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Socio-Economic Determinants of Livelihood Outcome Among Smallholder Coffee Farmers Participating in Mount Meru Coffee Project in Arumeru District

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Abstract
While coffee agricultural projects are recognised to be the engine of growth of the economy, most smallholder coffee farmers in Arumeru District have low livelihood outcomes. The study aimed to examine the socioeconomic factors influencing the livelihood outcomes of smallholder farmers involved in the Mount Meru Coffee Project. A cross-sectional research design was adopted, utilising an exploratory sequential mixed-methods approach. A total of 155 smallholder coffee farmers were selected using simple random sampling. Qualitative data were examined through thematic content analysis, whereas quantitative data were assessed using descriptive statistics and inferential statistics via a multiple regression model. The results indicated that age, livelihood diversification strategies, education, family size, membership in groups, participation in the Mount Meru Coffee Project, and land size were positively significant determinants of the household livelihood outcomes index at $p<0.005$ significance level. The study concludes that smallholder coffee farmers display variations in their socio-economic characteristics that affect their individual livelihood outcomes index. It is therefore recommended that local government authorities in Arumeru District should facilitate frequent meetings between smallholder coffee farmers to discuss issues emerging from their coffee production and come up with solutions to the constraints that are within their capacity. The Mount Meru Coffee project, in collaboration with the local government authorities, should promote the Mount Meru Coffee project model, as this model has proven to provide a better livelihood option than the other models adopted by smallholder coffee farmers.

Key words: Livelihood outcomes, Mount Meru coffee project, participation, smallholder coffee farmers.

INTRODUCTION

Agricultural projects that support the production and marketing of coffee are important in improving household livelihood outcomes in terms of human capital, social capital, assets, and household income. Worldwide, coffee is among the crucial cash crops for the nations and the livelihoods of the farmers (Kimaro, 2020). It is estimated that coffee is produced in more than 70 countries, with Brazil, Vietnam, Colombia, Indonesia and Ethiopia being the biggest producers (ICO,2015). According to Mhando et al. (2018), the crop in many parts of Africa and Tanzania was originally cultivated by missionaries, and later, in the mid-1920s, it was grown by small-scale farmers, and it was linked to the cooperative movement involving native farmers in the mid-1920s and 1930s.

The country is a significant coffee producer, and coffee is one of its major agricultural exports, though it is not among the top global producers. It ranks as the fourth biggest coffee producer on the African continent behind Ethiopia, Uganda, and Côte d'Ivoire. In Tanzania, Kagera region remains the leading in producing robusta coffee, followed by Mbeya, Kilimanjaro, Arusha, and Ruvuma, which produce arabica coffee. Key Arabica growing areas include Kilimanjaro, Arusha, Mbeya, Mbinga (Ruvuma), and Mbozi (Songwe), whereas Robusta is predominantly cultivated in the Kagera region. Other coffee-producing regions include Tanga, Iringa, Morogoro, Kigoma, Manyara, Mwanza, Rukwa, and Mara (Rweyemamu et al., 2024).

The Tanzanian coffee industry plays a vital role in the nation's economy, providing livelihoods for hundreds of thousands of families and contributing significantly to export earnings. However, coffee farming in Tanzania is largely practised by smallholder farmers operating on an average farm size of 1.5 hectares (TCB, 2024). Despite the small-scale farmers, coffee remains a crucial source of income, supporting about 400,000 smallholder farmers who contribute approximately 90 per cent of the country's coffee output. In the 2023/2024 marketing year, Tanzania produced an estimated 1.35 million 60-kilogram bags of coffee; this represents a 21 per cent rise compared to the previous years due to a recovery from drought conditions.

