



EFFECT OF TEA FARMING HOUSEHOLD CHARACTERISTICS ON POVERTY LEVELS AMONG TEA FARMERS IN KONOIN SUB-COUNTY, KENYA

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Abstract

Tea is a major economic activity in Kenya. However, its contributions in eradicating poverty has not been studied and documented, especially on small-scale tea farmers. The purpose of this study was to investigate the effect of farming household characteristics on poverty levels among tea farmers in Konoin sub-County. The objectives of the study were to determine the effect of family size, age, gender of household head and number of labour units engaged on poverty levels among tea farmers. To achieve the purpose of the study, the hypothesis tested was: farm household characteristics (family size, age gender of household head, number of labour units engaged) have a significant effect on poverty levels among tea farmers. The sample that took part in the study was 380, selected from a target population of approximately 36,000 small-scale tea farming households. The sample was selected proportionately from 12 tea catchment areas. Generalized Linear Model (GLM) and censored Tobit regression models were used to analyze data. The household characteristics; household size, gender of the household's head, labour units engaged, age and dependency ratio were found to significantly influence the income levels of the households. Family size was found to be significant in predicting the poverty levels of tea farming households, while the age of the household head and dependency ratio significantly influence both poverty gap and depth of the households. As a recommendation, interventions targeting on family size closely linked to dependency ratio and the age of the households should more inform policy formulation targeting poverty reduction among small-scale tea farming households.

Keywords: *small-scale tea farming, poverty, household characteristics*

1.0 Introduction

According to World Poverty Report (2011), one of the demographic characteristics of developing world is its rural nature of population. Some 3.1 billion people or 55 percent of the population in developing countries live in rural areas depending on small-scale farming. Globally, close to 1.01 billion people, 14.5% of the world population still lives in extreme poverty with the majority of the world poorest found in sub-Saharan Africa and South East Asia who rely on substance agriculture (World Bank, 1990).

In Kenya, agriculture is predominantly small-scale farming where the sector accounts for 75 per cent of total agricultural output and 70 per cent of marketed agricultural produce. The sector is a major source of the country's food security and stimulant to growth of farm employment, both of which are of primary concern to the government. According to Government of Kenya (GOK)(2000), agriculture contributes to 25 percent of GDP, employs 80 percent of labour force, contributes to 60 percent of total earnings and 45 percent of government revenue and accounts for 80 percent of rural incomes (Republic of Kenya (ROK) (2004) in Tegemeo (2008). Tea is among the leading Kenya's foreign revenue earner with significant potential for further expansion and enhancement of economic development, with new markets being discovered and coupled with growing world tea consumption. To the contrary, in rural Kenya, the industry and especially the smallholder sector continues to face multiple of constraints including low prices, productivity and high production costs.

As postulated in a World Bank Report (2012), by 2015 it was estimated that about one billion people will be living on less than \$ 1.25 (ksh.102) a day exposing them to deprivation to essential food, clothing, water and shelter needed for proper living. According to Harry (1975), poverty consists of having insufficient spendable resources to maintain a standard of living deemed by some standard to be adequate for civilized survival. According to World Bank (2000), poverty is not just being about income but is multi-dimensional, including access to social services, self-respect and autonomy.

Despite the overall poverty decline from 52.2 percent in 1997 to about 46.0 percent in 2005/06, more than 2 million people were added to the ranks of the poor between 1999 and 2005/06 in Kenya (Kenya Integrated Household Budget Survey (KIHBS), 2005/06). In former Rift valley province alone, more than 1 million people

were added to the ranks of the poor in the same period meaning that almost half of the province's population of 8.7 million is currently living in poverty. According to Central Bureau of Statistics (CBS) (2003), a large number of tea farmers live below poverty line based solely on tea income. The report also showed that poor farmers' expenditures were found to be lower on household's routine expenses as well as investment in tea farming activities. It also indicated that the levels of financial investment in tea management were lower among the poor and non-poor farmers. According to DfID (2012) and Trade-fair Foundation Report (2012), over 80 percent of Kenyan smallholder tea farmers live in poverty, with a key cause attributable to land subdivision making tea farms too small for one to make a decent living from tea alone. In Konoin sub-County, majority of the farmers derive their income from the tea sector under the umbrella of Kenya Tea Development Agency (KTDA). This background position informed the researcher on the need to investigate effect of tea farming household characteristics on poverty among smallholder tea farmers in Kpnoin sub-County, Kenya.

1.1 Research Objectives

The main purpose of the study was to investigate the effect of tea farming characteristics on poverty levels among tea farmers.

The specific objectives of the study were to determine the effect of; tea farming household size, age of household's head, gender of household's head, and number of labour units engaged on poverty levels among small-scale tea farmers.

