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Determinants of Choice Decision for Adoption of Conservation Intervention Practices: The Case of Mt. Damota Sub-Watershed, Wolaita Zone, Ethiopia

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Abstract- Factors affecting choice decision are location specific and it is also important to look into farmers' decision on conservation practices for which they are aware of. This study was undertaken in Mt. Damota sub-watershed, which is among the degraded site in the woreda as well in the zone. The study mainly investigated how farmers' decide on conservation practices and what determines their decision. The data was collected from 103 randomly and proportionately selected households from two PAs and six villages by using stratified random sampling techniques where wealth status was used for the stratification. The relevant data were generated using a combination of methods; structured questionnaire, key informants and group discussion methods as well as secondary data sources. Descriptive statistics with appropriate statistical tests and binary logistic regression model were used to analyses the data. The study findings from ch-square test showed that the farmers' choice decision was positively and significantly correlated to family size, educational status, social position, source and distance of farmland, tenure security, off-farm income, training, extension and credit service. Factors such as age, sex, farm size, farming experience, number of farm plots, slope gradient and soil type were not significant. The model output showed that factors such as; education, training; tenure security.

Keywords: *determinants, adoption, soil erosion, swc, decision.*

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Determinants of Choice Decision for Adoption of Conservation Intervention Practices: The Case of Mt. Damota Sub-Watershed, Wolaita Zone, Ethiopia

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Keywords; determinants, adoption, soil erosion, swc, decision.

I. Introduction

Poor and inappropriate land management is the main cause of physical and chemical degradation of cultivated land. Soil degradation is the most serious environmental problem affecting Sub-Saharan Africa (SSA) (FAO, 1999).

Ethiopia has been described as one of the most serious soil erosion areas in the world. The poor soil management and land use practices are the causes of high soil erosion rate (Nigussie & Fekadu, 2003). Repeated problems of drought and food insecurity have been attributed at least partly to this phenomenon of soil erosion. Almost 75% of the Ethiopian highlands were estimated to need soil conservation measures of one sort or another if they are to support sustained cultivation (Wood, 1990). The ever-increasing food deficiency and severity of famine problems in the country seem to confirm forecast. Therefore, to minimize the problem of soil erosion and the resulting degradation, proper soil management aiming at improving the condition of the soil by integrating soil erosion mitigating practices with strategic policies that can enhance agricultural productivity, and thus have positive impact upon growth perspective (Adugna, 2008).

Considering of the intensity of problems, SWC practices were implemented in many parts of the highlands during the 1970s till present. They have been introduced in some degraded and food deficit areas mainly through food-for-work productive safety net programs which concentrated on structural types and of these the most common were the *fanya juu* and soil bunds (Belay,1992).Hundreds and thousands of kilometers of *fanya juu* and soil bunds were constructed on croplands. However, reports indicated that these conservation structures have not been adopted and continuously used by the farmers (Yeraswork, 2000; Fitsum et al, 2002). The limited adoption and expansion of soil and water conservation practices is not only due to technical problem, rather mainly due to a socio-economic problem with many constraints playing a great role (Habtamu, 2006). Detail investigation of the local level biophysical and socio-economic realities is essential to understand empirically the diverse socio economic variables affecting farmers' conservation decision (Woldeamlak, 2006; Bekele, 1998).This may help as to understand why possible solutions might not be successful to sustain soil conservation and land productivity. Awareness on the existence of a problem is the point of departure in seeking a solution to solve a problem (Zerfu, 1996). As in (Tesfaye, 2003) it is

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essential to know if and when farmers practice what they know and what they perceive about soil erosion.

The study site is one of highly populated area in the country and as well in Zone; with population density of 781 persons per km^2 and this resulted in vulnerability of the natural resources to be poorly managed. The farmers' practiced various traditional and introduced SWC practices to halt the problem but still there is a gap in activities to be taken to sustain environmental resources.

The overall objective this study was to assess the factors affecting farmers' choice decision to conservation intervention practices in the site.

