Innovations

Determinants of Households' WTP for Improved Electricity Supply Services in Debre Markos Town: -Using Contingent Valuation Method (CVM)

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Received: 05 March 2022 **Accepted:** 08 April 2022 **Published:** 30 April 2022

Abstract *This study was undertaken to analyze the determinants of households' Willingness to Pay (WTP) for improved electric power supply. The Contingent Valuation Method (CVM) was used by applying the double-bounded dichotomous choice value elicitation format. Though secondary data was used, the data used in this study was mainly primary and cross-sectional for the year 2021/22. Purposive sampling was used to select the study area, but multistage sampling methods of probability sampling technique were used in order to obtain the sample households from the town. In the first stage, Simple Random Sampling (SRS) was used to select sampled kebeles for the study. In the second stage Systematic Sampling (SS) was used to draw individual households in each sampled kebele. For collection of the primary data from these sample households, this study used well-designed questionnaire. The study used cross-sectional data collected from 404 selected sampled households. Multicolliniarity between explanatory variables was cross-checked by the measure of Correlation matrix of explanatory variables and heteroscedasticity was checked by using robust regression model. The Probit empirical model was employed to analyze CV surveyed responses. The Probit model test statistics showed that respondents years of stay in the town, households' income, respondents satisfaction level, reliability of the existing electric power being used, average electric power interruption (outage) per day and quantity of electric power being used had a positive effect on the probability of households' WTP for improved electricity. On the other hand sex of the respondent, responsible organ for the provision of improved electricity supply and initial bid offered to respondents had a negative expected effect on the probability of saying 'Yes' for the initial bid offered to them for improved electric power supply services*

Key Words*: 1.Contingent Valuation Method 2.Willingness to Pay 3. Improved Electricity Service 4.Probit Model 5. Debre Markos*

1. Introduction

Many people in Least Developed Countries (LDCs) do not have access to adequate and un-interrupted supply of electricity. For instance in Sub-Saharan Africa and most remote areas globally 1.2 billion

people still lives in the dark (International Energy Agency (IEA), 2019). Though the target of United Nations (SDG) is to decrease the number of people without clean cooking access to 2.2 billion in 2030, in 2017 nearly half of the worlds' population, who lives mainly in Africa and Asia do not have access for clean cooking and thus it affects the health, environment and gender equality (World Bank, 2019). Even though some have access to electricity, reliability problems which lead to frequent power outages have been given less concern in terms of project funding and research in developing countries, particularly Sub-Saharan Africa,. For example the power outages in Sub-Saharan Africa occurred 8.5 times in typical month each with an average duration of 4.1 hours (Anderson and Dalgaard, 2013).

Like any other developing countries, Ethiopia is not able to solve fully the reliable and modern energy service problem of its people. Despite the fact that the percentage of households who have access to energy services such as access to electricity and clean cooking increases from time to time, it has one of the lowest rates (44.3%) of access to reliable electricity, whereby the energy supply is primarily based on biomass with its share of 92.4% of Ethiopia's energy supply, followed by oil (5.7%) and hydropower (1.6%) (IEA, 2016). Thus, the policy advice based on comprehensive energy analysis to improve electricity access and diversification of the energy supply-mix to develop a sustainable power sector is lacking in Ethiopia. This is so because the Government of Ethiopia (GoE) has limited potential to finance the huge investment in electricity development project due to lack of finance and trained manpower. One way to finance these high investments incrementally is through an increase in the electricity tariff which is not easy, since the increase is done before investments are made. Thus, it is necessary to understand customers' willingness to pay (WTP) for such improvements and consequently, it is important to understand which aspects influence their WTP. This indicates that to set appropriate electric bill pricing or tariff structures, it is important to investigate the ability and willingness to pay of users of improved electricity supply services (Ministry of Water and Energy, 2015)

The existing electric supply of Debre Markos town is characterized by low generation potential which creates shortage of electricity supply in the town resulting high rate of outages (interruptions) with average estimated power outages of approximately 3 to 5 hours per day in the town which have been particularly chronic for the last 5 years which exposed the town's domestic users to additional direct costs for alternative sources electricity and disrupts the residential users preferred order in which it performs certain activities in a day and all these made them to outcry for the service providers to improve service delivery since households do suffer some economic losses in the event of power outages to the extent that they may be willing to pay higher tariffs if that will ensure an improved supply of electricity during this power interruptions which usually goes off indiscriminately without prior notification to them (Debre Markos Town Electricity Supply Office, 2021). Therefore, to improve the electric supply services of the town and improving the distribution of electricity supply, the service beneficiaries are required to pay extra additional charges and thus understanding the actual households electricity use behavior, observed ability and willingness to pay (WTP) for this improved electricity services is very important due to the fact that these demand side information is highly required to design the appropriate bill tariff by policy makers that is consistent with government policy and enhance the long term viability of the service, by taking Debre Markos town as a case study.

