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Households' Characteristics, Forest Resources Dependency and Forest Availability in Central Terai of Nepal

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Abstract : For centuries, forests have been a key component of rural livelihood. They are important both socially and economically in Nepal. Firewood and fodder are the basic forest products that are extracted daily or weekly basis in most of the rural areas in Nepal. In this study, a field survey of 100 households was conducted to examine the degree of forest dependency and forest resource availability, households' livelihood strategy and their relationship with forest dependency in Chitwan, Nepal. A household' response indexes were constructed, Gini coefficient, Head Count Poverty Index (HCI) and Poverty Gap Index (PGI) were calculated and one way ANOVA test was also performed for data analysis. Data revealed that 82/81% of all households were constantly used forest for firewood and fodder collection respectively while 42% of households were used forest or forest fringe for grazing. The Forest Product Availability Indexes (FPAI) showed a sharp decline of forest resources from 0.781 to 0.308 for a 20-yr time horizon while timber wood was noticeably lowered than the other products. Yet, about 33% of households were below the poverty threshold line with 0.0945 PGI. Income distribution among the household showed a lower Gini coefficient 0.25 than 0.37 of landholdings size. However, mean income was significantly varies with F-statistics= 246.348 at P=0.05 between income groups (rich, medium and poor). The extraction of firewood, fodder and other forest products were significantly different between the income group with F-statistics=16.480, 19.930, 29.956 at P=0.05 respectively. Similarly, landholdings size and education were also significantly different between the income groups with F-statistics=4.333, 5.981 at P=0.05 respectively. These findings suggested that income status of households was the major indicator of forest dependency while poor and medium groups were highly dependent on the forests for firewood, fodder and other products. Forest dependency still remains high and the availability of forest products that can be extracted from the remaining forestlands is decreasing. The high dependency of households on forest coupled with other socioeconomic attributes like education, poverty, small landholders and so on were possibly caused the forest degradation in Chitwan.Therefore, policy must be directed towards the poor livelihood supporting agenda that may enhance the financial conditions of rural households while it could reduce the degree of forest dependency inspired with other income generating activities in due course.

Key words **:** *forest dependency, rural livelihood, field survey, chitwan, nepal, household response index*

1. Introduction

Forests provide a wide range of natural assets, including household goods, cultural values, physical and biological products, and other services that are vital to the livelihood of many people (USDA, 2007; NRC, 2008). Sunderlin *et al.* (2005) found that household surveys and case study research demonstrated that the rural poor tend to be disproportionately dependent on forest resources in the sense that a higher proportion of their total income comes from forest resources (Reddy and Chakravarty, 1999). Similarly, Odihi (2003) noted that one cause of deforestation was the lack of alternative energy sources and high profit margins from the fuelwood economy. Moreover, forests are promoted to improve the well-being of local communities (Elands *et al.*, 2004), and extensive forest areas are occupied with large numbers of poor people that depend on the forest for their livelihoods in the tropics (Wunder, 2001). In Nepal, forests are closely related to the basic needs and survival of the rural poor. The dependency on timber and non-timber forest products exceeds 95% and the procurement of fuelwood for cooking and house heating accounts for

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83% of the energy consumption (Gautam, 2006; SOE, 2001; ADB, 2004). Fodder collection and grazing are also traditionally practiced for livestock production, a major food resource for people of all regions in Nepal (FRA, 2000). However, human dependency on forest resources has had adverse impact on flora and fauna, and excessive pressure on these resources has led to severe environmental deterioration (FAO, 1999). Consequently, various problems i.e. climate change, desertification, deforestation and forest degradation have been also continually observing and rural livelihood is also threatening in the recent years.

