Determinants of Livelihood Diversification Strategies in Communities Adjacent to Large Scale Agricultural Investment in Kilombero Valley, Tanzania.

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Abstract: Household's socio-economic characteristics have the potential of determining livelihood strategies of community living adjacent to large scale agricultural investment areas. However, livelihood diversification strategies in areas with large-scale agricultural investment are determined by complex and yet empirically untested factors in Kilombero Valley. Thus, the aim of this study is to examine the determinants of livelihood diversification strategies in the study area. The study based adopted a cross-sectional research design and the exploratory sequential research strategy whereby data were collected from 376 respondents. Quantitative data collected through a structured questionnaire were entered into SPSS and Multinomial logit model was used to examine determinants of household livelihood diversification strategies. Qualitative data were subjected to content analysis. Generally, findings show that household size, land size and access to credit were positively and significantly ($p \leq 0.05$) associated with households' livelihood diversification for households adjacent to Kilombero Sugar Company Limited (KSCL). On the other hand, land size, total income and group membership were significantly ($p \leq 0.05$) associated with households' livelihood diversification for households adjacent to Kilombero Plantation Limited (KPL). It is concluded that diversification of livelihood strategies in communities adjacent to large-scale agricultural investments are context specific and depends on investors adjacent to the community in question. It is recommended that local government authorities and other development actors in Kilombero Valley should recognize and support non-farm livelihood diversification and address access to credit constraints by provision of credit with lowest interest rate to households who will be interested in non-farm income generating activities.

Keywords: Livelihood Diversification Strategies, Agricultural Investment, Livelihood, Kilombero

1.0 Introduction

The 21st Century is experiencing a wave for a growing interest on large-scale agricultural investment particularly in Sub-Saharan Africa (Gibbon, 2011). The phenomenon is considered as one of the development models that plays an important role in improving smallholder farmers' income and households' livelihood (FAO, 2012). Such a wave is fuelled by a fear of some food-importing countries about not being able to access sufficient quantities of food for their people (Matondi *et al.*, 2011). Livelihood diversification plays a crucial role in promoting economic growth and reducing rural poverty in developing countries especially those areas experiencing large scale-agricultural investment (Loison, 2019). The concept of Livelihood Diversification refers to the processing of combining both agricultural and non-agricultural activities to survive and improve the standard of living (Martin and Lorenzen, 2016; Pritchard *et al.,* 2019).

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Household across developing countries put more efforts to diversify their livelihood activities to secure from risks and cope with economic and environmental shocks (Baird and Hartter, 2017; Gautam and Andersen, 2016). More than 70% of Tanzanians depend on agriculture for their livelihoods (Msuya *et al*. 2018). Large scale agricultural investment has emerged as a threat to natural life and livelihood system for communities adjacent to large scale agricultural investment (Synder *et al*., 2019).

The investment in agriculture by large-scale investors affects livelihood of rural communities by increasing global demand for natural resources which is increasing competition for land across developing world, pushing companies into land that many rural communities have sustainably managed for generation (Bellemare, 2012). To cope with changing situation, rural communities in areas with large-scale agricultural investment are adopting both on-farm and off-farm activities (agricultural input supplies, mobile money business, motorcycle riding, employment in investors farm and food vending) and decreasing food consumption/changing diets diversification strategies (Akyoo *et al*., 2020). These diversification activities allow rural farming household to manage risk and improve their lives (Aniah *et al*., 2019; Baird and Hartter, 2017). Non-farm activities have the potential to help households reduce poverty by offering them with a form of insurance against the threats of farming and minimizing reliance on natural resources (Gebru *et al*., 2018). Previous empirical studies by Hazell and Reardon (2010) reports that rural household across developing countries earn 35-50% of their income from non-farm sources. In Tanzania, empirical case studies found that non-farm income account for as much as 40-45% of the average household's income (Sulle, 2017). In this regard, it is obvious that the contribution of non-farm income is immense but varies from place to place and people to people due to different contextual factors.