However, production is projected to grow by 7 per cent to 1.5 million bags in 2024/2025, attributed to improved agronomic practices, distribution of climate-resilient seedlings, and rehabilitation of plantations. In addition, exports are also expected to increase by 13 per cent to 1.27 million bags due to higher exportable supplies (TCB, 2024). Apart from this expected progress, the Tanzanian government, through the Ministry of Agriculture, has made several initiatives, including the distribution of approximately 17.8 million coffee seedlings during the 2022/2023 season and an ambitious target to reach 25 million seedlings and improve accessibility of extension services by 2025. The goal is to enhance productivity and quality by 2025 (Mhando, 2025).

In cognisance of the contribution of coffee production to forex and employment, the government of Tanzania has designed and implemented policies and programs supportive of its development. These policies and programs include the coffee industry development strategy (CIDS). The objective of CIDS is to boost income throughout the entire value chain by raising both coffee production and quality. Likewise, the Milwaukee Synod of the ELCA and the ELCT Diocese of Meru also agreed to engage in a partnership in 1999 to support families growing coffee through the Mount Meru Coffee project (Makoninde, 2010). The project started selling coffee abroad within the congregations of the Greater Milwaukee Synod (GMS) in 2002 (Annual Report, Mount Meru Coffee Project, 2022).

Despite the increase in coffee production compared to previous years, the actual impact on smallholder farmers' livelihood outcome index remains unclear. This situation may be attributed to the complex pricing structure, whereby the prices received by farmers are diminished by deductions from primary societies, cooperative unions, and the warehouse receipt system. Additionally, thin markets with few buyers limit competition and depress farm-gate prices (Rweyemamu et al., 2024). Therefore, the study of the livelihood outcome index of coffee production among smallholder farmers participating in the Mount Meru Coffee Project in Arumeru District, Tanzania, is very important to assess smallholders' efforts in relation to the livelihood outcome index.

LITERATURE REVIEW

Theoretical Review

This section discusses the Sustainable Livelihood Framework to describe the Socio-economic Determinants of Livelihood Outcome Among Smallholder Coffee Farmers Participating in Mount Meru Coffee Project in Arumeru District as follows:

Sustainable Livelihood Framework (SLF)

The present study is grounded in the Sustainable Livelihood Framework (SLF), which conceptualises the interaction of socio-economic characteristics influencing vulnerability, opportunities, livelihood characteristics, assets and adaptive capacity (Natarajan et al., 2022; Dabla-Norris, 2015). The Sustainable Livelihood Framework (SLF), as developed by DFID, also focuses on how resources are used as assets to improve human well-being and promote development by considering livelihood assets, processes and structures, and livelihood strategies to achieve livelihood outcomes (Wendimu et al., 2016). Grounded in the Sustainable Livelihood Framework, this study characterises determinants of the livelihood outcome index among smallholder farmers participating in the Mount Meru Coffee project.

Empirical Review

In conducting the study of determinants of the livelihood outcomes index of coffee production among smallholder farmers participating in the Mount Meru Coffee project in Arumeru District, several studies were reviewed. For example, Kiyingi and Gwali (2012), who examined the productivity and profitability of robusta coffee in central Uganda, found that the production of coffee was profitable. The study found that shaded coffee generated significant income from shade tree products, contributing 53.3 per cent and 42.5 per cent of the gross annual income in the traditional and compost coffee systems, respectively. However, the mean coffee productivity per acre from coffee fields with compost manure (748 kg acre) is traditional, low-input. However, the profitability of the coffee can be significantly improved by increasing coffee stocking density from the current average (340 coffee trees per acre) to the recommended stocking density of 450 coffee trees per acre. In addition, farmers can provide their own manure instead of buying.

Bamenga et al. (2025) did a study on Profitability Analysis of the Robusta Coffee Value Chain in the Democratic Republic of Congo. Their results showed that the production was profitable, optimising better coffee processing practices to increase the value of coffee for efficiency. Another study was done by Yang *et al* (2022) on the profitability of coffee in African countries. The study found that the coffee production was profitable, although coffee originated in Africa, the average coffee production efficiency of African countries (0.6167) lags behind that of non-African countries (1.1563). Nevertheless, the average coffee productivity in African countries (1.1766) surpasses that of non-African countries (1.1007). Currently, coffee production efficiency across African coffee-producing nations remains low, prompting the adoption of technological advancements to enhance performance.

