IS VALUE ADDITION IN HONEY A PANACEA FOR POVERTY REDUCTION IN THE ASAL IN AFRICA? EMPIRICAL EVIDENCE FROM BARINGO DISTRICT, KENYA

By

Berem, Risper M.; Obare, Gideon; Owuor, George

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Authors:

1. Risper .M. Berem

Email:rismaks@yahoo.com

2. Prof. Gideon Obare

Senior Lecturer,

Department of Agricultural Economics and Agribusiness Management,

Egerton University.

Email: g.obare@uni-hoheheim.de

3. Dr.George Owuor

Lecturer,

Department of Agricultural Economics and Agribusiness Management,

Egerton University.

Email:gowuor2001@yahoo.com

Abstract

Using survey data from 110 randomly selected honey producers from two divisions in Baringo this paper analyzes the constraints and drivers of value addition in honey, an economic activity with a potential to improve household livelihoods but whose development has remained rudimentary. Baringo District undergoes frequent and prolonged drought that impacts on household livelihood assets. The livelihoods have traditionally been agro-based but due to variations in climatic conditions, crop production has been very low. Livestock production has also been adversely affected by these trends, leaving honey production as a viable alternative for smallholder farmers since it is less dependent on, or affected by climatic variations and is not resource intensive. This study uses Heckman two stage and the logistic regression models to determine the extent of value addition contingent on the decision of a honey producer to participate in value addition activity, and to assess the link between honey value addition and household poverty status, respectively. The results show that the decision to add value is positively and significantly influenced by the amount of honey harvested, group membership and amount of hours spent on off-farm activities, while it is negatively influenced the age of the farmers and the education level of the household head. Value addition contributes to the reduction of poverty through the improvement of household incomes. This paper concludes measures need to be put in place that would encourage and facilitate the practice of value addition if the welfare of the poor rural population is to be improved.

Key words: value addition, poverty reduction, drought, ASAL, Africa

Introduction

Bee-keeping in Kenya is practiced in the arid and semi arid areas both by individual small scale farmers and Common Interest Groups (CIGs).According to a report by the Ministry of Livestock (GOK, 2001) bee keeping can be carried out successfully in 80 percent of the country. It is especially suitable in semi-arid areas where other modes of agriculture are not very possible. Bee keeping contributes to incomes as well as food security through provision of honey, beeswax, proppolis, bees' venom and royal jelly in medicine.

The country's potential for apiculture development is estimated at over 100,000 metric tones of honey and 10,000 metric tones of beeswax. However, at the moment only a fifth of this potential is being exploited (GoK, 2008). Despite this however, and the downward trend in global production of honey, the Kenyan case has however been different. Findings by the Ministry of trade in 2001 indicated that production in Kenya has been steadily growing for instance from 17,259 metric tones in1994, 19,071 in 1996 and 22,803 in 2000 (GoK, 2001). In Kenya, over 90% of beekeepers use traditional methods that presumably lead to honey of low quality (Mbae 1999).

According to the Development plan for 1997-2001, honey production is estimated to have been 79 tones in 1995, the latest year for which statistics were available at the time of compilation of the plan (Office of the Vice President and Ministry of Planning, undated). Bee keepers earned Kshs.7.2 Million from the sale of honey and this compared favorably with other activities in the livestock-rearing sector. Milk, for example, earned farmers Kshs.6.6 million in the same period. It was expected that earnings could have been higher and lower incomes were blamed on an inadequate marketing infrastructure.

Poverty and food insecurity have defined the livelihood of people in Baringo District for a long time. Their livelihoods are mainly agro based, dependent on crop and livestock production. However due to poor climatic conditions characterized by frequent and prolonged drought, crop production has been very low. Livestock production has also been adversely affected by these trends, leaving honey production as the only viable alternative for smallholder farmers since it is less dependent on, or affected by climatic variations and is not resource intensive. However, majority of the farmers produce and sell raw honey, hence receive low value from the honey

such that they cannot cover production costs. It is not yet clear firstly, why there is limited value addition by farmers given the potential benefits and the available market and secondly whether market orientation of apiculture through value addition can mitigate poverty effects in the area and other similar areas. This study aims to address this issues and by so doing contribute to the existing body of knowledge on the apiculture sub-sector and its linkage to poverty eradication especially in arid areas.