Despite, different empirical studies were conducted based on Contingent Valuation Method (CVM) to value households'(individual's) Willingness To Pay (WTP) for improved electricity supply (Gunatilake and Maddipati, 2012; Abdullah and Mariel (2010); Amador, Gonzalez and Ramos Real (2012); Nomura and Akai

(2004); Twerefou,D.K. (2014); Zoric et,al (2012)), most of them used a single bounded dichotomous choice and or another bidding game approach which is considered statistically less efficient to elicit information about households' actual WTP (Champ et al., 2009). Thus, besides estimating domestic users WTP for improved electricity supply, this study tried to fill this methodological gap by using double bounded dichotomous choice format which is recently recognized as statistically efficient as compared to other formats to elicit stated preference of WTP (Loomis, 2013). In addition, even though there are few studies on Willingness to Pay (WTP) for access and reliable electricity supply in Ethiopia, none has been done in Debre Markos town.

2. Literature Review

Contingent Valuation Method (CVM) is one of Stated Preference Methods, and probably the best benefit estimation method that rely on hypothetical market conditions which typically uses survey to inquire about individuals WTP for some environmental policy initiative when market data are unavailable. This survey approaches to benefit estimation is known as Contingent Valuation Method (CVM), since the results are depending up on the hypothetical market devices.

Robert K. Davis (1963) was the first to come to use the CVM in the early 1960, when he used questionnaire to estimate outdoor recreation in benefits of Maine back woods area .It is the earliest technique of the Stated Preference Method of non-market valuation approaches. The method has been used by economists to measure the benefits of variety of environmental goods starting from that period of early 1960 (Mitchell and Carson, 1989).

It is a survey based elicitation technique to estimate Willingness to Pay (WTP) or Willingness to Accept (WTA) values of goods that is not traded in the conventional market. It involves directly asking consumers' willingness to pay for non-market goods under a given condition to elicit their WTP by using hypothetical market scenario through describing to the surveyed respondents in eliciting their WTP values of the good which are contingent upon the hypothetical market prescribed in the instruments (Gunatilake et.al, 2007).

In recent years particularly starting from 1960s, Contingent Valuation Method has found extensive applications in valuing of environmental benefits, such as the benefit of reduced air pollution, valuing of water quality, valuing of improved electricity, valuing of improved solid waste management and the option of existence value of ecologically important species. The CVM can be successfully applied in developing countries before 1987, but little available work suggests that its application in non-market valuation is limited in Developed Countries (DCs) (Whittington et al, 1990 and 1998).

Abdullah and Mariel (2010) investigated households WTP for improved electricity in Kenya based on iterative bidding elicitation format. The result reported that the coefficients of variables such as household size, age, employment status, bank account holding and years of residence in the study area affect willingness to pay for reductions in power outages in Kenya.

Amador, Gonzalez and Ramos Real (2012) conducted a contingent valuation on customers' preferences and willingness to pay for reliable electricity supply in the Canary Islands, Spain. The study finding clearly showed that, customers years of stay in the study area reflected through experiencing the serious shortage of electricity, respondents' level of education and costumers electricity usage practices were some of the significant factors determining the respondents' willingness to pay for reliable electricity supply in Canary Islands.

Gunatilake, H., Maddipati, N. & Patail, S. (2012) conducted a Contingent Valuation study in Madhya Pradesh (MP), India, to investigate residents' willingness to pay for good quality and uninterrupted power supply using Stratified Random Sampling (SRS) method in two districts namely Rajgarh and Guna. The study used single bounded closed-ended referendum value elicitation format with a total number of 2083 sampled households during the survey. The study results using OLS regression model clearly showed that the coefficients of the ownership of a home business, perceived benefits of reliable electricity, per capita household income and the number of children of school going age in the household had expected sign and statistically significant.