Likewise, Ssekitooleko (2019) in his study of Profitability of Coffee Production among the Youth in Kirumba Sub County, Kyotera District in Uganda, his results indicated that the coffee production was not profitable due to low access to extension services, distance from the market and herbicide use.

Additionally, Mohammed et al (2013) conducted a study focusing on the profitability of coffee production in Kebab/Bunu local government area of Kogi State, Nigeria. The results indicated that coffee production is profitable in the study area; age, family size, farming experience and farm size play vital roles in increasing coffee production. The level of profit was affected by the high cost of labour, processing method, low yield and the unavailability of an accessible market.

Apart from that, Andrew and Philipp (2014) conducted a study on Coffee Production, profitability and constraints in the Kigoma Region, Tanzania. The findings indicate that farmers in the Kigoma Region earned a gross margin of 730 Tanzanian shillings per tree annually. Farmers who processed their coffee at the CPU earned approximately TZS 1,350 per kilogram as a coffee improvement gain. Therefore, this indicates that farmers are operating for profit; however, coffee production contributed about 39 per cent of total household income in the Kigoma region. The main challenges faced by coffee producers included input costs, taxes, contributions to research and the Central Pulpery Unit, limited extension services, unreliable markets, low coffee prices and quality, transportation issues, and delayed payments.

Research done by Mhando and Mdoe (2018) assessed the reasons smallholder farmers' districts continue with coffee production despite fluctuating prices. The study found that despite the production and marketing challenges, coffee farming has remained a source of reliable income, a traditional crop and cultural symbol. Overall, the reviewed literature highlights that profitability in coffee farming is not solely determined by yield levels but also depends on market access, price transparency, and institutional support. These findings justify the need for integrated strategies that enhance both on-farm practices and broader market systems to

improve the livelihood outcomes for smallholder coffee producers. Moreover, most have focused on either the technical aspects (like input use and improved varieties) or market-based strategies (such as value chain integration) that enhance coffee profitability.

Previous studies show that coffee production projects are vital for smallholder livelihoods. For example, studies by Mmari (2012 pointed out that the coffee industry employs about 2.5 million people directly and indirectly, despite there being many other studies on the contribution of coffee production to the livelihood improvement (Kimaro et al., 2017; Mmari, 2012; Maghimbi, 2012; Mhando et al., 2018; Mapunda, 2019). There has been less focus on coffee production projects by the private sector. Hence, the differences in the livelihood outcomes between smallholder coffee farmers participating in projects and non-participants have remained unknown, at least in the context of the study area. Furthermore, the livelihood outcomes of households participating in coffee projects are difficult to generalise as they are affected by different location-specific cultures, traditions and project implementing models (Akyoo, 2021).

Therefore, it is important to have empirical evidence from diverse backgrounds. Such information is useful for policymakers, researchers and development partners, especially those engaged in promoting partnership projects and bringing about coffee farmers' empowerment. Therefore, this paper provides empirical evidence on livelihood outcomes among Mount Meru Coffee project participants and non-participants.

METHODOLOGY

The research utilised a mixed-methods approach following an exploratory sequential design.to assess livelihood outcomes, human capital, social capital, household assets, and income among participants and non-participants in the Mount Meru Coffee Project in Arumeru District Council, Tanzania. Four villages (Nkoaranga, Ngyani, Songoro, and Mulala) were purposively selected from Nkoaranga and Songoro Wards due to their high participation in the project, which involves approximately 5,000 smallholder coffee farmers (Mount Meru Coffee Project Annual Report, 2023).

