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Constraints To Forecast Application For Agricultural Production In Bungoma Central Sub-County, Bungoma County Kenya

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***Abstract:** This article is based on part of findings of a Masters study that was carried out to determine the socio economic factors that influence forecast use in Bungoma central sub-county Bungoma County. Two wards; Chwele and Mukuyuni were used as the case studies. Seasonal forecast is regarded as important in agricultural production. It is expected to assist farmers cope with the expected weather in averting risks during a poor season and taking advantage of a good season for maximum yields. However, use of forecast does not necessarily depend on its access but a number of other factors may impede or enhance forecast application. The study was set to establish the demographic characteristics of the community of Bungoma central Sub-County and the socio-economic factors that influence forecast use. Descriptive research design was used, with interviews, questionnaires and focus group discussion being the methods which were used in data collection. The study population was made up of farmers, agricultural extension officers and key informants. Data was analyzed with the help of SPSS to generate descriptive statistics,* **presented and the hypotheses tested by factor analysis.** *The findings revealed that socio- economic characteristics of a farmer could either impede or enhance use of forecast. Moreover a big number of farmers in the study area had a weak socio-economic base, this highly compromised their livelihoods. The recommendations include; enabling farmers to access farm inputs and animal power to enable them respond to the forecasts, encouraging the young people to venture into farming as an enterprise and practicing intensive farming to curb the problem of land fragmentation.*

***Keywords:** Seasonal climate forecast, demographic characteristics, socio-economic factors, Constrains, livelihoods*

I. BACKGROUND

Seasonal weather forecast have been regarded as being important in enhancing agricultural production and minimizing risks in times of extreme weather events(Philips et al., 2002 and Phillips, 2003). Although the KMS regularly issues climate forecast (Oduor et al., 2002), climate variability continues to adversely affect life support systems on which small holder farmers depend, severely affecting not only households but also national food security and the general social order in Kenya. This information is expected to assist farmers in decision making so as to avoid risks and improve agricultural output. These forecasts could be generated scientifically or by indigenous knowledge

Successful use of forecasts requires on one hand a deeper understanding of the characteristics and needs of specific user groups and a clear understanding of what the forecasts mean on the other hand. However, studies carried out in West and Southern Africa show limited adoption of forecasts by farmers due to serious resource limitations such as lack of land, labor, inputs, credit, market access and limited exposure to the use of forecasts. It is therefore important that the needs and concerns of users, in particular vulnerable groups, also inform the content and forecast dissemination approaches. The fact that many small scale farmers are unable to take advantage of forecasts due to resource constraints necessitates that socio-economic and political needs are also addressed along with climate information needs in adaption and planning. While this local community(of the study area) has for years relied on their indigenous forecasting methods for planning agricultural activities, there has been an increasing use of modern seasonal forecasts over time. Access of the forecast does not

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necessarily translate to forecast application. There are quite a number of factors that determine forecast use by farmers for their farm management.

OBJECTIVES

- ✓ To assess demographic characteristics of farmers in the study area
- ✓ To investigate socio- economic factors that impede or enhance use of forecasts

A. MATERIALS AND METHODS

A. STUDY AREA

The study was carried out in Chwele and Mukuyuni Wards located in Bungoma Central Sub-County, Bungoma County. The area lies within latitude 0^{0}35’00’’ North and 0^{0}50’00’’ North and longitude 34^{0}20’00’’ East and 34^{0}40’00’’ East (Figure 3.1). It covers an area of 81.9km^2 with a population density of 692 (GoK, 2008). Field study for this study was conducted here. The study area and setting was appropriate for testing the hypotheses on an ethnically homogenous farming population.

