The Journal of Economic Concerns | Vol. 12, No. 1, 2021
ISSN Print : 2091-0541 | ISSN Online : 2705-4802 | Published by NECS, NEPAL

Binary Choices of Forest User's Group of the Community Forest about Familiarity of REDD in Nepal

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Abstract

This study examines empirically low carbon activities potential from avoided deforestation in the community forest of Nepal by using primary data sets. The primary data sets were collected from household survey in the Kafle Community Forest (KCF) of Lamatar-6, Lalitpur District, Nepal. The study has employed descriptive statistics and probit model to analyze the data sets. The study found 45 percent household depending on the community forest for livelihood materials (firewood, leaf litter, grass, water), along with service and agriculture income sources. Further, the study accounted a carbon income of Rs. 39, 81,196, if KCF enters in Reduction of Emission from Deforestation and Degradation (REDD). The income is 41 times more than the present mean income of Rs 24, 549.55 from forest products sales of the community forest. As a result of binary choice, the study in mixed familiarity with REDD finds only 44 percent of households expect that REDD will be a better livelihood alternative to the poor. 63 percent respond to the need and use of carbon income for livelihood objectives. Thus, the poor households expect a livelihood role from carbon trading from REDD mechanism in Nepal. Therefore, the REDD program of the government should be designed more beneficial to the poor household stakeholders from carbon trading for their livelihoods, income generation and welfare so that poverty reduction program would be effective.

Keywords: *Community forest, REDD, Deforestation, Livelihood, Carbon income.*

1. Introduction

Community forest users groups (CFUG) are major stakeholders with higher responsibility and authority based on three principles: participation, collective action and sustainable management in the success story of the community forest (Bista, 2021). In Nepal, CFUGs are 22266 managing 2.24 million hectares (35%) of total forests (44.74 % =6.61 million hectares) with 2.91 million households (33% of total households) (DFRS, 2015 & MoF, 2020). In CFUG, individual members are heterogeneous in socio-economic characteristics with different knowledge and perceptions on sustainable forest management and reduction of emission from degradation and deforestation (REDD). In the socio-economic characters, its composition is mixed of rich and poor people, literate and illiterate, male and female. These differences and heterogeneity affect their level of familiarity about REDD and their forward looking decisions on the implementation of REDD. However, DoF (2018) considers REDD as source of financial and non-financial carbon benefits for advancing sustainable forest management and contributing global low-carbon economic development pathways and the global sustainable development agenda. At national level, the participation of the government of Nepal has been since 2011. At CFUG level, decision to transform CFUG to REDD has been a big issue.

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In the willingness to pay (WTP) regression models, socio-economic variables are explanatory (Arrow *et al*, 1993; Ojea & Louriero, 2007). Similarly, Bista (2021) has widely used socio-economic variables in probit model logistics models and also in multiple regression models. In the non-market module of the community forest, heterogeneous individuals have awareness about environmental problems: free rider, forest degradation, disasters and over livelihood dependency (Bista, 2021 & MoF, 2021). However, they were not aware about market module of the community forest and its link with carbon credit and climate change. In the non-market public goods, their range of understanding is plantation, conservation and utilization for their livelihood without thinking their opportunity cost to these collective actions and activities for generating positive externality at the community and environmental public goods. As a result, the growth of forest resources are impressively significant in terms of the growth of greenery of trees, grass and shrubs with birds and wild animals, appearing water sources in the unexpected areas, and natural beauty. As its outcomes, the positive externality of the forest has reduced external cost of health hazards and physical losses, along with employment opportunities and poverty reduction. DoF (2018) has projected 9 million ton carbon credit from the community forest having 15600 million NRs carbon income potentials. The projection covered 13 districts of the country. In Nepal, the government has initiated the readiness program of REDD in the country since 2011 (DoF, 2018). Till date, awareness and capacity of CFUG are matter of concern because large CFUG cannot decide to transform CFM to REDD. Thus, their range of environmental knowledge decides vote on REDD. Therefore, the familiarity about REDD is determinant to develop their opinion.