Data were collected using a cross-sectional research design at a single point in time, enabling simultaneous measurement of outcomes and exposures in an efficient, cost-effective manner (Bernard, 2017; Babbie, 1990; Omolo, 2017). Data collection proceeded in two phases. First, qualitative data were gathered through six Focus Group Discussions (FGDs) with 6–8 knowledgeable coffee farmers per group and ten Key Informant Interviews (KIIs) with purposively selected stakeholders, including two project extension workers, two Ward Executive Officers, four Village Executive Officers, and the District Agricultural, Irrigation and Cooperative Officer. Second, quantitative data were collected via a household survey of 155 coffee-farming households.

The sample size was calculated using Israel's (2013) simplified formula.

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

Where
n is the sample size;
N = Size of the population of coffee farmers.
e is the error margin.
Thus,

$$n = \frac{700}{1+700(0.05^2)}$$

n= 154.54 ≈ 155 respondents

Proportionate sampling allocated the sample as follows: Mulala (38), Nkoaranga (36), Ngyani (35), and Songoro (16), based on village-level population proportions (Kothari et al., 2017).

Qualitative data were transcribed and analysed through content analysis to identify themes aligned with study objectives. Quantitative data were input into SPSS version 25 for descriptive analysis of socio-economic characteristics and multiple regression analysis to identify the determinants of livelihood outcomes. The dependent variable, livelihood outcomes, was measured via a composite index comprising four indicators (human capital, social capital, assets, income), each derived from three sub-indicators rated on a 3-point Likert scale (1 = low, 2 = medium, 3 = high), with overall scores aggregated for analysis. Ethical considerations were upheld throughout: participants received full information on the study purpose, provided informed consent, and retained the right to withdraw. Confidentiality was maintained by anonymising quotes and verbatim responses, with data used solely for research purposes.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Coffee Farming Households

This section presents the background information of the respondents, describing their age, gender, educational level, and marital status. The demographic characteristics of the respondents are characterised by categories such as gender, age, level of education, household size and marital status.

Gender of the Respondents

The purpose of this question was to reveal the gender distribution of respondents in the study area. Table 1 shows that 85.8 per cent of the respondents were male, while 14.2 per cent of the respondents were female. The findings mean that most respondents were men, as the coffee crop is grown by men in most African countries.

Age of the Respondents

In this study, participants were requested to disclose their ages with the objective of discerning the age distribution within the sample, recognising that various activities can vary significantly among different age cohorts. The analysis showed that 16.5 per cent of respondents were aged 18–25 years, whereas the majority (49.6%) were between 26 and 45 years. Additionally, 20.5 per cent of the respondents were in the age group of 46-60 years, leaving the remaining 13.4 per cent of respondents above 60 years of age.

These findings underscore that the largest portion of respondents belonged to the age group of 26-45 years, a segment characterised by vitality and active engagement in farming activities. Across all four villages, this age group was consistently identified as being primarily responsible for ensuring their families' daily basic needs were met. Consequently, it can be inferred that relatively few farmers above the age of 60 were actively participating in Mount Meru coffee farming activities. This aligns with the argument presented by Rutasitara (2016), suggesting that older individuals may lack the physical strength required to generate wealth and are more likely to face economic challenges if they have not accumulated savings over the years. However, Bellemare (2018) contended that in Tanzania, the economically productive age range falls between 26 and 60 years.

These findings echo the results of a study conducted by Mapunda et al. (2020), which found that individuals between the ages of 26 and 45 years were particularly active in various socio-economic activities and constituted the responsible age group for family well-being. Age emerges as a significant factor influencing both productivity and food consumption, as noted by Ba et al. (2019). The level of an individual's economic activity is indeed influenced by their age, with children and the elderly generally exhibiting lower levels of engagement in economic pursuits compared to those in the middle-aged bracket. During this middle-aged phase, individuals tend to be highly active, driven, and motivated by the needs of their families. Consequently, the age composition of the respondents holds significant importance in the context of this study's analysis. See Table 1 for a detailed summary of the respondents' demographic characteristics in the study area.