II. Research Methodology

a) Study Site Description

Wolaita zone is located in SNNPRS and is approximately located between 6.4^0 -7.1^0 N longitude and 37.4^0 -38.2^0 E latitude part of the world. It shares the boundary with Kambata- Tambaro zone in the north, Dawuro zone in the west, Gamo-Gofa zone in the south, Hadiya zone in North west, Sidama zone in the east, and Oromia region in the south east and it shares Lake Abaya with Gamo-Gofa and Sidama zones (Kassahun, 2009). Mount Damota is located in Wolaita Zone, at 390 km (via Shashamane) and 327 km (via Butajira) southwest of Addis Ababa, the capital city of Ethiopia. It is located at the junction of three weredas of Wolaita Zone (Damot Gale in the east and north, Soddo Zuria in the south and west and Bolosso Sore in the west and north) with a total size of about 5862 ha (WZARDD, 2009). Mt. Damota is a source of many streams and rivers flowing to different woredas in radial pattern and it is reaching the highest peak about 2955 m and is locally called ''*Wolaita Tuussa''* to mean the *pillar* of Wolaita (Abiraham, 2010). It can be referred to as roof of Wolaitta (a water tower of Wolaitta) since it has many streams originating from it and its significant influence on the climate of several Kebele administrations surrounding it (Figure S1).

b) Materials and Methods

A combination of methods was used to collect relevant data. Primary data was collected during the study by using various techniques such as face-to-face interview; transect walk, direct observation, key informant and focus group discussion and triangulation. As part of the primary data, information also was collected through structured questionnaire from woreda agricultural experts, Kebele leaders, SWC supervisors and DAs accordingly (Figure S2).

Secondary sources of information employed in this study include published materials such as reports, plans, official records, project proposals and reports, research papers and websites and these sources were used carefully by counter checking for their authenticity/accuracy/validity.

c) Sampling Procedure

Among seven PAs in the watershed, two PAs (Woshy and Wandara) were selected purposefully based on the severity of soil erosion and intensive conservation intervention practices implemented in the area for this research work. Then three villages were selected from each PAs based on the criteria mentioned above, accordingly a total of 6(six) villages were selected from the two PAs for this study. The record of total households (1470HHs) living in the study area which was also categorized according to their wealth status (A" for rich,"B" for medium and "C" for poor) was obtained from the kebeles administration. This classification was based on local criteria such as (livestock number, farm size, income source and capital or cash in hand. A sample size of 7 %(seven) was considered to be sufficient and representative to achieve the objectives of the study. Simple random sampling technique was used to draw individual sample household proportional to the population of villages for in-depth interview through structured questionnaire. Accordingly a total of 103HHs were included.

d) Method of Data Analysis

The collected data was reorganized and fed into appropriate statistical tools such as descriptive statistics (i.e. percentage, figure, table, chart, mean value, graphs), Cross tabulation Chi-square test, and with the use of regression model (binary logistic model) fed into SPSS software.

e) Model specification (Econometrics results of Binary logistic model)

Next to descriptive statistics, econometric model was used to study the relationship between variables empirically. Binary logit regression model which holds discrete and continuous explanatory variables was used to analyze factors affecting choice decision of farmers to adopt improved conservation measures.

This section deals with factors, which affect farmers' decision on conservation intervention practices. To identify these factors some statistical model was selected and fed into SPSS software. For this work, choice decision is defined by considering the implementation of introduced conservation intervention practices (mainly soil bund, grass strip and fanya juu) on farmers' plots. A farmer is considered adopter; if she/he implemented at least one of the practices in one of her/his plots and non- adopter; those farmers who never practiced any of them in any of their plots. Considering from this angle, the farmers were classified into two categories: adopter and non- adopter of the technology.

On the bases of theoretical background and review of literature on related studies, Binary logistic model was employed for this study to estimate the effect of hypothesized explanatory variables on farmers'

decision on conservation intervention practices. The dependent variable is choice decision of SWC intervention practices.

