

The Contribution of Village Land Forest Reserves in Livelihood Improvement: The Case of Songea and Liwale Districts in Tanzania

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Abstract: Village land forest reserves (VLFRs) are recognized as an important base for rural community development. This study used timber and honey production activities to assess the actual contribution of three Village land forest reserves of Lupagalo VLFR from Songea District in Ruvuma Region, and Liboya and Luhangino VLFRs from Liwale District in Lindi Region on livelihood improvement rural communities living adjacent to these forests. This study assessed livelihood improvement based on financial, human, physical, and social assets. Data were collected using household structured interviews and focused group discussions. A total of 71 timber dealers (38 in Songea and 33 in Liwale District) and 37 honey dealers (23 in Songea and 14 in Liwale District) were interviewed in this study. Inferential statistics and Descriptive statistics such as frequency and percentage were used to report the results of this study. Results show that there is gain in livelihood assets due to timber and honey production. In addition, findings reveal that, physical capital indicators including better education, better health care, and food security had significant influence on livelihood of timber and honey dealer as the p-value ($p < 0.05$). In financial capital, savings had a significant influence on the livelihood of honey and timber dealers. Also, training as an indicator of human capital had a significant contribution on the livelihood of honey and timber dealers. Further, based on social capital, membership status had a significant influence on livelihood contribution $p < 0.05$. Since this study considered only two products, other forest products such as firewood, charcoal, and medicinal plants should be assessed.

Keywords: Livelihoods, Timber, Honey, Adjacent Communities, Village Land Forest Reserves, Tanzania

1. Introduction

Community-Based Forest Management (CBFM) is one of the strategies that aims to sustainably manage forest resources while improving the economic and environmental aspects as well as the livelihoods of local communities [1]. CBFM has led to the establishment of Village land forest reserves (VLFRs) which are also recognized as an important resource base for social and economic development and environmental conservation for many rural communities [2-4]. Since forests are important sources of timber and non-timber forest products, the majority of the rural communities

depend on forests for their livelihoods [5-7]. Through the extraction of various forest products, communities adjacent to VLFRs improve their livelihoods [8-10].

Despite having valuable forest resources, the majority of communities living adjacent to forests have remained in low living standards. Many studies discussed the issues of livelihood improvement for example [11], provided empirical evidence on the contribution of dry forests to the annual income of rural households in Ethiopia [12], assessed the role of forest resources in local livelihoods in Kenya, [13, 14] addressed the contribution of forest products on livelihoods in Ruvuma and Rukwa, Tanzania, respectively. However,

there has been little focus on assessing the contribution of VLFRs on livelihoods especially in Songea and Liwale districts. Thus leaving an information gap in understanding the contribution of the contribution of VLFRs to the livelihoods of communities adjacent to forests. The information is essential for policymakers to design and implement effective policy management policies and programs that take into account the needs and rights of local communities.

Therefore, this study assessed the contribution of VLFRs on livelihood improvement by focusing on livelihood assets. It draws results from two forest products (timber and honey) from the three VLFRS located in the two study sites of Songea District in Ruvuma Region and Liwale District in Lindi Region, in Tanzania. The two sites were selected based on the historical data of implementing these two activities (timber and honey) in their VLFRs [15]. Specifically, the study aimed to: (i) examine the gain of livelihood assets due to timber and honey production and (ii) assess the influence of gained livelihood assets on livelihood improvement.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted in Liweta and Litowa villages located in Parango Ward, Songea District in Ruvuma Region owned the Lupagalo VLFR which was established in 2010 and covers an area of about 1,289 ha with a boundary length of 15km (Figure 1). The Litowa village has a total area of 17,191 ha. There are 313 households with a total population of 1,418 people composed of multi-ethnic groups mainly ngoni as a dominant tribe, yao, ndendeule, Sukuma, and mbulu. The main economic activities are agriculture and livestock keeping. Liweta village on the other hand, has a total area of 13,475 ha. The number of households is 383 with a total population of 1,345 people. The village has multi-ethnic groups mainly the ngoni as the dominant tribe, yao, bena, nyasa, kinga, ndendeule, pangwa, and masai. The main economic activities are agriculture and livestock keeping.