Growing levels of concern have been leading to the studies of forest resource dependence among the rural households (Mamo *et al.,* 2007), socio-economic factors and their related activities (Namaalwa *et al.,* 2007), fuelwood consumption and forest degradation (Heltberg *et al.,* 2000), microeconometric analysis of forest biomass extraction by households (Dayal, 2006), models of policy changes (Grainger and Malayang III, 2006) in various part of the world. However, except few researches and individual studies (Fox, 1984; Adhikari *et al.,* 2004; Adhikari *et al.,* 2007; Sapkota and Oden, 2008; Panta *et al.,* 2009), yet fewer studies has been carried out in Nepalese Terai addressing this type of issues.

It is widely known that degree of forest dependency is also determined by the various households' characteristics. Therefore, we considered some households' characteristics such as education, poverty, income and landholdings size related with forest resources extraction pattern in Chitwan. Thus, this paper attempted to analyze the socioeconomic attributes of households' and their dependency on forest in terms of using firewood, timber, fodder and grazing land in Chitwan district of Nepal based on information gathered from field visit during the household survey. This information could be useful to planner in decision making process by understanding the households' livelihood, forest dependency, and their critical consequences in deforestation and forest degradation process of Nepalese Terai.

Methods and Materials

1. Study area

Chitwan district is located between 27° 00'-27° 45' N latitude and 84°15'-85°15'E longitude (Figure 1). It covers a total area of 2,218 sq km and ranges from 244 m to 1,945 m in altitude. The district is divided into two municipalities, and there are 36 Village Development Committees as the lowest administrative unit. Diversified socioeconomic structure with traffic junction for east-west highway and connection to the country's capital in north is another characteristic of Chitwan. It was one of the resource-rich districts of the country, having immense natural and commercial forests and agricultural commodities which, covered by virgin forest, had been

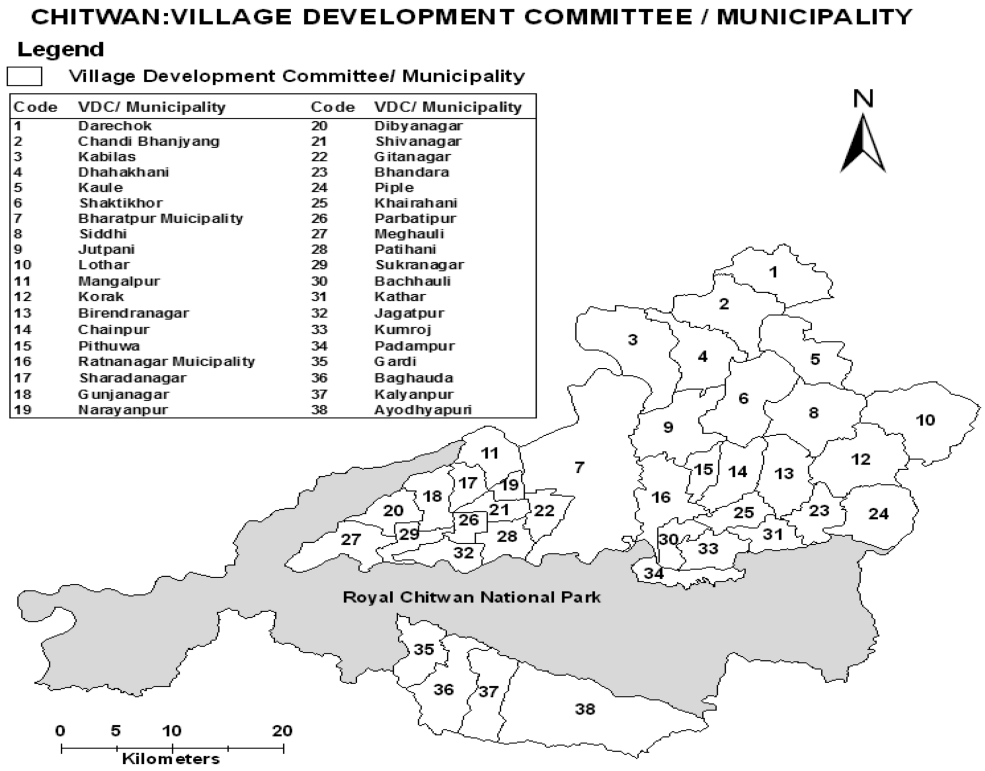

Figure 1. Study area containing VDCs in the Chitwan district of Nepal.