Various tests of multicollinearity were conducted and hence variables were found free from the problem of serious multicollinearity. As indicated in (Table S5), the results of the binary logit model showed that, among the 15 hypothesized explanatory variables; educational status of HHs, training, off-farm activities, tenure security, source of land, and effectiveness of SWC were found to be significantly related to the choice decision of conservation intervention practices and each of these variables are discussed under.

III. Results and Discussion

a) Socio-economic profile of the study area

i. *Age and Sex Composition*

The age composition of a family is worth mentioning as it is a characteristic that has implication on the availability of labor for the various activities undertaken by the family. The chi-square test result showed that there was no significant mean difference on age ($P=0.59$; $\chi^2=31.6$) and sex ($P=0.59$; $\chi^2=0.289$) on conservation intervention practices between adopters and non-adopters and this implies that sex and age have no influence on choice decision to be adopters or non- adopters in the site. The result a beat contradicts the findings of others such as (Eleni, 2008; Getachew, 2005& Fikru, 2009).

b) Family Size and Educational Status

Family size and composition affect the amount of labor available for farm, off-farm and household activities and also determines the demand for food (Table S1).

The chi-square test result showed that there was statistically significance mean difference on family size on conservation practices between adopters and non- adopters at $P<0.1$ levels and it disagrees with the works of (Amsalu, 2006; Fikru, 2009) found insignificant difference.

Education enables farmers to tackle land degradation using various ways of soil fertility improving practices, traditional and introduced soil conserving technologies. The empirical result shows that the educational status of farmers in the study area is considerably low. In the area as a whole, significant share (about 46%) of the household heads were illiterate. Eleni, 2008; Adugna, 2008 & Fikru, 2009 also said the largest proportion is illiterate (no formal education). From the remaining 54%, about 10% of them have taken religious education, 28% have attended grades 1-6, 15% have attended from grade 7-10 and the remaining 1% have attended grade 11 and above.

The chi-square test result showed that there was statistically significance mean difference at $P<0.05$ levels ($P=0.042$; $\chi^2=8.143$) on education among adopters and non-adopters.

As hypothesized, educational status *(EDUC)* of household heads was found to be significantly and positively correlated with the choice decision of conservation practices. This is attributable to the fact that education reflects acquired knowledge of env'tal amenities and educated farmers tend to spend more time and money on land management practices. The finding was in agreement with (Ervin &Ervin, 1982; Bekele &Holden,1998; Tegegne, 1999; Krishana *et al*,2008, Fikru,2009). The results showed that as farmers' education level increases by one extra unit, the probability of choice decision of practices increases by a factor of 3.9(Table S5).

c) Social Position and Farming Experience

Many farmers were involved in different social and administrative responsibilities with or without salary in the society. The survey result indicated that 55% of the sample respondents were involved in various responsibilities in the society such as *kebeles* executive membership (4%), being cadre (9%), religious leadership (10%), edir and social committee (21%) and some are participated in more than one responsibility (11%). The chi-square test result showed that there was statistically significance mean difference on social position on conservation practices between adopters and non-adopters at $P<0.05$ levels ($P=0.008/\chi^2=15.6$).

From discussions, it was shown that farmers those have ample experience were more interested and committed to invest on conservation practices and to take care of their land and (Adugna, 2008) also confirmed this. The chi-square test result showed that there was no statistically significance mean difference with the farming experience between adopters and non-adopters.

d) Farm Size and Source of Farmland

As in most of the highlands of the country; the landholding of farmers in the study area is very small. Minimum and maximum sizes of landholding were 0.06 and 1.75 ha, the average being 0.5ha with the standard deviation of 0.3 ha.