The rural farm households in Kilombero Valley are producing cereal crops like paddy and maize as well as commercial crops like sugarcane which are highly dependent on the rain-fed agricultural production system (Snyder *et al*., 2019). Furthermore, due to the insufficient land resources resulting from large-scale agricultural investment in the area, land resources have failed to absorb household's full labour force (Herrmann et al., 2015). The rural farming household are obliged to engage in different income generating non-farm activities like cane-cutting, trading, causal labour in investor farm (Akyoo, *et al*., 2018). Even though, the rural household in Kilombero Valley are involved in diverse livelihood activities, the household level of livelihood diversification to different income sources beyond agriculture varies across land size (Gebreyesus, 2016). Moreover, rural farming household's level of livelihood diversification into non/off-farm activities is determined by different factors (Roy and Basu, 2020).

The debate on household's livelihood diversification strategies is not unique and the factors determining rural household for choosing and adopting livelihood diversification strategies in areas with large-scale agricultural investment are controversial and depends on various household socio-economic characteristics (Gebru *et al*., 2018). For example, the distribution of income and wealth status plays a crucial in households' choice over which type of livelihood diversification strategy to select and apply (Loison, 2019). Roy and Basu (2020) studies in Bangladesh reported that, the adoption of diversified activities is strongly influenced by age and education of the household head, number of earning family members, social network and

government donation while the frequent of occurrence of natural disasters, inadequate infrastructure and lack of financial capacity are the critical constraints to livelihood diversification. Empirical studies, in area adjacent to large scale agricultural investment in Ethiopia indicate that age, education, number of non-farm activities, market distance, number of livestock, creditcost and farm size are found to be the significant determinants to household livelihood diversification (Gebreyesus, 2016). Further empirical studies by Gebru *et al*. (2018) in Eastern Tigray Region of Ethiopia revealed that household's choices and adoption of livelihood diversification strategies were positively affected by households' levels of education, access to credit, income, membership to cooperatives, land size, and farm input use whereas age, dependency ratio, family size, access to extension services, distance to market, livestock ownership and agro-ecology negatively affected. Likewise, Yizengaw, (2015) reported that households' choice of livelihood strategies is influenced by land size, livestock holding size, sex of the household head, mass media, market distance, total annual household income and urban linkages.

Based on the arguments, present in theoretical debate, it is evident that rural household participation in diverse livelihood diversification strategies is determined by complex and yet empirically untested factors in the study area. It is thus, so important to identify the determinant of household livelihood diversification strategies in the study area to improve rural household's livelihood diversification strategies. Therefore, the objectives of thus paper to examine the existing livelihood strategies pursued by the rural farming households; and the determinants of livelihood diversification strategies among rural farming households.

2.0 Methodology

The study was conducted in the Kilombero Valley, Kilombero District, Tanzania. Four villages namely Msolwa Ujamaa, Sanje, Mchombe and Mngeta were purposively selected based on having substantial number of out-growers and presence of out-grower associations as well as households working for wage in large-scale agricultural investment.

A cross-sectional research design was adopted in order to examine determinants of households' livelihood diversification strategies in the study area. The sampling unit was a household and exploratorysequential research strategy was adopted with two stages so as to expand the scope and improve the quality of the results. In this strategy, qualitative data collection and analysis, stage one, preceded quantitative data collection and analysis (stage two).

Table 1: Participants involved inthe focus group discussions

Village name	Number of FGDs conducted	Number of Male Participants	Number of Female Participants	Mean age (years)	Minimum age (years)	Maximum age (years)
MsolwaUjamaa	3	14	7	42	25	72
Sanje	2	1g0	5	44	29	61
Mchombe	1	5	3	46	31	66
Mngeta	1	4	2	48	34	70
Total	7	33	17	NA	NA	NA

NOTE: FGDs=Focus Group Discussions; NA=Not Applicable

The qualitative phase involved Focus Group Discussions (FGDs) and Key Informants Interviews (KIIs) used to collect information on sources of livelihood and the key factors influencing households' livelihood diversification strategies. A total of seven FGDs with a total of 50 (33 Male and 17 Female) participants were conducted as shown in Table 1. Participants ranged between six and eight. The selection of FGDs participants was based on gender and age representation to capture age and gender specific views. Seventeen KIIs were involved including two out-grower association administrative secretaries, three Ward Executive Officers (WEOs), four Village Executive Officers (VEOs), two representatives from Kilombero Plantation Limited (KPL) and Kilombero Sugar Company Limited (KSCL), one representative from the Southern Agricultural Growth Corridor of Tanzania (SAGCOT), one representative from Sugar Board of Tanzania and Kilombero District Agricultural, Irrigation and Cooperative Officer (DAICO). The selection of key informant participants was based on age and awareness about large-scale agricultural investment. The aim was to get participants with experience on out-grower scheme and investor farm wage employment in the villages.