Nomura and Akai (2004) applied the CVM studies for measuring the WTP for renewable energy in Japan. The surveyed result also showed that, average household income, educational level of the respondent, age and family size had expected sign and significantly affecting their willingness to pay for electricity sources from renewable energy sources

Twerefou,D.K. (2014) investigated households WTP for improved electricity supply in Ghana by using descriptive analysis to discuss the nature of electricity provision and households' WTP for improved electricity supply and econometric analysis to evaluate the factors influencing WTP for improved electricity supply. The study showed that household income, sex, household size, secondary and tertiary level education are the significant factors that influence households' WTP for improved electricity supply in Ghana.

Zoric et,al (2012) used a CVM to evaluate households WTP for green electricity in Slovenia by using CVM and Choice Experiment. The findings of the CVM study indicates that the coefficient of education, income, home ownership, family size and composition affect willingness to pay for reliable electricity which clearly indicates that the probability of 'yes' increases with the increasing the educational level and income which shows that their WTP increases with the educational status and income level of the respondents, but households with large family size have less WTP for the improved electricity services.

From the above empirical studies on CVM, it can be concluded that households' WTP for the improved electricity services is influenced by socio-economic and demographic characteristics such as education, income, household size, age and gender, characteristics of existing electricity supply situation and satisfaction with existing electricity supply service and household electricity use practice and finally households attitudes towards government policy on electricity. Therefore the study has also employed the CVM which is relevant in determining the factors affecting urban dwellers willingness to pay for improved electricity related projects in the study area and understanding the existing electricity supply situation of the town.

3. Research Methodology

The study used the Contingent Valuation Method (CVM) by applying the double-bounded dichotomous choice value elicitation format. The data used in this study were both primary and secondary, but it used mainly primary and cross-sectional for the year 2021/22 which was obtained from contingent valuation survey. Multistage sampling methods of probability sampling technique were used in order to obtain the sample households from the town. In the first stage, Simple Random Sampling (SRS) was used to select sampled kebeles for the study. In the second stage Systematic Sampling (SS) was used to draw individual households in each sampled kebele. For collection of the primary data from these sample households, this study used well-designed closed ended dichotomous choice questionnaire. The study used cross-sectional data collected from 404 usable selected sampled households.

3.1. Description of Explanatory Variables and expected signs

Based on the economic theories and the research problem defined before, relevant variables of the study were taken from the empirical studies reviewed (Aygul Ozbafli, 2015; Carlsson, F., Martinsson, P., 2007; Farhar, B.C., 1999; Francis and Christian, 2015; Gunatilake and Maddipati, 2012; Meles, 2017). Thus, from demographic variables; gender of household, age of household, household family size, and marital status are included. While socioeconomic variables; such as household education status, households' monthly income level and occupation of the households were taken as relevant variables of the study. Further initial bid offered to the respondents, households attitudes towards reliability, quantity of town's electricity supply, their level of satisfaction, house ownership and their years of stay in the town are assumed impact on households' willingness to pay for improved electricity supply, and hence incorporated in the study.

Table 1:- Definitions of variables and their Expected Sign

Variable	Description	Expected sign
Dependent Variables		
WTP	Willingness to Pay, Dummy Variable 1,if yes, 0 otherwise	
Independent Variables		
SORC	Household main electric power source, dummy variable 1 if hydroelectric source of power, 0 otherwise	+
OUTT	Electricity outage time per day, dummy variable 1, if there is high electric interruption; 0 otherwise	+
QTTY	Quantity of electricity used, dummy variable 1 if low; 0 otherwise	+
RLTY	Reliability of the existing electricity being used, dummy variable 1, if is not reliable; 0 otherwise	
LSAT	Level of satisfaction with the existing service, dummy variable 1 if not satisfied, 0 otherwise	_
GNDR	Gender of respondents, dummy variable 1 if male, 0 otherwise	+/-
HHDR	Household head of the respondent, dummy variable 1 if head, 0 otherwise	+
AGER	Age of the respondents in years	-
EDUR	Education level of respondents, dummy variable 1 if literate, 0 otherwise	+
OCCR	Occupation of the respondent, dummy variable 1 if formal sector salary employment, 0 otherwise	+
INCM	Household average monthly income in ETB(Ethiopian birr)	+
FAMS	Respondents' family size in number	+/-
HOSR	House ownership of the respondent, dummy variable 1 if have own home, 0 otherwise	+
MASR	Marital status of respondents, dummy variable 1 if married, 0 otherwise	+