2. The theoretical model

It is assumed that a huge potential for honey processing exists and that households who exploit this potential are well-off in terms of welfare as indicated by poverty status. It is also assumed that the decision to engage in value addition is predicated on higher expected utility. An interaction of these two decisions will be reflected on the welfare status subsequently. The decision on whether or not to add value is considered under the general framework of utility or profit maximization (Norris and Batie 1987; Pryanishnikov and Katarina 2003). Within this framework, economic agents, in this case smallholder honey producers will decide to add value if the perceived utility or net benefit from this option is significantly greater than is the case without it. Although utility is not directly observed, the actions of economic agents are observed through the choices they make. Suppose that Uj and U_k represent a household's utility for two choices, which are denoted by Y_j and Y_k respectively. The linear random utility model could then be specified as:

$$U_j = \beta_j X_i + \varepsilon_j \text{ and } U_k = \beta_k X_i + \varepsilon_k \quad (2.1)$$

where U_j and U_k are perceived utilities of value addition and non value addition choices j and k, respectively, X_i is the vector of explanatory variables that influence the perceived desirability of each choice, β_j and β_k are utility shifters, and ε_j and ε_k are error terms assumed to be independently and identically distributed (iid) (Greene, 2000). In the case of honey value addition, if a household decides to use option j, it follows that the perceived utility or benefit from option j is greater than the utility from other options (say k) depicted as:

$$U_{ij}\left(\beta_j' X_i + \varepsilon_j\right) > \left(U_{ik}\left(\beta_k' X_i + \varepsilon_k\right), \quad k \neq j \quad \forall\, i \right. \tag{2.2}$$

The probability that a household will choose to add value, i.e. choose method *j* instead of *k* could then be defined as:

$$\begin{aligned} &P(Y=1|X) = P(U_{ij} > U_{ik}) \\ &P(\beta_j' X_i + \varepsilon_j - \beta_k' X_i - \varepsilon_k > 0|X) \\ &P(\beta_j' X_i - \beta_k' X_i + \varepsilon_j - \varepsilon_k > 0|X) \\ &P(X^* X_i + \varepsilon^* > 0|X = F(\beta^* X_i) \end{aligned} \tag{2.3}$$

where P is a probability function, U_{ij}, U_{ik}, and X_i are as defined above, $\varepsilon^* = \varepsilon_j - \varepsilon_k$ is a random disturbance term, $\beta_j^* = (\beta_j' - \beta_k')$ is a vector of unknown parameters that can be interpreted as a net influence of the vector of independent variables influencing adaptation, and $F(\beta^* X_i)$ is a cumulative distribution function of ε^* evaluated at $\beta^* X_i$. The exact distribution of F depends on the distribution of the random disturbance term, ε^*. Depending on the assumed distribution that the random disturbance term follows, several qualitative choice models can be estimated (Greene, 2000). Any household decision on the alternative choices is underpinned by this theoretical framework, the realization of which can by implemented by a critically thought out conceptual framework.

3. Empirical model

To address objective two of this study in which the practice and extent of value addition in Baringo District was to be assessed, the Heckman two stage selection model was used. As mentioned earlier, it was stipulated that the farmers' behavior is driven by the need to derive maximize the utility associated with the practice. Depending on the farmers' perception on the utility they are likely to derive from the practice, a choice is made, either to add value or not. This farmers' behavior that leads to a particular choice is modeled in a logical sequence, starting with

the decision to add value, and then followed by a decision on the extent of the value addition. Since the farmers utility maximization behavior cannot be observed, the choice made by the farmer is assumed to represent the farmers' utility maximization behavior. Based on the nature of these decisions, it is justified to use the Heckman two stage selection model whose estimation involves two stages. In the first stage, the decision to add or not to add value was assessed using a probit model. The choice of this model is based on the fact that the decision to add value is discreet; it is either one adds value or not. Furthermore, the study assumes a normal distribution and hence the choice of the probit model. The reasoning behind the two stage approach is that the decision on the extent of honey value addition (the volume of value added honey) is usually preceded by a decision to engage in the process of value addition. The probit model used in the first stage is as specified in Equation 3.1.