Regarding ownership and sources of farmland, the survey result showed that more than 53% of the plots were inherited from family, 15% of the fields were distributed by PA leaders and nearly 22% of the fields were either rented or newly purchased by the current farmer and 10% were through sharecropping. The chi-square test result showed that there was statistically significance mean difference with the source of farmland at $P<0.05$ levels ($P=0.01$; $\chi^2=8.34$) and there is no significant mean difference with farm size between adopters and non- adopters and it is contrary to the findings of (Fikru, 2009). The way how farmers' access land *(SOURLAND)* was correlated significantly and

positively with farmers' choice decision of conservation practices. This is because besides the shortage of resource, farmers were not secure for sharecropped and rented plots. The finding is in agreement with Fitsum & Holden, 2003; Holden *et al*, 2002; Atakilte, 2003; Getachew, 2005 and Berhanu & Swinton, 2003. The probability of the farmer to choice decision that inherited cultivation land (owned farmland) is 2.53 times that of farmer that accessed for share cropping or renting (Table S5).

e) Distance of the Farm Land from the Residence area

It is assumed easier for the farmers to take care (to construct & maintain conservation structures) of the plots near their homes than those are far away. Manure is difficult to transport to distant fields since the field needs bulky manure. The scattered and far away fields are one of the factors that discourage farmers from deciding and using SWC measures. Shiferaw & Holden, 1998 found that some farmers undertake SWC work during the evening, making it difficult to go to the fields that are located far from the home .The chi-square test result showed that there was statistically significance mean difference on distance of farmland from the residence between adopters and non-adopters at $P<0.05$ level.

f) Slope Gradient of the Farm Plots

Slope is one of the farm attributes that aggravate soil erosion problem. The farm slope gradient of the sampled households in the study area classified by sampled respondents as steep slope (*dagetama*), medium steep (*mekakelenya daget*), and flat slope (*medama*).

The chi-square test was conducted and the result showed that there was no statistically significance difference on slope of farmland on conservation practices between adopters and non-adopters. Similar results were found by Bekele & Holden 1998; Tesfaye, 2003& Paulos *et al*, 2004).

g) Fertility Status of the Plots

Respondents have also classified their own plot fertility into three categories: low, medium and high. From a total of 178 farm plots respondents classified 22%, 64% and 14 % as low, medium and highly fertile soils respectively (Table S3). From transect walk and discussions, the fertile plots are more protected than the unproductive ones because of their profitability after investment on them.

h) Farmers' understanding of the Practices and Associated Problems

In order to learn farmers' general opinions about the conservation intervention practices (i.e. soil bund, fanya juu and grass strip), they were asked to identify if there is a problem related to the practices. Farmers' responses show different weights for these six problems (Table S4).

This result agrees with (Long, 2003) findings. These problems could be the possible reasons that the majority of the respondents who had soil bunds modified and adapted into their own ways. Farmers underlined that the disadvantages of soil bunds should be tolerated in view of the protection they give to their farm plots. The view on the disadvantage of the soil bund was shared both with those farmers who use soil bund as conservation strategy and who do not have any bunds on their farm plots. The result is in line with the finding of (Tesfaye, 2003).

i) Land Tenure Issue

Different questions were posed to the sampled respondents in the study area to understand their perception of the absence of individualized property right on their decision on conservation intervention practices. The questions concern in the area of land ownership and the use of it throughout lifetime. As the survey result showed, 69% and 62% of the respondents responded "yes, off course" and the remaining 31% and 38% respectively said no and as a reason they put various reasons such as the land belongs to government, stop farming in near future, the land will be redistributed, and some said land will be taken away by the government at any time. Though thus respondents knew that the land belongs to the government and they have only use right, no respondent put the insecurity of land as reason for not using conservation intervention practices that enhance land productivity.

The cross tabulation chi-square result showed there was statistically significant difference for the question of "land belongingness" at $P<0.05$ significance level ($P=0.012$; $\chi^2=6.350$) and no significant mean difference for the use of land throughout life time ($P=0.102$; $\chi^2=2.676$) among the adopters and non-adopters.

In a more general term, having the confidence of their land to inherit to their children makes a farmer to invest on his/her farm and to take care of it. About 86% of the respondents have an expectation to inherit their farm to their children. The result of chi-square showed that there was no a significant difference on their expectation to inherit their land to their children between adopters and non-adopters ($P=0.123$; $\chi^2=2.383$). This means having the confidence to inherit to their children has no influence whether to be adopters or non-adopters in the site and it contradicts the works of other persons such as (Abera,2003;Bekele &Drake, 2003) that found it was statistically significant.