The altitude of the Sub-County ranges between 1200m and 2000m above sea level. The land surface is gentle in slope and is well drained by rivers originating from Mount Elgon water catchment area. The rivers found in Chwele and Mukuyuni Wards of the Sub –County include Kuywa and Kibisi. The area has several hills, such as Kibichori and soils vary in fertility and drainage properties. These soils are well drained, deep and vary from dark-red notrosols to dark-brown acrisols. This permits a wide range of crops to be grown in the area. Such crops include: maize, beans, millet, sorghum, cassava, potatoes, coffee, bananas and horticultural crops

The rainfall in the area is bimodal. The long rains start from March to July, while the short rains are expected from August and continue up to October (GoK, 2008). Annual rainfall ranges from 430mm (lowest amount) to 1800mm (highest amount), most farming activities take place during the long rains. The annual temperature varies between 16^{0}C to 32^{0}C due to differences in altitude. The period between April and July tends to have lower temperatures while December to February tends to have higher temperatures sometimes reaching 32^{0}C (GOK, 2008)

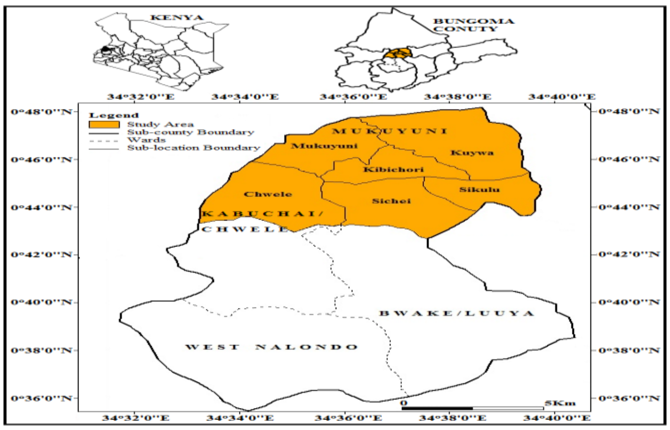
According to Kenya National Bureau of statistics, in 2009, the population of the study areas was 27,406 male and 29,287 female thus a total of 56,693 compounding to 11,574 households (GoK, 2010). The area is dominated by the Bukusu community. The other tribes found in the area due to intermarriages include Kalenjin-Sabaoti sub-tribe. The area supports one of the densely populated rural communities in Bungoma County. The area has agricultural potential but registers food poverty of 42% .This has affected the economic growth of the region.

Some of the economic engagements that occupy people in the study area include farming, small business, quarrying, brick making and tree nurseries. According to KIHBS (2005/2006), a large proportion of the Sub-county is involved in agriculture (88.8%) as the main economic activity. Generally, land use in the Sub-county is below optimum, out of 373 hectares of arable land, only 70% is utilized because of the overreliance on rain fed agriculture. The main food crops include maize, beans and sweet potatoes. The main cash crops include coffee and sunflower but the performance is below par. The livestock sector is very productive with 60% of the farmers preferring to keep indigenous animals mainly for milk and beef production. However, the potential has not been fully exploited. Despite the Sub-county being an agricultural area, it has food poverty rate of 42% and most farmers’ plant food crops once per year. Very few grow food crops during the second short rain season because of high cost of farm inputs (GoK, 2008).

The target populations in this study were all small-scale farmers in Chwele and Mukuyuni ward between ages 25-80. This was ideal because age is a socio- economic factor, it was important to note how the age of a farmer can influence forecast application. The study areas being a peri-urban area, not all household population are farmer households and therefore the target population was to take the following in to consideration. The targeted farmers were to fall under the criteria of inclusion below.

- ✓ The farmers to be included in the study must have stayed in the area for the last 20yrs from the year study (2013). This meant that they had a vast knowledge on indicators used for seasonal climate forecast.
- ✓ Farmers who do farming both for food security and source of family income were to be considered.
- ✓ The whole household was considered as a study participant but only the head of the household participated in the study.
- ✓ Provided one is the head of the household and is above 25 years could participate in the study.
- ✓ Head of NGO’s, CBO’s and opinion leaders are selected as FGD participnts and key informants for the study.

One thousand (1000) farmer households were reached at as the target population using this criteria and the sample size was drawn from here.



Source: International Livestock Research Institute (ILRI, Nairobi)

Figure 2.1: Location of the Study Area

B. SAMPLING PROCEDURE

Purposive sampling of Chwele and Mukuyuni wards was based on ecological zoning. The area lies within the upper midlands (UM) 2 & 3 where the soils range from red dark to red nitosols, ferrasols and brown to dark brown acrisols. This soil type can support crops like maize, beans, coffee, sunflower and other minor varieties of crops like ground nuts, Irish and Sweet potatoes, Cassavas and Bananas that are the main stay of the people living in the study area.