The quantitative phase of data collection involved household survey whereby 376 households were involved. Proportionate stratified sampling techniques using a household village register was applied to determine a sub-sample from each village. Considering 95% confidence level and a precision of 0.05, a required sample size was obtained using the following formula:

$$n = \frac{N}{N(e^2)+1}$$ ………………….. (Yamane, 1967 as cited by Israel, 2013)

Where:
n =Sample size,
N =Population of all households in study villages and
e =Level of precision.

According to the national census of 2012, the number of households in the four villages included in the study was 5914. Using the above formula, a sample of 376 households is obtained for all villages. The formula used to draw sample size in each village was adopted from Kothari (2004) formulas follows:

$$n = \frac{N(One village) \times n(all villages)}{N(All villages)}$$ ………………….. (Kothari, 2004)

Table 2: Sample households from selected villages

Village	Households	MHH	FHH	Out-growers	Investor farm worker	Non-Participants	Selected sample size
Mngeta	1286	77	10	-	38	49	87
Mchombe	1650	77	12	-	42	47	89
MsolwaUjamaa	1832	78	44	44	31	47	122
Sanje	1146	64	14	41	18	22	76
Total	5914	296	80	85	129	165	400

Thereafter, simple random sampling was used to select respondents from each village. The sub-sample from each village is shown in Table 2. Qualitative data were analyzed by using content analysis whereby transcribed text was organized into different themes based on the objectives of the study. Quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) Statistics, version 20.

Descriptive statistics were computed to describe household socio-economic characteristics while multinomial logit model was used to identify socio-economic and large-scale agricultural investment factors associated with households' livelihood diversification strategies. The model is widely used techniques in applications that analyse polytomous response categories in different areas of economic and social studies (Yizengaw, 2015). According to Kassie *at al*. (2017) multinomial logit model is an important model to examine the determinants of household livelihood strategy choices among the alternative livelihood strategies. The assumption is that in a given period at the disposal of its asset endowment, a rational household head chooses among the four mutually exclusive livelihood strategies that could offer the maximum utility.

The explanatory variables entered in the model were those transpired in the empirical literature (Table 3). The MNL model for household decision-making specifies the following relationship between probabilities of a household to adopt livelihood diversification strategies Yi and of predictor variable X (Green, 2015). Therefore, the equation used in the regression analysis was:

$$P(Y_i = j) = \frac{e^{\beta'_j X_i}}{\sum_{k=0}^{j} e^{\beta'_k X_i}}, j = 0,1...J$$

Where: i = cases, j = livelihood diversification strategy categories, k = predictor variables. Both continuous and dummy predictor variables were included in the MNL model. Dummy variables were used to avoid any unreasonable assumption that the original numerical values for the predictor variable categories (i.e., values 1, 2, ..., k) correspond to any specific interval scale. All predictor variables used in the analysis as listed in Table 3 were checked for multicollinearity (Field, 2009) and presence of any outliers before they were introduced into the MNL model. The dependent variable (Y) used in this analysis was a 'livelihood diversification strategies', which the study has categorized according to characteristics of the livelihood diversification and subsequently derived four clear and distinct strategies as they relate to the surveyed farm households [j =1, 4, where household choice is relying onj (1)=on farm alone; j (2)=on-farm +off-farm; j (3)=on–farm+non-farm;j (4)=on-farm+off-farm+non-farm income generating activities]. The estimation of MNL model was made by normalizing on-farm alone livelihood strategy as reference category for analysis. The maximum likelihood estimates as indicated by the chi-square test was found to be highly significant (Table 5).

