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Community forest use and dependence for livelihoods in Fako Division, South West Region of Cameroon

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ABSTRACT

This study assessed the extent, patterns and socio-demographic determinants of community forest use and dependence for livelihood in three community forests areas in Fako Division, Cameroon. The data, collected principally through a questionnaire administered to 295 selected community members, was analyzed using descriptive and inferential statistics with the aid of Statistical Package for Social Science 20. The study found that most (61.3%) of the respondents directly use the community forest, principally for fuelwood collection (89.4%), NTFPs harvesting (41.3%), subsistence farming (40%) and timber exploitation (25.7%). Community forest use was significantly predicted by user's location (*p=0.039),* gender *(p=0.011),* primary occupation (*p=0.00*), level of education (*p=0.00*), income level *(p=0.023),* origin *(p=0.010)* and membership in Community Forest Management Group *(p=0.025).* Furthermore, it was observed that most (53.1%) of the forest users depended on the forest for 61-100% of their household food, energy and material needs while the sales of forest resources accounted for 61-100% of the monthly income of 57.9% others. The study concluded that community forest resources make up a considerable portion of the livelihood portfolio of many forest-fringe households in the area and recommended among other things improvements in the current land tenure policy to enable local stakeholders to fully embrace participatory forestry and the training of forest users on value adding activities to enhance returns from the commercialization of forest products.

1. INTRODUCTION

With increasing recognition of its myriad economic, ecological, cultural and aesthetics functions and preponderant role in rural livelihood, forest and trees have been at the centre stage within policy and academic circles (FAO, 1995; Cheng, 2017).). This global recognition and other parallel trends in development thinking and practices prompted a paradigm shift in forest management policies of many developing nations (Roe *et al.,* 2009). For the greater part, these policies moved from a centralized, protectionist and exclusionary approaches to forest management models that are more inclusive of the notion of local community participation in the management and utilization of forest resources (Roe *et al.,* 2009). This new forest management approach variously called social or community forestry or its spinoffs became a buzzword and fashionable lexicon in the late 1980s (Beauchamp and Ingram, 2011) and was hailed as a panacea for achieving the triple objectives of livelihood improvement, forest resource conservation and natural resource management devolution (Yufanyi Movuh and Schusser, 2012; Oyono *et al.,* 2012). In the decades that followed its inception, many developing nations jumped on the community forestry bandwagon (Djomo, 2011; Beauchamp and Ingram, 2011). As a result, local communities were entrusted with the management of over 20% of global tropical forest (International Tropical Timber Organization, 2005).

Community forestry made its appearance in the forest policy scene in Cameroon on the heels of the environment and forest laws reforms of the 1990s (Oyono *et al.,* 2012). In the wake of these legislative changes, access, use, management and marketing rights of over 1 million hectares or 4% of the non-Permanent Forest Estates of the country were granted to local communities (Ministry of Environment and Forestry, 1998; World Resource Institute, 2011). Like in most localities in the country, the euphoria and popular optimism generated by the prospects of improved community livelihood through increased local control over substantial proportion of forests, prompted the creation, at varying periods, of four community forests in Fako Division of the South West Region of Cameroon ((Nkemnyi *et al*. 2014). This included Bimbia-Bonadikombo Community Forest, Bakingili Community Forest, Woteva Community Forest and Etinde Community Forest.

Unfortunately, after over a decade of implementation and or experimentation with community forestry in this locality, voices from several quarters have questioned its contribution to livelihood (Beauchamp and Ingram, 2011). Without an apriori understanding of the extent to which local forest community use and depend on forest resources, efforts at answering these salient questions will be predicated at best on conjectural and or anecdotal evidences.

Prior studies on forest dependence in Cameroon have largely focused on the national level (Djomo, 2012). As vital as this macro level assessment can be in conveying the general picture, they considerably mask micro or local level realities. Therefore, building a local community-forest dependency linkage is very essential and even more so in the present context where forest-dependent people have gained currency in development discourses (Jagger and Angelsen, 2011; Newton FAO, 2014; et al, 2016). Against this backdrop therefore, this study seeks to assess the extent, patterns and socio-demographic determinants of community forest use and dependence for livelihood in three selected community forests in Fako Division, South West Region of Cameroon.