In this study the observational units were farm households, in effect a sample survey was necessary to ensure adequate coverage of the area. The administrative units (Tables 2.2) were found to be a more convenient ground on which to develop a sample frame. The sampling procedure entailed two interdependent phases. Phase one encompassed the following; first the area was stratified into sub-locations. This gave rise to six sub-locations namely Mukuyuni, Sichei, Sikulu, Kibichori, Kuywa and Chwele. A proportionate sample of a given number of households in each sub-location (Table 3.2) was reached at in accordance with their total number of household population. A list of all farmer household in all sub-locations formed a sample frame from which the respondents were drawn. (Table 2.2).

Under phase two of the sampling procedure, the farm household were selected at the sub-location level. However, lists for the number of farm households in each sub-location were not available. A reconnaissance survey was therefore carried out by the researcher to generate original lists. It involved going to each of the villages in the sub-location and the village headsmen (Bakasa; Luhya) were very helpful in this activity. They provided lists of names of all farmers in the areas under their jurisdiction. A random sampling process was applied on the generated lists to select sample population covered in the area. This was done by writing all the names of farmers in each sub-location on ballot papers. The ballot papers were then folded, mixed well and put in separate containers according to sub-locations. The number of respondents allocated for each sub-location was reached at by picking the ballots from the containers. This procedure was applied to all the six sub-locations. A total of 100 farm households were selected from pre-enumerated lists (Table 2.2).

In addition to 100 respondents, four Key Informants were included for interviews they included: two village elders, two prominent farmers who had vast knowledge on IK; one male and one female. This was purposively done by the researcher in order to have information on gender involvement in forecasting and in farming. One CBO leader and one person from one NGO that deals with agriculture (One acre fund); by offering credit facilities to farmers were considered. Furthermore, two focus group discussions of 8 members each were also included for the study, in addition to key informant interviews (KII) and 100 respondents. They were to give information that could augment that of questionnaire and KII. This gave rise to twenty two (22) more people in addition to the 100 respondents. The two focus group discussions were based on age, interest and knowledge on IK. Both groups had members of mixed gender; both male and female were represented. Purposively, the researcher ensured that the number of male and female in the focus group discussion were equal.

Sub-location	Population	Households	Sample size
Chwele	18,705	4,198	36
Sichei	9,818	1,913	17
Sikulu	4,460	845	7
Kuywa	11,094	2,107	18
Kibichori	6,568	1,305	11
Mukuyuni	6,048	1,206	11
Total	**56,693**	**11,574**	**100**

Source: GoK (2010)

Table 2.2: Sample Size as per sub-location

Data collection was done by use of questionnaire, key informant interviews and focused group discussion.

II. RESULTS AND DISCUSSION

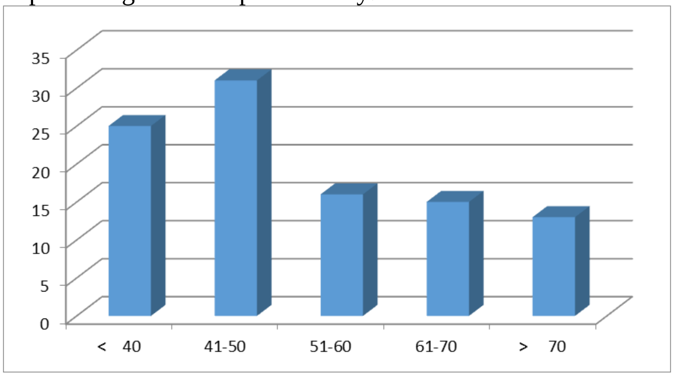
A. DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The socio-economic status of farmers can influence their use of seasonal forecast in crop management decisions. This section examines household characteristics and assets that can influence use of climate forecast information.

a. AGE

Respondents of all ages (through 30-80) were represented, with slightly larger numbers in the highest age bracket (40-80) category accounting for 75 (75%) and below 40 were 25 (25%) of the respondents, respectively. The oldest bracket was 60 and above years and this accounted for 28 (28%) of the respondents as shown in figure 4.6. This indicates that the data was collected from different age groups hence giving the general understanding of every age group as far as the study was concerned.

