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Socio-Economic Determinants of Household Dependency on Forest Resources in Masida Community Forest in Zambezi Region, Namibia

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ABSTRACT

The purpose of the study was to assess the socio-economic determinants of household dependency on forest resources in Masida community forest in Zambezi, Namibia as one of the contributions to the national strategies to ascertain sustainability of the scarce forest resources. A cross-sectional study was conducted during December 2018 to April 2019 using a semi-structured questionnaire, Focus group discussion and key informant's interview. A total of 185 randomly sampled household were interviewed. Logistic regression model was used to determine the socio-economic characteristics influencing household forest dependency and a multiple response was used to assess reasons for dependency on the forest. Results shows that age and education level of respondents together with the size of agricultural land owned are some of the socio-economic determinants that significantly ($p<0.05$) influenced forest dependency. Though the indices of forest dependence are generally low, the forest's provision of medicine natural ablution function and easy access are among the motives that influence people to depend on the forest in the study area. We recommend the provision of alternative livelihood income such as farming and animal husbandry to alleviate the dependence problem. This can be facilitated by the government and other stakeholders through projects, training and extension services.

Key words: forest dependence – determinants - socio economics - Masida community – Zambezi, Namibia

INTRODUCTION

Forest dependency is variously defined by different authors and mainly refers to household reliance on forest products and services for a large portion of their basic household needs (Miah 2014, Larson *et al*. 2017, Newton *et al*. 2016). In most of the literature, the term was used to refer to forest-people interaction and its definition and description was brought to relate to specific aspects of looking into the relationship between forests and people's livelihoods (ICF, 2014). Several studies have reported that forest provide goods and service to over 800 million up to 1.6 billion people globally (Abdullah *et al*. 2016, Fikir *et al*. 2016, Ojea *et al*. 2016). About 70% of the people are in sub-Saharan countries where they live in rural areas and depend heavily on natural resources for food and income, where the forests supply about 60% of their daily energy (Mohammed *et al*. 2015, Odunwole *et al*. 2015, Fikir *et al*. 2016).

Namibia like any other developing countries, has experienced challenges in applying

controlled forest management approaches because local people rely heavily on forest resources for their livelihoods (Pokharel *et al*. 2015) on one hand and the government capacity to manage the vast forest resources on the other. The country consequently faces forest degradation resulting from management failure and high dependency on forest resources, which motivated a shift in the forestry legal framework towards participatory forest resource management. Participatory Forestry acknowledges the direct inter-dependence of natural resources by the population of about 62 % that live in rural areas in Namibia (Riehl *et al*. 2015, Mogotsi *et al*. 2016, Vrabcova *et al*. 2019).

Studies conducted in Namibia by Mbongo *et al*. (2014), revealed that socio-economic benefits of community forests lie primarily on provision of forest products that enhance rural livelihoods. A study by Kamwi *et al*. (2015) on livelihood, land use and land cover change in Zambezi region indicated that illegal logging is one of the drivers of land use and land cover change, while the collection of non-timber forest products is one of the livelihood coping strategy. Parviainen (2012) assessed the role of community forestry in rural livelihood and poverty alleviation, focusing on net benefit generation in community forest and comparing cost and benefit analysis. However, in order to come up with better strategies for the management of the forest resources particularly with communities it is important to generate knowledge on the community-forest interaction for specific forest resources, the dependence, socio-economic factors that influence and the main reasons for the dependence. Currently there are no studies that have attempted to examine socio-economic determinants of forest dependency in the Zambezi region, Namibia, hence this study. The specific objectives of the study are to determine community forest dependence, to assess socio-economic factors influencing households' dependency on forest and to examine the major reasons for the dependence.

The study was expected to generate knowledge on the important socio-economic determinants of household's forest dependency in the study area, thereby contributing to the on-going strategies for management and conservation of scarce forest resources and reduction of deforestation and forest degradation.

