International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 10 Issue 8, August 2023

ISSN: 2394-4404

Factors Influencing Availability Of *Acacia Xanthoplea* For Wood Fuel In Semi-Arid Lands: A Case Of Rachuonyo South Sub-County - Kenya

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Abstract: ***The aim of this research was to find out the factors influencing the availability of Acacia xanthoplea for wood fuel in semi-arid Lands. The study was guided by the following specific objectives: To determine whether Acacia xanthoplea is used as a source of wood fuel, to establish the factors influencing the availability of Acacia xanthoplea as a source of wood fuel, to find out the forms of Acacia xanthoplea wood fuel utilized by the people of Rachuonyo South Sub-county. This research study employed a descriptive survey research design. The target population for this research study consisted of residents of Rachuonyo South Sub-county - Kenya with a population of 97,010. The researcher used simple random sampling technique to arrive at a more representative sample which gave more accurate information. The main tool of data collection for the study was a questionnaire. The reliability of the research instruments was tested, and the researcher conducted a pilot study at Rachuonyo North Sub-county - Kenya, whose respondents were not included in the final study population. The sample size was 300 households. Data was edited, coded and entered into the computer for analysis using the Statistical Package for Social Sciences (SPSS). This research yielded both qualitative and quantitative data. The data obtained was analyzed using descriptive and inferential statistics where chai squire and regration analisiz was used. The research study provides information needed to improve availability of Acacia xanthoplea for firewood and charcoal. The information will also be helpful to research students and scholars in forest extension and related disciplines.***

I. INTRODUCTION

Acacia xanthoplea has become a great concern in semi-arid lands where there is an increase in demand for wood fuel due to the rise in human population. Most tree species do not do well in such areas because of the soil type and scanty rainfall but the most dominant and suitable tree or shrub in these areas is the *Acacia* spp (Arochakenya, 2015).The tree provides a core energy crop and also provide a wide positive ecological trickledown effect that tree planting is associated with, which has diverse and extensive uses these ranges from food, medicine, paint, perfume, timber and wood fuel. Furthermore, it may be used in inks, cosmetics, hair products and textiles. Mwonga, 2004. On the other hand, the tree is useful with respect to increasing soil organic matter, erosion control, bio-diversity, water retention and catchment, soil conservation, bee forage, windbreaks, wildlife/bird habitat, nitrogen fixation, nutrient cycling, environmental resilience and also provide for social needs like boundary delineation, shades, among others (Karban, 2007) Land cleared for cultivation, especially in ASALs is poorly planned representing a future loss of potential wood fuel supplies (Trossero, 2002). As a result, many areas in Rachuonyo are bare and are susceptible to wind and water erosion

To this extent, it is worth noting that, the *Acacia xanthoplea* has a unique capability that should be fully exploited, not only counter climate change in Africa today but also ensure that the environment is well conserved. Furthermore, the curious question of wood fuel production and

utilization emerges with regard to the likelihood of this tree coming in handy to ensure wood fuel security (Unicef, 2009).

All the above notwithstanding, few studies have dwelt on research touching specifically on the factors influencing availability of *Acacia xanthoplea* for wood fuel in ASALs especially in Rachuonyo Sub-county, Kenya. Over the years, the availability of *Acacia xanthoplea* in semi-arid areas in Kenya is fast dwindling due to the following factors: Family size, type of soil, climatic conditions, rate of maturity, sources of seedlings, number of seedlings planted per year and partly due to N-limitation in sandy soils and the total clearing of *Acacia xanthoplea* for wood fuel resulting in the loss of soil nutrients from an already nutrient - poor ecosystem (Hagos & Smit, 2004). According to (Treydtea, 2007), large savanna trees are known to modify soil nutrient condition, but whether that has an impact on the quality of herbaceous vegetation is unclear. People in semi-arid areas have had problems over time with a ready source of wood fuel, where the problem mostly affects women and children who travel for many hours to gather wood fuel for cooking. Similarly, lack of access to modern cooking and heating technology increases the consumption of wood fuel (MacFarguhar, 2010). It is also evident that the people of Rachuonyo South Sub – County, do not have a ready source of wood fuel; therefore, it becomes expensive for them to acquire wood fuel for household use. Limited studies have focused on what can be done to change the above trend. It is against the above background that this study seeks to investigate the factors influencing the availability of *Acacia xanthoplea* for wood fuel in semi-arid lands. A case of Rachuonyo South Sub – County, Kenya.