1.2 Research Hypothesis

The hypothesis of the study was: tea farm household characteristics (household size, age of household's head, gender of household's head, and the number of labour units engaged) do not have significant effect on poverty levels among tea farmers.

2.0 Literature Review

2.1 Poverty

According to Harry (1975), the sources of poverty can be broadly classified into: the size of the family relative with its income-earning opportunities, and the value of the services of its income-yielding assets in the market place. The first type of poverty is associated with an excessive number of people dependent on the earning capacity of the family unit for their sustenance and support. It is dependent on the system of free enterprise in the supply of labour, which makes the family's spending power a function of the productive services it can supply and not on its need for economic support. The second type of poverty is caused by: inadequate employment opportunities for workers of sufficient skill to support themselves and their families above poverty if they were normally employed; inadequacy of factors of production; and inadequate earnings from the individual's or the family's stock of capital productive assets due to discrimination of hiring those assets (Harry, 1975). However, Brandshaw (2000) on a different view blames individuals in poverty for creating their own problems and argue that with harder work and better choices, the poor could have avoided their problems.

Theorists Rank, Yoon and Hirschl, (2003), notes that economic, political and social systems which cause people to have limited opportunities and resources with which to achieve income and wellbeing. Poverty, according to this theory can occur among certain segments of the population due to discrimination and systems that make it very difficult for those segments to cope. Additionally, Grondone, (2000) suggests that poverty is created by the transmission over generations of a set of beliefs, values, and skills that are generated but individually held and hence the poor create and maintain certain attitudes, beliefs and perspectives that keep them in poverty. However, poverty theories, though having relevance, may not adequately explain the causes of poverty in less developed countries. Most of them have been developed in advanced countries' setting and there is a great difference in the characteristics that exist between the developed and developing countries (Sondra, 2001).

Empirical analysis in the various sub-Saharan countries case studies finds that agricultural income growth is more effective in reducing poverty than growth in other sectors because: The incidence of poverty tends to be higher in agriculture and rural populations than elsewhere, and that most of the poor live in rural areas and a large share of them depend on agriculture for a living (World Bank, 2008) in Cervantes-Godoy and Dewbre, (2010)). Among the recent studies focusing on the relationship between agriculture and poverty, Bresciani and Veldes (2007) cited in Cervantes-Godoy and Dewbre (2010) concluded that when both direct and indirect effects of agricultural growth are taken into account growth is more poverty reducing than growth in non-agricultural sectors.

According to Deaton and Zaidi (1999), poverty is a complex phenomenon involving multiple dimensions of deprivation. Brandshaw (2005), identified a set of variables most significantly associated with causing poverty noting that five theories make up the bulk of poverty literature. Recent literature on poverty uniformly acknowledges different theories of poverty (Blank, 2003; Goldsmith and Blakely, 1992; Jennings and Kushnick, 1999; Rodgers, 2000; Schiller, 1989; Shaw, 1996 in Brandshaw 2005). Many poorest countries lack the financial means to make the necessary investments in infrastructure, education, health care systems and other vital needs. In affluent countries extreme poverty is often attributed to faults with the poor themselves or at least their governments (Griffiths, 2007).

2.2 The Theory of Agricultural Household

According to Ondari (2010), socio-economic factors like household size, household structure and household control decision making, sex and occupation, and household head are expected to influence household expenditure on both food and non-food consumption. Harvest Choice IFPRI (2013), stated that general and specific characteristics of the farm and their operators shape overall levels of production and productivity, generating differential returns to farming endeavors. Such characteristics as farm size, use of conservation practices, land tenure as well as household demographics and assets have been shown to exert some influence over enterprise and technology choice, input use and market participation. Besides farm characteristics, the socio-demographic traits of farmers such as education level, knowledge of farming practices, experience in farming, access to agricultural assets, level of poverty, age and gender structure of the household can greatly affect farm performance. Most empirical review on poverty of smallholder farmers exists in developed countries and Asian countries. But a few studies have been done on agriculture and in particular, tea farming in relation to poverty in Kenya. Most of the studies and literature related to measurement of poverty among the farm households have been based on income-poverty and economic-poverty with some researchers preferring one of the measures while others sticking to either of the methods. This means empirical literature to measure poverty has proceeded along a few general approaches only. The review also reveals that most of the previous studies left out many of welfare indicators in the measurement of poverty since it is a multidimensional concept. In regards to tea most of the studies showed conflicting results. The evaluation on the effect of tea farming on rural welfare has been limited by inadequate appropriate methods of measurement and data (IFPRI, 2013).