METHODOLOGY

Description of the study area

The study was conducted in Masida Community Forest in Linyanti Constituency, Zambezi region (Fig. 1). This is the biggest area amongst the first 13 community forests that were declared in 2006 by the Namibian government. The study area comprises 6 villages of Kapani, Kansoko, Sabelo, Masida, Taulo, and Sitanta. It covers an area of 19 325 ha. It borders Mudumu National Park (South), Makanga Village (East), Zambezi State Forest (North) and the Community Forest of Lubuta (West).

Community forests in Namibia are established under the provision of the Forest Act of 2001(as amended 2005) after meeting conditions prescribed by the legislation and declared by the Minister of Agriculture, Water and Forestry. The community forest is managed by the Forest Management Committee (FMC) on behalf of the community members as per provision from the forestry legislation. All the benefits derived in the community forest by the FMC are shared according to the benefit sharing plan as set in Section15 (2) (g) of the Forest Act of 2001 that states that "The Community Forest Management agreement must provide for the adequate reinvestment of the revenues of the Community Forest and the equitable sharing of the surplus." The plan identifies how any surplus incomes are to be used to provide benefits equitably meaning "fairly" rather than "equally" (Forest Act 2001). The distribution matrix is set up for all community forests that cover the benefits.

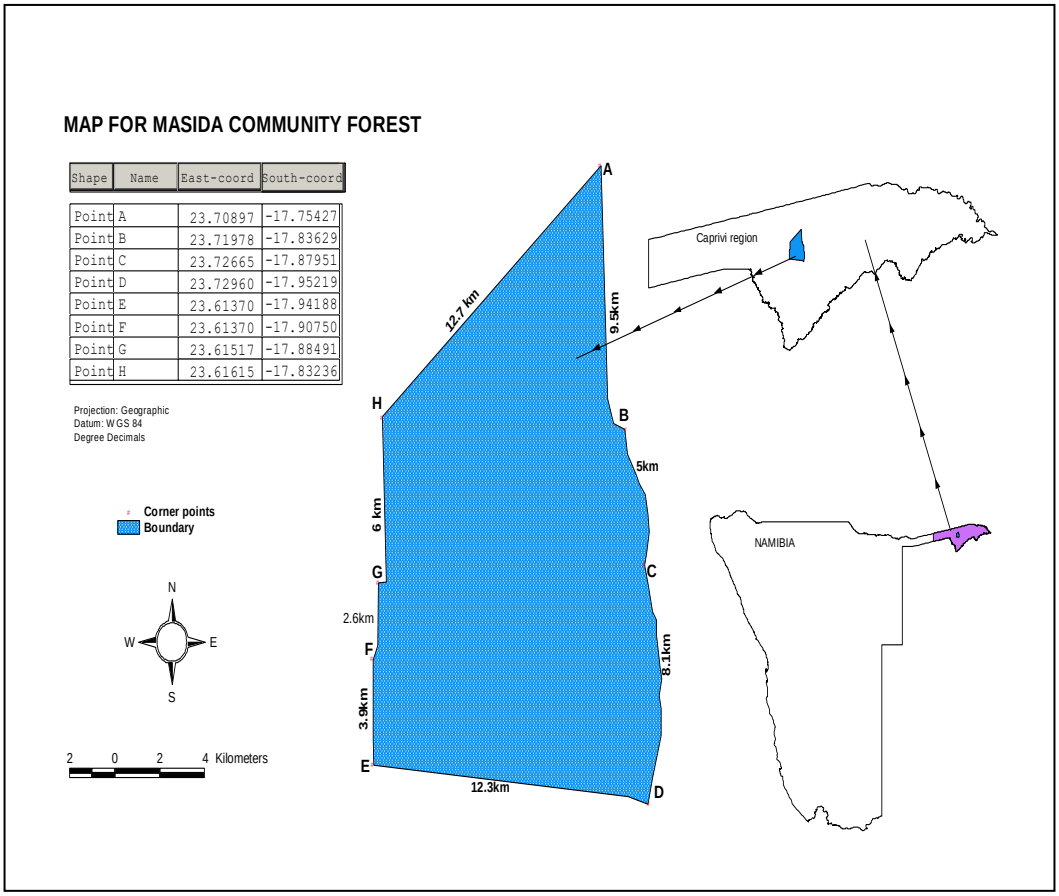

Figure 1: The location of Masida community forest

Sampling design, sampling procedure and sample size

The study was a cross-sectional study and used both qualitative and quantitative approaches. Primary data were collected using key informant interviews, Focus Group Discussions (FGD) and household questionnaires while secondary data were collected from reports, journals and books. Seven key informants were purposively chosen based on their broad knowledge of the Masida community and the forest resources the informants included traditional leaders, local authority leaders, village leaders and relevant state and none state stakeholders. Focus group discussions (FGDs) were held at community forest office with at least eight to ten selected representative members from two villages at each discussion, and three discussions were held. The discussions were based on checklist questions to inspire the discussion.

The study sampled households from all six villages in the area. Proportional random sampling was used to select number of household heads per village to be included in the sample using random numbers and each household in the area had equal chance of being included in the sample (Kothari and Garg 2014). The study area had a population size of 343 households the records from the village offices, and in sample size determination the formula by Jamane (1967) in Suleiman *et al*. (2017) was adopted.

The Formula denotes:

$$n = \frac{\mathrm{N}}{1 + (e^2)N}$$

$$n = \frac{343}{1+(0.05^2)343} \qquad n = 185 \text{ Households}$$

Where n was the estimated sample size (household);

N is the definite population (Total households) in the study area,

e is the significance level (0.05).

The formula minimizes sampling error and bias as it draws a representative sample from the target population (Suleiman *et al*., 2017).