II. MATERIALS AND METHODS

A. STUDY AREA

The study was carried out in Rachuonyo Sub-county - Kenya. The Sub-county has a population of 307,126 (Census, 2009) and an area of 945 km² out of which arable land is 752 km² and 193 km² is non-arable but only 541 km² is under cultivated crops. The Sub-county has two constituencies, Kasipul Kabondo and Karachuonyo is part of Homa Bay County since 2010. It is located at - 0.50898 latitude in decimal degrees, 34.7358 longitudes in decimal degrees at an elevation/altitude of 1420 meters.

Figure 1

SAMPLING DESIGN

The study applied stratified sampling procedure in grouping some strata for collection of data since they did not have uniform information (Creswell, 2013). From the strata data was collected using simple random sampling which is a method that gave each element in the strata equal opportunity for selection in the sample (Kothari, 2010). Sample of 400 was chosen from the population of 97, 010 using Yamanes, (1967) as cited in (Ukpong & Udofia, 2011) as shown in the calculation below.

$$n = \left[\frac{N}{1 + N\,(e)} \right]$$

III. RESULTS

A. AVAILABILITY AND USE OF ACACIA XANTHOPLEA AS A SOURCE OF WOOD FUEL IN RACHUONYO

Statistics						
	Family size	Type of soil	Type of climate	Maturity rate	Seedlings planted per year	Source of seedlings
Total Number	**300**	**300**	**300**	**300**	**300**	**300**
Mean	3.03	4.82	2.09	2.3067	6.02	4.19
Variance	.778	2.066	1.868	.809	2.912	1.867
Std. Deviation	.882	1.437	1.367	.89925	1.707	1.366
Skewness	-.676	-.755	1.387	1.884	-1.646	-1.409
Std. Error of Skewness	.141	.141	.141	.141	.141	.141

Table 4.3.1 Analysis of the variances of the factors influencing the availability of acacia

From the analysis in table 4.3.1, it shows that the variances of the independent variables factors influencing the availability of acacia as a source of wood fuel had small values of Variance (.778, 2.066, 1.868, .809, 2.912 and 1.867). This indicates that they had small deviations among them meaning that variables were consistency in showing the relationship between the independent variables and dependent variables. The variables contributed to the factors influencing the availability of Acacia in any given area.

Use of Acacia	**Frequency**	**Percentages**
Yes	80	26.7
No	174	58.0
Not aware	46	15.3
Total	**300**	**100.0**

Cross tabulation for gender against the families using acacia as wood fuel in their homes

		Do families use Acacia			**Total**
		Yes	No	Not aware	
Gender	Male	80	40	0	120
	Female	0	134	46	180
Total		**80**	**174**	**46**	**300**

Table 4.3.2: Use and availability of Acacia xanthoplea by the participants

The research ascertained that *Acacia xanthoplea* was not so much available and is not used as a main source of wood fuel in Rachuonyo South Sub-county, Kenya. Table 4.3.1 summarizes the responses of the participants. Table 4.3.2 indicates the use and availability of *Acacia xanthoplea* by the participants. Out of the 300 participants, 58 percent (174) indicated that they did not use *Acacia xanthoplea* as a source of wood fuel while 26.7 percent (80) of the total population indicated that they used the tree as a source of wood fuel. However, 15.3 percent (46) of the total population indicated that they were not aware of the availability of the plant and its use as a source of wood fuel in Rachuonyo South Sub-county.