According to Intriligator (1979), the household is any group of individuals sharing income so as to purchase consumer goods and services, and is one of the basic institutions of economic theory. The economizing problem of the household is that of deciding how much of each of the available goods and services it should purchase, given the prices of all goods and services and its income. The economizing activities of the household are treated mathematically as the choice of a particular point in “commodity space”.

2.3 The Neoclassical Problem of the Household

According to Intriligator (1979), Varian (1992), and Jehle and Reny (1978), the neoclassical problem of the household is that of choosing a bundle of goods and services, given preference relation (utility function) and given the “budget constraint”, which restricts the household to a subset of commodity space. The budget constraint states that total money expenditure on all goods and services cannot exceed money income. The neoclassical farm model became popular in 1960 to explain the behaviour of farm households in simultaneous decision making about consumption and production. This model typically incorporates the notion of full household income (Becker, 1965)

2.4 Utility Maximization Theories

The utility maximization approaches encompass the dual character of peasant households as both families and enterprises and thereby take account of the consumption side of the peasant decision making. Chayanov (1966) in Mendola (2007), emphasized the influence of family size and structure on peasant economic behaviour, through the subjective evaluation of labour within the household, in the absence of the labour market. According to Dillon and Heady (1960), choice and uncertainty prevails when the decision maker has no objective knowledge about the probability of occurrence of the various possible states of nature. While he may know nature’s possible alternatives, he knows nothing about the probabilities of each event or alternative.

2.5 Production Function

The production function portrays an input-output relationship. It describes the rate at which resources are transformed into products (Intriligator 1979; Varian 1992; and Jehle and Reny, 1978). Any given input-output relationship specifies the quantities and qualities of resources needed to produce a particular product. Much of the research in agriculture has attempted to find the relationships between, fertilizer applied, and so on, to a field and the resulting yield. Numerous other factors that affect crop yield are; weather, plant population, soil type and management practices among others (Doll and Orazem, 1984). Jehle and Reny (1998) and Varian (1992), refer production as the process of transforming inputs into outputs. The state of technology determines and restricts what is possible in combining inputs to produce output. They described the firm’s technology in terms of a production function.

There are many theories that have been developed on how to organize the various factors of production with ultimate aim of turning scarce resources into outputs.

2.6 The Firm

According to Intriligator (1979); Varian (1992) and Jehle and Reny (1998), a firm is any entity using economic inputs such as land, labour, and capital to produce output of goods and services sold to households or other firms. The economizing problem facing the firm is that of deciding how much output to produce and how much of various inputs to use in producing this output, given the technological relation between output and inputs and given the prices of inputs and the price of output. According to Intrilligator (1978) the application of econometrics to the firm

includes the estimation of production functions, cost curves, factor demand equations, and technical change. The technology is summarized by a production function, a technical relationship based on physical or engineering considerations indicating the (maximum) output attainable for alternative combinations of all conceivable inputs of factors of production. In the case of a firm producing a single output from two inputs, the production function can be presented as;

$$y = f(x_1, x_2) \dots\dots\dots(2.1)$$

2.7 Theory of the Household Behaviour

Barnum and Squire (1979), in discussing the theory of the farm household, employed a Cobb-Douglas specification for the production function. Four exogenous variables which have been of central importance in the theoretical literature involving the farm-household are: the size of the family force; the price of the main agricultural output; technology; and the wage-rate for agricultural labour. The integration of the production and consumption decisions allows the model to determine both farm profit and wage income. This determines the policy significance of the farm-household theory.

2.8 Duality and Expenditure Function

In the neo-classical economics, the theory of consumer demand is founded upon a utility function describing the preferences of a consumer over a bundle of commodities. The preferences can be presented by a utility function if they satisfy the following axioms of choices: reflexivity, completeness, transitivity continuity, non-satiation and convexity (Varian, 1992).

2.9 Agricultural Household Production Model

According to Intrilligator (1978), the problem of the household (or consumer), is that of choosing levels of consumption of goods (including services) so as to maximize a utility function subject to a given constraint. Considering the case of two goods, in which purchases by a single household are measured by x_1 and x_2 , respectively, the problem of the household can be stated as:

$$\max_{x_1, x_2} U(x_1, x_2) \text{ subject to } p_1x_1 + p_2x_2 = I \dots\dots\dots(2.2)$$

Here $U(x_1, x_2)$ is the utility function, p_1 and p_2 are the prices of the two goods, and I is the level of income of the household. The budget constraint requires that total expenditures, obtained by totaling expenditures on each of the goods, equal income. The household thus chooses among bundles that satisfy the budget constraint so as to attain the highest available level of utility (Intrilligator, 1978).