2. MATERIALS AND METHODS

2.1 Study area

Fako Division is located between latitude 4°28´30″ and 3°54´26″ N and longitude 8°57´10″ and 9°30´49″ E (Figure 1). It covers a total surface area of 203,876 hectares and has a total population of 444 269 (Orock and Lambi, 2014). The division has the Cameroon type of climate with two seasons; one wet season (March to November) and a short dry season (December to February). Rainfall distribution is not even (i.e. highest at the coast and diminishes towards the interior of the land). The vegetation consists of montane, sub-montane, lowland and mangroves forest which hosts a variety of endemic wildlife species. The soils are volcanic, making the area predisposed for agricultural production. Other economic activities in the division include fishing, food processing, timber extraction, trade, oil refining, quarrying and tourism.

2.2 Study population and sampling strategy

The study population consisted of residents of villages or settlements adjacent to the selected community forests. To select study participants, a multi-staged sampling procedure was employed. In the first stage, three out of the four community forests in Fako division were randomly selected using balloting, including Bimbia-Bonadikombo, Bakingili and Woteva community forests. Secondly, 9 out of the 16 villages and settlements bordering the chosen community forest were purposefully selected based on their proximity to the forests and geographical accessibility. These included, Bakingili, Wete-Wete camp, Woteva, Bonagombe/Bonabile, Bonadikombo (Mile 4), Upper Mawon, Lifanda Congo, Ombe Native village and Bamukom. In the final stage, 300 respondents were randomly selected.

2.3 Data collection

Primary data was principally obtained from a structured questionnaire containing close-ended questions and divided into three sections. A total of 300 questionnaires were administered but 5 were rejected for incomplete or imprecise answers. The

primary data was complemented with secondary data from available literature.

2.4 Analytical Approach

The data obtained from the questionnaire survey was analysed using descriptive statistics (i.e. frequency and percentages) and inferential statistics (Fisher's Exact test and binary logistic regression coefficients). The Fisher's exact test were employed as a test of association while the binary logistic regression was employed to assess the significant socio-demographic determinants of forest use or none use. The binary logistic regression model has been used in similar study by Agresti (1996) and explicitly stated as

$$\text{Log}\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10}$$

Or

$$\frac{1}{1-\mathrm{P}} = e^{\beta_0+\beta_1 X_1+\beta_1 X_1+\beta_2 X_2+\beta_3 X_3+\beta_4 X_4+\beta_5 X_5+\beta_6 X_6+\beta_7 X_7+\beta_8 X_8+\beta_9 X_9++\beta_{10} X_{10}}$$

where P is the probability of forest use, 1-P is the probability of non-use, $\frac{P}{1-P}$ is the odds of forest, use , e is the exponential, β_0 is the intercept, β_1 is the regression coefficient for X_1 (location), β_2 is the regression coefficient for X_2 (gender), β_3 is the regression coefficient for X_3 (age group), β_4 is the regression coefficient for X_4 (level of education), β_5 is the regression coefficient for X_5 (primary occupation), β_6 is the regression coefficient for X_5 (income level), β_7 is the regression coefficient for X_5 (marital status), β_8 is the regression coefficient for X_5 (duration of stay), β_9 is the regression coefficient for X_5 (origin) and β_{10} is the regression coefficient for X_5 (membership in CIG).

The data was analysed using IBM® Statistical Package for Social Sciences version 20. Charts and tables to enhance the narratives were developed using Microsoft Office 2013.

3 RESULTS AND DISCUSSIONS

3.1 Socio-demographic characteristics of the respondents

Table 1 presents the socio-demographic characteristics of the 295 study respondents. The majority (135 or 45.8%) of the 295 respondents were from Bimbia-Bonadikombo. Slightly more than half (52.5%) were female. Most (68.5%) were below the ages of 45 years, indicative of a youthful and productive population. More than three quarter (75.3%) had some form of formal education. Close to half (48.1%) of the respondents were into agriculture and forest-related activities. Most (51.5%) of the respondents were in the lowest income category, indicative of a relatively poor population. More than half (63.1%) of the respondents have been in the area for more than 11 years, signifying that they are knowledgeable about the trends in forest use and dependence. Most (51.5%) of the respondents were non-indigenes.