The high number of participants who did not use *Acacia xanthoplea* and those who are not aware about its existence was very high amounting to 73.2 percent of the total targeted population. This can be attributed to earlier literature that had stated that despite the economic uses of the acacia in recent years, it has lost favor with smallholder farmers in Kenya. From the literature, some African countries Government and farmers have perceived acacia woodland to be a reservoir of insects carrying diseases that afflicts humans and livestock. This, however, is a fallacy that should be countered with proper education and sensitization of the people especially in Rachuonyo South Sub-county.

On whether families used the *Acacia xanthoplea* plant, the crosstab indicates that 80 male participants indicated they did and 40 indicated they did not use it. For the female participants, 134 indicated that they did not use the tree for wood fuel while 46 were not aware about its existence.

Statistics		
Variance Analysis	uses of charcoal in the family	Uses of firewood in the family
Total number	300	300
Mean	2.10	2.18
Variance	1.290	.871
Std. Deviation	1.136	.933
Skewness	1.312	1.524
Std. Error of Skewness	.141	.141

Table 4.4.6: The analysis of the variances and standard deviation for availability of acacia

From the analysis in Table 4.4.6, it shows that the variances of the dependent variables on the usage of acacia as a wood fuel had small values of 1.290 and .871 respectively. This indicates that they had small deviations meaning that the variables under study were consistent in showing the relationship between them. From this result, it can be deduced that the *Acacia xanthoplea* is available in the area under study.

Effects of Acacia's nature	Frequency	Percentages
Yes	224	74.7
No	76	25.3
Total	**300**	**100.0**

Cross tabulation for effects of acacia's nature and availabilities in Rachuonyo South Sub-County

		Acacia's thorny nature affects its availability				Total
		Strongly Disagree	Disagree	Agree	Strongly Agree	
Nature of acacia plant affects the usage in families	Yes	0	0	3	221	224
	No	3	24	49	0	76
Total		**3**	**24**	**52**	**221**	**300**

Cross tabulation for effects of acacia's nature and availabilities in Rachuonyo

		The size of acacia affects its availability in Rachuonyo					Total
		Strongly Disagree	Disagre e	Neutra l	Agree	Strongly Agree	
Nature of acacia plant affects the usage in families	Yes	1	0	0	0	223	224
	No	18	14	24	14	6	76
Total		**19**	**14**	**24**	**14**	**229**	**300**

Cross tabulation for effects of acacia's nature and availabilities in Rachuonyo

		Type of shade affects the availability of Acacia				Total
		Strongly Disagree	Disagree	Agree	Strongly Agree	
Nature of acacia plant affects the usage in families	Yes	0	0	32	192	224
	No	19	21	36	0	76
Total		**19**	**21**	**68**	**192**	**300**

Table 4.4.9: Acacia's nature and its effect on families usage and availability of Acacia

On whether the nature of acacia affects its availability in Rachuonyo South Sub-County, Table 4.4.9 established 74.7 percent of the participants agreed that its nature contributed to its unpopularity among the people of Rachuonyo. Since 224 of the participants out of 300 participants who participated had a negative attitude towards the plant in the area. Looking at cross tabulation for effects of acacia's nature and availabilities in Rachuonyo South Sub-County, it was apparent that the people of Rachuonyo were not happy with the nature of the plant itself. From the table 4.4.9, 224 participants strongly agreed that because of its thorny nature, its size and canopy respectively, they were not ready to have it as a source of wood fuel. Only 76 of the participants indicated that the nature of acacia has nothing to do with its availability. This might be explained by the literature that despite acacia being a source of wood fuel, it has its side effects, which many people of Rachuonyo might fear.

B. MULTIPLE REGRESSION ANALYSIS FOR THE FACTORS CONTRIBUTING TO AVAILABILITY OF ACACIA PLANT

This study sought to establish the strength of contribution of family size, soil type, climatic conditions, maturity rate of Acacia, source of the seedlings and number of seedlings planted per year on the availability of acacia species in Rachuonyo South Sub- County in Kenya. The findings were presented in the regression model Table 4.4.1 and Table 4.4.2.