Farmers' perceptions of security of land *(LANDSECU)* they cultivate was significantly associated with choice decision to conservation intervention practices. It influences farmers' choice decision by influencing sense of responsibility and length of planning horizon of the household. It is in agreement

with (Woldeamlak, 2003; Yeraswork, 2000; Wood, 1990; Atakilte, 2003; Gebremedhin &Swinton, 2003) and disagrees with Bekele, 1998 & Long, 2003. As from the model output as there is more land tenure security, it will increase the probability of farmer's choice decision of conservation practices by 15.6% (Table S5).

j) Off–farm activities

Off-farm activities such as labor work and trade were also considered as other sources of household incomes in the study area. The result of chi-square analysis showed that there was statistically significant difference on the off-farm activities on intervention practices among the non-adopters and adopters at $P<0.1$ levels. As in (Amsalu, 2006) Off-farm activities may have a negative effect on the decision behavior of SWC due to reduced labor availability. When the farmer and family members are more involved in off-farm activities, the time spent on their farmland will be limited and hence the family is discouraged from being involved in construction and maintenance of SWC structures. On the other hand, Habtamu, 2006 & Fikru, 2009 off-farm activities can be a source of income and might encourage investment in farming and SWC.

As hypothesized, off-farm income *(OFFINCO)* of the household is found to have a very significant and negative correlation with the conservation practices. This may be explained by the negative relationship between the conservation practices and off-farm income activities. Other similar studies reveal the same results (Ervin &Ervin, 1982; Gebremedhin & Swinton, 2003; Semgalawe & Folmer 2000; Pender &Kerr, 1998; Bekele & Holden, 1998). As observed from the result, an increase in off-farm income will decreases the probability of farmer's choice decision of conservation practices by 2.6% (Table S5).

k) Distance to market

The nature and development of markets for factors of production (land, labour) inputs and out puts can play a major role in determining patterns of land use and land management.

With respect to distance to markets the survey result showed that, 44% of the farmers responded the location of market is far from their residence, 37% responded as very far and only 19% said closer to their residence. The result of chi-square analysis showed there was no statistically significant mean difference on the distance of markets from their home among the non-adopters and adopters.

IV. Institutional Support

a) Training on Conservation Practices

Empowering farmers to have a now how of soil degradation and how to halt it through training has a great contribution in conserving soil resources. It was reported that, currently government (Productive safety net program and other projects) and also NGOs working in the area provide technical and material support including short and long term trainings concerning erosion hazards and intervention measures. Farmers of the area received regular technical advice from DAs or other soil conservation technicians.

In the site, the majorities 66% and 58% have taken long and short term training respectively and the remaining have not participated in any form of training related to erosion and conservation intervention practices respectively. The chi-square test result showed that statistically significant mean difference on training conservation practices at $P<0.05$ significant level between adopters and non-adopters ($P=0.000$, $\chi^2=15.699$).

Access to training *(TRAIN)* in various times on hazards of erosion and intervention practices is highly significantly correlated with choice decision. Training influences farmer's decision to adopt various practices by enabling farmers to get adequate information that is useful incentive for choice decision. Previous studies indicated that farmers that are more informed assess the impact of soil erosion better than their counterparts that are not (Traorè *et al*, 1998; Sain & Barreto, 1996). As observed from the model result, as farmers get training on SWC and related activities, the probability of using improved SWC practices increases by a factor of 6.6% in the study area (Table S5).

b) Agricultural Extension Services

The information obtained and the knowledge and skills gained through extension message and contents accelerates farmer's decision on conservation practices. BoARD is the responsible organization to give agricultural extension services to the farmers in the rural area. The organization has a structure that extend down to Peasant Association (PA) level. From the result of survey, about 85% of the respondents have reported that they have access to extension services. The service is mostly given on crop and animal production and little attention was given to conservation practices. Development Agents who undertake the extension service at grass root level also confirmed this. The chi-square test result showed that there was a statistically significance mean difference on extension services among the adopters and non-adopters ($P=0.007$, $\chi^2=7.391$).