$$\text{Prob}(Y_i = 1 | X = \int_{-\infty}^{X'\beta} \varphi(t)dt = \varphi(X'\beta) \tag{3.1}$$

where Y_i is an indicator variable equal to unity for households that add value, $\varphi(.)$ is the standard normal distribution function, βs are the parameters to be estimated and Xs are the determinants of the choice. When the utility that household j derives from value addition is greater than 0, Y_i takes a value equal to 1 and 0 otherwise. It follows therefore, that:

$$Y_i^* = \beta_i X_i + V_i \tag{3.2}$$

where Y_i^* is the latent level of utility the household gets from value addition and $V_i \sim N(0,1)$ Given this assumption, it follows that:

$$Y_i = 1 \text{ if } Y_i^* > 0 \quad \text{and} \quad Y_i = 0 \quad \text{if} \quad Y_i^* \leq 0 \tag{3.3}$$

Empirically, the model can be represented as follows:

$$Y = \beta_j X_i + \varepsilon_i \tag{3.4}$$

where Y is the probability of a household value adding given farm and farmer characteristics X_i, and ε_i is the error term.

In the second step the Inverse Mills ratio (IMR) is added as a regressor in the extent of value addition equation to correct for potential selection bias. It was expected that the extent of value addition is self selected in the sense that only some farmers choose to add value, hence the decision of the extent of value addition is preceded by the decision to add value. Consequently this raises an empirical problem of self selection. To reconcile this problem, we treat the decision to add value endogenously in this study to control for the potential sample selection problem. Therefore, first the determinants of the decision to add value are estimated, then the mills ratio from the selected equation is used as an independent variable in the target equation, that is used to assess the determinants of the extend of value addition.

$$E(Z_i \mid Y = 1) = f(x_i\beta) + \gamma\hat{\lambda} + u_i \tag{3.5}$$

where E is the expectation operator, Z_i is the (continuous) extent of value measured by the proportion of value added honey output, x is a vector of independent variables influencing the extent of value addition and β is a vector of the corresponding coefficients to be estimated, $\hat{\lambda}$ is the estimated IMR and $U_i \sim N(0, \sigma_u)$. So Z_i can be expressed as follows:

$$Z_i^* = \beta_i X_i + \gamma\hat{\lambda} + u_i \tag{3.6}$$

Z_i^* is only observed if the farmer is doing value addition (Y=1), hence $Z_i = Z_i^*$.

Empirically, this can be represented as:

$$Z_i^* = \beta_i X_i + \gamma\hat{\lambda} + u_i \tag{3.7}$$

where Z_i is the extent of value addition given the farm and farmer characteristics, X_i, $\hat{\lambda}$ is the inverse Mills Ration estimated in step 1 of the Heckman model and u_i is the error term.

Equation (3.4) and (3.7) are then jointly estimated using the Heckman two stage procedure in STATA. The variables to be used in the two stage Heckman selection model are as shown in Table 3.1.

Table 3.1: Factors hypothesized to influence value addition in honey

Variable	Description	Unit of measurement	Expected signs
Dependent variables			
Valadd	Farmer adds value or not	1= adding value, 0=else	
Extvaladd	Quantity of honey value added	Kilograms	
Independent Variables			
Prkg	Price of value added honey/ Kg	Kenya Shillings	(+)
Age	Age of the household head	Years	(-)
Totland	Total land owned by the household	Hectares	(-)
Credacess	Access to credit	Dummy(1=accessed, 0=otherwise)	(+)
Equipment	Availability of value addition	Dummy(1=yes,0=No)	
Hhaeq	Household adult equivalent	No. of adults	(+)
Educlvl	Level of household education	Years	(-)
Gender	Gender of household head	Dummy(1=male,0 = female)	(+,-)
Totasset	Value of total household assets	Kshs.	(-)
Hivsnow	Number of hives owned		(+)
Honhvest	Quantity of honey harvested	Kgs	(+)