Table1: Socio-demographic characteristics of respondents

Characteristics	Count	Percent	Characteristics	Count	Percent
Location			**Age group**		
Bakingili	109	36.9	15-24 years	38	12.9
Bimbia-Bonadikombo	135	45.8	25-34 years	101	34.2
Woteva	51	17.3	35-44 years	63	21.4
			45-54 years	38	12.9
Gender			> 55 years	55	18.6
Male	140	47.5			
Female	155	52.5	**Primary occupation**		
			Agriculture	86	29.2
Level of education			Forestry	56	19.0
No formal	73	24.7	Petit trade	58	19.7
Primary	120	40.7	Fishing	30	10.2
Secondary	72	24.4	Civil service	17	5.8
University	30	10.2	Student	16	5.4
			Others	32	10.8
Income Level					
≤ 50000Frs	152	51.5	**Marital status**		
50001-100000Frs	74	25.1	Single	104	35.3
100001-150000Frs	33	11.2	Married	154	52.2
≥150001Frs	36	12.2	Separated	9	3.1
			Divorced	11	3.7
Longevity in area			Widowed	17	5.8
1-5 years	33	11.2			
6-10 years	76	25.8	**Origin**		
11-15 years	52	17.6	Indigene	143	48.5
Above 16 years	134	45.4	Non-indigene	152	51.5

3.2 Extent of community forest use

In the study, 179 (60.68%) of the 295 respondents reported using the community forest for livelihood activities while the rest (116 or 39.32%) reported no direct use of the community forest. (Figure 1).

3.3 Patterns of community forest use

Figure 2 presents the patterns of forest use in selected community forests in Fako Division.

Among the 179 respondents who used the forest, 160 (89.4%) reported using the forest for fuel-wood collection, 46 (25.7%) reported using the forest for timber exploitation, 71 (40%) used the forest for farming, 74 (41.3%) reported Non-Timber Forest Products (NTFPs) harvesting, while the rest reported using the forest for cultural rites and ceremonies (7 or 3.9%), recreation (6 or 3.4%) and research (2 or 1.1%) (Figure 2).

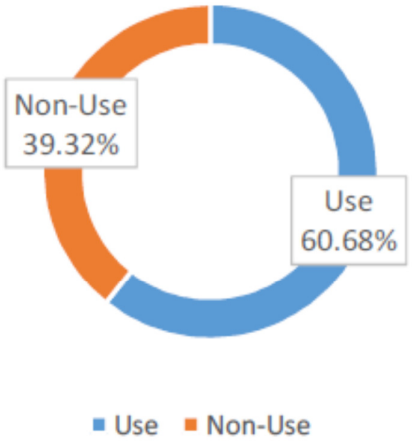

Figure 1: Extent of community forest use in Bakingili, Woteva and Bimbia-Bonadikombo CFs