Table 1: Demographic Characteristics of Respondents (n=155)

Characteristics		Frequency	Percent
Gender	Male	133	85.8
	Female	22	14.2
Age	18 - 25years	21	16.5
	26 - 45years	26	49.6
	46 – 60 years	63	20.5
	60 years and above	17	13.4
Education	No schooling	17	13.4
	Primary Education	79	62.2
	Secondary Education	11	8.7
	Tertiary Education	20	13.7
Marital status	Single	24	18.9
	Married	90	70.9
	Divorced	13	10.2

Level of Education of the Respondents

Table 1 illustrates that a significant proportion, specifically 62.2 per cent of the respondents, reported having received a primary school education. Furthermore, the findings reveal that 13.7 per cent of respondents had reached the tertiary education level. Conversely, a relatively small number, 8.7 per cent of respondents, had attended secondary school, and 13.4 per cent of respondents had pursued non-formal education. Notably, as highlighted in other sections through cross-tabulation, the level of education appeared to be closely linked to the respondents' occupations.

These findings indicate that a significant number of the respondents had a basic understanding of the subject and had gained some relevant knowledge. This informed the choice of utilising questionnaires as a primary data collection tool for this study. Importantly, it should be acknowledged that education, even at the primary school level, holds influence in various occupations that farmers might engage in. Such education equips individuals with the capacity to comprehend crucial technological aspects associated with specific agricultural practices. These findings are consistent with the view presented by Ragasa (2018), who argued that education empowers farmers to effectively utilise the available agricultural resources, thereby enhancing their cognitive abilities in agricultural production processes.

Marital Status of the Respondents

Respondents were also queried about their marital status, and the findings displayed in Table 1 show that a substantial majority, precisely 90 respondents or 70.9 per cent, reported being married. In contrast, 24 respondents, constituting 18.9 per cent, indicated that they were single, while only 13 respondents, equivalent to 10.2 per cent, reported being divorced. These findings highlight that a significant number of the respondents were part of family units, and both spouses were actively engaged in agricultural activities. This indicates that families were often utilised as a valuable source of labour for agricultural endeavours, serving as a means to generate both income and sustenance.

Married couples typically possess an advantage in terms of productivity when compared to single individuals, primarily due to the increased availability of labour within the household. This enhanced labour supply enables them to effectively share the responsibilities associated with coffee crop production and non-farm activities. These results align with the observations made by Machimu and Kayunze (2019), who similarly identified that marriage has a discernible impact on the production process, chiefly by augmenting labour resources within the household, thus contributing to increased productivity.

Farm Structure and Size

Table 2 provides an overview of the farm sizes and the different categories of land ownership among the farmers. The findings reveal that 43.3 per cent of respondents possessed land holdings ranging from 1 to 2 acres, while a significant proportion, specifically 52.8 per cent, owned land spanning 3 to 4 acres. Notably, only a small number of farmers, specifically five individuals, owned more than four acres of coffee farmland. These outcomes suggest that the farmers in this study predominantly had relatively modest land holdings.

It is worth noting that the observation that the majority of farmers possessed between 1 and 2 acres of coffee farmland per household is lower in comparison to the range of 2 to 3 acres per household reported by Louhaichi et al. (2018) for smallholder farms in Tanzania. Consequently, these findings underscore that the majority of respondents, amounting to 86.7 per cent, can be categorised as small-scale farmers due to their limited land holdings.

Table 2: Land Size of Coffee Farm Owned

Variable	**(n= 127)**	
	Frequency	**Percent**
Coffee land size		
1- 2 acres	55	43.3
3 - 4 acres	67	52.8
Above 4 acres	5	3.9

Socio-Economic Determinants of Livelihood Outcomes Index of Smallholder Coffee Farmers

Prior to conducting the multiple regression analysis, several assumptions were examined. The Shapiro-Wilk test was employed to assess the normality of the dependent variable. As it was not normally distributed, a natural logarithm transformation was applied. To evaluate potential collinearity among the independent variables, diagnostic tests were conducted. Following Pallant (2011), multicollinearity arises when explanatory variables exhibit linear or near-linear relationships. Tolerance and Variance Inflation Factor (VIF) tests were conducted to assess multicollinearity, and, following Pallant's (2011) guidelines, all VIF values were below 10, indicating that multicollinearity was not present.