Most of the farmers are in their productive ages and, therefore, use of forecasts can significantly contribute to improved agricultural productivity.



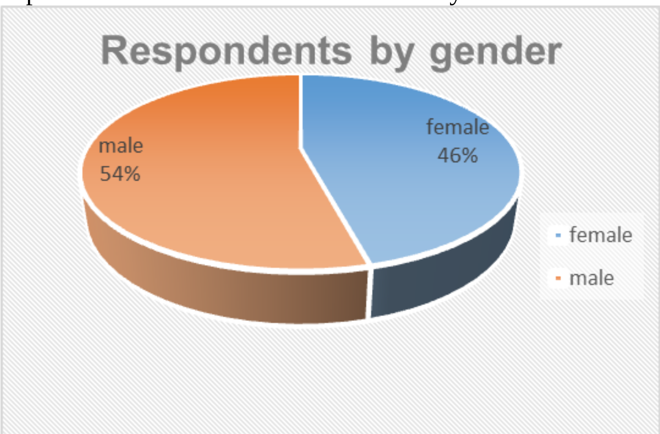
Source: Field, (2013)

Figure 3.1: Distribution of respondents by age

b. GENDER

To establish the distribution of respondents by gender, it was found that male were more than female. The number of male interviewed was slightly larger at 54 (54%) compared to females at 46 (46%) as shown in figure 3.2. This indicates a well-mixed perspective of the subject as far as data collection was concerned. Although it was desirable to have the equal number of male and female farmers represented in the study, this was not achieved. This could be attributed to the fact that farming activities for a long time were issues that would be tackled by men. Women are rarely organized into agricultural cooperative societies or other functional associations while agricultural extension programmes and other supporting services have traditionally concentrated more on educating male farmers; hence, women still largely depend on their husbands for farm related information (Raffety, 2012). This is so ironical because the implementation of all farm activities is done by women. For instance, weeding, harvesting, winnowing and threshing. There is therefore for need for women to be fully involved in all stages of decision making regarding farm management

Most men engage in outdoor activities and thus paved way for their wives to take care of farm activities hence the number of women. This gives a total of 100 farmer respondents who were included in the study.



Source: Field, (2013)

Figure 3.2: Distribution of the respondents by gender

c. HOUSEHOLD COMPOSITION

Most of the farmers have a household composition of persons below 15 years as shown in figure 3.3 this accounts for 60%. 30% of farmers have ages 15-19 as their household composition and only 10 have 20-25 adults in their families.

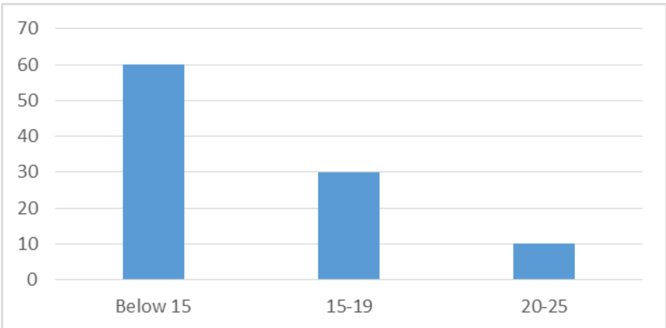


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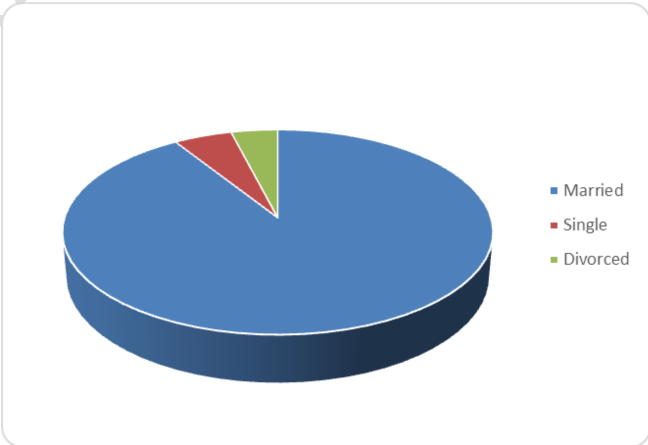
Figure 3.3: Farmers household composition by age of dependants