Offhrsda	Hours spent on daily off-farm activity	Hours	(-)
Distance	Distance to the nearest local market	Km	(+)
Grpmem	If member of a group	Dummy(1=yes,0=No)	(+)
Train	If farmer attended training	Dummy(1=yes,0=No)	(+)

Finally, to assess the contribution of value addition to poverty reduction as required for objective three a probit model was used. Universally, chronic poverty is defined as a condition whereby the average per adult income in a given household is less than 1 US$ per day. The chronic poverty level was computed by calculating the Daily Percapita Income (DPI[1]) for each household. Denoting the DPI by X and poverty line by Z, the level of chronic poverty will be 1 if $X < Z$ and 0 otherwise. To assess the influence of value addition and other socioeconomic factors on the level of household poverty a probit model was used. The model is given as:

$$\text{Prob}(Z_i = 1 | X = \int_{-\infty}^{X'\beta} \varphi(t)dt = \varphi(X'\beta) \tag{3.8}$$

where Z_i is an indicator variable equal to 1 if a household is chronically poor, and zero otherwise. $\varphi(\cdot)$ is the standard normal distribution function, βs are the parameters to be estimated and Xs are the determinants of the dependent variable, in this case the level of household poverty.

The functional form of the probit model is specified as follows:

$$Z(0,1) = \log\left(\frac{p}{1-p}\right) = \gamma_{0j} + \alpha_{ij}X_{ij} + \beta_{ij}W_{ij} + \delta_{ij}V_{ij} + \theta_{ij}U_{ij} + \xi_{ij}T_{ij} + \varepsilon_i \tag{3.9}$$

where, Y is the probability for a household falling below the chronic poverty line α_{ij}, β_{ij}, δ_{ij}, θ_{ij} and ξij are vectors of parameters to be estimated, p is the probability of the event occurring, X_{ij} is a vector of household socioeconomic characteristics which include, age, gender, household size, education level, value of household assets, off-farm employment. W_{ij} is a matrix of farm characteristics such as farm size and number of bee hives V_{ij} is a vector of institutional factors

[1] Daily Percapita Income (DPI) = (Total household income per day/adult equivalents per household)

including access to credit, extension services, NGOS and social capital (group membership and participation), U_{ij} is a vector of market characteristics such as distance to the market, T_{ij} is a vector of additional income after value addition and ε_i is the error term. $\varepsilon_i \sim N(0,1)$

The dependent variable was a dummy with those households living below a dollar per day per person represented by (1) implying they are chronically poor while those living above a dollar a day represented with (0) for the converse. Thus, factors that negatively influence the dependent variable are those that reduce poverty while those with a positive influence increase the prevalence of poverty.

Table 3.2 presents explanatory variables with their hypothesized effects on chronic poverty, and as indicated, value addition was theoretically expected to reduce poverty through increased income as a result of higher prices, while the older the decision maker the less productive and consequently chronically poor such a household is expected to be. Access to education as well as exposure to agricultural workshops is hypothesized to reduce chronic poverty implying that the more educated the decision maker the better skilled and productive he or she is and consequently the less poor the household. Female involvement in decision making is hypothesized to have either positive or negative effects on chronic poverty. Traditionally, no theoretical foundations exist on gender and poverty. Nonetheless, in Africa more women than men are involved in rural economic activities such as farming, pointing at possible negative effects on chronic poverty. However, at the same time, women in Africa have no rights to property which infringes on their access to the input and credit markets which drags their households towards poverty.