A sample size of 185 households as respondents for the household survey was used to get specific household respondents from all six villages of the study area. A list of all households within the six villages was acquired from the Community Forest office which was updated in December 2018.Village representatives recorded all households (census) in their respective villages. Table 1 presents the proportion allocation method that was used to get the sizes of the samples from different villages proportional to the size of the study population (Kothari and Garg 2014).

Table 1: Sampling frame and sampling size of Masida CF

S/N	Village	Sampling frame	Proportion	Sample size
1	Kansoko	64	64/343*185	34
2	Sabelo	67	67/343*185	36
3	Masida	30	30/343*185	17
4	Taulo	87	87/343*185	47
5	Sitanta	51	51/343*185	27
6	Kapani	44	44/343*185	24
	Total	**343**		**185**

The observational unit was the household head independent of his/her gender status, who is 18 or above years old or a representative in the case of the head of the household being absent during the time of the interview. This member of the household had to be able to narrate the household socio-economic activities.

Data collection

Primary data was collected from the field through a semi-structured questionnaire administered to the household head respondents through face-to-face interviews. The type of data collected include products and services obtained from the forest, income derived from the forest and from other household income sources, historical trends in the utilization of the forest resources and specific products, benefits from the forest and management opportunity costs, permits, information on the management of the community forest, bylaws and other regulation. In addition, the FGD was conducted in the study area with Meetings comprised of two villages coming together with approximately four to five members from each village comprising of men and women of different ages elders and young ones, with varied experiences regarding forest management and utilization, making a total of eight to ten members per meeting and a total of three meetings in the whole study area was conducted (Nyumba *et al*. 2018). Key informant interviews were also conducted to supplement the questionnaire, and were administered to the traditional leaders, community forest officer, conservancy officer, constituency development committee chair, and government officers from the ministry.

The questionnaire used contained both open and closed-ended questions, which was translated to respondents into Sifwe, the vernacular language commonly spoken in the area. The questionnaire was pre-tested by taking 5% of the total households that gave a total of 10 households. The household respondents that were interviewed during the pre-testing of the questionnaire were not part of the respondents during the onset of the study. This exercise helped to assess appropriateness and the structure of the questionnaire (Kothari and Garg, 2014). Thereafter, the pre-test results were used to adjust the questionnaire accordingly.

Secondary data were obtained from literature such as journals articles, books, reports, and from the respective government offices responsible for the study area. The data from the questionnaire was complemented with this secondary data.