The organization of this paper is comprised as follows: section 1: Introduction, section 2: Objectives, section 3: Literature Review section 4: Methodology, section 5: Results and Discussion, and section 6: Conclusion.

2. Objectives

The broad objective of this paper is to measure the familiarity about REDD, and to suggest policy implications.

3. Literature Review

Community Forest Users Group (CFUG) has a customary right to take decision on forest management, benefit sharing and future planning. Kaimowitz (2008) and et al., (2013) emphasized to the effective implementation of REDD to capture its mitigation potential under the flexible, phased approach and to sustainable outcome for REDD under the global partnership by developing reference level based on employing the Kyoto Protocol definition of forest and the Intergovernmental Panel on Climate Change (IPCC) framework for greenhouse gas (GHG) inventories. McDermott (2009) considered it with observing the large influence of forestry user groups on decision making process on access to resources and benefits with distributional justice. In practice, Howard (1991) mentioned multiple decision making criteria of forestry user groups. In Nepal, Chhetri et al. (2013) found forest user groups as determinant of decision making about forest management and planning and benefit sharing. In the group, higher caste have influenced largely. Gautam (2009) supplemented it with argument of their self-governance on social, human and ecological capital and sustainable forest management. In Kenya, Uganda, Bolivia and Mexico, Suna, Mwangi and Meinzen-Dick (2011) found the influence of gender composition on property rights

and forestry governance. The gender balanced forestry groups focused more on forestry decision making and exclusive use of forests. Agarwal (2015) observed gender role similarly. Bhattarai (2020) focused gender equitable adaptation to climate change with suggestion of monitoring the changing gender inequality in the forest management institutions and service delivery mechanisms and adaptation planning to fully harness the potential of gender equitable forest management and climate change adaptation. Therefore, CFUG is a determinant to decision making and planning.

On climate change, Dahal (2011) and Geeklyanage et al., (2015) considered multidimensional impacts of climate change on the life of rural communities by focusing adaptation practices in community forest. Besides, Timilsina et al. (2014) found adaptation practices of CFUG to climate change. In novel decision support system, Czimber and Gálos (2016) focused on adaptation and mitigation strategies of climate change. Mentioning CF as a tangible contributor to human and social capital and awareness about forest management, Lin et al. (2019) considers the progress as a viable climate change adaptation strategy in Southeast Asia and the need of comparative research on it. Thus, CFUGs have realization about the relationship between threat of climate change and community forest.

In this regard, as a solution of REDD, Bista (2011) suggested the decision of CFUGs on REDD because of a huge carbon stock of the community forest of Nepal. Similarly, Pandey, Cockfield and Maraseni (2016) considered CFUGs of CF of Nepal on adaptation and mitigation. They argued the role of the community forest user groups (CFUG) to increase forest carbon stocks with their motivation to realize REDD+ carbon incentives to reduce the food supplement capacity of forests by limiting vegetation diversity. Besides, Dahal and Banskota (2009) found the consensus of the CFUGs to access the unfolding opportunity of carbon financing through REDD, despite their poor knowledge about its potential benefits. They noted their ability to resolve national and international issues of REDD. Furthermore, Poudel et al., (2014) found carbon sequestration as new value under REDD. However, REDD generated both positive and negative outcomes. Despite CFUGs as independent decision making institution and customary access rights to forests, they just considered an opportunity. But CFUGs have not familiar about REDD and its benefits. Above mentioned literatures have a gap to measure their familiarity level about REDD. This study fills up this gap. Therefore, this is relevant in the assessment of REDD.