The number of household members has an implication on food security and farm labor. Use of forecast influences plans to improve food security and decision on when and by how much farm labour is required (Mwinamo, 2001). For instance, a large family is always hunger stricken in case of low harvest but at the same time it offers a good source of labor in the promising season. Large family coupled with small pieces of land and the vagaries of weather are a challenge to food production and security.

d. MARRITAL STATUS

The findings of this study showed that most of the respondents (91%) were married and living with their spouses. A further (4%) were divorced and (5%) were single (figure 3.4). Marital status was perceived to be vital as far as access and use of seasonal forecast was concerned, be it indigenous or scientific forecasts. Marital status has an influence on decision making with regards to the response strategies to be taken after any weather forecast is made. Men were rated as the heads of the households who were responsible for all farm decisions on when to prepare land, what to plant and where. The head of the household was to decide on when to harvest, the mode of storage and all that appertains farming. Women were viewed as helpers and implementers of what their husbands decided. Female headed households and their children were generally perceived to be more vulnerable to the risks of weather on agricultural productivity than their counterparts' households with both spouses. Single or divorced women could manage their own farm but financial constraints were noted as setbacks to maximum use of the forecasts.



Source: Author, (2013)

Figure 3.4: Marital status of respondents

e. LEVEL OF EDUCATION

From figure 3.5, it is clear that a big number of respondents have primary and secondary education. 18% of respondents were totally illiterate, 26% having primary level education, 39% having secondary education and 17% had post-secondary education. No respondent had special training of any kind in agriculture; which is a big challenge. Farmers' level of education and personal characteristics influence the way he/she acts upon information received. Patt and Gwatta, (2002) argue that young and educated farmers are more

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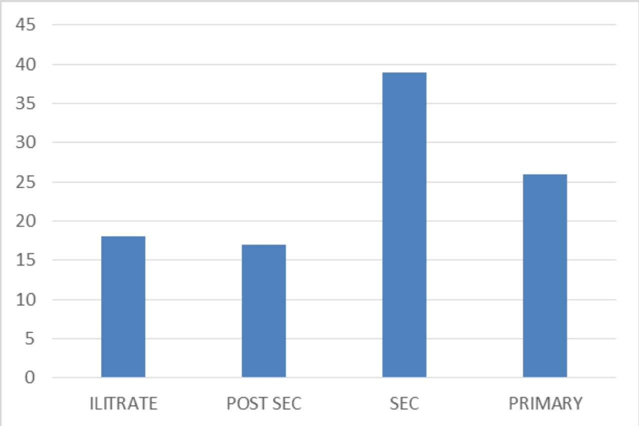
prepared to take risks in order to try new ideas than elderly farmers.

Education level is important to understand basic concepts in forecasting and making choices of what and when to plant. It was also clear that those who are illiterate and who have primary education have more confidence in IK forecast than the scientific forecasts, a situation that could arise from their inability to understand the scientific forecast concepts. Even those with secondary education had a problem with understanding and interpreting the forecast concepts such as above normal and depressed rainfall.