Data analysis

Household's socio-economic determinants of forest dependency

Data collected during fieldwork was compiled, coded, and analysed using Statistical Packages for Social Sciences (SPSS) and Microsoft Office Excel. Qualitative data (interviews and discussions) were recorded using a digital camera and transcribed immediately after the fieldwork. The data was summarized into contents that were used to triangulate the data collected during the household interviews. Descriptive statistics were used to summarise the factors influencing households to depend on forest. A binary logistic regression model was used (Jannat *et al*. 2018, Hosmer *et al.* 2013) to determine the effect of socio-economic factors influencing households' forest dependency. The assessing of relationship between dependency and socio-economic factors, forest dependency was the dependent variable and independent variables were the socio-economic factors. A multiple response analysis was used to analyses open ended questions and summarised the repeated responses of respondents on factors influencing forest dependency.

Since measuring forest dependency is core in this study, the forest dependence was computed by adapting a formula from Adam and Tayeb, 2014 and Langat *et al*. (2016) and derive it as;

$FI = TFI/ TI$…… (1)

Where:

FI is the Forest Income,
TFI is the Total Forest Income and
TI is Total Household Income.

The study adapted the strategies used by Jannat *et al.* (2018) by taking the average value across the villages as the cut-off threshold of forest dependency. Household lying below 0.2, that is a household whose income from the forest products accounts for less than 20% of the total annual household income was categorized as "Low forest dependency" and households lying at 0.2 and above whose income from the forest products accounts for more than 20% were identified as "High Forest dependency". In a logistic regression binomial probability theory, the dependent variable in this study was assigned a value of 1 (one) if the household dependency is greater than or equal to 0.2 and a value of 0 (zero) if the value is less than 0.2.

Analytical model for determining the socio-economic factors of forest dependency

Binary logistic regression model was used to identify the socio-economic variables influencing household to depend on forest as cited by Jannat *et al*. 2018; Jain and Sajjad, 2016.

The estimation of forest dependency formula was adapted from Adam and Tayeb (2014):

$[P_i/(1-P_i)] = \beta_0 + \beta_1 X_1 i + \beta_2 X_2 i + ... + \beta_k X_k i$ …… (2)

Thus, $Y_i = [P_i/(1-P_i)]$

Where:

Y_i is the dependent variable that takes a value of 1 for the subscript *i* denoting the i^{-th} household who depend on forest in Masida CF.

β_0 is the intercept term; and $\beta_1, \beta_2, ..., \beta k$ are the coefficients of the explanatory variables to be estimated,

$X_1, X_2, ..., X_k$. are a matrix of independent variables which are related to forest dependency.

The association between two binary data values was measured using odds ratios. It was hypothesized that the forest dependency of the households was influenced by all the socio-economic characteristics of the households in Masida community forest.

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Table 2: Socio-economic characteristics of respondents around Masida Community Forest

	Frequency	Percentage		Frequency	Percentage
Gender of Respondents			**Respondent type**		
Male	64	34.6	Head of Household	132	**71.4**
Female	121	**65.4**	Representative	53	28.6
Age of Respondents			**Marital status of Respondents**		
18-28	41	22.2	Single	57	30.8
29-39	62	**33.5**	Married	93	**50.3**
40-50	44	23.8	Separated	6	3.2
51-60	15	8.1	Widowed	13	7.0
61+	23	12.4	Cohabitant	16	8.6
Size of the household			**Level of Formal education**		
1-2	22	11.9	None	30	16.2
3-5	85	**45.9**	Primary	46	24.9
6-8	65	35.1	Secondary	106	**57.3**
8+	13	7.0	Tertiary	3	1.6
Occupation of Respondents			**Ethnicity (Tribe) of Respondents**		
Unemployed	110	**59.5**	Mafwe	165	**47.3**
Farmer	55	29.7	Mafwe; Zambia	3	0.9
Pensioner	16	8.6	Kwamashi; Zambia	4	1.1
Civil Servant	1	0.5	Masubia	4	1.1
Private Company	1	0.5	Totela	4	1.1
Business Enterprise	1	0.5	Mbalangwe	2	0.6
Others; Specify	1	0.5	Mbukushu	3	0.9
Years of residence in the village					
0-10	32	17.3			
10-20	17	9.2			
20+	136	**73.5**			