Table 3: Description of the variables in the model

Choices (j)			Livelihood diversification strategies
j =1,ON,			On-farm alone
j=2,ON+OFF			On-farm+off-farm
j=3,ON+NF			On-farm+non-farm
j=4,ON+OFF+NF			On-farm+off-farm+non-farm
Variables	**Category**	**Description of the variable**	**Expected outcome**
Age	Continuous	Age of the household head (in years)	+
Education	Continuous	Years of schooling of the household head (in years)	+
Household Size	Continuous	Number of individuals in a household	+/-
Land Size	Continuous	Household land size (in ha)	+
Group membership	Dummy	Household group membership (1 if in group membership, 0 otherwise	+
sex	Dummy	Sex of the household head (1 if Male, 0 female	+
Access to credit	Dummy	Household access to credit (1 if household access credit, 0 if No)	_
Marital status	Dummy	Household head marital status (1 if married, 0 if single, separate, widow/widower or divorced)	+
Distance to the nearest investor	continuous	Kilometer to the nearest market	+
Household total income	continuous	Total household income	+

Before running the MNL model, six continuous and five discrete/binary explanatory variables were checked for multicollinearity using Variation Inflation Factor (VIF) and contingency coefficient, respectively. The VIF for all the continuous variables were less than 10 and greater than one. Similarly, the results of the contingency coefficient test revealed that there was no problem of association among the four discrete explanatory variables. This indicates no serious problem of multicollinearity. Table 3 provides information for all predictor variables included in the MNL model along with their expected outcome.

3.0 Findings and Discussion

3.1 Respondents' Socio-economic Characteristics

The average household size in communities adjacent to KSCL was larger than in communities adjacent to KPL. Larger households in communities adjacent to KSCL were considered essential for provision of needed farm labor for both on-farm, off farm and non-farm activities. Communities adjacent to KSCL had higher mean age of household heads (43.5 years) than communities adjacent to KPL (42.2 years). The age of the household head is positively associated with livelihood experience and, as a farm household acquires more and more experience in livelihood strategies, it can accumulate more wealth, use better planning, and ultimately improve success in livelihood (Kassie, 2017). There was a slight difference in

education level of household heads between communities adjacent to KSCL and communities adjacent to KPL.

In communities adjacent to KPL, households owned larger farmland than in communities adjacent to KSCL. The bigger household land size in communities adjacent to KPL may be associated with household labor availability and an increased demand for food, therefore prompting cultivation of larger land areas. On the other hand, the smaller average cultivated land area in communities adjacent to KSCL might be associated with its high agricultural potential for sugar cane production, which is characterized by integration of community land with investor land thereby making it more susceptible to land grabbing by rich people from major towns of Morogoro and Dar es Salaam, which ultimately resulted in land scarcity.

Table 4: Description statistics for variables included in the MNL Model

Variables		KSCL (n=200) Percentage/mean	KPL(n=176) Percentage/mean
Dependent variable			
LDS of the household (%)	ON	5.9	43.0
	ON+OFF	35.7	26.7
	ON+NF	19.2	25.1
	ON+OFF+NF	39.2	5.2
Predictor's variables			
Age		43.5	42.2 (M),
Marital Status (%)		65.4 (M), 34.6 (O)	64.5 (M), 35.6 (O)
Years of Schooling		6.6	6.7
Household Size		4.1	4.3
Group Membership (%)		44.6	34.6
Land Size		2.7	3.0
Sex		66.5 (M), 33.5 (F)	65.4 (M), 34.6 (F)
Access to credit (%)		43.0	29.4
Distance to nearest Investor		2.6	3.4
Total Income		3.6	3.2

Table 4 indicates further that more households in communities adjacent to KSCL had more total income compared to KPL. KSCL is located closer to main roads and major urban centers like Morogoro, which were likely to offer more off-farm income and non-farm opportunities. KPL is located in a relatively remote and was likely to offer fewer off-farm income opportunities, which could supplement income generated from farm sources. The close proximity to major towns and main road made communities adjacent to KSCL to have better access to credit/input services, extension services, and access to local organisations compared to households adjacent to KPL. The percentages of female-headed households in all areas were slightly lower than the Tanzania national average (Tanzanian NBS, 2013).

3.2 Determinants of Household Livelihood Diversification Strategies

The MNL results for both communities adjacent to KSCL and KPL showed that the Pearson and Deviance statistics were not statistically significant ($p > 0.05$), meaning that predicted values were not significantly different from the observed values, and thus the model was a good fit of the data.