2.10 Theory of Agricultural Household Model Combining Production and Consumption Activities

According to Chayanov (1926), Krishna (1969), Nakajima (1969), Barnum and Squire (1979), Jorgenson and Lau (1969), Strauss (1983) and Lopez (1984), agricultural household models/household-firm models (AHM's) are microeconomic models of farm households that combine producer, consumer, and labour supply decisions in a theoretically consistent manner. In a subsistence household, these decisions are made simultaneously. However, according to Singh *et al.*; (1986), a large part of agriculture is made of semi-commercial-farms in which some inputs are purchased and some outputs are sold. Producer, consumer and labour supply decisions are not made simultaneously but they are connected because the market value of consumption cannot exceed the market value of production less the market value of inputs. The models are good for goods that are both produced and consumed by the household.

3.0 Methodology

Research design used was explanatory which explain cause-effect relationship between variables. The study targeted approximately 36,000 smallholder tea farmers in Konoin Sub County who were registered and supply their tea leaf to four KTDA managed factories, namely Mogogosiek, Kobel, Kapset and Rorok tea factories. Konoin sub-County in Bomet County was purposively selected as a sample unit for the study given it is predominantly a smallholder tea farming zone. Stratified random sampling was used to ensure representation of the 12 tea zones/catchment areas in the sub-County. The selection of respondents was based on simple random sampling from the factory lists. Out of the approximately 36,000 farmers, 380 respondents were based on a sampling formula fronted by Krejcie (1970).

The model of analysis used was based on both Generalized Linear Model and Tobit regression model anchored on standard microeconomic theory where individual welfare W depends on a bundle of goods, an array c , which also includes services and material and immaterial goods (Pradyot *et al.*; 2012).

$$W_i = W_i(C_i; x_i) \dots\dots\dots(3.1)$$

In equation (1), it is assumed that a socially-defined welfare function W exists which gives each individual i , a value of individual welfare W_i for every bundle of goods c_i , under consideration of additional factors x_i . Accordingly, following Strengmaun-Kuhn (2000) and Pradyot *et al.*; (2012), equation (1) can be rewritten as:

$$W_i = W(C_i x^*(r_i); x_i) = W(r_i; x_i) \dots\dots\dots(3.2)$$

Where; the resources of individual i are called r_i . Welfare, then, is directly dependent on a bundle of goods c_i which is dependent on resources r_i . The bundle of goods c_i may not necessarily be identical with the observable bundle of goods c_i , as preferences of the individual may differ from those preferences implied by the welfare function W defined by households/society. c_i is the result of maximizing the socially-defined function W_i subject to the available resources r_i . Relevant for poverty definitions is this value of W_i which depends on an optimization process theoretically restricted by available resources. This goes in line with the well-known resource definition of poverty by Sen (1981), Hagenars (1986), Ringen (1988), and Strengmaun-Kuhn (2000) cited in Pradyot *et al.*; (2012).

Following the model specification of Achia *et al.*; (2010), Pradyot *et al.*; (2012) and Glewwe (1991), the household characteristics shaping household poverty/welfare takes the linear form specified in equation (3).

$$y_i = \beta x_i + \varepsilon_i \dots\dots\dots(3.3)$$

Where y_i is the household welfare measure, x_i is the household characteristics and other determinants of welfare, β is the vector of parameters to be estimated and ε_i is the random term.

Foster-Greer-Thorbecke (FGT) was adopted as a model for poverty measurement. Foster *et al.*; (1984) provided the foundational measure for household welfare in line with the model adopted by Glewwe (1991) and Pradyot *et al.*; (2012). There are three widely used Foster–Greer–Thorbecke (FGT) poverty measures: Poverty count index, poverty depth index and poverty severity index derived from the following foundational formula of (Glewwe, 1991 and Pradyot, 2012);

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^\alpha \dots\dots\dots(3.4)$$

Where:
 $0 \leq P_\alpha \leq 2$

Taking Z as the poverty line, P_α is the poverty/welfare indicator, n as the total population, q as the number of “poor” households in the population and α as a poverty “aversion parameter” a measure of poverty aversion or the proportional shortfall of income from the poverty line for each poor.