RESULTS AND DISCUSSIONS

Socio-economic characteristics of households in the study area

The socio-economic characteristics of respondents are shown in Table 2The average household size per households in the study area is dominantly 3-5 people, comprising 45.9% of the occupants. About 71.4% of the respondents were head of the households and only 28.6% were represented in their absence by their children, wife or husbands and relatives living in the same house with the household head. About 73.5% of the respondents indicated to have resided in the area for over 20 years and 50.3% are married. About 89.2% of the respondents belong to the Mafwe tribe. Females constituted 65.4% of the respondents interviewed and the majority of respondents were in the 29 – 39 age groups (33.5%). Although 57.3% of these respondents, indicated to have attended formal education up to secondary level, 59.5% of these were unemployed. This finding corresponds with study by Suleiman *et al*. (2017) who reported about 68% as unemployed and depend on forest resources and 37 % of respondents revealed farming as their main occupation and similarly, Ofoegbu *et al.* (2017) reported that respondents resided for more than 20 years in the area. Other studies found that forest resources serve as a safety net in time of economic crisis thus helps in poverty alleviation (Schaafma *et al*. 2014, Abdullah *et al*. 2016).

Forest dependence

Generally, most of the forest resources collected from the community forest area are for own-consumption, and occasionally for sale. The results of this study show that households of Masida Community Forest depend on community forest for a diverse forest products and services (Figure 2). The study determined forest dependency of households by assessing the portion of forest income contribution to the total household annual income. Figure 2 shows the various sources of income. Figure 2 shows the sources of income in the study area. Their source of income is mainly from forest products, with the majority of the households actively participating in harvesting and sale of devil's claw, sale of poles and other forest products that constitute a significant quota.

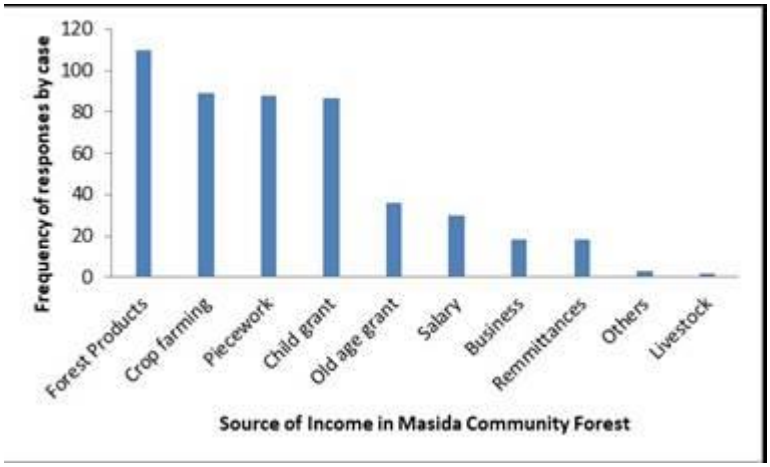

Figure 2: Sources of income in Masida CF

Figure 3 presents the average forest dependency indices of all households in the villages, showing the Forest dependency indices varying from 0.05 to 0.3, and Taulo and Sabelo villages had highest dependency index (0.29 and 0.26 respectively), which indicates that in average more than 20% of their household income is derived from the forest.