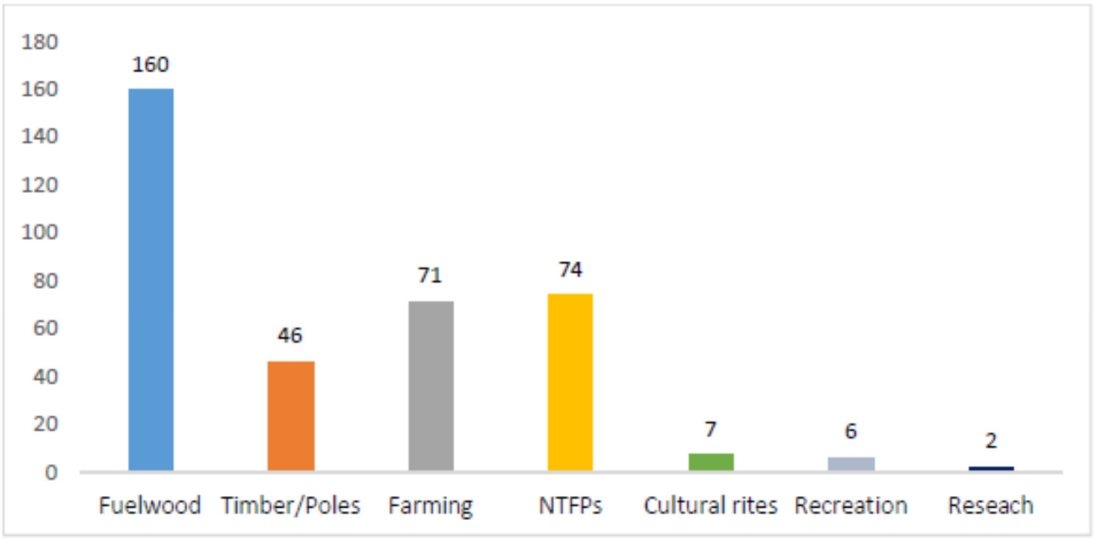

Figure 2: Patterns of Community Forest use in Bakingili, Woteva and Bimbia-Bonadikombo CFs

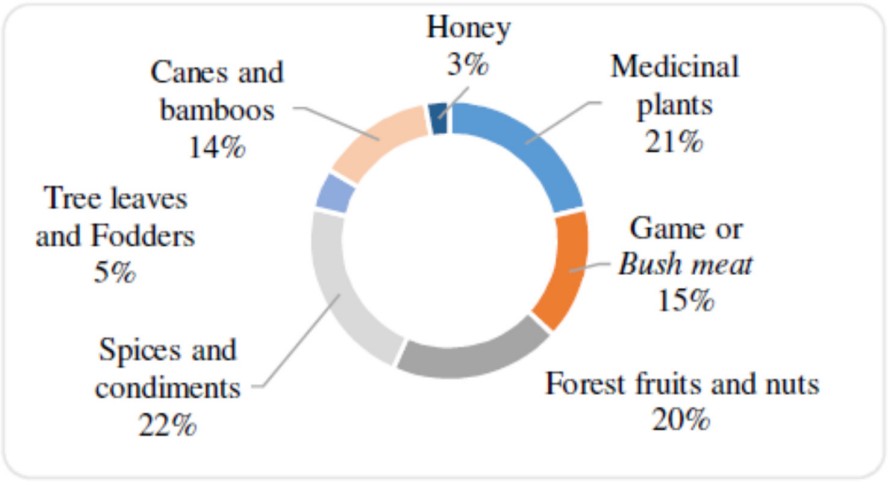

Figure 3: Types of Non-Timber Forest Products exploited in Bakingili, Woteva and Bimbia-Bonadikombo CFs

As shown in Figure 3, the most reported types of NTFPs exploited were spices and condiments (22.2%), medicinal plants (21.2%), forest fruits and nuts (19.8%), game or *bush meat* (15.6%), canes and bamboos (13.7%), leaves and fodders (4.7%) and honey (2.8%).

3.4 Socio-demographic determinants of community forest use.

Table 2 presents a binary logistic regression analyses of the socio-demographic factors that mediate community members' use of community forests.

Table 2: Regression analysis of the socio-demographic determinants (predictors) of forest use

Variables	Estimates	Std. Errors	Wald	df	Sig.	Odd Ratios Exp (β)
Location	0.54	0.327	2.73	1	0.039	0.583
Gender	1.016	0.401	6.41	1	0.011	2.761
Age group	0.077	0.187	0.17	1	0.682	1.08
Education	-0.981	0.241	16.51	1	0.00	0.375
Occupation	0.859	0.137	39.13	1	0.00	0.423
Income level	-0.458	0.202	5.14	1	0.023	0.632
Status	0.115	0.251	0.21	1	0.646	1.122
Longevity	0.664	0.247	7.24	1	0.052	0.515
Origin	.31	0.508	6.65	1	0.01	3.706
Membership	1.885	0.841	5.02	1	0.025	0.152
Constant	9.074	2.155	17.74	1	0.00	8725.831

Hosmer and Lameshow Test (X^2=7.534;df=8;p=0.480) Omnibus Test (X^2=216.015;df=10;p=0.00); Cox and Snell R^2=0.519; Nagelkerke R^2=0.703

The Hosmer and Lameshow (X^2=7.53; df=8; p=0.480*)* and Omnibus Test *(*X^2=216.01; df=8; p=0.00) tests statistics showed a high goodness-of-fit for the model. The pseudo R^2 indicated that the model explained between 51.9% (Cox and Snell R^2) and 70.3% (Nagelkelke R^2) of the variation in forest use.