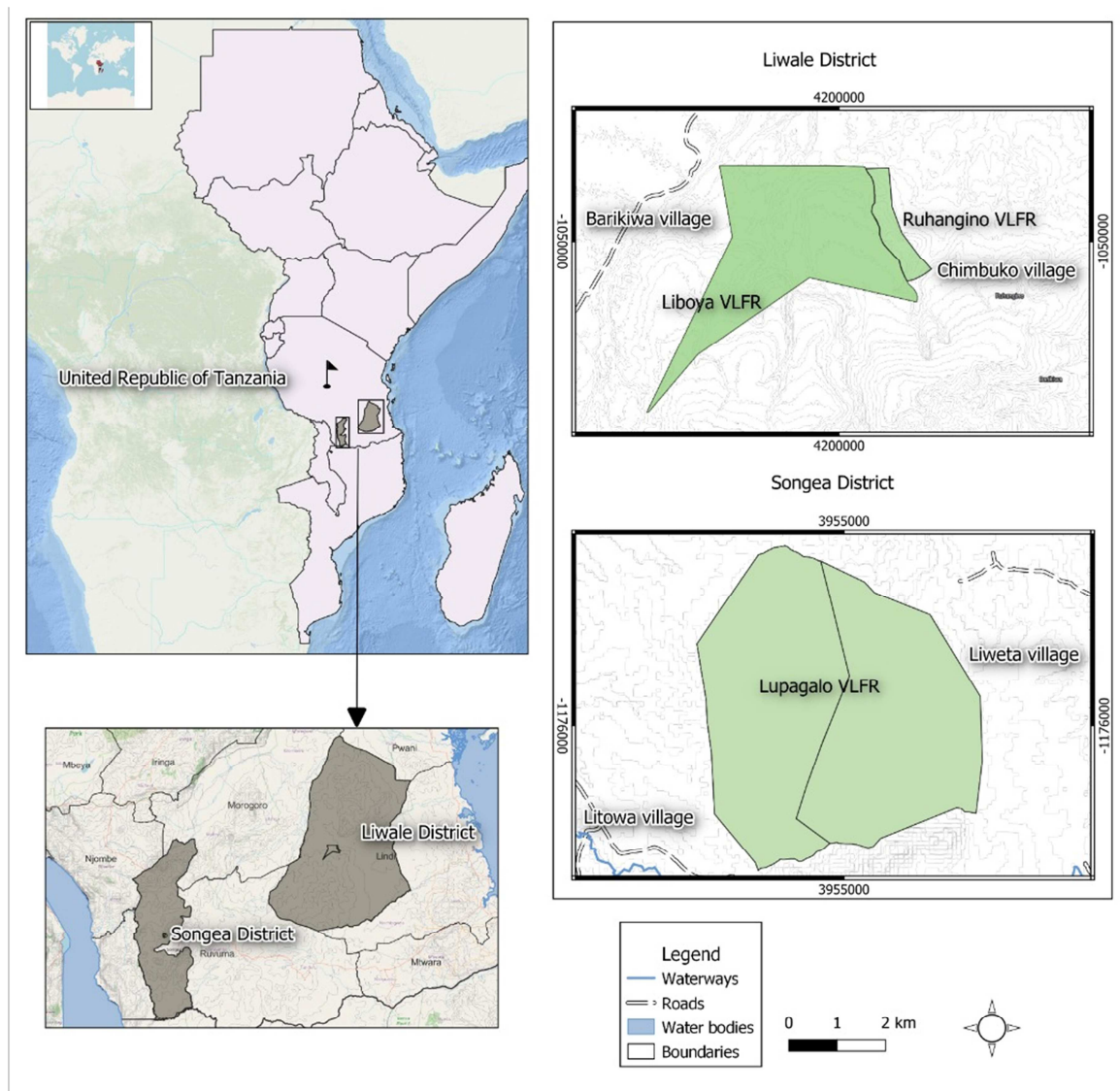


Figure 1. A map of villages around Village Land Forest Reserves.