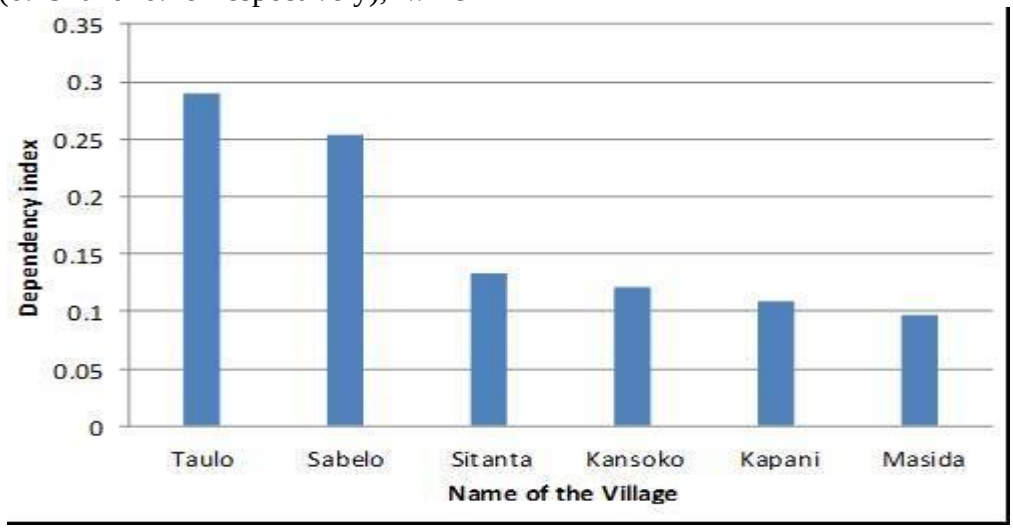

Figure 3: Forest dependency ratio in the villages of Masida CF

Other villages are less dependent on forest resources e.g., Masida, the central village, where most of the development is taking place, and people are less dependent on forest resources as they have other sources of income including Salaries, Child grant and Old age grants, their dependence index is below 0.2 meaning that less than 20% of their income is derived from the forest. The findings of this study concur with other studies in India and Bangladesh that related forest dependency of villages as attributed to their sources of income (Jain and Sajjad, 2016; Jannat *et al*., 2018).

The results of these sources provide interesting outcomes. For example, the forest products have the highest households' frequency as the main source of incomes, but only contributes 16% to the average annual household income. The other non-forest incomes contribute up to 84% to the respondent's livelihoods. This can be attributed to the fact that in monetary terms forest products have less contribution to the perceived household income though it can be more in real terms.

Socio-economic factors influencing households' dependency on forest

Table 3 shows the binary logistic regression model results. The findings of this study indicate that the model with independent variables (PAC: 70.3) performs better than the null model (PAC: 54.6). The results shows further that the model performance is statistically significant (x^2 (8.d.f) = 206.768, $p<0.05$). The inferential test for goodness of – fit, the Hosmer and Lemeshow (H-L) statistics, indicates that the model fit the data well (x^2 (8 d.f) = 8.387, $p> 0.05$). The descriptive measures of goodness of-fit also supports that the model fits the data well (Cox & Snell R^2 = 0.229 & Nagelkerke R^2 = 0.306). The results indicate that the constant variable of the model is insignificant and will not be included ($p>0.05$) in the analysis.

Results of the Likelihood ratio test (207) of the regression model is significant ($p<0.05$), the logistic regression model has an explanatory power that explained the total variation in the dependent variable with an overall fitness of (x^2 value of 48.132, $P< 0.05$). Indicating a significant relationship between the independent variables and forest dependency. The model predicted forest dependency with 70.3 % accuracy. The pseudo R^2 (0.31) indicating that the independent variables fitted in the model explained 31% of the total variation in the dependent variable. Therefore, these variables can be used as explanatory variables for further studies on forest dependency elsewhere.

Table 3: Socio-economic factors influencing household's dependency on forest

Predictors	B(S.E)	Wald	Sig.	Exp (B)	95% C.I.for EXP(B)	
					Lower	Upper
Constant	18.5(4019.0)	0.000	1.000	11.3657496.9		
Age (40 -50)	2.2(1.01	4.621	0.032*	8.750	1.211	63.214
Education (none)	0.9(1.67)	0.298	0.585	2.512	0.092	68.429
Education (Primary)	-0.8(1.60)	0.252	0.616	0.449	0.020	10.223
Education (Secondary)	-0.97(1.54)	0.403	0.526	0.376	0.018	7.711
Education (Tertiary)		7.639	0.044*			
Hectares Owned (0)	1.2(0.53)	5.016	0.025*	3.269	1.159	9.217
Hectares Owned (1-3)	1.9(0.78)	5.813	0.016*	6.515	1.420	29.889
Hectares Owned (4-6)	2.1(1.03)	4.086	0.043*	7.983	1.065	59.831
Hectares Owned (7+)		8.056	0.045*			