Model	R	R Square	Std. Error of the Estimate
1	.810[a]	.776	.673

a. Predictors: (Constant), Number of seeds planted per year, soil type, family size, maturity rate, sources of the seedlings and climatic conditions

Table 4.5.1 Regression model for factors influencing availability of Acacia plant

The regression model in table 4.6.1, established R value (multiple coefficients of determination) of 81 percent which indicated that there was a good relationship between the

independent variable factors influencing the availability of acacia species and dependent variable wood fuel in Rachuonyo South Sub-county - Kenya. The R-square (coefficient determination) indicated a high goodness-of-fit for the model. The value 77.6 percent of variance in the dependent variable was explained by the independent variable in the model that was 77.6 percent of variability in the availability of acacia plant in Rachuonyo South Sub-County. The remaining 22.4 percent could be attributed to the random fluctuation on the other unspecified variables that was the (stochastic error term).

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.808	6	8.635	512.236	.000[a]
	Residual	4.939	293	.017		
	Total	56.747	299			

a. Predictors: (Constant), Number of seeds planted per year, Soil Type, Family size, Rate of maturity, what is the source of the seedlings, climatic conditions

b. Dependent Variable: Use of acacia as source of wood fuel

Table 4.5.2 ANOVA analysis for the factors responsible for the availability of Acacia

Table 4.6.2, described that the overall variance accounted for in the model. The F statistics tested the null hypothesis that, there are no factors influencing the availability of *Acacia xanthoplea* as a source of wood fuel. The expected values of the regression coefficients were equal to each other and that they were equal to zero. A large value of F (512.236) and a small significant level (α.000) two tailed, indicated that six predictor variables were not equal to each other and could be used to predict the dependent variable use of acacia as source of wood fuel. Therefore we failed to accept the null hypothesis is rejected; there are no factors influencing the availability of *Acacia xanthoplea* as a source of wood fuel in Rachuonyo South Sub-county, Kenya.

DECISION RULE

Because ($p <$.05), we reject the null hypotheses; therefore we state that there is a strong relationship between the factors influencing the availability of Acacia and its use as a source of wood fuel.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.029	.307		16.398	.000
	Family size	.357	.092	.095	3.903	.000
	Soil Type	.337	.057	.317	5.948	.000
	Climatic conditions	.973	.099	.272	9.837	.000
	Maturity rate of Acacia	.294	.096	.013	3.070	.002
	source of the seedlings	.165	.050	.057	3.333	.001
	Number of seedlings planted per year	.542	.122	.082	4.436	.000

a. Dependent Variable: Use of Acacia as source of wood fuel

Table 4.5.3: Multiple Regression analysis for factors influencing availability of Acacia plant

Table 4.5.3, provides the effect of individual variables on the dependent variable. The coefficient indicates that increase in the value of the dependent variable for each unit led to increase in the predictor variable. The standardized coefficient or the Beta column provided a common scale (t score; all variables had a mean of zero and a standard deviation of one and were expressed in the same unit of measurement). These values gave the following regression model:

$$\acute{Y} = 0.029 + .095X1 + 0.317X2 + 0.272X3 + 0.013X4 + 0.057X5 + 0.082X6$$

Where:

Y = Acacia wood fuel
X1 = Family size
X2 = Soil type
X3 = Climatic conditions
X4= Maturity rate of acacia
X5 = Source of seedlings
X6= Number of seedlings planted per year

The regression model indicated a positive relationship among the variables; family size, soil type, climatic conditions, maturity rate of Acacia, source of the seedlings and number of seedlings planted per year. Consequently, a unit increase in each variable caused; 9.5 percent, 31.7 percent, 27.2 percent, 1.3 percent, 5.7 percent and 8.2 percent respectively in the availability of acacia plant especially in Rachuonyo South Sub-county- Kenya. This means that the factors influencing the availability of acacia contributed 86.5 percent in establishing the acacia species in Kenya as shown in the model Table 4.4.2. The remaining percentage can be attributed to the error in sampling 13.5 percent. To be more relevant, the Government and other stakeholders need to capitalize on marketing acacia species at Rachuonyo South Sub-county since the area has most of the factors that promote the suitability of the plant in the region for easier alleviation of the problem of charcoal consumption in the area.