The Durbin-Watson test resulted in a value of 2.014, falling within the recommended range of $0.5 < d < 2.5$, as suggested by Kutner et al. (2005). This indicates the absence of autocorrelation in the multiple regression analysis. Moreover, the model testing results indicated that the correlation coefficient (R) was 0.679, indicating that the independent variables collectively shared an association with the dependent variable, accounting for 67.9 per cent of the variance. Additionally, the coefficient of determination (R2) was 0.489, implying that the model could explain 48.9 per cent of the variation in the dependent variable. These findings are in line with cross-sectional data patterns as reported by Okurut et al. (2014).

Furthermore, the results indicated that age, livelihood diversification strategies, education, family size, membership in groups, participation in the Mount Meru Coffee Project, and land size were all significant determinants of the household livelihood outcomes index, as presented in Table 3, Socio-Economic Determinants of Smallholder Coffee Farmers' Livelihood Outcome.

Table 3: Socio-Economic Determinants of Smallholder Coffee Farmers' Livelihood Outcome

Model	Unstandardized Coefficients	Standard Coefficients		T	Sig.	Collinearity Statistics	
	B	Std.Error	Beta			Tolerance	VIF
(Constant)	14.158	0.551		25.686	0.000		
Age	0.013*	0.005	0.176	3.124	0.002	0.529	1.981
Marital status	-0.170	0.124	-0.063	-1.371	0.171	0.789	1.286
Household headship	0.079	0.142	0.025	0.556	0.578	0.823	1.251
Education	0.067*	0.022	0.151	3.051	0.002	0.687	1.545
Family size	0.107*	0.032	0.164	3.375	0.001	0.710	1.480
Membership in Groups	0.350*	0.118	0.132	2.880	0.004	0.804	1.423
Livelihood strategies	0.158*	0.066	0.116	2.405	0.017	0.727	1.367
Land size	0.118*	0.019	0.291	6.117	0.000	0.739	1.335
Member of Mount Meru Coffee Project	0.655*	0.170	-0.213	-3.848	0.000	0.548	1.862
Access to Credit	0.264	0.138	0.099	1.914	0.056	0.632	1.538
	0.117	0.132	0.046	0.886	0.376	0.635	1.547

$R = 0.679$, $R^2 = 0.489$, Adjusted $R^2 = 0.437$, $t = 25.686$, Durbin-Watson = 2.014, $F = 21.073$, ($p=0.000$). Dependent Variable: Livelihood Outcomes Index. * Significant at 5 per cent level

The results indicated that participation in the Mount Meru Coffee Project had a positive and statistically significant effect on the livelihood outcomes of smallholder coffee farmers at the 5 per cent significance level (see Table 3). This suggests that increased participation by smallholder coffee farmers in the Mount Meru Coffee Project is associated with higher livelihood outcomes. One contributing factor to this phenomenon is the project's provision of higher coffee prices to smallholder farmers, which, in turn, boosts their income

from coffee sales and consequently enhances their overall livelihood outcomes. This finding is in line with what is reported in FGDs in Nkoaranga village, that:

> … Coffee farming is *paying at all since we experience higher price than ever before. We are getting higher price than others farmers who are not members of Mount Meru Coffee project. The quality of coffee we produce is of high standard which attract higher price as we sell direct to abroad market...* (FGDs in Nkoaranga Village)

The aforementioned findings imply that the Mount Meru Coffee Project has played a significant role in improving the livelihood outcomes of participating farmers. Key Informant Interviews (KIIs) corroborated this observation, noting that since the establishment of the Mount Meru Coffee Project in 1999, farm income has seen an increase. In fact, during the KIIs, it was reported that some households actively sought additional land in neighbouring villages to expand their coffee cultivation area, with the aim of boosting household income from coffee sales. Similar studies conducted by Kimaro et al. (2017) have supported these observations.