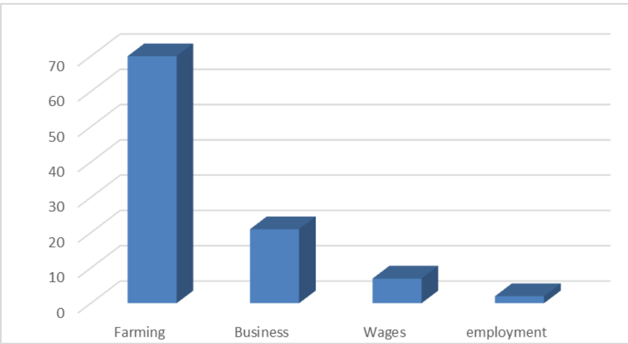


Source: Author, (2013)

Figure 3.5: Education level of respondents

f. INCOME

As shown in figure 3.6 the major source of income in the study area is farming; both crop farming and livestock keeping, this accounts for 70%. The other sources of income included employment at 2%, wages at 7% and business at 21%, although the businesses engaged in accrue from farming and, therefore, this means that farming is the biggest source of income. In order for these people to realize livelihood sustainability then, use of forecasts is inevitable. KMS issues forecasts one month earlier, giving time for preparation in terms of finances from CBO's, NGO's and other credit facilities institutions. It gives advance information on the outlook of the expected season so that farmers can decide on whether to borrow money to invest in farming or not. One acre fund; an NGO that gives credit facilities in terms of farm inputs could bridge this problem by solving the farmer's income problem but most farmers do not dare borrowing for fear of defaulting, as a result they end up lacking capital to purchase farm inputs and hire labor hence underutilizing the forecasts



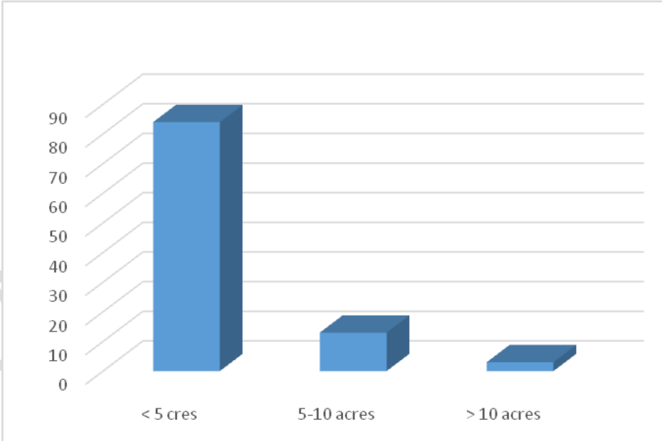
Source: Field, (2013)

Figure 3.6: Respondents sources of income

g. LAND SIZE AND TENURE

Land is a big resource in Chwele and Mukuyuni wards because from the earlier sections it is clear that most of the people's livelihood depends on this natural resource. Most of the respondents have land less than 5 acres as represented by 84% of the respondents, 13% have between 5-10 acres and 3% have more than 10 acres. Land size and tenure are major factors in deciding on the use of forecasts (Fig 3.7). Given that majority of the respondents acquired land through inheritance (Table 3.1), land fragmentation could be the reason why most of them have small land sizes.

Small land inhibits increase in area in case of a good forecast in order to take advantage of the season and maximize the yield. Therefore, intensified farming should be encouraged to optimize the yield.



Source: Field, (2013)

Figure 3.7: Land sizes owned by respondents

Land acquisition	Frequency	Percentage (%)
Inherited	79	79
Bought	9	9
Rented	12	12
Total	**100**	**100**

Source: Field, (2013)

Table 3.1: Land acquisition

From table 3.1 most of the land owned by people was acquired through inheritance as represented by 79% of the respondents, 9% of the land owned by farmers was bought and some famers do rent the land for farming purposes as depicted by 12% of the respondents.

h. FARMING PRACTICES

Table 3.2 shows that the annual crops grown in the study area included maize, which accounted for 23.6%, beans, (23.6%), sorghum, (11.5%), millet (11.1%) and groundnuts (19.1%), and other crops accounted for 10.8%. Maize, beans and groundnuts are the main annual crops grown in the study area with few people growing sorghum, millet and other seasonal crops. It is clear that farmers plant more than one crop. This is important in minimizing risks of weather, pests and diseases, when one crop fails a farmer does not incur total loss. Crops do very well in the area but clear seasonal climate forecast are inevitable since any slight weather anormaly greatly affects the yield, exposing the population to food insecurity stresses. For instance, in 2013 beans were affected by too much rain during the long rains and maize affected by poor distribution of rain during the fruiting stage. Data collected from the field showed that the area registered very poor yield in 2013 compared to other years that did not have extreme weather.