REYS	Respondents years of stay in the town in years	+
RESP	Responsible organ for provision of improved electricity supply, dummy variable 1 if government, 0 otherwise	-
IB	Initial bid offered to the respondent	-

3.2. Model Specification

According to Habb and Mc Connell, allowing the inclusion of respondents' socio-economic factors in to willingness to pay functions and determining the mean willingness to pay is main objective of estimating econometric model in willingness to pay survey (Habb and Mc Connell, 2002).
In the Probit model of closed- bounded dichotomous responses, individuals are given the initial 'bid' price that has 'yes' or 'no' responses. Random Utility Model (RUM) constructed by Hanemann (1984) is the basic model for analyzing such dichotomous contingent valuation responses. It starts with utility function where the researcher can only make probability statement about respondents 'yes' or 'no' responses to the proposed scenario due to the fact that indirect utility of individual contains deterministic and stochastic components, which means in other words although an individual knows his/her utility with certainty, it has some components which are not observable from the view point of the researcher and hence the indirect utility function for respondent 'j' can be written as follows (Habb and Mc Connell, 2002):

V_{ij} $=V_i$ (Yj, Xj, ε_{ij}), where Yj =j^{th} respondent's income and **i**=0 denotes the status quo (initial state) and **i=** 1 denotes the final state (after improvement), X_j**=** is vector of household characteristics and attributes of a given choice and $\boldsymbol{\varepsilon_{ij}}$**=** is the random component of a given indirect utility that is the stochastic disturbance term, which is assumed to be independently and identically distributed with mean 'zero' and a constant variance of σ^2.

In the Probit model, the cumulative distribution function $F_\eta(.)$ follows the normal cumulative distribution function and assuming the normal cumulative distribution, the Probit model can be defined as:

$T_i^*=\beta' X_i+\varepsilon_i$, where T_i^*= is unobservable households' willingness to pay for improved electricity supply, that is non-observable latent variable.

What we observe is a dummy variable WTP_i which is defined as: WTP_i =1 if $T_i^* \geq \beta_i^*$(T_i^* =1, if the response is 'yes' and WTP_i =0 if $T_i^* < \beta_i^*$ (T_i^* =0, if the response is 'No'), Where **Xi =**is a vector of explanatory variables **B*=**is a vector of unknown regression parameters, $\boldsymbol{\varepsilon_i}$ **=**is the random error term which is assumed to have random, normal distribution with mean 'zero' and common variance of σ^2.

Thus Maximum Likelihood procedures is used to estimate this 'Yes' or 'No' responses obtained from the closed-ended survey and thus the Likelihood function can be expressed as a series of Bernoulli trials

$L=\sum T_i^* \ln F_i + (1-T_i^*) \ln (1-F_i)$, where $F_i = F(T_i^*/X_i, \theta)$, i^{th} individual's response probability and T_i^* is the dummy variable indicating an individual choice 1 for 'Yes' and 0 for 'No' (Hanemann, W.M and Kanninen B, 1998, p.23).

Thus we can specify the Probit model for households' preference for the improved town's electricity supply based on the above justification, as follows:

$WTP_i=\beta_0+\beta_1GNDR+\beta_2EDUR+\beta_3INCM+\beta_4HHDR+\beta_5AGER+\beta_6RESP+\beta_7LSAT+\beta_8FAMS+\beta_9OCCR+\beta_{10}RLTY+\beta_{11}OUTT+\beta_{12}QTTY+\beta_{13}REYS+\beta_{14}IB+\beta_{15}MASR+\beta_{16}HOSR+17SORC+\varepsilon i$

Where WTPi = is response to the 'bid' price=1 if the response is 'Yes', =0 if the response is 'No', β_i is the regression parameter, εi is the error term and the explanatory variables are as defined in the variable description part. By using the standard econometric STATA 14.0 software, the regression parameters were estimated by Maximum Likelihood technique.