Table 3. 2: Description and measurement of variables to be used in the probit model

Variable	Description	Unit of measurement	Expected sign.
Dependent variable	Level of poverty	1= chronic poverty, 0=else	
Independent variables			
Valadd	Decision to add value	Dummy(1=Yes, 0=No)	(-)
Yrschool	Level of household education	Years	(-)

Totlu	Total Tropical Livestock Units	Years	(-)
Hhnums	Number of household members		(+,-)
Totassets	Value of total household assets	Kshs.	(-)
Offhrsda	Hours spent on daily off-farm activity	Hours	(-)
Grpmem	If member of self- group	Dummy(1=yes,0=No)	(-)

Findings from a study by Jayne *et al.,* (2007) indicate that access to land plays an important role in rural household welfare. Constant access to transfers, livestock assets and engagement in off-farm activities presents households with additional income for productive investment and consumption smoothing, both which are expected to have a negative impact on chronic poverty. Farmers located in the higher tropics where rainfall is more reliable are hypothesized to perform better in other agricultural activities such as crop production and experience lower poverty levels as compared with their counterparts in Marginal areas who only depend on honey production. However, with respect to distance to the market, farmers located far away from product markets are expected to be poorer due to high transaction costs that infringe on their farm incomes.

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4. Data

The target population of the study was smallholder bee keepers comprising of value adders and non-value adders. Multistage sampling was used in this study**.** The two divisions (Radat and Marigat) were first purposively be sampled, because they have the production levels of honey in the District.. Second the locations with the largest number of honey producers were purposively selected from each division. Third, the population of smallholder honey producers in the selected locations in each division was stratified according to value adders and non-value adders based on the sampling frames generated by the aid of provincial administration leaders. A sample was drawn, consisting of both farmers involved in value addition and those not involved

5. Results

5.1 Determinants of adoption and Extent of Honey Value Addition

The Heckman two step regression results are as presented in Table 5.1 and discussed in the next subsection.

Table 5.1: Factors that influence adoption and extent of value addition in Honey

Variable	Target Equation			Selection Equation		
	Coefficient	z	P>|z|	Marginal effects	z	P>|z|
Age	-2.86	-2.29	0.022	-3.260	-2.70	0.07
Tot asset	-0.000	0.99	0.324			
Credacess	19.428	0.90	0.366	16.393	0.78	0.433
Hhaeq	20.153	2.80	0.005	20.153	2.80	0.005
Distance	-0.979	-0.64	0.525	-0.943	-0.62	0.533
Honhvest	-0.029	-1.24	0.217	-0.002	-0.04	0.969
Totland	-0.974	-2.47	0.013	-1.002	-2.57	0.010
Grpmem	40.066	1.74	0.081	1.670	3.023	0.003
Yearscho	5.045	0.82	0.413	3.147	0.54	0.588
Price	-0.008	-0.18	0.858			
Hivsnow	2.317	5.08	0.000	2.228	4.96	0.000
Train	1.431	0.08	0.939	-0.584	-0.03	0.975
Off-farm employnt	0.350	0.28	0.777	0.810	0.74	0.457
Lambda				15.449	0.50	0.615
Rho				0.418		
Sigma				36.89		

The practice of honey value addition was found to be significantly influenced by household heads' age, the amount of time spent in off farm activities, group membership, household education level, measured by the years of schooling, and household size.

The number of hives owned acts to represent the amount of honey harvested or the amount that a farmer anticipates to harvest come the harvesting season. The larger the number of hives owned, the higher the quantity of honey harvested hence the participation in value addition and vice versa Farmers with larger quantities of honey are more likely to engage in value addition as they see it as profitable unlike their colleagues who harvest smaller quantities of honey. This factor was reported as a major constraint to value addition with those who harvested little amounts reporting that they could not participate in value addition majorly because they viewed it as a waste of time and finances

The age of the household head also plays a key role in determining the participation of a household in value addition. The older the head, the less likely that a household will practice value addition. This arises from the fact that as the decision maker grows older, they become risk averse and are not willing to venture into new fields or take part in activities that they are not certain about. Value addition is not an exception thus there is a low probability of them undertaking it. Furthermore, older members are less energetic and therefore find it hard engaging in activities which require quite some energy. Value addition is one such activity.

