education of Household Head (years)	0.0490	$< 2e^{-16}$	***
Log of Household Head lands (acres)	0.1845	$3.87e^{-10}$	***
Gender of Household Head: 1=Male, 0=Female	0.0022	0.963484	
Village is accessible by road all year: 1=Yes, 0=No	-0.0129	0.732404	
Proportion of village land irrigated	0.1399	0.002407	**

Significance. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4523 on 1116 degrees of freedom

Multiple R-squared: 0.2335, Adjusted R-squared: 0.2252

F-statistic: 28.33 on 12 and 1116 DF, p-value:  $< 2.2e^{-16}$

### Results

The base model is valid for estimating expenditure because the F-statistics is 28.33, which is different from zero, and statistically significant with a p-value of less than  $2.2e^{-16}$ .

Furthermore, the adjusted R-squared value indicates that approximately 22.52% of the variation in the log of household expenditure per capita is explained by the variation in the explanatory variables included in the model. Variables that can be considered statistically significant in predicting the log of total household expenditure per capita are: price of milk, price of eggs, price of edible oil, number of household members, age of household head, education of household head, log of household head lands, and proportion of village land irrigated—along with price of wheat at the 10% significance level.

*We cannot conclude that the presence of a male microcredit participant within a village is related to log of household expenditure per capita.*

**H<sub>0</sub>: B<sub>1</sub> = 0** (There is no effect on log of household expenditure per capita due to a male participant in a microcredit program)

**H<sub>a</sub>: B<sub>1</sub> ≠ 0** (There is an effect on log of household expenditure per capita due to a male participant in a microcredit program)

Based on t-statistic: -0.078 within critical values: [-1.645,1.645]

We fail to reject the null hypothesis at the 5% level and thus conclude that the effect of having a male household member participating in a microcredit program on the log of household expenditure per capita is not statistically significant.

### Interpretation of Coefficients

Total expenditure per capita of a household with a male participant in a microcredit program is, on average and holding all other variables constant, 2.70% less than that of a household without a male participant in a microcredit program.

For each increase by 1 Tk./kg of the price for wheat, total household expenditure per capita decreases by 3.10% on average and holding all other variables constant.

For each increase by 1 Tk./liter of the price for milk, total household expenditure per capita increases by 2.02% on average and holding all other variables constant.

For each increase by 1 Tk./4 counts of the price for eggs, total household expenditure per capita increases by 15.03% on average and holding all other variables constant.

For each increase by 1 Tk./kg of the price for edible oil, total household expenditure per capita increases by 1.06% on average and holding all other variables constant.

For each additional year in age of the household head, total household expenditure per capita increases by 0.52% on average and holding all other variables constant.

For each additional year of education earned by the household head, total household expenditure per capita increases by 4.90% on average and holding all other variables constant.

For each percent increase in the acres possessed by the household head, total household expenditure per capita increases by 18.45% on average and holding all other variables constant.

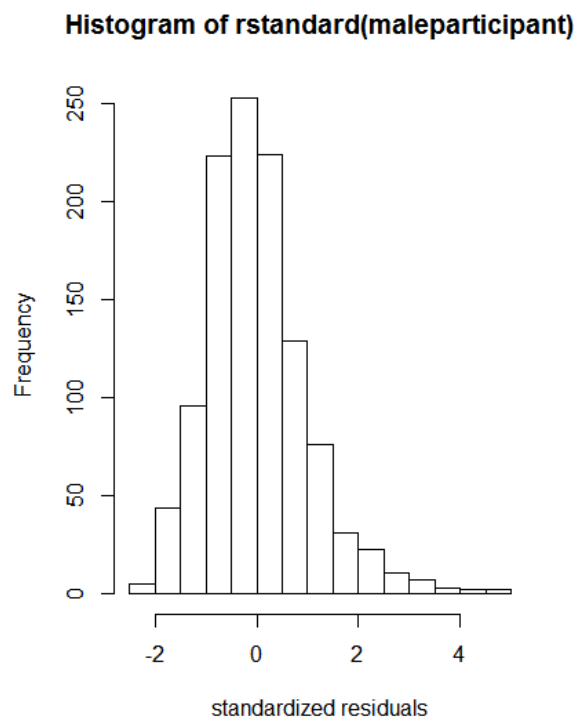
Total expenditure per capita of a household with a male head is, on average and holding all other variables constant, 022% larger than that of a household with a female head.

Total expenditure per capita of a household in a village accessible by road year-round is, on average and holding all other variables constant, 1.29% less than a household in a village without year-round access to a road.

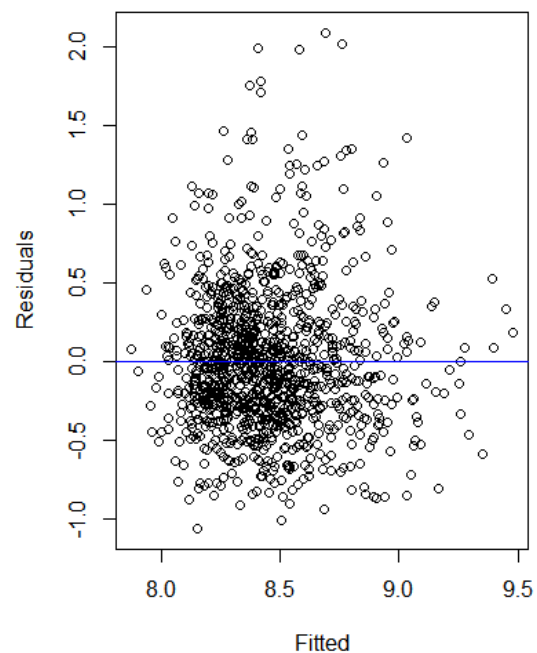
For each percent increase in the proportion of village land irrigated, total household expenditure per capita increases by 13.99% on average and holding all other variables constant.