Significant level *p<0.05,

Tests:	X^2	Df	P-value
Model evaluation (overall):			
Likelihood ratio test	206.768	8	0.005
Goodness of fit test:			
H-L Statistics	8.387	8	0.397

Notes: Percentage of Accurate Classification (PAC):
Null model = 54.6%;
Model with independent variables = 70.3%;
Cox & Snell R^2: 0.229;
Nagelkerke R^2: 0.306;
Sample size used in the analysis (n) = 185

The result shows the Wald's Chi-square statistics testing the unique contribution of each predictor to forest dependency keeping other predictors constant.

The Age of respondents (40 – 50) has a positive coefficient and significant ($p < 0.05$) increased the likelihood on forest dependency by a factor of 8.75 (an odd ratio). Those with no formal education were not significant ($P>0.05$) but increased the likelihood of dependence by a factor of 2.512. The secondary and Primary education level had negative relations and not significant ($P>0.05$), with a likelihood of decreasing dependence by a factor of 0.449 and 0.376 respectively. Furthermore, the area of land owned (from ownership of 0 hectares, 1-3 and 4-6 respectively) have positive coefficient and significant ($p<0.05$), showing an increasing likelihood on forest dependence as the hectares increases with a factor of 3.269, 6.515 and 7.983 respectively. The remaining variables did not significantly explain forest dependency; thus, the null hypothesis was rejected. The findings are similar to what was reported elsewhere in Cameroun, India and Nigeria (Malleson *et al*. 2014, Jain and Sajjaid 2016, Suleiman *et al*. 2017).

The positive relation of age in the households (aged 40 - 50) showed the highest multiplicative factor (8.75) to forest dependency in Masida CF. The dependence can be attributed to the fact that at this age, the head of households build houses using materials collected from the forest and use forest resources both for subsistence and for commercial purposes. Similarly, those aged 40 - 50 are people with experience of the forest in identifying forest resources for various uses. Furthermore, the influence of age groups (40 – 50) imply that the majority of the respondents were unemployed, and at active age to get into the forest to harvest forest resources. Thus, the positive relations indicate that any unit increase in age results in an increase in the odds of a household forest dependence. In contrast, as the age reaches 60 years, the citizens of Namibia are entitled to the old-age social grant and hence their status of unemployment changes and rely less on forest resources. In a study conducted in South Africa, Ofoegbu *et al.* (2017) reported that the age of respondents (≤38–65) significantly ($p < 0.05$) influenced use of the forest resources.

The primary to secondary level of education is negatively correlated to forest dependency, showing that an increase in one unit of the education causes a decrease in the odds of households' dependency on the forest. Hence, the more educated members are the least found in the area and they have secured employment, and rarely use forest resources in their households. Furthermore, the negative association with education level indicates also that as community members get more educated, their understanding of health vulnerability associated with using the forest as natural ablution facility increases, and build pit latrines or flush toilets. Similarly, the finding of this study concurs with Newton *et al.* (2016) and Jain and Sajjad (2016) who reported that the higher level of formal education reduces reliance on forest as education increases prospects of diverse employment opportunities. The positive and significant ($p<0.05$) relationship between forest dependency and the size of the area (ha) owned by Masida CF residents is explained by the fact that households who own larger areas of land tend to clear the forest for expansion of agricultural activities and this corresponds further with Suleiman *et al.* (2017) who reported similar findings.

Reasons from respondents for forest dependence on the

The reasons attributed to households and forest dependency was explored using multiple response analysis. The results (Table 4), show that the majority of respondents indicated that their dependency on forest resource to include (a) Forest use as natural toilet facility, (b) Provision of free medicine from the forest, (c) Easy access to the forest without any restriction (d) Forest resources are cheap to get, (e) The forest provides some income to the unemployed and (f) Use of forest resources because they cannot afford to pay for alternatives such as electricity and gas.