When $\alpha = 0$, it is simply the head-count ratio, an indication of the proportion of the total population with income below the poverty line.

$$P_0 = \frac{q}{N} \dots\dots\dots (3.5)$$

Where:
 $0 < P_0 < 1$

When the degree of poverty aversion is increased to one ($\alpha = 1$), the outcome is a measure of the “income-gap ratio” representing the average shortfall of income and hence the depth of poverty. This index measures the depth of poverty; it is also referred to as “income gap” or “poverty gap” measure.

$$P_1 = \frac{1}{N} \sum_{i=1}^q \left(\frac{Z - y_i}{Z} \right) \dots\dots\dots (3.6)$$

Where:
 $0 < P_1 < 1$

As noted by Atkinson (1987), the measure has been widely interpreted as the minimum cost of eliminating poverty (relative to the poverty line), based on the reflection that it measures how much would have to be transferred to the poor to bring their income up to the poverty line. According to Foster *et al.*; (1984), increasing the poverty aversion parameter to two ($\alpha = 2$) was necessary as a way of taking into account inequality among the poor. This is simply a weighted sum of poverty gaps indicative of how severe the household/unit is relative to the poverty line.

$$P_2 = \frac{1}{N} \sum_{i=1}^q \left(\frac{Z - y_i}{Z} \right)^2 \dots\dots\dots(3.7)$$

Where:
 $0 < P_2 < 1$

Were variables for determining the effect that tea farming has on the poverty depth and severity levels, following Pradyot *et al.*; (2012). While equations (3.6) (3.7) and (3.8) are used for determining poverty indicators for the entire population, the fundamental essence of the measure is the proportional shortfall of income of the poor from the poverty line component expressed by; identified with each unit on which poverty is measured. The proportional shortfall of income from the poverty line for each of the “poor” farm households was taken as the dependent variable for determining the impact of tea farming on poverty depth and severity following Pradyot *et al.*; (2012). The two dependent variables took the form indicated in equation (3.8) and (3.9).

$$P_1 = \left(\frac{Z - y_i}{Z} \right)^1 \quad (\text{Income gap ratio}) \dots \dots \dots (3.8)$$

$$P_2 = \left(\frac{Z - y_i}{Z} \right)^2 \quad (\text{Poverty severity}) \dots \dots \dots (3.9)$$

Based on this framework, and following the model adopted by Pradyot *et al.*; (2012), and the recommendations of Alkire *et al.*; (2015), fronting for Generalized Linear Models (GLM) as a means of overcoming the assumptions of linearity and equal variance in Ordinary Least Square (OLS) regression was adopted. GLMs are an extension of linear models that allows response variables from different distributions other than normal distributions. Generalized linear models were formulated by Nelder and Wedderburn (1972), as a way of unifying various other statistical models, including linear regression, logistic regression and poisson regression through the utilization of an iteratively reweighted least squares method for maximum likelihood estimation of the model parameters. The general modeling of GLM takes the form indicated in equation (10).

$$g(u) = \beta_0 + \beta_1 x_i + \varepsilon \dots \dots \dots (3.10)$$

Following the recommendations of Alkire *et al.*; (2015) and Pradyot *et al.*; (2012), the different household parameters considered to affect the household poverty/welfare were modeled into equation (10) with;

$g(i)$: Household income (Kshs per day), with an identity link function,

β : Coefficients estimated from the model, X_1 : Gender of household head (1= Male, 0 = Female),

X_2 : Age of the household head (Years), X_3 : Dependency ratio (household members below 14 and above 65 divided by the rest of household members), X_4 : Total farm labor (family labor plus hired labor), ε denoting the error term.

In gaining an in-depth into the poverty levels component, four measures were adopted: total income, position of the household relative to the poverty line, poverty gap and depth of poverty following the specification of Pradyot *et al.*; (2012) and Foster *et al.*; (1984). The first part of the analysis sought to analyze the level to which household characteristics affects income levels, taking the total income as an indicator of their welfare. The second and the third parts of the analysis sought to assess the level to which the household characteristics predicts the position of the farmer relative to the poverty line using the International Standard poverty line of 1.25 dollars per day set by World Bank (2001) as a reference. The dollar value was converted into Kenyan shilling using the purchasing power parity (PPP) exchange rate and then adjusted for monthly national inflation. A GLM with logistic link function was modeled as indicated in (11), following Ngunyi *et al.*; (2015).

$$\ln \left(\frac{Pu_i}{1 + Pu_i} \right) \dots \dots \dots (3.11)$$

Where: p_{ui} is the probability of household income being above the poverty line.

As envisaged by Foster *et al.*; (1984), the assessment of the household poverty gaps and poverty depth applicable to only poor households taking a form of variables that are left censored at zero, violating the assumptions underpinning the use of both GLM and OLS, a Tobit model for estimating the coefficients was instead used. The Tobit was developed by Tobin (1958) to describe the relationship between a non-negative dependent variable y_i and an independent variable x_i such that:

$$y_i = \begin{cases} y_i^* & \text{If } y_i^* > 0 \\ 0 & \text{If } y_i^* \leq 0 \end{cases} \dots \dots \dots (3.12)$$

Where: y_i^* is a latent variable and

$$y_i^* = \beta x_i + \mu_i, \mu_i \sim N(0, \sigma^2) \dots \dots \dots (3.13)$$

Where: β is the regression coefficient and u_i is the random term.