C. SCATTER PLOT WITH LINE OF BEST FIT FOR THE FACTORS INFLUENCING ACACIA

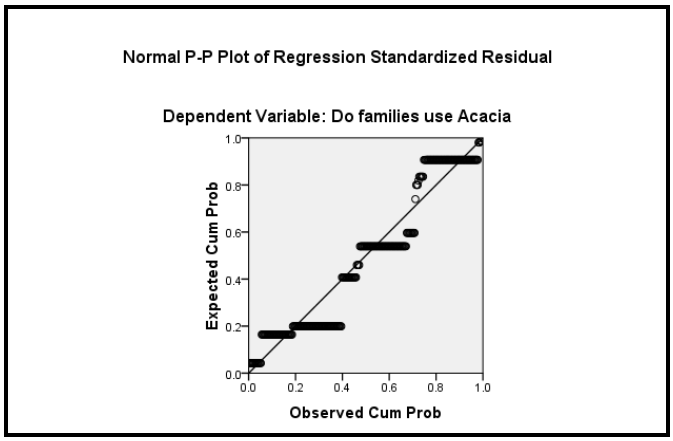

Figure 7: Scatter plot with line of best fit for the factors influencing Acacia

The scatter plot provided the best line of fit in the figure 6, for all the points of the regression model in the relationship between the availability of Acacia and usage as the source of wood fuel. Therefore, with the best line of fit in the scatter, probability curve shows that the multiple regression model that was used in this study holds to be true since the model is revealed as linear model.

D. ANALYSIS OF THE INTERVENING FACTOR ON THE AVAILABILITY OF ACACIA IN RACHUONYO

This analysis established the effect of moderating factor on the availability of acacia species in Rachuonyo South Sub-County - Kenya. The findings were presented in the regression model Table 4.5.1 and Table 4.5.3.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.788	2	11.894	107.178	.000[a]
	Residual	32.959	297	.111		
	Total	56.747	299			

a. Predictors: (Constant), Uses of firewood in the family, uses of charcoal in the family
b. Dependent Variable: Effects of nature of acacia plant and usage in the family

Table 4.7.2: ANOVA analysis for the factors affecting the availability of Acacia

Table 4.5.2, described the overall variance accounted for in the model. The F statistics tested the null hypothesis that the expected values of the regression coefficients were equal to each other and that they were equal to zero. A large value of F (107.178) and a small significant level (α.000) two tailed, indicated that three predictor variables were not equal to each other and could be used to predict the dependent variable, use of acacia as source of wood fuel. Therefore this study failed to accept the null hypothesis (Ho); *Acacia xanthoplea* is utilized in various forms of wood fuel by the people of Rachuonyo South Sub-county, Kenya.

DECISION RULE

Because (p <.05), we reject the null hypotheses; therefore we state that *Acacia xanthoplea* has no strong relationship with various forms of wood fuel used by the people of Rachuonyo South Sub-county, Kenya

Table 4.8.1: Reliability testing for factors influencing the availability of acacia species

The study revealed that the Cronbach's Alpha Based on Standardized Items for internal consistency was 0.869, which was mentioned by (George & Mallery, 2003) and (Tavakol & Dennick, 2011) that the closer alpha coefficient is to 1.0, the greater the internal consistency of the items in the Likert scale. Given the study had 0.832 from the thumb rule: "≥ 9 = Excellent,≥ 8 = Good,≥ 7 = Acceptable,≤ 6 = Questionable,≤ 5 = Poor, and ≤ 4 =Unacceptable." This means the variables that were measuring the factors influencing availability of acacia plant in Rachuonyo South Sub-county for the growth of wood fuel in Kenya were excellent variables for measuring the relationship since they were able to provide internal consistency of, ≥ 8, which means they were good measure by 86.9 percent.