The statistically significant socio-demographic determinants or predictors of forest use were location (p=0.039), gender (p=0.011), primary occupation (p=0.00), level of education (p=0.00), income level (p=0.023), origin (p=0.010) and membership in Community Forest Management Group (p=0.025).

Consequently, the binary logistic regression model for forest use in the study area was:

Log (forest use) =13.5 – 0.49Location +1.01Gender – 0.88 Occupation –1.05Education -0.42 Income + 1.367 Origin -1.935Membership.

3.5 Extent of dependence on Community Forest

3.5.1 Dependence on community forest for households needs

All of the 179 (100%) community forest user reported using the forest and associated resources for household consumption. Of this total, 13 (7.3%) reported a dependence on the community forest for 1-30% of their household food, energy and material needs, 71 (39.6%) reported a dependence of 31-60%

while 95 (53.1%) reported a dependence of 61-100% (Table 3). Dependence on community forest for household food, energy and material needs varied significantly with gender (p=0.002; χ^2=8.519; df=2), age group (p=0.00; χ^2=42.05; df=8), primary occupation (p=0.00; χ^2=39.9; df=12), level of income (p=0.015; χ^2=13.58; df=6), marital status (p=0.00; χ^2=71.9; df=8) and longevity in the area (p=0.009; χ^2=17.16; df=6) of respondents (Table 4).

Table 3: Respondents dependence of forest for household food, energy and material

Proportion of household Needs	Counts	Percent	Level of dependence
1-30%	13	7.3	Low
31-60%	71	39.6	Moderate
61-100%	95	53.1	High

Table 4: Dependence on CF for household food, energy and material needs across socio-demographic characteristics

Socio-demographic characteristics

QUESTIONS	RESPONSE	Location: Bakingili	Location: Bimbia-Bonadikombo	Location: Wokeva	Location: Total	Gender: Male	Gender: Female	Age group: 15-24 years	Age group: 25-34 years	Age group: 35-44 years	Age group: 45-54 years	Age group: ≥ 55 years
Proportion of household food and energy consumption from CF	1-30%	6	5	2	13	0	13	5	0	0	0	8
	31-60%	32	22	17	71	30	41	5	23	17	17	9
	61-100%	42	30	23	95	36	59	18	11	26	11	29
	x²-statistics	0.602				8.519		42.054				
	P value	0.963				0.002		0.000				
	F	0.612				9.993		47.347				
	Exact P Value	0.98				0.006		0.00				
	Rp											
x² Tabulated	df	4				2		8				
	x²-tabulated	2.132				2.92		1.86				
	Significance	ns				ss		ss				

QUESTIONS	RESPONSE	Level of education: No formal edu	Level of education: Primary	Level of education: Secondary	Level of education: University	Primary Occupation: Agriculture	Primary Occupation: Forestry	Primary Occupation: Petit trading	Primary Occupation: Fishing	Primary Occupation: Civilservice	Primary Occupation: Student	Primary Occupation: Others
Proportion of household food and energy consumption from CF	1-30%	4	5	4	0	9	0	0	0	0	4	0
	31-60%	24	32	12	3	30	21	14	3	1	0	2
	61-100%	32	52	11	0	46	34	8	1	0	4	2
	x²-statistics	8.761				39.858						
	P value	0.155				0.000						
	F	8.019				30.946						
	Exact P Value	0.201				0.00						
	Rp											
x² Tabulated	df	6				12						
	x²-tabulated	1.943				1.782						
	Significance	ns				ss						