4.0 Findings and Discussions

This section looks at the profile of smallholder household’s characteristics in Konoin sub-County categorized into four broad areas encompassing household head characteristics, household membership, household income, household expenditure and labour engaged in tea farming and their influence on poverty level. A summary of the household heads’ key characteristics are as presented in table 1. Most of the household heads were males indicating the presence of gender bias towards males as the household decision makers significantly influencing household incomes. This is in agreement with the findings of Garba (2005), Diao *et al.*; (2007) and Dollar and Kraay (2002) in Diao *et al.*; (2007) which posit that inequality and gender discrimination worsen poverty position.

Educational levels of the household heads were found to be on average up to a secondary school level with limited technical skills and general management skills. The fact that more than half of the household heads had attained a secondary level of education means that majority of them have fundamental but not specialized or advanced managerial skills. Zepada (2001) emphasizes the need for providing extension education and training

services to farmers in such a context in order to provide them with sufficient knowledge in crop management practices and obtain agronomic information. The result would be adoption of technologies and improved productivity. The implication is that they cannot effectively manage the farm activities and is why they obtain low tea production and hence low income.

As indicated in table 2, the GLM model results reveal that four household characteristics were significantly influencing the household incomes of smallholder tea households. The average age of the household heads was relatively older with an average of 43.12 years, which did not significantly influence the poverty indicators adopted in the study. The distribution of the household member's age provides a key proxy of the burden of provision that is placed on the household head. It was further established that increase in age of the household head by one year, increases mean household income by Kshs 0.666 per day holding other factors constant.

In effect, household size is significant and negatively associated with low income and high expenditure levels, a situation that is likely to increase the chances of a household falling into poverty. This finding is in line with the outcome of studies by Fambon (2011) and Kanbur (2001) in Elbadawi (2005) postulating that increase in dependency ratio having a high possibility of household living below the poverty line. When the family size increased by one member, there was an expected decrease in mean household incomes by Kshs 2.99 per day holding other factors constant. This is consistent with the findings of Muyanga *et al.*; (2008); Tavneet *et al.*; (2008); Harvest Choice IFPRI (2013); and Ondari (2010), who noted that relatively larger households tend to be poorer. Consequently also, it was noted that increasing labour use in tea production by a single worker increases the mean household income by Kshs 3.517 per day, holding other factors constant.

The composition of the households as presented in table 1 indicates that an average dependency ratio of 0.879, closely attributed to most of the households heads being older and hence most of the children are within the productive ages. This indicates that smallholder households with large number of members are likely to be poor. Further in tandem with the findings of Muyanga *et al.*; (2008), an increase in the dependency ratio in the household by one unit decreases mean household income by Kshs 5.20 per day denoting that the chances of a household with high dependency ratio to be poor is high. This can be closely identified with the burdening of the productive age group leading to low commitment to farming as they look for immediate cash flow investment as compared to tea where payments tend to be received on a longer, more often on monthly basis.

When the same household characteristics were examined against household position against the poverty line, only the size of the household was found to be significant as indicated in Table 3. For every unit increase in the household size, there was a 1.325 increase in the odds of their average daily income being above the poverty line holding all the other factors constant. The assessment of Poverty gaps and poverty depth as defined by Pradyot *et al.*; (2012) and adopted for the study falls under the unique class of bounded variables.

With the interpretation of coefficients in Tobit regression, using a similar approach as those of an OLS model, the age of household head and household dependency ratio were the only characteristics of the household significantly influencing the poverty depth levels as indicated in table 4. An increase in household heads' mean age by one year, reduced the mean poverty gap ratio by 0.133 while an increase in household dependency ratio by one unit was found to increase the mean poverty gap ratio by 0.0539, an indication that households with a higher number of members aged below 15 years and above 64 years were more likely to be deeper in poverty. Similarly, as indicated in table 5 the ease of getting a household out of poverty as indicated by the poverty depth was found to increase by 0.04163 with an increase in household dependency ratio by one unit *ceteris paribus*. This shows consistency with the results obtained by (Mwaura and Muku, 2007).

5.0 Conclusion and Recommendations

The aim of this paper was to explore the influence of household characteristics on the poverty levels among small-scale tea farming household in Konoin-sub County, Bomet County, Kenya. In examining the individual household characteristics, it was established that a majority of the households were male headed, with an average age of 43 years, have basic education levels and an average of 16 years in tea farming. The average dependency ratio among the households stood at 0.879, with an average of 2 labour units engaged in farm work, yielding an average income of Kshs 97,774 per household annually.