The study was also conducted in Liwale District, Lindi Region in the two villages of Chimbuko and Barikiwa villages (Figure 1). The forest in Chimbuko village is called Ruhangino VLFR which was established in 2007 and it covers an area of about 18,915 ha. The village has a total area of 67,253.1405ha. The village has bounded by the Selous game reserve. The dominant tribe found is known as ngindo. The forest in Barikiwa village is called Liboya VLFR which was established in 2007 and covers an area of about 19,268ha.

The three Village land forest Reserves are capable of supporting beekeeping activities and have valuable timber tree species such as *Pterocarpus angolensis*, *Brachystegia floribunda*, *Brachystegia manga*, and *Percophids angolensis*.

2.2. Sampling and Data Collection

Both purposive and random sampling were employed in this study. Purposive sampling was applied on selecting villages that have VLFRs of which honey and timber extraction are among the activities from the forest while random sampling was applied to select respondents for the interviews using a questionnaire and focus group discussion. The sample size of the study was determined according to [16]. A total of 108 people were used in data collection of which 37 (23 in Songea and 14 in Liwale District) were honey producers and 71 (38 in Songea and 33 in Liwale District) were timber dealers. Data were collected based on livelihood assets indicators. All assets had respective indicators selected based on the literature reviewed. Where financial capital had household income, savings, and saving location. Human capital had a source of knowledge, training, the basis of training, and who provided training. Physical capital had improved education facilities, improved healthcare facilities, and improved health centers. Social capital had organization membership status as indicator.

2.3. Data Analysis

Descriptive statistics were applied for the first objective

which assessed the gain in livelihood capital indicators. Data from questionnaires were entered into Excel software and then examined and coded before importing into SPSS (version 23). Then outputs such as frequencies and percentages were obtained and discussed showing the extent to which livelihood capital has been gained due to honey and timber production from VLFRs. Results are presented in terms of tables, figures, and graphs.

Also, inferential statistics were applied for the second objective, which aimed at assessing the influence of gained livelihood assets on livelihood contribution. Binary logistics regression model was used to examine the factors (livelihood capitals) that contribute to the livelihood of honey and timber dealers. The binary logistic regression was used following the nature of the dependent variable that had a binary nature (dummy variables, (1=Yes, 0=No) which was the contribution of timber and honey production on livelihood. The independent variables were the indicators of human capital, social capital, financial capital, and physical capital.

3. Results

3.1. Socioeconomic Characteristics of Respondents

The socio economic characteristics of the respondents from both sites are presented in Table 1. Results show that the majority of the respondents (40%) age group ranged from 26-35 years old. About 70% of most families across villages had 2-5 members of household 30% with 1-2 members. Also, results showed that About 50% of respondents from Barikiwa and Chimbuko villages had an average annual income within the wealth group of 500,000 - 1,000,000 while those from Litowa and Liweta had an average annual income within 100,000 - 500,000. Timber dealers were many compared to honey dealers. Also, the majority of respondents (>75%) had attained primary education level while non were found to have tertiary education from higher a learning institution.

Table 1. Socio-economic characteristics of respondents in Liwale and Songea Districts (n=108) Source: field data 2022.

Socio-economic variables		LIWALE (n=47)		SONGEA (n=61)					
		BARIKIWA (= 20)		CHIMBUKO (n=27)		LITOWA (n=32)		LIWETA (n=29)	
		Freq	%	Freq	%	Freq	%	Freq	%
Age group	18-25	0	0.0	1	3.7	4	12.5	3	10.3
	26-35	11	55.0	11	40.7	13	40.6	9	31.0
	36-45	9	45.0	8	29.6	7	21.9	9	31.0
	46-60	0	0.0	6	22.2	5	15.6	8	27.6
	60 and above	0	0.0	1	3.7	3	9.4	0	0.0
Sex	male	11	55.0	21	77.8	26	81.3	20	69.0
	female	9	45.0	6	22.2	6	18.8	9	31.0
Education level	Primary education	15	75.0	23	85.2	31	96.9	27	93.1
	Secondary education	5	25.0	4	14.8	1	3.1	2	6.9
	Tertiary Education	0	0.0	0	0.0	0	0.0	0	0.0
Occupation	Honey	7	35.0	7	25.9	11	34.4	12	41.4
	Timber	13	65.0	20	74.1	21	65.6	17	58.6
Household Size	1-2 people	7	35.0	5	18.5	3	9.4	2	6.9
	2-5 people	13	65.0	20	74.1	25	78.1	25	86.2
	Above 5 people	0	0.0	2	7.4	4	12.5	2	6.9