QUESTIONS	RESPONSE	Level of Income: ≤ 50000FCFA	Level of Income: 50001-100000FCFA	Level of Income: 100001-150000FCFA	Level of Income: >150001FCFA	Marital Status: Single	Marital Status: Married	Marital Status: Separated	Marital Status: Divorced	Marital Status: Widowed
Proportion of household food and energy consumption from CF	1-30%	8	5	0	0	5	0	0	0	8
	31-60%	40	11	13	7	17	51	1	1	1
	61-100%	52	31	7	5	32	46	5	7	5
	x²-statistics	13.580				71.920				
	P value	0.015				0.000				
	F	12.376				46.755				
	Exact P Value	0.04				0.00				
	Rp									
x² Tabulated	df	6				8				
	x²-tabulated	1.943				1.86				
	Significance	ss				ss				

QUESTIONS	RESPONSE	Longevity in area: 1-5 years	Longevity in area: 6-10 years	Longevity in area: 11-15 years	Longevity in area: ≥ 16 years	Origin: Indigene	Origin: Non-indigene
Proportion of household food and energy consumption from CF	1-30%	0	0	6	7	3	10
	31-60%	5	28	6	32	39	32
	61-100%	6	26	20	43	46	49
	x²-statistics	17.164				4.505	
	P value	0.009				0.105	
	F	16.891				4.429	
	Exact P Value	0.006				0.111	
	Rp						
x² Tabulated	df	6				2	
	x²-tabulated	1.943				2.92	
	Significance	ss				ns	

x²=chi square Rp=Pearson's correlation coifficient P=Probability df=Degree of freedom ss=statistically significant ns=non-significant F =Fisher exact test statistics

3.5.2 Dependence on community forest for household income

In addition to depending on the community forest for some proportion of their household food, energy and material need, 56 (31.3%) of the total 179 forest users reported using the forest resource for commercial purposes. Of this total, 3 (5.3%) reported that proceed from the sales of these forest products accounted for 1-30% of their total monthly income, 21 (36.8%) reported that sales of forest resources represented 31-60% of their total monthly income while the rest (33 or 57.9%) reported a monthly income proportion from the sales of forest associated resources of 61-100% (Table 5).

Table 5: Respondents dependence of forest for income in study localities

Proportion of Total Income	Counts	Percent	Level of dependence
1-30%	3	5.3	Low
31-60%	21	36.8	Moderate
61-100%	33	57.9	High

Dependence on forest for income significantly differed with gender (p=0.014; χ^2=8.554; df=2) and level of income (p=0.014; χ^2=15.953; df=6) (Table 6).

Table 6: Dependence on CF for monthly income across socio-demographic characteristics

QUESTIONS	RESPONSE	Socio-demographic characteristics																																				
		Location				Gender		Age group					Level of education				Primary Occupation							Level of Income				Marital Status					Longevity in area				Origin	
		Bakingili	Bimbia-Bonadikombo	Woteva	Total	Male	Female	15-24years	25-34years	35-44years	45-54yeas	≥ 55 years	No formal edu	Primary	Secondary	University	Agriculture	Forestry	Petit trading	Fishing	Civilservice	Student	Others	≤ 50000FCFA	50001-100000FCFA	100001-150000FCFA	>150001 FCFA	Single	Married	Seperated	Divorced	Widowed	1-5years	6-10years	11-15years	≥ 16years	Indigene	Non-indigene
Proportion of monthly income from CF	1-30%	2	0	1	3	3	0	0	0	3	0	0	0	3	0	0	1	2	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	3	0	3
	31-60%	8	6	7	21	8	13	1	7	9	3	1	6	11	2	2	12	4	3	1	0	1	0	15	3	0	3	6	15	0	0	0	1	6	0	14	15	6
	61-100%	12	10	11	33	7	26	6	5	9	5	8	15	14	3	1	18	8	2	1	0	3	1	25	4	1	3	8	19	0	1	5	5	5	3	20	19	14
	x^2-statistics	1.599				8.554		13.265					5.563				5.481							15.953				6.219					6.313				5.704	
	P value	0.816				0.010		0.103					0.474				0.857							0.014				0.399					0.389				0.058	
	F	1.463				7.547		10.521					5.282				7.356							11.787				6.533					5.189				5.143	
	Exact P Value	0.917				0.014		0.14					0.527				0.84							0.042				0.39					0.498				0.056	
	Rp	0.055				0.347		0.097					-0.175				0.087							-0.117				0.208					-0.114				-0.066	
x^2 Tabulated	df	4				2		8					6				10							6				8					6				2	
	x^2-tabulated	2.132				2.92		1.86					1.943				1.782							1.943				1.86					1.943				2.92	
	Significance	ns				ss		ns					ns				ns							ss				ns					ns				ns	

x^2=chi square Rp=Pearson's correlation coifficient P=Probability df=Degree of freedom ss=statistically significant ns=non-significant *F*=Fisher exact test statistics