c) Access to credit

Credit is use to improve the ability of households at critical times of the year to buy inputs. From the total of 103 sampled respondents who were asked whether they received credit or not, about 63% reported that they had received agricultural credit in the past years and they also mentioned the sources where they access i.e. government, NGOs, relatives and the combination in the form of fertilizer credit, seed credit,

livestock and incentives for SWC practices and 40% of farmers use credit for conservation practices. The output of cross tabulation chi-square test showed that there was a statistically significant difference among adopters and non-adopters on credit services (P=0.001, χ^2=10.989).

V. Conclusions

Farmers' conservation intervention decisions whether to use conservation practices are shaped by several factors and are mainly determined by the particular location. In this regards, this work assessed farmers' decision on intervention practices and concerned factors in Mt Damota sub-watershed. The study has tried to look into the socio-economic, physical, institutional and other related factors. This study focused on three major conservation intervention practices (grass strip, fanya juu and soil bund).From the total respondents, about 72% of the sample households practiced at least one type of this practices on their farm; which indicated that most of the farmers in the study area are adopters of the technology.

The cross-tabulation chi-square test result showed that, the farmers' choice decision of conservation intervention practices was positively and significantly influenced by the respondents' educational status, social position, source and distance of farmland, training, tenure security, extension and credit service at P<0.05 levels and family size and off-farm income at P<0.1 levels; where as it is not influenced by the age, sex, farm size, farming experience, number of farm plots, slope gradient and soil type in the site.

Results of the model showed that among these hypothesized explanatory variables six variables were found to be significantly related to the farmers' choice decision on practices; educational status, training, off-farm activities, source of land, and tenure security .

With regard to strategies and programs by concerned bodies in SWC practices, it is concluded that considering the importance and difference in the above mentioned variables in the design, promotion and implementation of SWC practices leads to effectiveness and productivity; unless and otherwise it is unlikely to be effective.

a) Future line of Work

Based on the findings, the following points are forwarded for future work:

- An institutional support on conservation practices should get due attention by the planners and other concerned bodies for effective conservation and agricultural development in short and long time intervals.
- There is a need that extension planners should give attention to activities, which focus on the complementarities of both the conservation strategies of land management and income generating activities in long run. (e.g., Employment generating scheme during slack period of the year).
- Detail identification of both techniques (traditional &introduced) and further studies on their effectiveness and productivity is essential and attention and technical support should also be given and extended to land husbandry.
- Educational status and family size are significantly and positively related to decision. So; attention should be given to education access in the site in short and long run. Controlling the increase in the family size should be of priority and Policy related to family planning, education and other means of reducing family size will help to reduce land degradation and increase crop production and per capita income.

Competing Interest

The author declares that there is no competing interest on this publication.

Authors' Contributions

Merkineh Mesene has designed the research, collected field data, analyzed and prepared the report.

VI. Acknowledgments

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Appendices

Table 1: Appendix S1: Family size of HHs

Family size	Woshy (44HHs)		Wandara (59HHs)		Total(103HHs)	
		%		%	N	%
<2	0	0	1	2	1	1
3-5	17	39	20	34	37	36
6-10	24	54	37	62	61	59
>10	3	7	1	2	4	4
mean						7
SD						2
χ^2						16.2*

Note: SD- standard deviations, N-sample size
**is significant at less than 10% probability level.* *Source: FieldSurvey*

Table 2: Appendix S2: Slope gradient classification

Gradient class	Woshy (44HHs)				Wandara (59HHs)				Total (103HHs)	
	P1	P2	P3	P4	P1	P2	P3	P4	total	%
Flat	10	2	2	0	17	6	0	0	37	20
Medium	13	11	2	1	23	11	9	1	71	40
Steep	20	9	6	2	19	10	3	3	72	40