Socio-economic variables		LIWALE (n=47)				SONGEA (n=61)			
		BARIKIWA (= 20)		CHIMBUKO (n=27)		LITOWA (n=32)		LIWETA (n=29)	
		Freq	%	Freq	%	Freq	%	Freq	%
Wealth Groups (TZS)	Below 100,000	0	0.0	0	0.0	10	31.3	1	3.4
	100,000 - 500,000	1	5.0	7	25.9	20	62.5	18	62.1
	500,000 - 1,000,000	11	55.0	14	51.9	2	6.3	9	31.0
	above 1,000,000	8	40.0	6	22.2	0	0.0	1	3.4

3.2. Gain of Livelihood Assets Due to Timber and Honey Production

The gain in all livelihood assets was assessed based on indicators for all assets. All livelihood assets had indicators that were used as a basis for assessment. The gain in livelihood assets is shown in the following sections.

3.2.1. Human Capital

The gain in human capital due to honey and timber production is presented in Table 2. Results show that timber and honey dealers in Liwale district attained the largest human capital livelihood contribution compared to those in Songea. Further, most of the knowledge obtained by timber dealers in Liwale district is obtained through community interaction as 100% of respondents obtained knowledge from

relatives, followed by 85.75% who got it from their neighbors and about 81.8% from NGOs (non-government organizations), similarly in Songea whereby about 10% got knowledge from neighbors, and only 4% from NGOs while Honey dealers had no information source linked with them.

For the case of training, about 93.1% of timber dealers in Liwale received training and only about 6% of timber dealers in Songea received training. Also, about 33.3% of honey dealers had been trained in Liwale while none of honey dealer have been trained in Songea. Further, results shows that 84.8% of timber dealers and 28.6% of honey dealers in Liwale had received both technical and business training while only 5% of timber dealers and non in honey dealers had received both kind training in Songea district. Various programs have initiated skills as presented in Table 2.

Table 2. Human capital gained due to timber and honey dealers by District (n=108). Source; field data 2022.

Human capital indicators		Liwale (n=47)				Songea (n=61)			
		N		Proportion		N		Proportion	
		Response	Honey	Timber	Honey	Timber	Honey	Timber	Honey
Source of Knowledge	NGO	11	22	36.4%	81.8%	18	23	0%	4%
	Neighbors	3	7	0.0%	85.7%	2	10	0%	10%
	Relatives	0	4	0.0%	100.0%	3	5	0%	0%
Training	yes	9	29	33.3%	93.1%	18	32	0%	6%
	no	5	4	20.0%	25.0%	5	6	0%	0%
Training type	Technical training	0	0	0.0%	0.0%	0	0	0%	0%
	Business training	0	0	0.0%	0.0%	0	0	0%	0%
	Both	14	33	28.6%	84.8%	23	38	0%	5%
Trainer	FORVAC	9	29	11.1%	86.2%	23	38	0%	5%
	FORVAC& Govt	2	1	50.0%	0.0%	0	0	0%	0%
	FORVAC& TAFAS	2	1	50.0%	100.0%	0	0	0%	0%
	MJUMITA	1	1	100.0%	100.0%	0	0	0%	0%
	TASAF	0	1	0.0%	100.0%	0	0	0%	0%

3.2.2. Financial Capital

Table 3 presents the financial capital gains from timber and honey production in the study areas. The results indicate that majority of timber dealers in Liwale district contribute more (100%) to household income than those in Songea District (17%). Similarly 33.3% of honey dealers in Liwale agreed that honey production contributes to household income while in Songea none agreed on the contribution of honey production in household income.