preserved for centuries and an undisturbed wildlife habitat. Forests resources were predominantly covered with Sal (*Shorea robusta*), relatively in good form compared with another districts nearby; however, it is surrounded by human settlement and therefore under heavy pressure to meet the basic desires of settlers hence forest are also deteriorating very rapidly. Moreover, since the 1960s, the land cover has been heavily disturbed by humans. Hence, a heavily degraded narrow Sal forest passage in the middle of the district is the last remaining forest corridors linking Chitwan national park with the wider mountain ecosystem of Nepal in north.

2. Data collection

This study was carried out mainly based on primary data collection in VDC/Wards level through a households' survey in 2007. In Nepal, Village Development Committee (VDC) in rural areas and Municipality in urban area are the grass root level administrative units, and each is further divided in to the smaller units called Wards. A VDC constitutes 9 wards and a Municipality constitutes more than 9 wards. First, we selected 8 administrative units including both VDCs and Municipalities purposely considering the location advantages using a stratified random sampling. However, due to time and financial constraints later we preferred only five units where forest boundary is one of the boarders of these administrative units. Accordingly, three Wards from each VDC and Municipality were selected purposely giving consideration to sharing a border and location nearest to the forest boundary for sample households. Such a way, 15 Wards were selected and then only 5 Wards were reselected randomly for the purpose of field survey. From each selected Wards 20 households and the total of 100 households was selected randomly using Random Number generating calculator for interview.

Systematically designed survey questionnaires were governed and triangulated to gather both qualitative and quantitative information. Questionnaires were prepared in Nepali language for the convenience of the respondents and were asked about the demographic, education, landholdings size, major sources of income, occupation and households' consumption, forest resources availability, uses and their monetary value based on local price, and households views about the forest management/degradation was also considered. All the households' information gathered from the questionnaires were coded and analysis in MS Excel and SPSS. Key informant/elite person interview, consultation of meetings and small group discussions, meeting with elderly people and direct observation were also carried out during the field work. In this way, households' survey and forest inventory data together Participatory Rural Appraisal were served as the primary information sources from the study area. While secondary information was collected from VDCs and Municipalities offices, previous research, documents and other publications. Local people nearby forest boundary who are mostly depend on forests as well as key informants involved in forest management were asked to interview and gather data on the status of livelihood, forest resources availability and the extent of forest dependency in the study area.

3. Data analysis

Forest Product Availability Response Index was constructed to reflect the household perception regarding the concentration of forest resources in the study area. This index was calculated on the basis of responses from sample households regarding the availability status of forest resources and forest products over the three different time horizons (20 years before, 10 years before and currently considered for 2007). Scores were assigned to measure the availability status over time (abundant=1, as required=2, less than required=3, and scarce=4). The average household score was then decoded into a scale between 0 and 1 (where 1 is perfect) and the results were interpreted. MS Excel and other simple statistics were also used for the data analysis.

Foster-Greer-Thorbacke (FGT) indices recommended by World Bank (http://www.worldbank.org/) like Head Count Poverty Index (HCI) and Poverty Gap Index (PGI) were used to calculate the economic strength of sample households. HCI explains the proportion of units (households or individuals) below the poverty line while GPI explains the total economic deficit of poor and depth of poverty. Both indexes were calculated in this analysis as below:

$$HCI = \frac{N_p}{N} \times 100$$

Where, HCI = Head count poverty Index
N_p = Number of units below poverty line
N = Total population