A look at the influence of the household characteristics on the income levels of the households revealed that, household size, gender of the household head, labour units engaged by the household and dependency ratio were significantly influencing the levels of income derived by the household. This was a pointer to the fact that most of the household characteristics collectively interact and influences the income generating capacity of the household and by extension, poverty and welfare levels. This calls for a holistic approach in policy interventions intended for improving household incomes.

Age of the house head and dependency ratio were significantly influencing both the position of the household relative to the poverty line and the poverty depth of the household. Older household heads were more likely to lift their households out poverty and increase the odds of getting out of extreme poverty. This a key outcome that can be attributed to older household heads having better access to land and resources as compared to younger household heads who are more likely affected by land fragmentation, limiting their earning from tea farming. Inevitably, higher dependency ratio increases the household's odds of being poor and reduces the chances of getting out of

extreme poverty. This calls for targeted policy approach that reverses increased household dependency ratio. A concerted policy effort should be directed towards voluntary interventions enlightening households' decision makers on smaller household size and its influence on directly reducing the dependency ratio.

Table 1: A summary of Smallholder Household Heads Characteristics in Konoin Sub-county

Description		Frequency	Percentage			
Gender	Female	41	11.1%			
	Male	330	88.9%			
Marital status	Married	338	91.1%			
	Single	33	8.9%			
Highest level of Education	Primary	117	31.5%			
	Secondary	159	42.9%			
	Tertiary	90	24.3%			
	None	5	1.3%			
Skills possessed	Technical skills	162	43.7%			
	General management	122	32.9%			
	Financial management	112	30.2%			
	Book keeping	97	26.1%			
	Other skills-plumbing, teaching, driving.....	58	15.6%			
Attribute	Minimum	Mean	Maximum	SD		
Age in years (years)	22	43.12	118	13.159		
Experience in tea Farming (years)	1	16.39	62	12.62		
Dependency		No. of Households	Mean	SD		
Households with a member(s) aged below 14 years		263	1.79	1.554		
Households with a member(s) aged between 14 and 65 years		371	3.74	2.251		
Households with member/s above 65 years		35	0.14	0.476		
Household Dependency ratio		371	0.88	0.978		
Income	No of Households	Levels of Income (Kshs/Year)				
		Min	Mean	Max	SD	
Income from Tea farming	371 (100%)	5,000	97,774	395,280	95,628	
Description	Number of Households	Percentage	Min	Mean	Max	SD
Family labour	224	60.3%	1	1.37	4	1.159
Hired labour	89	24%	1	0.98	5	1.957
Family & Hired Labour	58	15.6%	1	2.74	8	1.235
Total labour engaged	371	100%	1	2.36	8	1.552

Source: Author (2017)

Table 2; GLM Regression Results of Household Characteristics and Income

Parameter	β	Wald chi-square	Robust Std. Error	Sig ^a
(Intercept)	46.071***	21.981	17.410	0.008
Gender of household head	16.545***	7.667	5.9564	0.005
Family size	-2.993***	7.048	1.1399	0.009
Total farm labour used	3.517**	4.193	1.7226	0.041
Age of household head	1.162	2.202	0.8362	0.165
Dependency ratio	-5.200**	5.763	2.1786	0.017
Education level	-1.649	1.658	2.4434	0.500

** Significant at 0.01, *** Significant at 0.05

Source: Author (2017)

Table 3: GLM regression results between household characteristics and poverty Status of the household.

Parameter	β	Wald Chi Square ^a	Odds	Std. Error	Sig
(Intercept)	0.619	0.038			0.846
Gender of household head	-0.017	0.001	0.983	0.7075	0.980
Family size	0.282**	4.266	1.325	0.1364	0.039
Total farm labour used	-0.288	1.966	1.33	0.2057	0.161
Age of household head	-0.115	1.246	1.12	0.1033	0.264
Dependency ratio	0.479	3.806	1.614	0.2457	0.051
Education level	0.252	2.327	1.28	0.2764	0.361

^a The Wald chi-square statistic are for the null hypothesis that the coefficient is zero. *** Significant at 0.01. ** Significant at 0.05.

Source: Author (2017)

Table 4. Tobit regression results of Household characteristics and Household Poverty Gap

Dependent Variable : Poverty Gap	β	SE	Z ^a	P-value
Intercept	1.064***	0.207	5.13	0.000
Gender of household head	0.008	0.0437	0.19	0.851
Family size	0.008	0.008	0.94	0.345
Age of household head	-0.0133**	0.006	-2.07	0.039
Dependency ratio	0.0536***	0.014	3.86	0.000
Education level	0.013	0.0168	0.78	0.436
Log likelihood = 5.806, Prob > chi2 = 0.0000, Pseudo R ² = 0.907, N : 207 Left censored, 164 Uncensored				

^a Based on z statistic , *** Significant at 0.01., ** Significant at 0.05.