4. Methodology

4.1. Models: Binary Choices of Households about REDD

Consider there are heterogeneous characters (x_i) of n^{th} household stakeholders in terms of income level, awareness level, occupation, age, food sufficiency, literacy, and organization. These heterogeneous socio-economic characters are determinants of n^{th} household stakeholder's responses on dichotomous choices. Different preferences and choices of the household stakeholders have assumed an important role in policy decision-making. Such type of issue can be trapped by using the Sequential Model (Greene, 2005; Maddala & Lahiri, 2009) for determining the probability of REDD for familiarity about REDD in Nepal. Probit Regression Model framework will be as follows:

$$\text{Probit}(Y_i) = \beta X_i + u_i \text{----------(2)}$$

Where $Y=\int_{0\ otherwise}^{1=if\ Y*>0}$

Where, β= vector of regression coefficient ($0<\beta<1$)

x_i= vector of predictor variables (e.g. avoided deforestation, livelihood, REDD etc.)

u_i= vector of Random variable (error term)

π= probability of an outcome

From probit and logit models, we will get the probability of familiarity of household about REDD which will be the dependent variable. The relationship between a dependent variable and independent variables (income, landholding, education, caste, household size, occupation, area, organization, etc) will be captured by using multiple regression models.

P (Familiarity of household about REDD=1) = $\beta_0+\beta_1$ income+β_2 landholding+$\beta_3$education+β_4 caste+β_5 household size+β_6 occupation+β_7 area +$\beta_8$organization + ε

Where, β_0= intercept $\beta_1,\beta_2,\beta_3,\beta_4,\beta_5,\beta_6,\beta_7,\beta_8$=regressors, $0<\beta_0,\beta_1,\beta_2,\beta_3,\beta_4,\beta_5,\beta_6,\beta_7,\beta_8<1$

ε=error term

4.2. Data Sources

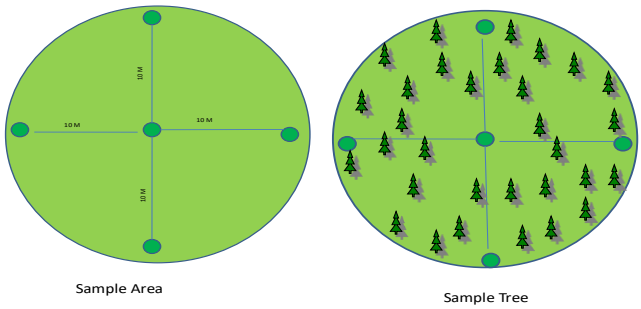
Data set for this study was primary. The survey team conducted a household survey to 48 households as stakeholders of KCF in Lamatar Village in 2018 (April-May-June) following up the survey 2010. Its rationales are as follows: a) KCF had a community forest management's 10 years long history and involvement in carbon inventory and activities with NGOs and INGO. Secondly, Kafle Community Forest was selected on these relevancy grounds to REDD. As stakeholders, there was assumed variation about community forest management participation and dependency and knowledge of REDD and heterogeneity in household socio-economic characters. Thirdly, the study site was visited for pre questionnaire test, understanding households, and carbon inventory. Thus, Kafle Community Forest was finally selected for the conducting household stakeholder survey and carbon inventory survey.

In the second level, sample size of the study was 48 households out of 63 total household's stakeholders in KCF as users groups after the required pre-information was collected from the Village Forest Range Post and the Executive Committee of KCFUG to conduct a household stakeholder survey and carbon inventory survey. It covers approximately 70 percent of household stakeholders of KCF.

In the third level, the household questionnaire survey was conducted with the help of a KCF executive member. The survey was conducted by coding household stakeholders during three months (April-May-June). The questionnaire which was used in the household survey is divided into three sections: section 1: basic information about household socio-economic status, section 2: household's participation and dependency in KCF and section 3: familiarity about REDD. Locally trained people had conducted carbon inventory in KCF. The survey had also focused to find out the familiarity, opinion, and expectations of household stakeholders about REDD.

Finally, KCF was visited several times to observe the demonstration plot and five blocks of KCF for identifying sample plots for carbon inventory. After the discussion with a trained local carbon inventor, the sample plot was finally selected. The sample plot was made a circle by making a central point from

Figure 1: Sample Plots of KCF



Source: Raghu Bir Bista, 2010 based on Sample Plot and Sample Tree selected in KCF

that point there was made area of 10 meter radius into four directions east-west-south-north (*see in figure 1*). In the sample plot, carbon inventory was used to measure the dbh of trees. In the carbon inventory, approximately 30 tree species were measured (see in appendix). The average dbh in KCF was 13.56.