Source: Field survey

Table 3: Appendix S3:Fertility status

Fertilit	*Woshy (44HHs)*				*Wandara (59HHs)*				*Total(103HHs)*	
	P1	P2	P3	P4	P1	P2	P3	P4	N	%
Low	6	6	4	3	3	10	4	4	40	22
Mediu	33	11	3	0	45	13	6	3	114	64
High	3	3	1	0	12	3	3	0	25	14

Source: Field survey

Table 4: Appendix S4 : Problems associated with practices

Problem related to practices	Frequencies of respondents		
	Grass strip (%)	Fanya juu (%)	Soil bunds (%)
Require large labour	6	15	22
Reduce farm (plot) size	2	14	19
Difficult to implement	6	12	16
Lack of grass species (seedling)	15	-	-
Difficult to turn oxen	-	10	11
Sources of rodents	-	8	12
No problem	7	2	6

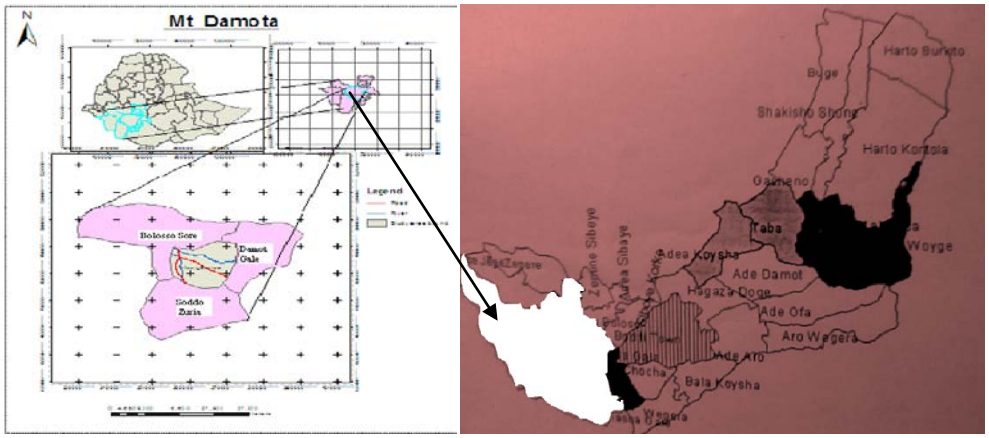
Source: Field survey

Table 5: Appendix S5: The maximum likelihood estimates of the binary logit model

Variable code	Estimated coefficient (B)	Standard error (S.E.)	Wald statistics	Degree of freedom (df)	Significant level (Sig.)	Odds ratio Exp(B)
SEX	-0.960	2.290	0.176	1	0.675	0.383
AGE	-0.256	0.175	2.131	1	0.144	0.774
EDUC	1.363	0.642	4.510	1	0.034*	3.907
FAMLSIZE	-27.495	4.019E4	0.000	1	0.999	0.000
FARMEXP	-5.813	3.720	2.442	1	0.118	0.003
FARMSIZE	8.136	6.899	1.391	1	0.238	3.415E3
PERCSH	-23.233	1.828E4	0.000	1	0.999	0.000
TRAIN	2.717	1.166	5.426	1	.020**	0.066
EXTENS	-1.970	2.119	0.865	1	0.352	0.139
CREDTS	-7.420	5.135	2.089	1	0.148	0.001
LANDSECU	1.861	0.886	4.411	1	0.036**	0.156
OFFINCO	-3.665	1.486	6.081	1	0.014*	0.026
FARMDIS	-0.145	1.294	0.012	1	0.911	0.865
SOURLAND	0.926	0.382	5.874	1	0.015*	2.525
EFFECT	3.607	1.199	9.054	1	0.003*	3.666
Constant	67.540	2.212E4	0.000	1	0.998	2.150E29

Notes: Exp (B) shows the predicted changes in odds for a unit increase in the predictor
**and **Significant at 0.1 and 0.05 level, respectively.*

Appendix S6: Location of study site



Source: Field photo by the researcher

Appendix S7: Discussion with Key Informants