Table 5: Likelihood Ratio Statistics Showing Overall Contribution of Each Predictor Variable to the Model

Effect	KSCL (n=200)			KPL (n=176)		
	-2log Likelihood of Reduced Model	Chi- Square	Sig.	-2log Likelihood of Reduced Model	Chi- Square	Sig.
Intercept	473.706[a]	0.000		516.227[a]		0.000
Household size	497.087	23.381***	.000	516.264	.037	.998
Age	476.499	2.792	.425	521.985	5.758	.124
Education	476.024	2.317	.509	517.415	1.188	.756
Land size	509.780	36.074***	.000	549.817	3.590***	.000
Total income	474.890	1.184	.757	527.477	11.249**	.010
Sex	474.698	.992	.803	517.085	.857	.836
Access to credit	482.655	8.949***	.030	516.330	.103	.991
Group membership	476.845	3.138	.371	520.869	4.642	.200
Distance	474.620	.914	.822	529.295	13.068**	.004
Marital status	476.862	3.155	.368	521.191	4.964	.174

Note: **significant level = 5%, ***significant level = 1%

Table 5 indicates that the variables which had an overall statistically significant contribution (at 5% level) to household choice of livelihood diversification strategies in communities adjacent to KSCL were household size, land size and access to credit services, while in communities adjacent to KPL the variables were land size, total income and household group membership.

3.2.1 Determinants of Household Livelihood Diversification Strategies in Communities adjacent to KSCL

Table 6 shows the parameter estimates for predictor variables on three categories of livelihood diversification strategies in community adjacent to KSCL relative to on-farm livelihood diversification category. The coefficient of household size and land size were negatively and statistically significant for on-farm and non-farm, on-farm and off-farm and on-farm, off-farm and non-farm households, which suggests that the odds of choosing any of the three livelihood diversification strategies other than the on-farm increase for those households with smaller household sizes and smaller land sizes. The implication of these findings is that resources-constrained households, particularly in relation to land size as well as household size were less likely to adopt an on-farm livelihood diversification category. There are two propositions for this: firstly, on-farm farming livelihood diversification strategy requires a relatively large land area to support both livestock keeping and crop production. The relationship between on-farm

livelihood diversification and larger land area requirements was emphasized during the FGD and interviews with key informants as indicated in the following quotes:

> "*Most of us practice non-farming income generating activities because we lack land to participating in farming as most land are owned by large-scale sugarcane growers*" (FGD Participants, Sanje Village). 17th February, 2017.

These findings are consistent with those of a study on the association between land size and livelihood diversification strategies in Africa by Yizengaw *et al*. (2015) and Gebru *et al*. (2018), which found that larger land size, were associated with on-farming mixed crop-livestock keeping activities.

Table 6: MNL Estimates for Determinants of household livelihood diversification strategies Households adjacent to KSCL

variables	ON+NF				ON+OFF				ON+OFF+NF			
	B	Std. Error	Wald	Exp (B)	B	Std. Error	Wald	Exp (B)	B	Std. Error	Wald	Exp (B)
Household size	-.587**	.235	6.231	.556	.-.550***	.134	16.881	.577	-.546***	.161	11.441	.579
Age	.008	.026	.103	1.008	.024	.016	2.303	1.024	.008	.018	.204	1.008
Education	-.147	.109	.834	.863	-.005	.069	.005	.995	-.007	.079	.008	.993
Land size	-.201**	.098	4.177	.818	-.061***	.018	11.607	.941	-.088***	.031	8.201	.916
Total income	-.296	.738	.161	.744	-.413	.381	1.175	.662	-.243	.450	.292	.784
Sex	.392	.746	.276	1.480	-.251	.471	.284	.778	-.148	.548	.073	.862
Access to credit	.450	.904	.247	1.568	-.886**	.437	4.113	.412	-1.094**	.486	5.064	.335
Group membership	-.107	.669	.026	.899	.571	.378	2.277	1.770	.192	.437	.193	1.212
Distance	.031	.809	.001	1.031	.321	.475	.458	1.379	.483	.570	.718	1.620
Marital status	1.330**	767	3.004	3.780	.474	.492	.930	1.607	.452	.539	.704	1.572

Note: The base category is on-farm, **significant level = 5%, ***significant level = 1%

Secondly, on-farm livelihood diversification strategy is labour demanding; therefore, bigger household size was likely to supply needed labour for both livestock keeping and cropping activities. The association between labour and livelihood diversification strategy was also raised during FGDs in communities adjacent to KSCL as quoted below.