PGI was calculated based on:

$$P_i = \frac{1}{N} \sum_{i=1}^{N_p} \frac{Y_p - Y_i}{Y_p}$$

Where, P_i = Poverty Gap Index
N = Total Population
N_p = Number of people below poverty line
Y_p = Poverty Line Income ($1 per day of 14,942 NRs per annum considering, household available only 210-215 days of working day/year)
Yi = Individual income

The Gini coefficient is a measure of statistical dispersion which is commonly used to quantify the inequality of income or wealth. However, it has also applied in the

diversified fields such as ecology, health science and chemistry to study inequalities. It can ranges from 0 to 1. A low Gini coefficient indicates a more equal distribution while 0 indicate perfect equality. Oppositely, higher Gini coefficients indicate more unequal distribution with 1 perfect inequality (http://en.wikipedia.org/wiki/Gini_coefficient). Thus, Gini coefficient was also calculated to measure the inequality in income and landholdings distribution among the sample households in this study. Forest consumption and the degree of forest dependency are highly determined by the households' characteristics such as poverty, income, education/occupation, cast, distance to forest, landholdings size and so on (Sapkota and Oden, 2008) which is directly or indirectly related with rural livelihood. Poor households' are highly depended on forest for their basic needs because they are much benefited from the forest (Reddy and Chakravarty, 1999; Sapkota and Oden, 2008). Therefore, we also analyzed the forest dependency in terms of using forest products/services like firewood, timber, fodder, other forest products and grazing with respect to households' livelihood characteristics in the area. Households economic was considered as a key basis for analysis so households were divided in the three income groups namely: poor (Nrs. <14,942), medium (Nrs.14, 942-25,000) and rich (Nrs. >25,000) based on annual income and poverty threshold of the households. Finally, one way ANOVA test has performed in SPSS for further analysis.

Results

1. Forest products and energy sources at household level

Out of 100 sampled households, 82% responded that they collect firewood only from forest while 12% responded that collected from both their own land and forest; 81% of households collect fodder from the forest and approximately 42% of households use the forest or forest fringe to graze their animals. Types and quantities of various forest products extracted from the forest are presented in Table 1.

Similarly, 95% of the households responded that electricity was mainly used for lighting and electronic house wares. However, 34% of households were also used kerosene for burning lamps during power cut-off. Firewood, LP gas, and biogas are used as major fuel energy source for cooking at the households. Based on households' response, a total of 82% of households were using firewood for cooking in the study area (Table 2).

2. Monetary value of forest resources

The annual extraction values of forest products and

Table 1. Type and quantities of forest products used at household.

S.N.	Description	Households		Average Quantity Used (per household)	
		Number	Percent	Local Unit (Bhari/Week)	Standard Unit/week
1	Fire wood from the forest	82	82	3.46	103.8 kg/week
2	Fire wood both from the forest and respondent's own land	12	12	-	-
3	Fire Wood from respondent's own land	5	5	-	-
4	Timber	12	12	-	5.970 cf/year
5	Fodder from Forest	81	81	2.19	65.7 kg/week
6	Medicinal Plants	21	21	-	0.5 kg/year
7	Mushroom	10	10		0.7 kg/year
9	Fiber and other Products	5	5	-	3.99 kg/year
10	Grazing	42	42	-	1.21 hr./day

Table 2. Types and purpose of energy use at households.

S.N.	Description	Household No	Purpose	Percent
1	Electricity	95	lighting, radio, television, ironing	95
2	Kerosene	34	light during electric cut-off	34
3	Firewood from the forest	82	cooking	83
4	Firewood both from the forest and own land	12	cooking	12
5	Both firewood and Biogas	20	cooking	20
6	Both firewood and LP gas	23	cooking	23
7	Biogas and LP gas	2	cooking	2

Table 3. Forest services used and their valuation based on local price.