4.1 Extent and patterns of forest use

The results indicated that community forest use for livelihood is widespread in the communities. This high level of forest use can be explained by the lack of non-forest and non-farm employment opportunities in the area. Beauchamp and Ingram (2011) have also reported high level of community forest use in the Melombo and Akomnyada II localities in the Eastern region of Cameroon.

Forest use was principally dominated by fuel wood collection. This is congruent with the works of Rossi (2007). Fuelwood is extensively used in the study area for household cooking, heating, fish smoking and charcoal production. Contrary to other timber and NTFPs, there are limited restrictions on the collection of fuelwood for household consumption from the selected CFs.

NTFPs collection or harvesting particularly for spices and condiments, medicinal plants, forests fruits and nuts and bush meat emerged as the second most dominant use type of the selected community forest. NTFPs such as bush mangoes (*Irvingia gabonensis*), eru (*Gnetum Africanum*), Njangsang (*Ricinodendron Heudelotti* spp), bush pepper (*Piper guineensis), bush onions*, alligator pepper (*Aframumum spp*), pygium (*Prunus Africana*), yellow stick (*Garcinia mannii*), and game such as antelope, cane rat, viper, pangolin, squirrel, Mona Monkey, Brush tail porcupine are used extensively as food and medicine in the area.

Farming emerged as another dominant community forest use type. In most of the selected community forests, there are forest management units allocated for farming purposes particularly within the Keta, Lower Ngoe and Maungu Forest Management units in Bakingili, around the southern flanks and Ekona Lelu border in Woteva and the Moliwe hills, Likomba La Mbenge, parts of Bonadikombo and Bamukong in Bimbia-Bonadikombo etc. The use of community forest for agricultural purposes have also been documented in the Kilum-Ijim Community forests (Gardner, 2001) and in Tinto Community forest (McCall and Minang, 2005) in the North West and South West regions of Cameroon respectively.

Timber species like mahogany (*Ethandophama spp*), *iroko, Isaka, man carabot, small leaf, tiger wood* etc. are exploited from these forest and generally used for house construction or transported for sales to neighboring towns and cities. The presence of touristic sites in the community forest such as the German graves and lava craters in Woteva, the slave port in Bimbia and lava flows of 1999 in Bakingili make the community forest important destinations for tourist. Given that most of this community forest fall within the Mt Cameroon biodiversity hotspots, they are also used for scientific research.

4.2 Determinants of community forest use.

The results from the regression analysis show that the respondent's origin was the most significant socio-demographic determinant or predictor of community forest use. Non-indigenes were 3.706 times more likely to use the community forest than indigenes. This is in contrast with the works of Ratsimbazafy et al (2012) who argued that the indigenes of the Makira region in the North Eastern section of Madagascar use the adjacent forest Makira forest more than others. The high probability (0.78) that a forest user will be a non-indigenes observed in the study area is attributed to the fact that non-indigenes make up the bulk of the population in most of the localities (Tekwe and Percy, 2001; Folemu, 2011) and also constitute the majority of those involved in farming and forest gathering (Yaron, 1999).

Gender emerged as the second most significant determinant or predictor of forest use. Being a woman increases the likelihood of forest use by a factor of 2.761. Analogous findings have been advanced by Abanda and Nzino (2014) in a study of gender disparity in participation in NTFPs value chain in the Mount Cameroon Region. This high probability (0.7) of female forest use can be linked to the fact that women by the virtue of their household roles are often primary forest users (FAO, 2013) and often lack the skills to enter non-farm or non-forest occupations.