"Farming is too demanding especially sugarcane farming, we are forced to continue look for alternative income generating activities like petty trade because we are unable to meet cost of renting land as well as casual" (FGD Participants, Sanje Village. 17th January 2017).

Gebru *et al*. (2018) found that large farming households were likely to engage in farming, whereas smaller households tend to practice small business. Similarly, other studies have shown that households with greater number of members are likely to farm larger land areas and conduct critical farming operations at the right time than those with those with fewer (Boru *et al*.,2015; Swai *et al*., 2012).

Except for the on-farm and non-farm livelihood diversification category, access to credit was statistically and negatively associated with the odds of choosing either on-farm and off-farm or on-farm, off-farm and non-farm over on-farm. This implies that households which had access to credit were more likely to practice on-farm livelihood diversification strategy compared to on-farm and off-farm as well as those in on-farm, off-farm and non-farm households. On-farm households tended to live in relatively remote areas to ensure access to sufficient land for both pasture and crop production and, consequently, had a harder time accessing the mainly urban based credit institutions. According Kassie, (2017), financial institutions that provide a broad range of financial services, such as credit and savings are heavily urban biased. The difficulties experienced by farmers in communities adjacent to KSCL in accessing credit were captured in the discussion with key informants as indicated in the following quote:

"Participation in groups is helpful in terms of accessing credit schemes. Moreover, agricultural inputs like seeds and fertilizers channeled via groups by KSCL in collaboration with the National Microfinance Bank (NMB) to sugarcane out-growers but for farmers who live far from KSCL and engage in other crops, credit access is a problem" (KIIs, Msolwa-Ujamaa Village. 22nd December, 2016).

3.2.2. Determinants of household livelihood diversification strategies in Households adjacent to KPL

Table 7 shows that the parameter estimates for predictor variables on the three categories of livelihood diversification strategy in communities adjacent to KPL relative to on-farm livelihood diversification strategy category. The MNL results for communities adjacent to KPL suggest that household choice of livelihood diversification strategy was associated with availability of resources as land, income and social capital (expressed as 'membership in groups'). The coefficient of land size was positively and statistically significant (P≤0.05) for all three livelihood diversification strategy (on-farm and non-farm, on-farm and off-farm and on-farm, off-farm and non-farm), implying that the odd of choosing any of the three livelihood diversification strategy relative to on-farm rises for those households with bigger land size. This suggests that smaller land sizes were likely to be the reason why most households in communities adjacent to KPL practice on-farm livelihood diversification category.

The role of land size in household decision-making was highlighted repeatedly during the FGDs and interviews with key informants in communities adjacent to KPL. There were strong perceptions among participants that the available land does not meet the village population farming demands, and it was expected to remain so in future, this is reflected in the following quotes:

> *"…The land is decreasing due to elite capture of land and the land available does not meet current population demands. Most of young household heads lack land that can be used to grow different crops and therefore they rely on wage employment which attracts low wages." (FGD Participants, Mngeta Village. 11th January, 2017).*

However, there were claims that shortage of farming land in communities adjacent to KPL was associated with either misconduct of some of the village officials, failure to follow land use plan, and/or giving land ownership rights to only few individuals while neglecting the village majority. These are illustrated by the quotes below:

> *"…Land is not a problem in this village. What exists is corruption. You find very few people with up to 100 acres and others owning even more." (FGD Participants, Mngeta Village. 11th January, 2017).*

The discussions conducted with the key informants suggest that as time goes, family lands are being fragmented into small pieces to accommodate the newly born individuals in each generation. As a result, the sizes of land owned by households have been decreasing with an increase in population size. This clearly indicates that the smallholder rural farm households are engaged into non/off-farm livelihood diversification strategies for push reasons. The smaller amount of land size could not support food and other financial requirements and hence forces them to look for other alternative sources of income. These findings are consistent with those of Yizengaw *et al*. (2015), who found that the farm households who have large land size, depends on agricultural activities alone whereas farm households with smaller land size are engaged in non-farm and off-farm livelihood diversification strategies.