S.N.	Product	Unit	Annual Extraction	Per unit local price (NRs.)	Total Value (NRs.)
1	Firewood	Kg	5397.6	0.8/kg	4,318.08
2	Timber	cf	5.97	650/cft	3,880.5
3	Fodder	kg	3416.4	0.5/kg	1,708.2
4	Medicinal plants	kg	0.5	150/kg	75
5	Fiber and other	kg	3.99	50/kg	199.5
6	Mushrooms	kg	0.7	60/kg	42.0
7	Average herd size	No.	6	-	-
8	Grazing	day	58.40	-	-
9	Total grazing	animal days	350.40	-	-
	Total value of forest products (NRs.)				10,223.28

Note: NRs. = Nepali Rupees

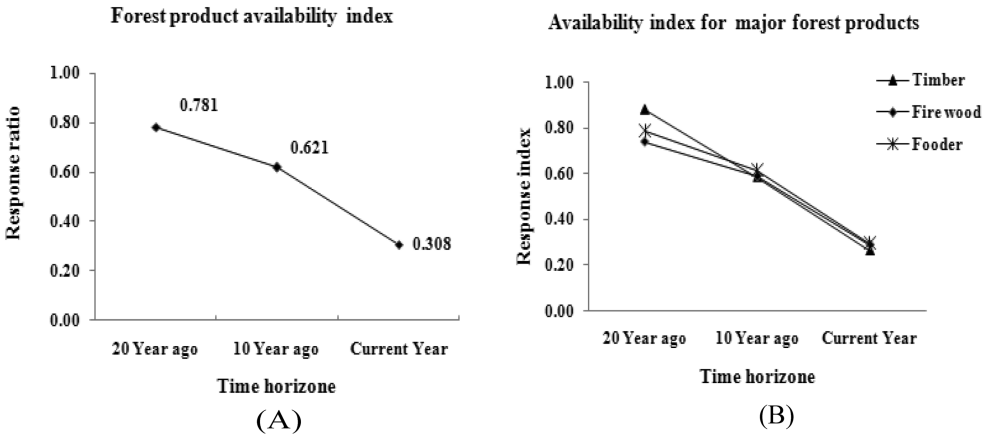

Figure 2. (A) Total forest product availability index (B) major forest products response index.

services used by local people in monetary terms are presented in Table 3. The sum total of Nrs. 10, 223.28 is the total annual value of the forest products and services that are consumed by individual households. Among the forest products, firewood constitutes the largest value (Nrs. 4,318.08) followed by timber wood (Nrs. 3,880.8), fodder (Nrs.1, 708) and fiber Nrs.200/yr.

3. Forest product availability in the study area

The forest products and services availability response ratio revealed that the forest availability was quite good (0.781) before 20 yrs. However, the response ratio was slightly declined for the next 10-year period from 0.781 to 0.621; but, it was sharply declined from 0.621 to 0.308 (reached at half) from 10-year period to the current year (current year considered for this study is 2007, the year of sample household survey data collection for this analysis) (Figure 2A). Moreover, a response index for some of the key forest products was also constructed. It explained that there was a sharp decline in timber wood availability as compared to the firewood and fodder in between time horizon (Figure 2B). However, in the case of fodder and firewood, there was slightly decline of availability between 20 years before to 10 years before, but the declining trend was accelerated for 10 years before to the current year 2007 as similar trend followed by the timber wood.

4. Poverty level at households

Poverty status was generated based on the income assessment of the sample households during the field survey. Income from different sources was calculated considering the local price of agriculture and forest commodities that produced or extracted by the villagers (Table 3). HCI and PGI was used to calculate the poverty status considered the threshold poverty line Nrs. 14,942/yr based on the per capita income US $ 1 per day with assumption of 210-215 working days available for them. This was generalized in whole study area. Our results showed that almost 33% of households were still below the poverty thresholds (Nrs.14, 942) with PGI 0.0945. This was considerably higher than the NLSS II (2003/2004) which was estimated by almost 28% of head count poverty in rural Terai.

Table 4. Descriptive statistics for households' income groups.