Crop	Frequency (n=100)	Percentage (%)
Maize	100	23.6
Beans	100	23.6
Sorghum	49	11.5
Millet	47	11.1
Groundnuts	81	19.1
Others	46	10.8
Total	**425**	**100**

Source: Field, (2013)

Table 3.2: Crops grown in the study area

Due to double responses; one farmer planting more than one crop, the frequency went beyond the exact number of respondents. The types of crops grown in the area have an influence on the response to seasonal climate forecast in such a way that most farmers would not wish to have change of cultivar as a response strategy, because of the tradition of planting specific crops in that area. Even if the season is not promising for maize and beans, they would still plant these very crops because they are not used to other crops which would do well with little rainfall.

i. FARM EQUIPMENT

From table 3.3, it is clear that most farmers do not own their own farm equipment. Regardless of whether the forecast of any kind is given in advance, response to the forecast may be limited by draft. Most farmers have to wait for those with animal power to finish on their farms before they have mercy on them. Inadequate income also inhibits their ability to hire farm machinery on time thereby exposing them to food insecurity.

Farm tools	Frequency (n=100)	Percentage (%)
Animal plough	**15**	**15**
Ox-cut	**7**	**7**
Sprayer	**30**	**30**
Oxen	**26**	**26**
Other	**22**	**22**
Total	100	100

Source: Field, (2013)

Table 3.3: Farm tools owned by farmers

B. FACTORS INFLUENCING THE USE OF IK AND SCIENTIFIC FORECASTS

Agricultural decision makers currently fail to optimally use available climate information and forecasts (Changnon *et al.*, 1995); suggesting that increased accuracy of forecasts and other climate information will not translate automatically into increased influence on farmer decisions. Factors other than the accuracy and reliability of forecasts influence farmer choices regarding the use of forecasts in their decisions. The question is, "What other factors?" The factors under study that influenced the use of IK and scientific climate forecast in improving agricultural production in Chwele and Mukuyuni Ward included: age, educational level, belief system, income, labor, land size, animal power, storage facilities and interpretation of IK indicators as shown in table 3.4

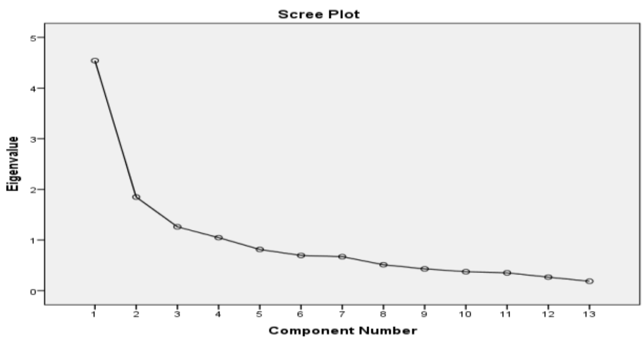
Limiting factor	Frequency	Percentage	Rank
Age	54	13.2	3
Level of education	53	12.9	4
Income	83	20.2	1
Belief system	47	11.5	5
Interpretation	73	17.8	2
Labour	22	5.4	8
Land	23	5.6	7
Storage facilities	15	3.7	9
Animal power	40	9.7	6

Source: Field, (2013)

Table 3.4: Factors limiting the use of forecasts for agricultural production

Table 3.4 shows that the major factors that limit the use of seasonal climate forecast in improving agriculture are age (13.2%), level of education (12.9%), income (20.2%), belief system at (11.4%), interpretation (17.8%) , land (5.6%), labor (5.4%), animal power (9.7%) and storage facilities at 3.7%. Land storage facilities and animal power are factors are underlain by income. Out of the 15 factors that the researcher had anticipated, only 9 were mentioned by respondent as factors that influence the use of forecasts. The 9 factors initially analyzed were reduced to 5 main ones after caring out factor analysis.