Group membership plays a key role in determining participation in value addition. Most farmers who are members in different farmer groups participate in value addition. This is in line with major empirical findings. Some researchers argue that farmers in groups have an easy access to skills and information which in turn enable them to diversify their income sources and value addition is one such off-farm activity. Social capital (in this case group membership) is a key instrument for exchange of ideas and in essence, farmers benefit both economically and socially if they belong to groups This happens because the Government and donors target not individual farmers but farmer groups and cooperatives. These farmers are given grants and loans which enable them to engage in more off farm activities unlike their counterparts. Moreover, farmers in groups have a strong bargaining power when marketing their products and in turn receive better returns for their produce. This is in addition to penetrating wider markets and being offered contracts by major buyers. This case has been supported by Shiferaw et al., (2006), who argue that collective marketing, allows small-scale farmers to spread the costs of marketing and

transportation and improve their ability to negotiate for better prices, and increase their market power. As is the case in many rural areas, farmers acting individually face high transaction costs because they deal in small quantities. However, there is hope for farmers as per a report[2] by Kindness and Gordon (2001).

The larger the size of land owned, the less likely that a household will engage in value addition. This can be explained by the fact that owners of larger pieces of land tend to devote more of their time in other farm activities and very little to bee keeping.

The extent of value addition is influenced by many factors among them age, adult equivalence, amount of honey harvested, total land owned, group membership and number of household membership.

Age of the member has a negative influence on the extent of value addition implying that the older the member of the household, the less likely for them to proceed with value addition. This could result from the fact that value addition requires some energy hence older members are less likely to engage in it. Furthermore, older members are known to be risk-averse thus they resist adoption of any new technology because of the perceived risks involved.

Household adult equivalents have a positive influence on the extent of value addition, implying that the larger the household in terms of adult equivalents, the higher the number of adults in a household, the higher the value addition done by the household. This could be related to the decisions being made pertaining to value addition and the energy required to undertake the activity.

The number of hives owned by the household, just like in the decision to add value, has a positive influence on the extent of value addition. This indicates that a farmer who has more hives, harvests more honey is not only likely to add value but will take a step further and add value to a larger percentage of that honey. This can be explained by the theory of economies of scale. One who adds value to more honey is likely to incur reduced costs per unit and in turn is likely to benefit more from the value addition exercise because they are able to sell in bulk. This puts them in a position where they can negotiate for better prices as well as contracts with major buyers in which case therefore, are assured of a constant market.

[2] This report stipulates that farmer marketing groups can help reduce these costs by facilitating input and output market access and service delivery and in so doing promote commercial activities and technological change in agriculture. The scenario is no different in Baringo District where a large percentage of farmers who add value are members of farmer groups. They reported benefiting from value addition because they sell their products through their groups which have contracts with major buyers like CITES Enterprise, Honey Care Africa and Baraka and consequently get good prices as well as prompt payments for their products.

Ownership of land is another key factor which negatively influences the extent of value addition. If an individual owns huge tracts of land, the chances of them engaging in value addition are low. If at all they are involved in value addition, the possibility of them adding value to large amounts of honey is also low. This can be explained by the fact that such farmers are normally involved in so many other on-farm activities like livestock rearing and crop farming thus leaving little time for value addition. If the returns realized from these other activities are more than what they get from honey, farmers are likely to divert all their time and energies on these other areas and very little, if any, on value addition.

Group membership positively contributes to the extent of value addition and this can be explained by the fact that individuals in groups are easily influenced by their associates than those in isolation. They get to exchange ideas and learn about the benefits of value addition and are thus willing to take the extra step of adding value to more of their honey. Members of groups also receive training on diverse issues among them value addition and are therefore willing to take up value addition and increase its extent as a means of improving their farm income hence poverty status. Furthermore, members of farmer groups are in a better position to pull their resources together and take advantage of economies of scale. They access wider markets and higher prices unlike their colleagues who are not members of groups.