ACACIA XANTHOPLEA CHARACTERISTICS

IV. DISCUSSION

On the response rate, of the 300 questionnaires given out, 225 were successfully completed and returned to the researcher at a response rate of 75 percent which was considered sufficient. This study sought to find out the socio demographic characteristics of the respondents; gender, age, designation, level of education, and length of stay at Rachuonyo South Sub-county, the following was established:

On gender, it was realized that 40 percent of the participants were male while 60 percent were female. This result could be attributed to the patriarchal nature of the society whereby the collection of wood fuel is largely and culturally associated with the female gender. Concerning the age of participants, it was revealed that youth's of between 20-29 years were the most involved in firewood collection, representing 40.3 percent of the total participants. Those in the age category of between 50-59 least respondents in wood fuel collection.

With respect to the family size, the participants, the study established that 43.3 percent of the participants had a family of between 5-6 meaning that such families needed a lot of charcoal and firewood for use at home. Households with a family size of 6 and above people were 33.3 percent of the total number of participants. This implied that this group equally consumed a large percentage of fuel. Households with a family size of between 3-4 members 16.3 percent and 1-2 (7%) ranked lowest with respect to fuel consumption.

On the education level of participants, it was noted that most of the participants had primary level of education at an average of 43.3 percent. Those who had secondary education were 24 percent and those with a diploma in education were 17.3%. Participants who had a degree were 10 pecent of the total participants. Those with higher diploma were 3.7 percent and those with a master's degree were a meagre 1.7 percent. This made it clear that much of the population was semi-illiterate. This, it was concluded, may have significantly contributed to them not fully embracing the planting of *Acacia xanthoplea.* Interestingly however, it was noted that 56.7 percent of the population had at least acquired secondary education meaning that if the research and extension services staff at Rachuonyo South Sub-county prepared and exposed them to the advantages of *Acacia xanthoplea*, they would more readily embrace it and plant it to eliminate the challenge of availability of wood fuel in the area.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.863	**.869**	**9**

Another finding was on the relationship between the participants' level of education and gender. It was realized that out of the 130 participants with primary education, 10 were male while the majority (120) were female. This showed that , the female were less educated. Also, out of the 72 participants who had secondary education, 56 were male while 16 were female. Equally, out of the 52 participants with a diploma in education, 23 were male while 29 were female. 11 participants had higher diploma education and all were female. 26 male participants had a degree as opposed to 4 female participants. All the 5 participants with a masters degree were men. Based on this summary, it is clear that in Rachuonyo South Sub-county, men were more educated than women. It is therefore, prudent for the necessary organs of government to move in swiftly and bridge this gap.

The study also wished to understand whether the participants had lived in Rachuonyo South Sub-County and therefore would be able to furnish the researcher with relevant and accurate information. It was discovered that 90 percent (270) out of the total participants (300) were residents of Rachuonyo South Sub-county.

The study was carried out to determine the availability of acacia in Rachuonyo South Su-County under the following objectives:

The study established that the use and availability of *Acacia xanthoplea* in Rachuonyo South Sub-County was very minimal because out of the 300 participants,

58 percent (174) indicated that they did not use *Acacia xanthoplea* as a source of wood fuel while 26.7 percent (80) of the total population indicated that they used the other tree as a source of wood fuel. However, 15.3 percent (46) of the total population indicated that they were not aware of the availability of the plant and its use as a source of wood fuel in Rachuonyo South Sub-county. The number of participants who did not use *Acacia xanthoplea* and those who were not aware about its existence was 73.2 percent of the total targeted population. This high percentage can be attributed to earlier literature that had stated that despite the economic uses of the acacia in recent years, it has lost favor with smallholder farmers in Kenya and the perception that acacia woodland was a reservoir of insects carrying diseases that afflicts humans and livestock. This, however, is a fallacy that should be countered with proper education and sensitization of the people especially in Rachuonyo South Sub-county by all the stakeholders so that the community can tap from the huge potential of the acacia tree as source of wood fuel.

The research was mainly conducted to investigate the factors that were behind the availability of *Acacia xanthoplea* species in ASALs in Kenya and more particularly in Rachuonyo Sub-county -Kenya. From the study, it was found that family size, soil type, climatic conditions, maturity rate of Acacia, the source of the seedlings and number of seedlings planted per year contributed greatly to the availability of Acacia. This therefore means that the government and other stakeholders need to capitalize on marketing acacia species at Rachuonyo South Sub-county and other ASALs since such area have most of the factors that contribute the growth of the plant in the region to ease the problem of wood fuel and charcoal consumption more particularly in Kenya.