Additionally, the study found that in Liwale district, 93.8% of timber dealers and 66.7% of honey dealers do not save money.

Based on saving locations, majority of timber and honey dealers save money on VICOBA (Village Commercial Bank) and some among timber dealers about 66.7% of honey dealers use traditional boxes as their saving method. Majority of timber dealers in Liwale 87.5% prefer using mobile money in savings.

Table 3. Financial capital gained due to timber and honey production by districts (n=108).

Financial capital indicators	Response	Liwale (n=47)				Songea (n=61)			
		N		Freq		N		Freq	
		Honey	Timber	Honey	Timber	Honey	Timber	Honey	Timber
Contributes (HH income)	no	2	19	0.0%	73.7%	14	26	0%	0%
	yes	12	14	33.3%	100.0%	9	12	0%	17%
Saving Money	yes	8	17	0.0%	76.5%	17	30	0%	0%

Financial capital indicators	Response	Liwale (n=47)				Songea (n=61)			
		N		Freq		N		Freq	
		Honey	Timber	Honey	Timber	Honey	Timber	Honey	Timber
Saving Location	no	6	16	66.7%	93.8%	6	8	0%	25%
	no saving	8	17	0.0%	76.5%	17	30	0%	0%
	VICOBA	1	2	100.0%	100.0%	0	0	0%	0%
	Traditional box	3	6	66.7%	100.0%	1	5	0%	40%
	Mobile money	2	8	50.0%	87.5%	5	3	0%	0%

3.2.3. Social Capital

Table 4 presents an assessment of the gain in social capital resulting from timber and honey production, based on the group membership status of the dealers. The results indicate that timber dealers in the Liwale have been benefiting from

NGOs, with about 87.5% of them justifying this claim. In contrast, only 12.5% of honey dealers in Liwale benefitted from NGOs. In the Songea district, the majority of timber dealers rely on government support while about 39% of timber dealers did not receiving support from the government.

Table 4. Social capital gained due to timber and honey production (n=108).

Social capital indicators			LIWALE				SONGEA			
			Honey		Timber		Honey		Timber	
			N	%	N	%	Count	%	Count	%
Organization membership	Government	no	0	0.0	0	0.0	23	39.0	36	61.0
		yes	0	0.0	0	0.0	0	0.0	2	100.0
	NGO	no	10	66.7	5	33.3	0	0.0	0	0.0
		yes	4	12.5	28	87.5	0	0.0	0	0.0

3.2.4. Physical Capital

In this study, physical capital was assessed by measuring access to better education, healthcare, and food security using a Likert scale of five units for each indicator.

Table 6 presents the gain in physical capital resulting from honey and timber production. The results indicate that timber production has had a significant contribution to better education, with the contribution of better education to timber and honey dealer's livelihood being highly significant among timber dealers, especially those from Liwale, where it covers about 87.9%. In contrast, those from Songea had the least contribution of about 31.6%. Similarly, for honey dealers, the study found a low contribution to livelihood among honey dealers in Liwale of about 14.3%, and null contribution of 0% among honey

dealers in Songea.

Regarding food security, the study found that it is highly significant among honey dealers in both districts, with the highest contribution in Liwale of about 64.2%, followed by those from Songea with about 56.5%. In contrast, low achievement in food security contribution to livelihood was observed among timber dealers, with about 39.4% in Liwale and 2.6% in Songea.

Concerning better healthcare provision, the study found that timber dealers and honey dealers in Liwale district had a wide highest achievement in contributing to livelihood with about 54.5% and 28.6%, respectively. In contrast, Songea had the lowest contribution, with about 21.7% and 23.7%, making the majority disagree with the contribution of better healthcare among honey and timber dealers, respectively.

Table 5. Physical capital gained due to timber and honey production.