## Validation

### **Histogram: Maleparticipant**



### **Variance Plot: Maleparticipant**



## 2.5 Female household participant in Microcredit and Expenditure

### *Examining the Effect of a Female Participant in a Microcredit Program*

<b><u>Effect of Female Participant in Microcredit Program</u></b>	<b>Coefficient (Nearest 4 Decimals)</b>	<b>P-Value</b>	<b>Significance Level</b>
Intercept	7.4779	< 2e <sup>-16</sup>	***
Microcredit Program User Female (1=Yes, 0=No)	0.0895	0.001376	**
Price of Wheat (Tk./kg)	-0.0316	0.054805	.
Price of Milk (Tk./liter)	0.0203	0.000255	***
Price of Eggs (Tk./4 counts)	0.1452	0.002135	**
Price of Edible Oil (Tk./kg)	0.0100	0.0041	**
Number of Household Members	-0.0439	3.13e <sup>-11</sup>	***
Age of Household Head	0.0051	6.73e <sup>-11</sup>	***
Education of Household Head (years)	0.0506	< 2e <sup>-16</sup>	***
Log of Household Head lands (acres)	0.2019	1.21e <sup>-11</sup>	***
Gender of Household Head: 1=Male, 0=Female	0.0025	0.958252	
Village is accessible by road all year: 1=Yes, 0=No	-0.0074	0.843036	
Proportion of village land irrigated	0.1319	0.004105	**

Significance. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4502 on 1116 degrees of freedom

Multiple R-squared: 0.2405, Adjusted R-squared: 0.2323

F-statistic: 29.45 on 12 and 1116 DF, p-value: < 2.2e<sup>-16</sup>

### Results

The base model is valid for estimating expenditure because the F-statistics is 29.45, which is different from zero, and statistically significant with a p-value of less than 2.2e<sup>-16</sup>.

Furthermore, the adjusted R-squared value indicates that approximately 23.23% of the variation in the log of household expenditure per capita is explained by the variation in the explanatory variables included in the model. Variables that can be considered statistically significant in predicting the log of total household expenditure per capita are: household has a female participant in a microcredit program, price of milk, price of eggs, price of edible oil, number of household members, age of household head, education of household head, log of household head



lands, and proportion of village land irrigated—along with price of wheat at the 10% significance level.

**H<sub>0</sub>:  $B_1 \leq 0$**  (A negative or no effect on log of household expenditure per capita due to a female microcredit program participant within a household)

**H<sub>a</sub>:  $B_1 > 0$**  (A positive effect on log of household expenditure per capita due to a female microcredit program participant within a household)

Based on t-statistic:  $3.208 > \text{critical value: } [1.645]$

### Interpretation of Coefficients

Total expenditure per capita of a household with a female participant in a microcredit program is, on average and holding all other variables constant, 8.95% more than that of a household without a female participant in a microcredit program.

For each increase by 1 Tk./kg of the price for wheat, total household expenditure per capita decreases by 3.16% on average and holding all other variables constant.

For each increase by 1 Tk./liter of the price for milk, total household expenditure per capita increases by 2.03% on average and holding all other variables constant.

For each increase by 1 Tk./4 counts of the price for eggs, total household expenditure per capita increases by 14.52% on average and holding all other variables constant.

For each increase by 1 Tk./kg of the price for edible oil, total household expenditure per capita increases by 1.00% on average and holding all other variables constant.

For each additional member in a household, total household expenditure per capita decreases by 4.39% on average and holding all other variables constant.

For each additional year in age of the household head, total household expenditure per capita increases by 0.51% on average and holding all other variables constant.

For each additional year of education earned by the household head, total household expenditure per capita increases by 5.06% on average and holding all other variables constant.

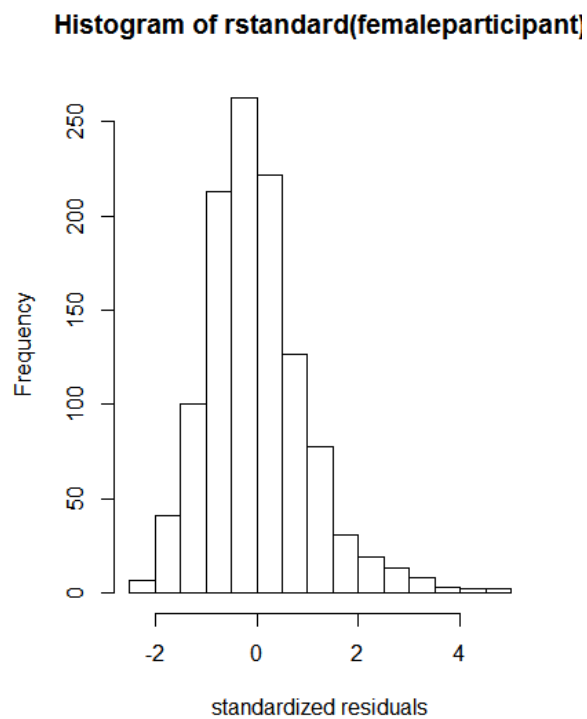
For each percent increase in the acres possessed by the household head, total household expenditure per capita increases by 0.2019% on average and holding all other variables constant.

Total expenditure per capita of a household with a male head is, on average and holding all other variables constant, 0.25% larger than that of a household with a female head.

Total expenditure per capita of a household in a village accessible by road year-round is, on average and holding all other variables constant, 0.74% less than a household in a village without year-round access to a road.

## Validation

**Histogram: Femaleparticipant**



**Variance Plot: Femaleparticipant**