From the results, it was found out that 43.3 percent was harvested only (6-10) sacks of charcoal per annum. 33.3 percent of the participants indicated they harvested between 11-15 sacks per year while 13.7 percent harvested between 1-5 sacks per year. The remaining 4.7 percent indicated that they harvested 16-20 sacks of *Acacia xanthoplea* charcoal every year. This clearly showed that the people of Rachuonyo South Sub-county did not benefit from Acacia charcoal to a great extent because the harvest of charcoal from the tree was negligible. Sensitization needs to be done by agricultural extension officers to promote the burning of charcoal from *Acacia xanthoplea* because from preliminary research, its charcoal is of good for use. On families that used *Acacia xanthoplea* wood as a source of firewood, 80 participants said they did, 174 did not while 46 did not know what *Acacia xanthoplea* wood fuel was. This result clearly shows that to address the problem of wood fuel in ASAL, more sensitization needs to be done on the wood's usability and suitability thus more trees should be planted in this regard.

V. CONCLUSION

Taking into account of the study, it is clear that information is still limited regarding the use *Acacia spp* and its importance. It is also clear that information is lacking on supply side of wood energy systems, especially forest and non-forest area based on production and flow systems. This affects the planners' efforts to project energy demand based on sustainable supply potential, and affects farmers and traders by restricting their knowledge of the size of the existing fuel wood market, wood fuel prices and pricing mechanisms. This calls for a review of existing policies and legislation governing land, forest and tree ownership and tenancy. The forestry and agriculture sector policies are uncoordinated if not contradictory, and the energy sector still seems reluctant to come forward to give its unqualified support to wood energy development. Forestry and agroforestry related education and training programmes in the region do not yet recognize the need to include subjects related to wood energy development in their training curriculum. Training in the power and energy related institutes generally care more about non-conventional renewable sources than wood energy. This therefore calls for coordinated effort to enhance communication and exchange of ideas thus creating a sense of responsibility in the following ways: educating the people on the importance of planting trees to conserve the environment and as a source of wood fuel. This can be done in the form of seminars and other sensitization programmes directed to the youth groups, women groups, men groups and churches done through the local media and Barazas.

This study does not agree with the findings of Kinyanjui, Karachi & Nyabuti, (2013) who posited that *Acacia spp* had lost favour with many farmers in Nakuru because they were reservoir for insects which harbor diseases that infect human beings and livestock. But it agrees with the findings of (Mariano, 2014) who found out that some *Acacia spp* had no problem in Naivasha but they were good source of woodfuel in the area.

Therefore, the current study proposes to the stakeholders to adopt the use of *Acacia xanthoplea* which is found in Rachuonyo South Sub-County because the study revealed the Acacia spp to be human and animal friendly since it is not thorny and does not harbor insects for diseases.

ACKNOWLEDGEMENTS

I sincerely acknowledge my supervisors, Dr. Samson N. Maobe, Dr. Dickson Menge, Dr. Enock Obuba and Prof. Evans Basweti for taking me through this thesis writing process. I have learned so much from you and I will be forever indebted to you both. Working with you has been a pleasure and you will always be a pleasant treasure in my memory bank. Thank you also, for being welcoming, approachable, supportive and for your valuable suggestions and many hours offered in reading and offering advice and always pushing me to maximize my potential. Also, special regards to Mr. Zachary Nyariki, Mr. David Mayaka, Mr. Vincent Nyang'au, Mr. Cornelius Sakawa, Mrs Julia Marwanga and Bro. Martin Mwau for their useful critique of this work. Finally, I acknowledge all my family members and the Cogregatio Fratrum Beatae Mariae Virginis, matris Misericordiae (Brothers of Our Lady Mother of Mercy) whose moral and material support, love, patience, and prayers have brought me this far.

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