Source: Author (2017)

Table 5: Tobit Regression results for household characteristics and household poverty depth

Poverty Depth	β	SE	P-value
Intercept	.7671143	.1709972	0.000
Gender of household head	.0189155	.0361073	0.600
Family size	.0019784	.0069838	0.777
Total farm labour used	-.0118134	.0130339	0.365
Age of household head	-.0110183***	.0052649	0.036
Dependency ratio	.0416343 ***	.0113622	0.000
Education level	.0075932	.0138	0.582
Log likelihood = 51.918, Prob > chi2 = 0.0000, Pseudo R ² = 0.847, N : 207 Left censored , 164 Uncensored			

*** Significant at 0.01., ** Significant at 0.05.

Source: Author (2017)

Results

The results show that households with other land uses had their mean poverty severity reduced by 0.078 compared to those with no other land uses, holding all other factors constant. Households with access to credit had their mean poverty severity reduced by 0.1579 compared to those with no access to credit. In regards to the tea crop variety, those households with mixed variety of tea bushes had a 0.0899 reduction in their mean poverty severity compared to those with pure tea crop variety. It was also noted that households with other sources of income apart from tea farming had their mean poverty severity reduced by 0.0803 compared to those with no other sources of incomes holding all other factors in the model constant.

For factors that were measured on a continuous scale, four were found to be significant. An increase in households' land size by one acre was found to reduce their mean poverty severity ratio by 0.1872, while increase in weighted tea age by one year reduced the mean poverty severity by 0.011 assuming all other factors remain constant. Increase in household dependency ratio by one unit increased the poverty severity by 0.04163, while increase in the log of kgs of fertilizer used per acre by one unit increases the mean poverty severity of the household by 0.0374 holding other factors in the model constant. This shows consistency with the results obtained by (Mwaura and Muku, 2007).

The parameter estimates tests, Wald Chi-square and z tests included in both GLM and Tobit regression results in table 4.16 were used to assess the four hypotheses postulated for the study and all tested against households'

income, relative position of the households on the poverty line, households poverty gap and poverty depth. The household head's age and gender, family size, dependency ratio and access by the household to other income sources apart from green tea leaf were all found to be significant in determining a household's income. Other household income sources and household size were significant in predicting the position of the household relative to the poverty line. Household head's age, household dependency ratio and access to other sources of income turned out to be significant for both poverty gap and poverty depth levels of the household. This resonates with the conclusion arrived at by Ondari (2010); Harvest Choice IFPRI (2013) and Elbadawi (2005). The findings provided the basis for rejecting the null hypothesis and that household characteristics had a significant effect on smallholder tea farmers' poverty levels in Konoin sub-County.

Household related determinants of welfare are many and have been tested by researchers in different context with mixed results. In the study, firstly, five household characteristic measures namely: household head age, gender, family size, dependency ratio and access by the households to other sources of income apart from tea farming enterprises were evaluated. Secondly, two indicators of land characteristics; acreage under tea crop and existence of the other land uses were selected.

From the regression analysis, all the farm household factors, except for the household heads' age significantly influenced the household's income. The results indicated presence of negative relationship between the oldest household heads and welfare. Household family size and access to other sources of income apart from tea farming significantly predicted whether the household would be poor or not. The household heads' age, households' dependency ratio and access to other sources of income significantly influenced the poverty gap and poverty depth levels among the households. It is hence important to recognize the critical influence that households' characteristics have on the different dimensions of poverty.

Secondly, household characteristics remain to be an influential factor influencing the income and poverty levels of smallholder tea farming households in Konoin sub-County. Large family size and high dependency ratio remains to be significant factors driving income and poverty among the households. There is a significantly high dependency ratio with the majority of the dependants being young. Diversity of the households' income sources, despite having a negative influence on their income has a notable influence in enhancing income level and poverty reduction in the sub-County.

The significant influence that household characteristics had on poverty exhibited by the empirical findings calls for household centered policy interventions in areas of education, family planning, increased alternative income opportunities and change in the younger people's mindset towards tea farming. Since poverty is shown to increase with household size, it is imperative to educate the farmers on the importance of a small family. The farmers should be made to embrace family planning. Specifically to be given more focus is education and training on technical and managerial skills. Education should include efforts to transform agriculture, and specifically the tea sector. The study suggests that increasing access to education will reduce poverty both by increasing individual productivity and by facilitating the movement of the smallholder households to better income status.

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