Table 4: Reasons for household dependence on the Forest

Reasons	Response	Percentage of respondents in the Villages (%)					
		Kapani n = 24	Kansoko n = 34	Sabelo n = 36	Masida n = 17	Taulo n= 47	Sitanta n= 27
Forest easily accessed (3)	No	20.8	44.1	27.8	29.4	12.8	0.0
	Yes	79.2	55.9	72.2	70.6	87.2	100.0
Forest resources cheap to acquire (4)	No	29.2	35.3	33.3	11.8	19.1	11.1
	Yes	70.8	64.7	66.7	88.2	80.6	88.9
Cannot afford to pay alternatives (e.g., electricity, gas) (6)	No	70.8	88.2	83.3	100.0	31.9	29.6
	Yes	29.2	11.8	16.7	0.0	68.1	70.4
Unemployment (5)	No	29,2	17.6	16.7	17.6	38.3	59.3
	Yes	70,8	82.4	83.3	82.4	61.2	40.7
Forest resource provide free medicine (2)	No	37.5	2.9	22.2	11.8	19.1	22.2
	Yes	62.5	97.1	77.8	88.2	80.9	77.8
Natural Ablution facility (1)	No	25.0	14.7	16.7	17.6	17.0	37.0
	Yes	75.0	85.3	83.3	82.4	83.0	63.0

This finding can be explained by the fact that Masida CF is a remote area, and residents encounter transport problems to reach the nearest health center located at Sibbinda, 25 km away. This makes people to use forest as a first aid before a patient is taken to the hospital. The ablution facility function is observed in the study area that only houses with an old aged or senior citizen had pit latrines built by the government in a campaign for the healthcare and reduction of the diseases. The unemployment is observed as a factor that enables the households' member to depend on forest resources for food, medication and free harvesting of forest products and build their own dwellings. Furthermore, forest products such as poles, thatch grass, and withies are a source of piecework to get cash in return for product sale and the labour force to others who cannot harvest for themselves.

Affordability to pay for alternatives such as the utility of electricity and gas was a limiting factor in most households. However, in the sampled households, only a few (8.7%) have managed to pay for the service and those who afford to be connected are using it only for light in the houses, but for cooking and heating, they still use the firewood.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings shows that forest dependency of the study area was found to be high in two villages Taulo and Sabelo villages had highest dependency index (0.29 and 0.26 respectively), which indicates that in average more than 20% of their household income is derived from the forest. The other villages in the study area have their dependence indices are below 0.2 meaning that less than 20% of their income is derived from the forest. Though the overall results show generally low dependence the forest products have the highest households' frequency as the main source of incomes, but only contributes 16% to the average annual household income. The other non-forest incomes contribute up

to 84% of the household income. This can be attributed to the fact that the forest provides varied products and services that do not go to the normal accounting system hence, in monetary terms forest products have less contribution to the perceived household income though it can be more in real terms.

The study further reveals that the socio-economic factors such as age and education of respondents, and crop land size owned significantly ($p<0.05$) influence forest dependency. Age, land ownership as the size increases (from 0, 1-3, and 4-6 hectares) have the highest likelihood of increasing forest dependence by a factor of 8.75, 3.269, 6.515 and 7.983 respectively. On the other hand, only education is negatively correlated to forest dependence, meaning household head with higher educational levels are less likely to rely on the forest resources for their household basic needs.

Natural ablution function, provision of free medicine, cheap acquisition of forest resources, easy accessibility to the forest, and unemployment were found to be the major reasons for households' forest dependency in the study area.

Recommendations

Since the dependence measurement indicates lower indices to most villages, the few that have higher indices can be dealt with strategically to address their livelihood basic needs. This can go by providing alternative livelihood income to alleviate the dependence. The government and other stakeholders can facilitate through projects and other tailor-made income generating activities that can be accommodated within their community setting. Others include provision of social services like hospital and access through roods.

Education of the household head is one of the factors that reduce dependence (is negatively correlated to dependence on the forest resources, therefore improvement in terms of formal education and other alternative livelihood strategies could transform peoples' mind set on forest product utilizations and dependence.

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