4.3. Characteristics of Study Area

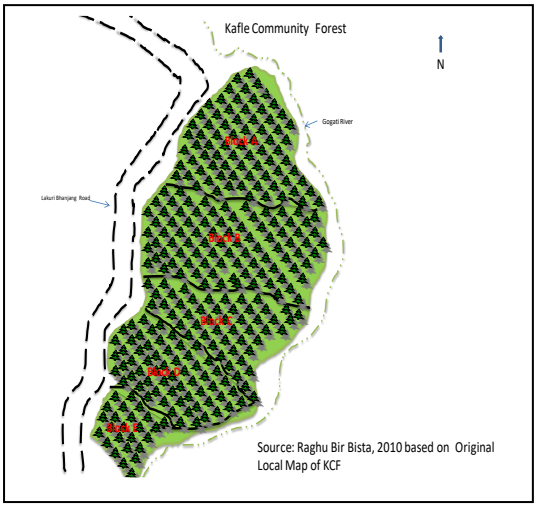
4.3.1. Characteristics of Kafle Community Forest (KCF)

Kafle Community Forest (KCF) is the study area of Nepal. It locates at Lamatar 6 in Lalitpur District, Kathmandu (*see in Map 1*). The selection of this community forest is because of its representative characteristics of the community forest, deforestation history but successfully avoided deforestation, higher livelihood dependency of the poor households, documentation of plant species, activities of carbon inventory, and easy accessibility.

Map 1: Study Area

Source: Raghu Bir Bista, 2010

Map 2: KCF Map



Lalitpur district, a small district of 75 districts of Nepal highlighted in Kathmandu Valley locating the Central Development Region. In 2006, the forest area in the district was recorded at 15, 253 ha. Community forest was approximately 65 percent (9,923ha) managed by 162 CFUGs (DoF, 2006). Kafle Community Forest in Lamatar Village is one of the CFUGs.

The Kafle Community Forest (KCF manages a block of 96 ha involving 63 households of the VDC is located in Mathilo Khoriya Dada in the east, Gumati Khola in the north, Chisapani Peepal Tree to way to Bhihawar in the South, and the main road to Khatri Bhajho in the west (*Map -2*). The altitude of KCF ranges from 1540 meters to 1970 meters. For forest management and utilization, KCF was managed into five blocks as A, B, C, D, and E with the area of 20, 31,27,6, and 10 hectares respectively. The forest is dominated mixed type regenerated trees (DFO, 2002)

The forest lies at an elevation of between 1830 and 1930 meters and is dominated by lower temperate broad-leaved species, particularly Schima-Castanopsis (katus-chilaune). In KCF, there were found 52 species NTFP listed.

4.3.2. Household Characteristics of Stakeholders

This section presents characteristics of KCF households with household socio-economic condition, HH size and composition, household economy, and household resources endowments discussed.

Table 1: Household Composition and Demography

HH	Mean	Standard Deviation	Minimum	Maximum
HH size	4.85	1.42	2	9
Male	2.48	0.88	1	6
Female	2.46	1.009	1	5
Education				
Literate	4.45	1.54	1	9
Illiterate	1.04	0.21	1	2

Source: Field Survey, 2018

HH size and Composition in which Table-1 provides 4.85 mean household sizes in the range between 2 and 9 family members. This average household size is smaller than national household size (5.4) (CBS, 2011). However, the rich has smaller household size than the poor and medium-income group. In KCF, larger households of the poor and medium-income group are a major source of labor endowments in the forest management and conservation. Thus, the correlation between HH size, and labor endowments in the forest is observed in different kinds of literature. In sex composition, household has of 50% male and 50% female. There is not so much difference. Mean Male size is 2.48 and mean female size is 2.46.