5.2 Contribution of Value Addition to Household Poverty

The poverty status of the people in the study area was categorized into two, namely, chronically poor and non poor. A logistic regression was used in determining the factors that contribute either positively or negatively to the poverty status of the people. Among the key factors highlighted are *number of household members, education level, total household assets, off-farm income, total livestock units and the decision to add or not to add value, group membership and additional income obtained from honey value addition.* The results of the logistic regression model used to determine the factors that influence the level of household poverty are as presented in Table 5.2

Table 5.2: Logistic regression results on determinants of poverty levels (Dependent variable: Level of poverty)

Variable	Odds Ratio	Marginal effects	z	P>|z|
Number of household members	4.281	0.181	3.83	0.000
Log of Years in School	0.027	-0.449	-1.62	0.063
Log of Total Household Assets	0.320	-0.142	-1.86	0.062
Log of Off-farm Income	0.143	-0.241	-4.41	0.000
Total Livestock Units	0.873	-0.017	-3.20	0.001
Decision to Add Value(1=Yes,0=No)	0.104	-0.314	-1.98	0.048
Group membership	0.408	-0.113	-1.23	0.218
Additional income per Kg	1.007	0.001	1.69	0.090

The decision to add to add value is positive and significantly influences the probability of a household experiencing reduced poverty. This is in line with many empirical findings. Value addition has been found to reduce poverty levels through its positive contribution to welfare indicators including household income and food security. A household that adds value to its honey is guaranteed of higher prices as processed honey fetches about 3000% higher prices than crude honey. This in turn increases the income of the household and in essence such households are able to exit chronic poverty as they are able to access more of lives' necessities.

An increase in a household's Tropical Livestock Units (TLUs) by one unit reduces the probability of a household becoming chronically poor by 0.017 units. This is the case because a household with more livestock is traditionally wealthy. In an arid area like Baringo District, the major source of livelihood is livestock keeping. Farmers who own large herds of livestock receive more income from the sale of the animals and their products and therefore reduce poverty in their households.

From the results, it is clear that off-farm income, years in school and a household's total assets reduce the level of poverty. Involvement in off-farm income plays a key role in reducing the probability of a household becoming chronically poor. This is especially true in Baringo District which falls among the Arid and semi-arid regions in Kenya. An increase in off-farm income by one unit for instance, reduces the level of chronic poverty by 4.3 units. An increase in a household's assets by 1 unit reduces the level of poverty by 2.02 units. This implies that a

household with more assets is likely to be wealthier thus have a higher income and this lowers their levels of poverty.

Education level has an inverse relationship with poverty in the sense that the more learned the members of a household are, the lower the levels of poverty. In a study to Predict Household Poverty, Mwabu *et al., (*2002), found out that education emerged as the most important determinant of poverty. They reported that in the year 2000, poverty rates among household heads with no education were 72.02% and 69.05% for rural and urban households respectively, which were highest among all groups. In addition, people with at least secondary education were less affected by the increase in poverty between 1997 and 2000 than those with lower levels of schooling.

Conclusion

From the findings of the study, it emerges that the decision to add value is influenced by a number of key factors including the sense that the older the member, the less likely that a household will be involved in value addition. This could be explained by the reluctance of the old people to adapt new techniques as well as the energy and time required for value addition. The years spent in school also has a direct influence on the decision to add value. An individual who has spent more time in school is likely to get some other form of employment in which case they have less time for farming activities including bee keeping. Moreover, their attitude towards farming is likely to change and in most cases such people do not want to be associated with farm activities. The study elucidated some of the key factors that influence the decision to add value and these include.

Group membership has both direct and indirect effects on the decision to add value. Members of farmer groups are likely to engage in value addition more than the non members because of the many benefits they get by being in groups. For instance, they get more access to training, technical advice, funds and equipment from various organizations and government than other individual farmers. All these advantages motivate members and they therefore engage more in value addition. The more an individual spends time in off-farm activities, the higher the chances of them engaging in value addition. This comes indirectly through an increase in income hence

the ability to invest in value addition. A strong justification for farmer organization according to Doward et al., 2004, is their potential to play a critical role in both the delivery and marketing of agricultural outputs that will help reduce transaction costs related to the marketing of agricultural output.

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