The income level of the respondents was shown to be the third most significant determinant of forest use. Community members in the ≤ 50 000frs income group were 0.632, 1.264 and 1.896 times more likely to use the community forest than those in the 50 001-100 000frs, 100 001-150 000frs and ≥150 001frs income category respectively. Prakash *et al* (2003) have also documented an inverse relationship or negative correlation between income levels and forest use in the middle hills of Nepal. The heighten use of the forest by the low income strata of the population can be explain in that poorest household rely exclusively on forest and other common pool resources for their livelihoods.

The fourth most significant predictor of forest use was location. Residents in Bimbia-Bonadikombo were 0.583 and 1.166 times less likely to use the community forest than those in Bakingili and Woteva respectively. the relative differences in livelihood opportunities present in these localities could account for this differences. In Woteva where forest use is high, farm and forest related activities constitute the major livelihood activities. In Bakingili, where forest use is relatively moderate, in addition to farm cum forest related activities, a significant proportion of the residents are involved in artisanal fishing and trade. Increased opportunities for fishing, farming, petite trading and other paid employment in the urban and peri-urban localities of Limbe, account for the relatively low level of forest use in the Bimbia-Bonadikombo CF. Rossi (2007), in a study of joint forest management in Andhra Pradash India, observe similar difference across localities.

The respondent's primary occupation emerged as the fifth most significant determinants of forest use. Those involved in forestry (loggers, NTFPs collectors, fuelwood and charcoal production) were 0.432, 0.864, 1.296, 1.728 and 2.16 times more likely than those involved in petite trading, fishing, civil service and other activities (tailoring, car washing, driving, carpentry, mechanic etc) respectively of using the forest.

The respondent's level of education was the sixth most significant determinant or predictor of forest use. Respondents with university level education were 0.402, 0.804 and 1.206 times less likely to use the forest than those with secondary school level, primary level and no formal education respectively. This negative correlation or inverse relationship between educational level and income have been put forward by other studies (Sapkota and Oden, 2008; Rossi 2009). Those with higher educational attainment prefer white collar jobs and trade than menial farm and forest related jobs in the community forests.

4.3 Extent of dependence on forest

Dependence on forest for household food, energy and material consumption was very high with no variations across the selected community forests. The similarity of forest dependence for household food, fuel, fibre and other materials can be explained in that even though there are heterogeneity (in terms of culture, preference, ethnicity, income level, education, political ideologies) in the sampled population, they have similar needs. Sapkota and Oden (2008) have documented similar levels of forest dependence and homogeneity among forest user groups in the Teria communities in Nepal.

However, forest dependence varied by gender. This is consonant with Bwalya (2013). Women constituted the bulk of those who depend on forest for livelihood. This is so because rural women are the main consumers of natural resources. They gather firewood, leaves, fruits, bark, and small animals that go into the meals of their families; they are the custodians of traditional pharmacopoeia and harvesters of forest products for craft work.

The sales of timber and non-timber products constitute a major source of income stream for most households in the area (Yufanyi Movuh, 2012). No difference in forest dependence for income was found among the selected community forests. This similarity in forest dependence for income has also observed by Sapkota and Oden (2008).

5. CONCLUSION

In Fako Division, community forestry is associated with high level of community member's use and dependence on the forest and its associated resources for livelihood. Community forest resources make up a considerable portion of the livelihood portfolio of many forest-fringe households in the selected communities. However, community member's forest use and dependence can be improved further by developing a new land tenure policy that augments the deficiencies of the existing legal mechanisms and enable the local stakeholders to fully embrace participatory forestry. Equally, the forest management organization should train forest users on value adding activities so as to increase the price of forest resources. Pre-market processing of timber and non-timber products to add value could significantly enhance returns. Also farmers should be trained in forest alternative livelihoods such as conventional and non-conventional livestock production, plantain suckers multiplication and commercialization and domestication of some non-timber forest products etc. This will significantly reduce the pressure off forests and its associated resources.

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COMPETING INTERESTS

The authors of this manuscript have no competing interests that can influence the results and discussion of the study.

AUTHORS' CONTRIBUTION

This work was carried out in collaboration between all authors. Author FDN designed the study, designed the data collection instrument, collected the data, performed the statistical analyses and co-wrote the draft. Author AGA and AVT co- wrote the draft of the manuscript. Author CLN managed the literature searches. All authors read and approved the final manuscript.

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