Table 2: Poverty Scenario

Poverty	Relative Poor	Absolute Poor
Mean	5.06	14.17
Standard Error	0.419	1.31
Standard Deviation	1.6	4.18
Population	76	157
%	32.62	67.38

Source: Field Survey, 2018

Household's Economic Condition: Table 2 and 3 presents the poverty scenario and food sufficiency across income groups, education, and sex. In poverty measure, relative poor is 32.6 percent households and absolute poor is 67.38 percent households following per day earning poverty line of the World Bank (1.9USD) despite higher literacy level. 12 months food sufficiency measure shows 66.6 percent under food insufficiency (Table-3). Absolute poor households have very limited resource endowments.

They have not livelihood alternative to meet their food deficit months, except for KCF.

Table 3: Household Socio-economic Condition

HH categories	No of HH	Average	Average Food Sufficiency	
		Size of HH	12 month	less than 12 month
Economic				
Poor	12	4.9	4	8
Medium	25	4.9	8	16
Rich	11	4.58	4	8
Education				
Literate	45	4.35	15	29
Illiterate	3	0.5		3
Sex				
Male	45	2.37	12	26
Female	3	2.45	3	6

Source: Field Survey, 2018

Household Resource Endowments: In household Resource endowments, the study found "2Ls" variables: land and livestock (table 4). Almost households perceive land and livestock as major assets with the belief that more assets mean more wealth. Mean irrigated landholding is 2.7 Ropani (0.2 hectares) and mean marginal landholding is 2.3 Ropani (0.17 hectare). Since such mean landholdings lie below 0.5-hectare landholdings, almost households are small landholders. As supplementary, in livestock asset, mean number of cow/buffalo is 1.57 and mean number of goat/sheep is 2.73. Thus, household resource endowments indicate the characteristics of poor households.

Table 4: Household Resource Endowments

Land Holding	Mean	Standard Deviation	Minimum	Maximum
Irrigated land	2.7	2.0	0.1	10.0
Marginal land	2.3	1.6	0.1	8.0
Livestock				
Cow/buffalo	1.57	0.5	1	2
Goat/Sheep	2.73	1.5	1	6

Source: Field Survey, 2018

Household Participation: Table-4 shows household participation in KCF in percentage. Higher and medium participation in percentage can be considered as effective participation but lower and none measures cannot be considered effective participation. Household participation in forest protection is 85.3 percent, followed by forest management at 84 percent, development activities at 82 percent, resource utilization at 76.6 percent, decision making at 73.0 percent, and training at 55.99. These information indicate the effective participation of households in terms of labor contribution and attendance.

Household Livelihood Dependency: In Nepal, community forest is perceived as alternative livelihood local resources for the poor (NPC, 1997). It is followed by KCF households for meeting their basic demand of energy, fodder, leaf litters, clean drinking water, etc presented in table-6.

Table 5: Household Participation in Percentage

Participation	Higher	Medium	Lower	None
Decision Making	29.5	43.2	25	2.2
Development Activities	28.8	53.3	17.7	
Forest management	27.2	56.8	15.9	
Forest Protection	29.2	56.1	14.6	
Resource Utilization	16.2	60.46	16.29	6.9
Training	15.9	40.09	34.09	9.09

Source: Field Survey, 2018

Table 6 provides that there are 16.4 bhari (656 kg) mean firewood extraction, 4.4 (176 kg) bhari mean grass, and 7.6 bhari (304 kg) mean leaf litter. There is a maximum 100 bhari (4000kg) extraction of firewood followed by 40 bhari (1600kg) grass and 50 bhari (2000kg) leaf litters. In case of more forest product demand, the concerned household should pay nominal charges following the charge per bhari.

Table 6: Statistical Descriptive Summary of NTFP Extraction

Forest Product (in bhari)	Minimum	Maximum	Mean	Standard Deviation
Firewood	0	100	16.4	18.0
Grass	0	40	4.4	5.6
Leaf litter	0	50	7.6	12.9

Source: Field Survey, 2018

Despite household dependency on leaf litter, grass, and firewood, a household's dependency on firewood for household energy consumption for heating and cooking is greater than on other NTFP (leaf litter and grass). So far concerning firewood, the respondents are very happy with the availability of firewood and not required more time allocation for firewood collection. In addition, almost every household uses firewood for household energy, instead of gas. Energy expenditure of households is claimed 70 percent less than their demands.