Indicators	Response	LIWALE (n=47)				SONGEA (n=61)			
		Honey (n=14)		Timber (n=33)		Honey (n=23)		Timber (n=38)	
		n	%	n	%	n	%	n	%
Improved Education facilities	strongly disagree	8	57.1	1	3.0	10	43.5	17	44.7
	disagree	2	14.3	0	0.0	10	43.5	4	10.5
	neutral	2	14.3	3	9.1	3	13.0	5	13.2
	agree	0	0.0	12	36.4	0	0.0	12	31.6
	strongly agree	2	14.3	17	51.5	0	0.0	0	0.0
Improved food security	strongly disagree	0	0.0	0	0.0	0	0.0	0	0.0
	disagree	1	7.1	1	3.0	2	8.7	25	65.8
	neutral	4	28.6	19	57.6	8	34.8	12	31.6
	agree	8	57.1	13	39.4	12	52.2	1	2.6
	strongly agree	1	7.1	0	0.0	1	4.3	0	0.0
Improved healthcare	strongly disagree	5	35.7	1	3.0	2	8.7	8	21.1
	disagree	3	21.4	5	15.2	9	39.1	17	44.7
	neutral	2	14.3	9	27.3	7	30.4	4	10.5
	agree	4	28.6	18	54.5	5	21.7	9	23.7
	strongly agree	0	0.0	0	0.0	0	0.0	0	0.0

3.3. Influence of Livelihood Assets on Livelihood of Timber and Honey Dealers

Table 6 presents the influence of physical capital on the livelihood of communities around village land forest reserves. The results show a significant increase in livelihood of timber and honey dealers with better education, with an odds ratio of 6.5 times increase in livelihood compared to those who had not attained better education. Better healthcare had a likeliness of increasing livelihood by 5.3 times higher than those who had not attained better health care, which is statistically supported by the p-value (0.025) being less than 0.05. Similarly, results indicated the moderate significance of food security on livelihood by 2.7 times for those who had no food security. Overall, this implies that physical capital has a significant contribution to the livelihood of timber and honey dealers as all the livelihood assets appeared to be significant.

The influence of financial capital on the livelihood of communities around village land forest reserves is also presented in Table 6. The results show a moderate significant increase in livelihood of timber and honey dealers who had saving places, participated in saving, and made household income contributions. Only dealers who practiced saving had a significant contribution on the livelihood by 3046 times compared to those who do not practice saving, which is statistically supported by the p-value of 0.064 being less than 0.1 level of significance. Other financial capital forms, like saving

places and household contribution, had shown no significant influence on the contribution of timber and honey livelihood.

The influence of human capital on the livelihood of communities around village land forest reserve is presented in Table 6. The results show a highly significant influence of training on the contribution of timber and honey livelihood as the p-value (0.006) is less than 0.05 level of significance. On the other hand, the results show that there is no significant influence of the source of knowledge in contributing to timber and honey livelihood as the p-value (0.633) is greater than 0.05 level of significance. This implies that in human capital contribution on the livelihood of timber and honey dealers, only training plays a vital role in influencing the livelihood of dealers.

The influence of social capital on the livelihood of communities practicing timber and honey production around village land forest reserves is presented in Table 6. The results show a moderate significant influence of being a member of the social group towards the contribution of livelihood among timber and honey dealers. This is statistically proved as the p-value (0.011) is less than 0.05 level of significance and the odds ratio of 17 times increase in likeliness among those who participated as members compared to those who did not participate. This implies that social capital had a significant influence on the livelihood of timber and honey dealers.

Table 6. Logistic regression model assessing the influence of gained livelihood assets on livelihood of timber and honey dealers.

Livelihood assets	Variables	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for EXP (B)	
								Lower	Upper
Physical	Better education	1.872	0.502	13.889	1	0.000***	6.504	2.430	17.412
	Food security	1.015	0.583	3.033	1	0.082*	2.759	0.880	8.649
	Better healthcare	1.671	0.746	5.014	1	0.025**	5.319	1.232	22.972
Financial	Saving place	-2.357	1.513	2.428	1	0.119	0.095	0.005	1.836
	Saving	8.022	4.328	3.435	1	0.064*	3046.023	0.630	14718241.051
	HH Contribution	2.094	1.549	1.827	1	0.177	8.118	0.390	169.147
Human	Training	-6.407	2.310	7.694	1	0.006***	0.002	0.000	0.153
	Knowledge source	-0.402	0.841	0.228	1	0.633	0.669	0.129	3.479
Social	Membership	2.874	1.125	6.525	1	0.011**	17.706	1.952	160.608
	Constant	1.139	2.699	0.178	1	0.673	3.124		

p<0.01 ***, p<0.05 **, p<0.1 * and value without asterisk stand for non-significant.