Moreover, the age of the household head was found to have a positive and statistically significant effect on the livelihood outcomes of smallholder coffee farmers at the 5 per cent significance level, as shown in Table 3. These findings indicate that, while keeping all other variables constant, the livelihood outcomes increase by a factor of 0.013 for each additional year in the age of the household head. In essence, older household heads tend to achieve higher livelihood outcomes among smallholder coffee farmers. This phenomenon can be attributed to the fact that older households typically have greater access to land and possess extensive experience in coffee farming, which, if effectively utilised, can lead to improved livelihood outcomes. During FGDs in Mulala village, it was reported that:

> *… Most of young household heads lack land that can be used to grow different crops and therefore they are forced to rent land for other crops like carrot because it is not possible to rent land for coffee production as the crop is perennial crop...* (FGDs in Mulala Village).

These findings imply that participating in social groups helps smallholder coffee farmers improve their coffee production and engage in other income-generating activities, ultimately leading to enhanced livelihood outcomes. These results are consistent with earlier research by Bahaman et al. (2009), whose study in Malaysia emphasised the importance of social capital in improving household livelihood outcomes, as many credit schemes are channelled through groups.

In addition, family size was observed to have a positive and statistically significant effect on the household livelihood outcomes index at the 5 per cent significance level (see Table 3). The positive coefficient suggests that as family size increases, livelihood outcomes also increase. The coefficient of 0.107 for family size indicates that, with all other factors held constant, livelihood outcomes increase by 0.107 for each additional unit increase in family size. Larger family sizes contribute to family labour supply and, consequently, to improved livelihood outcomes index. A larger family size serves as a valuable asset for engaging in various economic activities within the household. This means that smallholder coffee farmers with larger families have more available labour for both coffee farming and other income-generating activities. Narayan (2010) also reported that households with larger family sizes are more likely to achieve higher livelihood outcomes because they can rely on a greater pool of labour for farming activities.

Additionally, household livelihood diversification strategies were shown to have a positive, statistically significant effect on livelihood outcomes at the 5 per cent significance level (see Table 3). This implies that households with diverse sources of income have a higher likelihood of achieving improved livelihood outcomes. Diversifying income sources enables households to avoid risks from relying on just one source and promotes economic stability. These results align with the findings of Akyoo (2021), who reported that households diversifying their income sources, both on-farm and off-farm, are more likely to experience better livelihood outcomes.

Similarly, education was identified as a positive and significant factor influencing the livelihood outcomes of smallholder coffee farmers at a 5 per cent level of significance (as outlined in Table 3). This is attributed to the fact that education equips households with valuable skills, better access to information, and the ability to

process and apply knowledge effectively. Educated households tend to have greater awareness of coffee farming agronomic practices that can lead to increased yields and, consequently, higher income. Highly educated households also tend to fare better on the livelihood outcomes index than those with lower levels of formal education. Low levels of education can hinder households from actively seeking ways to improve their livelihood outcomes. The findings align with Amrouk et al. (2013), who reported that education positively influences household livelihood outcomes.

Lastly, land size was identified as a positive and significant factor influencing the livelihood outcomes of smallholder coffee households at a 5 per cent level of significance (as shown in Table 3). This suggests that larger land sizes lead to increased coffee yields, attracting higher livelihood outcomes. Additionally, larger land sizes enable farmers to diversify their crop cultivation, reducing the risks associated with monocropping. Previous studies, such as Machimu and Kayunze (2019), have indicated that household livelihood outcomes are heavily dependent on the size of cultivated land. These results are in line with the qualitative results quoted as follows:

"…Membership in groups *has been of help to us in terms of coffee inputs; training on coffee agronomic practices…"* (FGDs in Songoro Village).