Similarly, the community has observed water resource availability in terms of higher scale and good quality in KCF after KCF has been regenerative and rehabilitated. The additional natural resource has a positive externality to the community in terms of free clean drinking water against the same opportunity cost of their labor for KCF management and conservation. The scale of clean drinking water is for 24 hours. This free public good is supplementary livelihood to the households.

Table 7 shows that Kafle community forest provides monetary benefit equal to Rs. 182,797.9 per annum. Mean KCF income is higher than mean income from service and agriculture sectors. Higher CF income share at household stakeholders show alternative livelihood sources having a huge economic value supplementary in terms of energy substitution, chemical fertilizer substitution, and clean drinking water supply and facility. This is the motivation part behind the household's participation in KCF. There is claimed equal participation and distribution.

Table 7: Annual Income of Sample Households from Different Sources (Rs)

Income Source	Min	Max	Mean	Sta Dev
Service	0	726000	179958.3	133483.1
Agriculture	-1000	268800	41122.55	46675.5
CF	73000	328500	182797.9	52003.4
Total	72000	1323300	403878.8	232161.9

Source: Field Survey, 2018

5. Results and Discussion

5.1. Estimation and Analysis of Expectations about REDD

The binary Discrete Choice Questionnaire about REDD was set up into level 1: familiarity about REDD. The questionnaire was surveyed in 48 household stakeholders of Kafle Community Forest. In the household survey, there was a major concern on awareness level, opinion, and expectation of stakeholders about REDD. These stakeholders' character, capacity, and decisions might show the future direction of REDD in Nepal at the stakeholder level in community forest management.

5.1.1. Descriptive Statistics of Independent Variables for REDD

Discrete choice of households on REDD is assumed to be influenced by heterogeneous socio-economic household characters when respondent households respond to these choices. These characters including such as literacy, poverty level, food sufficiency level, sex, landholding, family size, and income level are assumed independent variables in the selected models. Their statistical characters as presented in model is presented in Table 8 and 9.

In summary, HH size within the age group is measured in terms of the number of the unit. The food sufficiency of households is measured in months. The landholding of HH is in the local unit that is *Ropani(0.07 hectare).* Per person per day in terms of the dollar is used for earning per day. Earning is considered as an exogenous variable. Livestock of HH is in number unit.

Model: Familiarity about REDD

In Model: familiarity about REDD, there were binary choices: Yes and No. These choices reflect household awareness level. Responses of respondent households on familiarity with REDD are influenced by heterogeneous socio-economic household characters. In Model: HH size, food sufficiency, landholding, earning per day, Rsex, Rlivestock, literacy, per day earning, age, and source of information were used as independent variables. 48 households were surveyed for this purpose. Statistical characters of these independent variables are estimated and presented in Table 9.

Table 8: Model (Familiarity with REDD)

Variable	Mean	Std. Dev	Min	Max
HH size	5.42	2.07	3	9
Food Sufficiency				
12 >	0.35	0.52	0	2
9>	0.14	0.35	0	1
6>	0.33	0.47	0	1
3>	0.2	0.41	0	1
Land Holding				
10>	0.1	0.3	0	1
5>	0.2	0.41	0	1
1>	0.62	0.48	0	1
	0.041	0.2	0	1
Earning per day				
1>	0.22	0.42	0	1
2>	0.52	0.5	0	1
>2	0.25	0.43	0	1
Rsex	0.79	0.41	0	1
Rlivestock	1.8	1.39	0	1
Literacy				
>SLC	0.41	0.49	0	1
SLC>	0.22	0.42	0	1
Literacy	0.27	0.44	0	1
Per day earning	1.68	1.07	0.1	5.2
Age	54.68	90.32	18	66
Source of information				
Seminar	0.29	0.45	0	1
Training	0.14	0.35	0	1
Newspaper	0.083	0.279	0	1