Income groups	N	Mean	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Poor	32	10770.9375	391.77101	9971.9152	11569.9598	5438.00	13875.00
Medium	38	18977.6579	452.95714	18059.8796	19895.4362	15075.00	24258.00
Rich	30	34862.3667	1261.17145	32282.9814	37441.7519	25233.00	50160.00
Total	100	21116.9200	1058.48141	19016.6632	23217.1768	5438.00	50160.00

Table 5. ANOVA test among the income groups.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9267283255.966	2	4633641627.983	246.348	.000
Within Groups	1824507403.394	97	18809354.674		
Total	11091790659.361	99			

5. Distribution pattern of income and landholdings

Gini coefficient was calculated to foresee the income and landholdings distribution pattern within the sample households. It was observed that income and landholdings were not equally distributed however the Lorenz curve for income was nearer to the perfect line with low Gini coefficient 0.25 compare with moderately unequal Gini coefficient of landholdings size 0.37. Nevertheless, one way ANOVA test showed that the mean income was significantly different between the three income groups (poor, medium and rich) with F- tatistics 246.348 value at P=0.05 level (Table 5). The descriptive statistics for the income groups are presented in Table 4.

6. Forest dependency with respect to households characteristics

It was observed that the extraction or consumption pattern of forest resources like firewood, fodder and other products were significantly different in three income groups with F-statistics=16.480, 19.930, 29.956 respectively at P=0.05 level (Table 7). Poor and medium income group households were much depended on the forest for their firewood, fodder and other products (mushroom, fiber, herbs etc) desire than the rich group. Interestingly, firewood extraction/use was significantly higher in medium group while other minor forest products were in poor groups. There was no significant difference between the three income groups using timber wood and forest fringe for grazing, however, the rich groups were consumed more timber wood than the others two. The descriptive statistics for forest products use and some households' characteristics are presented in Table 6. Similarly, the livelihood characteristics of households such as landholdings size and education were also significantly different with F-statistics 4.333, 5.981 at P=0.05 level respectively in three income groups. Landholdings size and education number both were increased as income increases at households. Poor groups had a smaller size land and less number of educated than the other two groups.

4. Discussion and conclusions

Results found in this study with about 82% of households collected approximately 104 kg firewood and 81% of households collected 66 kg fodder on a weekly basis from the forest, and 42% of households were using forest to grazing their animals (Table 1) are the facts of high forest dependency. United Nations (1995) study also reported that 84% of household were used energy as firewood while 82% of households' firewood source was forest in Chitwan. Similarly, the households using LP gas and biogas with firewood accounted >50% of their cooking energy from firewood was another evidence of high reliance on the forest for fuel energy. That could be due to the high cost of LP gas and the low production of biogas which couldn't sufficiently meet their needs during the winter. Panta *et al.* (2008) mentioned that disproportionately reduction in Chitwan forest types and forest area could be the reason of forest land conversion or excessive forest extraction in the past. Both processes have had a dramatic and negative impact on forest reliance and forest availability as well.

Angelsen and Kaimowitz (1999) found that greater access to forests and markets can often hasten the forest extraction process. The same situation might have also happened in Chitwan district due to the accessibility of market and open entrance to the government managed forest. Consequently, it was observed that forest products availability found to be sharply declined from 0.781 to 0.368 compared with 20 years before and current year 2007 (Figure 2A). Moreover, based on Forest Product Availability Response Index we found that a sharp lost of timber wood products as compared to firewood and fodder for the year 2007 (Figure 2B). This shows the

forest dependency is still higher and that the availability of forest products that can be extracted from the remaining forestlands is decreasing, whether from local processes or through other socioeconomic causes in Chitwan. Some authors came close with the issues of households' fuelwood sources and they tried to differentiate fuelwood from forests and private farmland (Pattanayak *et al.,* 2004; Heltberg *et al.,* 2000). However, due to the open access in government owned forest, the largest part of firewood, fodder and other products are normally available from the government or community manage forest rather than the private land in Nepal. Therefore, there was only 5% firewood that household were collected from the private land; while 12% firewood was shared with both forest and private land in this study too (Table 1).