Following the above results, it is statistically found that all assets had a significant partial and total contribution on timber and honey dealer's livelihood.

4. Discussion

Results of this study indicate that the use of physical capital indicators has led to an improvement in livelihoods. This improvement in physical capital had also contributed to the improvement in livelihoods. The results show that there is a significant increase in livelihoods due to the forest products that were examined. These findings are consistent with previous research, such as that conducted by [17], which found that improved access to physical capital has positive impacts on livelihood improvement.

Furthermore, the results reveal that there is differences in the gain of physical capital among the districts and the forest products studied. This could be attributed by differences in capabilities and experiences among dealers in their forest product activities, as well as differences in wealth level (Table 1). This can be due to the fact that majority of respondents in Liwale district have a longer history of engaging in forest products than the majority of respondents in Songea district [15].

Findings from this study reveal that, the gain of financial capital differed between the two products of this study. Also there is insignificant contribution on livelihoods improvements due to the forest products. This may be attributed by the fact that the income generated from the activities does not benefit individually in terms of household

income but rather it collectively benefit. Although not significant, study findings are in line with findings by [18] who reported that there is minimal to no significant impacts of beekeeping activities on household income and also [19] documented that rural households do not benefit directly (in cash) from the share of timber revenues. This reveals that majority of rural people rely on agricultural incomes other than income from forest products [20]. However, this study findings are contrary to the study in Gambia reported that forest products had significant contribution on household income [21]. Further [22] reported beekeeping activities had significant contribution on household income which is contrary to this study findings.

This study found that through forest products human capital as a livelihood asset was gained through trainings which were mostly offered by development programs. Further, there was significant contribution of human capital on communities adjacent to VLFRs livelihoods. The trainings was based on both technical where the dealers were trained on how to produce quality timber and honey, dealers were being educated on the importance of using modern bee hives, the marketing and branding of their products. These improvements had led to improved livelihoods. Results are similar to the findings of previous empirical studies [5] and [23] who reported that knowledge is an important factor in livelihood improvement.

In social capital, this study found that the dealers of forest products have interaction groups which help themselves to work together. The membership category was significant in influencing livelihood contribution. Results reveal that the majority of community groups in study villages are being supported by non-government organization which are normally time oriented, not permanent. Similarly, [24] reported that “community-based forest management currently receives limited government investment and incentives”. Concurrently, [25] reported that non-government organizations and development programs has remained to be a driving force in enhancing and supporting PFM in mainland Tanzania. Also, study findings are contrary to the findings of study conducted in Malaysia which reported that the government forest sector had highest intervention on developing and enhancing forest products for the livelihoods of the communities [26].

5. Conclusions

The overall objective of this study was to assess the contribution of village land forest reserves on livelihood improvement of the households that rely on forest products specifically timber and honey, and reside in close proximity to VLFRs. Specifically, the study aimed to determine how forest products contribute to the improvement of livelihood assets and how those assets in turn influence livelihood improvement. Results indicate that both timber and honey production significantly contribute the livelihood of producers and some to the broader community. This suggests that forest products have the potential to greatly enhance the livelihood of forest-dependent communities. However, most

of the forest product dealers make a living from farming and rising animals, so they don't use forest products as much for their livelihood. We also assessed the influence of livelihood assets on livelihood contribution based on the selected indicators for each asset. The indicators varied in terms of strength of influencing livelihoods improvement. Thus, suggesting that development efforts which aim to improve rural livelihoods through forest products need to consider all the sustainable livelihood assets and the contribution of forest products in each of the livelihood strategies. This can led to more effective outcome of development efforts.

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