Source: Field Survey, 2018

Table 9: Model (Familiarity about REDD)

Variable	Probit	
	Coeff	St.Err
constant	-14.8	5.72
HH size	-0.24	0.4
Food Sufficiency		
12 >	-5.01	2.37
9>	-3.47	1.85
6>	-5.73	1.76
3>	-4.41	--
Land Holding		
10>	--	--
5>	-4.54	--
1>	5.38	1.66
Earning per day		
1>	4.14	2.59
2>	1.73	1.5
>2	--	--
Rsex	2.09	1.55
Rlivestock	-0.176	0.358
Literacy		
>SLC	9.27	0.91
SLC>	9.01	--
Literacy	8.61	1
Per day earning	1.35	0.89
Age	0.044	0.028
Training	0.14	1.16
Psedo R2	0.48	
LR(χ^2) (16)	27.5	
Prob>χ^2	0.0512	
No of observation	48	

Source: Field Survey, 2018

5.1.2. Estimation and Result of Probit Model

In the study, a Probit model was used for the estimation of parameters. The estimation was extended to **level: Familiarity about REDD.**

Model: Familiarity with REDD

In Model, the probability of familiarity about REDD is estimated by using HHsize, food sufficiency, landholding per household, different earning per day, Rsex, Rlivestock, literacy level, per day earning, age, and training as independent variables. Familiarity about REDD is the binary dependent variable having two choices: yes and no. In the model, yes is coded as one and no is coded as zero. The positive coefficient of independent variables implies an increase in the probability of familiarity with REDD. The estimation of the probit model for level 1: familiarity about REDD is presented in table 9.

The higher coefficient for LRχ^2 (16) test of better alternative of REDD to CF shows that the model has good explanatory power. The estimated parameters show that hh size, food sufficiency (12>, 9>, 6>, 3>), landholding (5>), and Rlivestock are significant and negative at 95 percent confidence level. It implies that the probability of familiarity about REDD decreases, if the households have large hh size, increasing food sufficiency, greater landholding than 5 ropani, and large number of Rlivestock. Similarly, the positive parameters show that age, literacy, per day, earning, Rsex and Training are significant and positive at a 95 percent confidence level. It implies that older people, increasing literacy, per day earning and male participation will increase the probability of familiarity about REDD.

6. Conclusion

REDD is a market mechanism of carbon credit trading to provide incentives to the conservation and preservation of forest resources in developing countries like Nepal where the community forest is a popular and successful story. However, there is a query about its sustainability in future, although its carbon sequestration is an effective measure to reduce the stock of GHG emission in the atmosphere. In this regard, REDD is a powerful tool. In Nepal, the low-income heterogeneous socio-economic characters of the people have been active in the community forest as collective action and property right for their livelihood objectives for their socio-economic safety and change. However, its livelihood and income are not motivational. In this context, REDD may be a big miracle to get a beautiful financial resource from their conservation and management of the forest. This transformation is possible when their perception about REDD is positive with their knowledge. Therefore, the study aims to examine the familiarity about REDD through the binary choice method. The study found that the poor households are more dependent on the community forest for NTFP. The share of forest products is approximately 45 percent. They contribute more labor endowments in forest management and conservation. Estimation of biomass and carbon per hectare provides REDD potentials if KCF enters in REDD. In the result of the model, 52 percent of household stakeholders have a familiarity with REDD but 48 percent do not have familiarity with REDD. Out of 25 household stakeholders, 44 percent of household stakeholders who are familiar with REDD expect that REDD is a better alternative livelihood to the poor. Thus, the result is mixed between familiarity and non-familiarity about REDD. Almost all households expect REDD for livelihood objectives. Therefore, the REDD program of the government should be designed to capture biomass capacity of the community forest for carbon income and made more beneficial to the poor household

stakeholders from carbon trading for their livelihoods, income generation and welfare so that poverty reduction program would be effective.

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