These findings suggest that engagement in social groups aids smallholder coffee farmers in enhancing their coffee production and other economic activities, ultimately leading to improved livelihood outcomes. These results align with earlier research by Bahaman et al. (2009) in Malaysia, which emphasised the pivotal role of social capital in bolstering household livelihood outcomes, particularly given that most credit schemes are channelled through these groups.

Furthermore, family size emerged as a significant and positively influencing factor on household livelihood outcomes at a 5 per cent significance level (as depicted in Table 3). The positive coefficient implies that larger family sizes are associated with improved livelihood outcomes. A coefficient of 0.107 for family size indicates that, while holding all other variables constant, an increase in family size by one unit results in a livelihood outcome increase of 0.107 units. Larger family sizes make substantial contributions to family labour supply and, consequently, livelihood outcomes. Having a larger family becomes a valuable asset when it comes to engaging in various economic activities within the household. This suggests that smallholder coffee farmers with larger families have a more abundant labour force available for both coffee farming activities and other income-generating pursuits. As highlighted by Narayan (2010), households with larger family sizes have a greater likelihood of achieving improved livelihood outcomes, as they can rely on a larger pool of labour for farming activities.

Similarly, household livelihood diversification strategies were identified as a significant and positively influencing factor on livelihood outcomes at a 5 per cent significance level (as indicated in Table 3). This implies that households with diversified income sources are more likely to experience improved livelihood outcomes, as diversification helps them mitigate the risks of relying on a single source of income. FGDs shared a similar view in the extract below:

"…*Most of us combine coffee with other crops and also other non-farming income-generating activities in order to ensure that we don't get into risks in engaging in only one source of income…"* (FGDs in Ngyani Village).

Similar results have been reported by Akyoo (2021), who revealed that households diversifying their livelihood sources between on-farm and off-farm activities have a higher likelihood of achieving improved livelihood outcomes.

Additionally, education was found to have a positive and significant influence on the livelihood outcomes of smallholder coffee farmers at a 5 per cent level of significance (as shown in Table 3). This is attributed to the fact that educated households possess better skills, improved access to information, and the ability to process information effectively. It also suggests that literate household heads are more likely to be aware of coffee farming agronomic practices that can boost yields, leading to higher income and ultimately improving their livelihood outcomes. Highly educated households are generally expected to enjoy better livelihood outcomes compared to those with lower levels of formal education. Low levels of education can hinder households' efforts to enhance their livelihood outcomes. These findings are consistent with previous research, as noted by Amrouk et al. (2013), which emphasised the positive impact of education on household livelihood outcomes.

Finally, land size demonstrated a positive and significant influence on the livelihood outcomes of smallholder coffee households at a 5 per cent level of significance (as indicated in Table 3.3). This implies that a larger land size leads to higher coffee yields, which, in turn, result in improved livelihood outcomes. This underscores the importance of having access to a substantial amount of land for coffee cultivation. Diversification of crops also becomes possible when farmers have larger land holdings, reducing the risks associated with monocropping. Previous studies, as reported by Machimu and Kayunze (2019), have indicated that household livelihood outcomes are significantly influenced by the size of land cultivated.

CONCLUSION AND RECOMMENDATIONS

Conclusion: The Mount Meru Coffee project in Arumeru District has the potential to improve the livelihood outcomes of participating smallholder coffee farmers. This suggests that smallholder coffee farmers display variations in their socio-economic and demographic characteristics, which, in turn, affect their individual livelihood outcomes. Therefore, any strategy aimed at improving household livelihood outcomes must recognise the diversity among households in terms of human capital factors, age groups, social networks, household size, livelihood sources, and land size.

Recommendations: To enhance household livelihood outcomes in the study area, the study recommends that local government authorities, in collaboration with the Mount Meru Coffee project, should encourage households to join the project. They should also promote livelihood diversification by investing in education and labour skills training to equip households with the knowledge and skills needed to secure better livelihood outcomes. Recognising that households vary significantly, development efforts, including those by the government, should concentrate on improving household education levels, facilitating land ownership, fostering social networks in rural areas, and promoting various livelihood diversification strategies.

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