Several researchers realized that woodland degradation is associated with a high level of dependency on fuelwood harvesting and charcoal production (Ribot, 1993; Geist and Lambin, 2001; Sankhayan and Hofstad, 2001; Luoga *et al.,* 2002). While other mentioned, poverty is blamed as one of the root cause of deforestation and forest degradation because poor people may have higher dependency on the forest for their endurance (UNCED, 1992). Nevertheless, other many socioeconomic inequalities among the rural households could play an indispensable role in both forest dependency and forest degradation process. Therefore, socioeconomic attributes of households must be considered in understanding the relationship between rural livelihood and their level of forest necessity.

Descriptive statistics revealed the differences in households' characteristics, income groups and forest resources use with respect to income groups among the sample households (Table 4 and 6). The F- test statistics showed that households' income was significantly varied between

Table 6. Descriptive statistics for households' characteristics and forest products use.

		N	Mean	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
fw_kg	Poor	32	7531.8750	381.42862	6753.9462	8309.8038	4680.00	14040.00
	Medium Income	38	4864.7368	484.67345	3882.6951	5846.7785	1560.00	12480.00
	Rich	30	3796.0000	494.35378	2784.9330	4807.0670	.00	10920.00
	Total	100	5397.6000	304.96369	4792.4859	6002.7141	.00	14040.00
Tm_cf	Poor	32	5.1563	1.29912	2.5067	7.8058	.00	20.00
	Medium Income	38	7.0263	1.26530	4.4626	9.5901	.00	20.00
	Rich	30	5.5000	1.93798	1.5364	9.4636	.00	50.00
	Total	100	5.9700	.85652	4.2705	7.6695	.00	50.00
Fd_kg	Poor	32	2193.7500	251.18499	1681.4548	2706.0452	.00	4680.00
	Medium Income	38	4926.3158	360.42499	4196.0254	5656.6062	.00	9360.00
	Rich	30	2808.0000	354.00058	2083.9875	3532.0125	.00	6240.00
	Total	100	3416.4000	224.69668	2970.5530	3862.2470	.00	9360.00
Oth_fpd	Poor	32	11.0000	.95962	9.0428	12.9572	4.50	30.00
	Medium Income	38	3.3026	.66017	1.9650	4.6403	.00	15.00
	Rich	30	3.7667	.72506	2.2838	5.2496	.00	13.00
	Total	100	5.9050	.56932	4.7753	7.0347	.00	30.00
gz_day	Poor	32	55.6156	12.50236	30.1169	81.1144	.00	182.50
	Medium Income	38	61.2421	12.08068	36.7643	85.7199	.00	182.50
	Rich	30	57.8033	12.65076	31.9296	83.6770	.00	182.50
	Total	100	58.4100	7.10709	44.3080	72.5120	.00	182.50
hsz_kattha	Poor	32	8.3281	.96083	6.3685	10.2877	2.00	28.00
	Medium Income	38	13.1053	1.60049	9.8624	16.3482	1.00	60.00
	Rich	30	17.0333	3.16236	10.5656	23.5011	1.00	75.00
	Total	100	12.7550	1.20599	10.3620	15.1480	1.00	75.00
edu_yr	Poor	32	4.3438	.69214	2.9321	5.7554	.00	14.00
	Medium Income	38	4.8947	.75975	3.3553	6.4341	.00	14.00
	Rich	30	7.9333	.83036	6.2351	9.6316	.00	18.00
	Total	100	5.6300	.46268	4.7119	6.5481	.00	18.00

Table 7. ANOVA test between households' characteristics and forest products.