Furthermore, Table 7 shows that households' membership to group was positively and significantly ($p \leq 0.05$) associated with households' livelihood diversification strategies. If other factors remain constant, the likelihood of livelihood diversification in favor of households with membership in group or groups to choose on-farm and non-farm, on-farm and off-farm and on-farm, off-farm and non-farm livelihood diversification strategies increases. The possible explanation for the positive relationship is that households with a membership in group/groups are more likely to achieve higher livelihood outcomes. This was expected since households' participation in groups minimizes their financial constraint because of having opportunities to finance farming activities and other income generating activities.

Table 7: MNL Estimates for Determinants of household livelihood diversification strategies in Households adjacent to KPL

Variables	ON+NF				ON+OFF				ON+OFF+NF			
	B	Std. Error	Wald	Exp (B)	B	Std. Error	Wald	Exp (B)	B	Std. Error	Wald	Exp (B)
Household size	.008	.155	.003	1.008	-.014	.159	.008	.986	.033	.264	.016	1.033
Age	.020	.013	2.335	1.020	-.013	.014	.870	.987	.024	.032	.552	1.024
Education	.049	.054	.817	1.050	-.008	.054	.020	.992	-.016	.137	.014	.984
Land size	.358***	.095	14.123	1.431	.303***	.096	10.001	1.354	.461***	.103	20.056	1.585
Total income	-.678	.486	1.945	.507	-.628	.523	1.442	.534	2.013**	.895	5.061	7.489
Sex	.263	.433	.368	1.300	-.019	.448	.002	.981	.712	1.017	.490	2.038
Access to credit	-.080	.352	.051	.923	.035	.353	.010	1.036	-.098	.942	.011	.907
Group membership	.029	.336	.007	1.029	.444	.341	1.694	1.559	1.600	.936	2.921	4.951
Distance	.690	.479	2.075	1.993	-.690	.412	2.804	.502	-2.134**	1.054	4.101	.118
Marital status	.805	.421	3.667	2.238	-.006	.413	.000	.994	-.529	1.257	.177	.589

Note: The base category is ON, **significant level = 5%, ***significant level = 1%

Group membership can also increase household's social capital. In addition, being a member in social groups increases bargaining power of farm household's in selling agricultural produce due to collective actions and decisions. These results are in line with observations from the FGDs as shown below:

> *"Participation in groups is helpful in terms of accessing credit schemes. Moreover agricultural inputs like seeds and fertilizers channeled via groups by KPL in collaboration with the National Microfinance Bank (NMB)" (FGD Participants, Mngeta Village. 22nd December, 2016).*

This implies that households participating in social groups are in a position to improve agricultural production and other economic activities, which can improve their livelihood diversification strategies. According to Bahaman *et al*. (2008), social capital in Malaysia is

important asset in diversifying household livelihood strategies because credit is in most cases channeled through groups.

The coefficient of households' income was positive and statistically significant for on-farm, off-farm and non-farm households but not for on-farm and non-farm and on-farm and off-farm households, implying that households which had with higher income, when compared with those with low income, were more likely to choose on-farm, off-farm and non-farm livelihood diversification strategy over on-farm. There are two propositions for this: first, on-farm, off-farm and non-farm households tend to have bigger bigger land size, implying that households participated in diverse livelihood activities for push reasons such as shortage of land to support their livelihoods. Second it is possible that the large land size increases labour efficiency of the households, thereby resulting in no surplus labour for other non-farming and off-farming work. The findings are consistent with results report by (Gebru *et al*.2018) in Ethiopia who reported that land size determine which livelihood diversification strategy household adopt.

4.0. Conclusions and Recommendations

The study demonstrated that the households adjacent to KSCL are likely to have a diversified livelihood when they have small land size, and they are likely to diversify into ON+OFF+NF when they have access to credit. In communities adjacent to KPL, the household choice of livelihood diversification strategy is associated with availability of resources such as land, income and social capital. The implications of key results for both communities adjacent to KSCL and KPL is that diversification of livelihood strategies in communities adjacent to large-scale agricultural investments are context specific and depends on investors adjacent to the community in question. The article recommends that in seeking to enhance households' livelihood diversification and to improve the livelihood of the communities adjacent to large-scale agricultural investments, local government authorities and other development actors in Kilombero Valley should make land available to households, support income generating activities and support community in group establishment formation There is also a need to address access to credit constraints by provision of credit with lowest interest rate to households who will be interested in non-farm income generating activities.

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