4. Results and discussion

Table 2:- Maximum likelihood estimates of the Probit Model

			Number of obs = 404 Wald chi2(17) = 66.07 Pseudo R2 = 0.8761	
Variables	Coefficients	Robust Std.Err	Z	Marginal Effects (dy/dx)
GNDR*	-.7382195	.386493	-1.91*	-.0021105
EDUR*	.3316283	.4619517	0.72	.0006826
INCM	.0006259	.0001279	4.89***	1.85e-06
HHDR*	1.622831	.4833826	3.36***	.0075501
AGER	-.0047626	.027724	-0.17	-.0000141
RESP*	-3.442253	.9748315	-3.53***	-.1188928
LSAT*	3.273358	.7085742	4.62***	.2976913
FAMS	-.413567	.3645866	-1.13	-.0012239
OCCR*	-.4952867	.3278538	-1.51	-.001417
RLTY*	1.835569	.4807067	3.82***	.0601474
OUTT*	2.202519	.471112	4.68***	.1062113
QTTY*	1.281213	.4402526	2.91**	.0167955
REYS	.1537012	.081977	1.87*	.0004549
IB	-2.736072	.5747277	-4.76***	-.0080974
MASR*	-.5061123	.3899194	-1.30	-.0010231
HOSR*	.0272302	.4046831	0.07	.0000811
SORC*	-.7956155	.5861692	-1.36	-.0014964
_cons	3.403010	1.823893	3.74	
Log pseudo likelihood = -27.579478 Restricted Log likelihood = -222.68239				

* -Significant at 10% level of significance

**-Significant at 5% level of significance

***- Significant at 1% level of significance

(*)dy/dx is for the discrete changes of dummy variable from 0 to 1.

4.1. Discussions

The continuous variable income of the household has a positive sign suggesting that the probability of a 'Yes' response (accepting the proposed bid) increases with income and it is statistically significant at 1% level of significance. The marginal effect indicates that one birr increase in the income of the household increases the probability of accepting an offered bid by 1.85e-06%, other things being equal. This result is consistent with the finding of Gunatilake, H., Maddipati, N. & Patail, S. (2012) who conducted a Contingent Valuation study in Madhya Pradesh (MP), India, to investigate residents' willingness to pay for good quality and uninterrupted power supply and also consistent with early literature (Nomura and Akai, 2004, Twerefou,D.K., 2014, Zoric, J., & Hrovatin, N (2012)

The dummy variable sex of the respondent has a negative sign indicating that male respondents are willing to pay less than female respondents which is also significant at 10% significance level. Thus keeping all other things the same, for male respondents, the probability of accepting the offered bid to pay for the proposed improved electric power service is lower by 0.2% compared with female respondents. This result, though not conclusive, suggests that male respondents are not engaged in homemade activities in the town such as cooking and thus less aware about the value of improved electricity supply services than female respondents. This result is consistent with the finding of Twerefou,D.K. (2014) who investigated households WTP for improved electricity supply in Ghana by using descriptive analysis to discuss the nature of electricity provision and households' WTP for improved electricity supply and econometric analysis to evaluate the factors influencing WTP for improved electricity supply.

As expected, household head of the respondent has a positive sign, suggesting that households who are heads are willing to pay more than non-headed households and statistically significant effect (at 1% level) on the probability of accepting the offered bid showing that the probability of accepting the offered bid for improved electricity service is higher by approximately 0.8% for headed households compared with households who are not head, ceteris paribus. This result suggests that, those households who are household heads are responsible for the whole family members to full fill all the requirements such as cooking and lighting, so that he/she gives more value for improved electricity supply and thus has more WTP.

The dummy variable, 'responsible organ for the provision of improved electricity supply services' has a negative sign and statistically significant effect (at 1% level) on the probability of accepting the offered bid indicating that, respondents who said that government is responsible for the provision of improved electricity supply services are willing to pay less than that of who argued community, private organizations and others are responsible for providing improved electricity supply scheme as expected a priori. Keeping other things the same, for those respondents who said that the provision of improved electricity supply is the responsibility of the government is lower by 11.9% compared with those who argued that government is not responsible.

As expected, the dummy variable representing respondents' level of satisfaction on the existing electric power supply has a positive sign and is significant at 1% level of significant. This result suggests that, households who are not satisfied with existing town's electricity power supply services are more likely to pay more for improved electricity supply. Ceteris paribus, for those households who were not satisfied with the existing electricity power supply, the probability of a 'Yes' response for the offered bid is higher by 29.8% compared with those who are satisfied with existing electricity power supply of the town.