		Sum of Squares	df	Mean Square	F	Sig.
fw_kg	Between Groups	233507669.132	2	116753834.566	16.480	.000
	Within Groups	687220554.868	97	7084747.988		
	Total	920728224.000	99			
Tm_cf	Between Groups	70.218	2	35.109	.473	.624
	Within Groups	7192.692	97	74.151		
	Total	7262.910	99			
Fd_kg	Between Groups	145574589.789	2	72787294.895	19.930	.000
	Within Groups	354262514.211	97	3652190.868		
	Total	499837104.000	99			
Oth_fpd	Between Groups	1225.211	2	612.606	29.956	.000
	Within Groups	1983.636	97	20.450		
	Total	3208.848	99			
gz_day	Between Groups	565.706	2	282.853	.055	.947
	Within Groups	499490.704	97	5149.389		
	Total	500056.410	99			
hsz_kattha	Between Groups	1180.897	2	590.449	4.333	.016
	Within Groups	13217.850	97	136.266		
	Total	14398.748	99			
edu_yr	Between Groups	232.646	2	116.323	5.981	.004
	Within Groups	1886.664	97	19.450		
	Total	2119.310	99			

Note: fw _ kg = firewood in kilogram
Tm _ cf = Timber in cubic feet
Fd _ kg = Fodder in kilogram
Oth _ fpd = Other forest products
gz _ day = grazing in day
hsz _ kattha = landholding size in kattha (1 kattha [Nepal] = 0.033 8 hectare)
edu_yr = education number in year

three poor, medium and rich income groups (Table 5). As Sapkota and Oden (2008) noted that the amount of fuel wood collection varied greatly between the rich and poor, we also found the extracted amount of firewood, fodder and other forest products were significantly varied between the income groups in this study (see Table 6 and 7). Which offer income could be one of the determinant factor of forest dependency in the rural community where their life mostly reliant in forest resources. Moreover, poor and medium groups were much involved in firewood, fodder and other products collection than rich. One reason could be, firewood is the only accessible source of households' energy at rural areas for poor simply they can't afford for the other sources i.e. LP gas, Kerosene and electricity etc. But other thought "Due to greater dependence, poor people extract more resources and hence generate higher income from the common" (Jodha, 1992; Iyenger and Shukla, 1999 cited in Sapkota and Oden, 2008). F-test statistics further showed a significant variation in landholdings size and number of educated within the income groups which could also influenced in forest resources collection. Our results were also in favor with Reddy and Chakravarty (1999), that who mentioned the poor have less land so are dependent on the forest for greater income. Numbers of educated person and landholdings sizes was determined by the income group i.e. poor group contained with lesser number and smaller land size and vise versa. Due to the absence of their schooling and less work in their own farmland, uneducated and petite landholder could have much free time. So that they can spend comparatively long hours in collecting and selling firewood and other minor forest products (mushroom, honey, medicinal plants, verities of forest fruits etc) which can proffer their better economy. Interestingly, extraction of timber wood and using grazing land didn't show any significant difference between the groups. However, rich groups were extracted timber wood much than the other two. The reason behind this could be the ability of timber wood consumption, economic strength, consciousness in forest value, and their supremacy in the society.

As Dayal (2006) thought, programs encouraging the

use of alternative fuels help to reduce the intensity of biomass extraction from the forest. Odihi (2003) also emphasized that improvement of the socioeconomic conditions of the poor and recruitment of alternative energy sources can lessen the forest dependency and deforestation problems as well. Therefore, the findings and perspective presented in this study could be prominent in planning and administration process to move ahead searching for the alternative sources of fuel wood desires and employing the various rural developmental installations. Programs encouraging those issues could help promoting in households' income, employment and education opportunity while reduce the degree of forest dependency ultimately. That may also significantly affect in rural livelihood hence traditional sources of energy possibly substitute with the modern fuel types at households so that achievement can be taken to reduce the degree of deforestation and forest degradation as well.

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