The dummy variable, reliability of the existing electric power supply in the town has a positive sign as expected and is significant at 1% level of significance. This result suggests that, those households who said that the existing electric power supply is unreliable are willing to pay more for the improved electricity supply. The marginal effect indicates that, keeping other things the same, the probability of saying 'Yes' for any initial bid offered is higher by 6.01% for households whose existing electricity supply is unreliable, when compared to others who said that the existing electric power supply is reliable for them.

As expected a priori, the coefficient of the dummy variable average electricity outage time per day has a positive sign which is also significant effect (1% level) on the probability of the offered bid for the improved electric power project. This result suggests that households who says more electricity interruption time per day are more likely to demand the improved electricity supply services and thus more likely to pay for the proposed improvement scheme.

The dummy variable, quantity of electricity being used in Kilowatt hour (Kwh) has a positive sign as expected and is statistically significant at 5% significance level. This suggests that for households for which quantity of electricity being used in Kilo watt hour (Kwh) is low are more likely to pay for the improved electric power supply services, which is consistent with Amador, Gonzalez and Ramos Real (2012) who conducted a contingent valuation on customers' preferences and willingness to pay for reliable electricity supply in the Canary Islands, Spain.

The probability of a 'Yes' response, that is accepting the initial proposed bid increases with households' number of years of stay in the town and is statistically significant at 10 % of level. This result suggests that, the probability of saying 'Yes' for the proposed bid offered to them is increased by 0.05%, when the household's years of stay in the town is increased by one year, ceteris paribus. This is so because those households who have stayed in the town for long years are more aware about the severity of the electricity supply problem and thus are willing to pay more for improved services than those who have lived for few years in the town. This finding is also consistent with the result found by Abdullah and Mariel (2010) who investigated households WTP for improved electricity in Kenya based on iterative bidding elicitation format and Amador, Gonzalez and Ramos Real (2012) who conducted a contingent valuation on customers' preferences and willingness to pay for reliable electricity supply in the Canary Islands, Spain.

As expected, the probability of accepted the proposed bid decreases with initial bid offered to the respondents, since it has a negative sign, and is statistically significant at 1% significance level. This result suggests that the probability that respondents are paying for improved electricity power supply will be reduced by 0.81% for a one percent increase in initial bid, ceteris paribus

According to Hanemann, deriving the central value (mean) of WTP distribution is one of the main objectives of estimating empirical WTP based on the CV survey response (Hanemann, Loomis and Kanninen, 1991). The mean WTP for dichotomous choice contingent valuation survey responses in the probit model can be calculated by dividing the negative of the regression constant (intercept) by the bid coefficient as already in the methodology part.

Therefore Mean WTP = $\mu = -\alpha/\beta = -3.403010/-2.736072 = 1.2437574742$

Thus 1.24 birr is the mean WTP obtained from the closed-ended format for the proposed improved water services per Kilowatt of electric power supply.

5. Conclusions

The study attempted to analyze the demand side of improved electric supply services with the aim of looking in to the possibility of the cost sharing by the town's residents for the improved electric supply services. In this study the cross-sectional primary data is mainly used, while it is also supplemented by secondary data from MoWE and the town's electric service office.

The study used the Contingent Valuation Method (CVM), based on face-to-face interview with a randomly selected 422 sampled households. But due to incomplete and miss-used, only questions answered by only 404 households were used. The double-bounded dichotomous choice with an open-ended follow-up elicitation format was used. Further the sampled households were also asked questions related to problems with the existing electric supply services, their electric power use practices, demographic and socioeconomic characteristics and some other general questions.

The Probit model was used to calculate the mean WTP of the sampled households and to analyze the determinants of households' WTP, using the econometric software STATA version 14.0. for the development of improved electricity supply services. The explanatory variables respondents years of stay in the town, households' income, household head of the respondent dummy (1 if household head), respondents satisfaction level dummy (not satisfied =1), reliability of the existing electric power being used dummy (1 = not reliable),average electric power interruption (outage) per day dummy (high =1) and quantity of electric power being used dummy (low = 1) has a positive and statistically significant effect on households' probability of saying 'Yes' to the initial bid offered to them for the development of improved electric power scheme, however, the explanatory variables, sex of the respondent dummy (male = 1), initial bid offered to respondents, responsible organ dummy (government = 1), had the expected negative sign and had significant effect on the probability of saying 'Yes" to the initial bid offered to the respondents. Therefore policy makers should take into consideration with regard to these explanatory variables for the purpose of developing improved electric power scheme in the town.

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