These five factors were observed and chosen for discussion. The choice of factors was based on the use of Eigen values and Scree slope technique at the cut off levels (Figure 3.8). In this case only five factors were identified, only those factors with Eigen values above one were considered. A communality analysis (principal component analysis was ran to identify which factors are among the five to be extract. To examine socio-economic factors influencing the use of forecast information for agricultural production, only factors with the value >.4 is significant and was extracted. Therefore, the extracted factors included age, level of education, belief, labor and storage facilities.



Source: Author, (2013)

Figure 3.8: Scree plot

From table 3.5, it is clear that age is a factor that influences the use of forecast as shown by the values greater than 4, Age registered .423 from the communality table. This concurs with the information given during the FGD interview. The FGDs revealed that most people who are elderly use IK in seasonal forecast and therefore age was concluded as a factor that could influence forecast use. This is attributed to the fact that most young people regard scientific knowledge as paramount and that IK is outdated and the old way before technology come by. This greatly affected the levels of agricultural production, although they have interest in the use of IK forecasts. Their farm decisions are made depending on what the neighbours do in terms of land preparation, planting time and so forth. Moreover, those who have high level of education could be inclined to the use of scientific forecasts and only seek IK where the scientific forecasts seem inaccurate. There should be a way through which young people acquire IK and this is where documentation of such information is key. On the other hand, the young give more attention to scientific forecast but which they say they still have no confidence in.

Lack of animal power is another hindrance to response to forecasts, as farmers fail to take advantage of the planting opportunities waiting for their turn to plough. The research showed that out of 100 farmers interviewed only 53% had their own animal power that is meaningful in crop farming, that means, 47% had to wait until their fellow farmers are through with ploughing before they start ploughing (Table3.3).

From Table 3.4 it is clear that 5.4% of the respondents considered labor as one of the factors that influence the use of forecast. Most famers use family labor, and where it is not enough they have to supplement it with hired labor. The challenge is still income and this could be a hindrance to any response to the forecasts. This is in line with the UNCEF / UNEP report (2006), the report pointed out that socio-economic factor such as labor could affect use of forecasts by farmers. For example, in a good rain year farm households which are limited by labor, may decide to reduce the cultivated area, use more manure and focus on weeding to maximize yield while households that have more labor can expand the cultivated area to maximum use of good rainfall conditions. In a drier year the behavior of both sets of households would be different. This information concurs with the findings of O'Brien (2003). They argued that socio-economic constraints form a critical gap between climate forecast information and its application at farm level decision making.

Belief as a factor registered, this means that how people perceive the forecasts greatly determines the response they put to it. The biggest challenge in the use of scientific forecast is the fact that famers view it as unreliable and always untimely. Patt and Gwata (2002) have argued that access and use of climate forecast remain the greatest challenge to climate scientists. Many a time climate forecast have suffered a credibility problem and people have shown mistrust for it (Hobbs, 1980) an attitude that comes from the previous forecasts being perceived as inaccurate, as a result, users end up ignoring the forecast. The study revealed that farmers had accessed forecasts; IK over 90% and scientific 70, when farmers were asked whether they believe in forecasts, only 30 % of those who access both IK and scientific believe KMS forecast and 80% believe IK forecast. According to FitzGerald (1994), people make decisions in line with what they perceive as opposed to what actually is. Farmers who do not believe in Meteorological forecasts attribute it to inaccuracy that perhaps stems from generating large geographical area forecasts.

Contrary to the many respondents who claimed to receive the scientific forecasts, they do not put it to use. Most of the respondents had faith in the traditional forecasts which they use. Farmers should be educated on the benefits of forecasts and how to use it. Farmers using own knowledge to determine rainfall on set to plant are most likely dependent on indigenous rainfall indicators (Ngugi, 2001; DMCN, 2004). IK can predict onset but not distribution and cessation.

Forecasts are important in averting agricultural risks. Patt and Gwatta (2002) argue that quality of the information is the level of confidence placed in it by receivers and affects its acceptance and use. Therefore, KMS should downscale forecasts at a reduced geographical area as a way of improving accuracy, before this is done, it is unlikely that a farmer will believe and use meteorological forecasts.

Cases of farmers rating Meteorological forecasts as useful but not using it are also reported in Hudson (2001) and Mwinamo (2001).

The level of education as a factor that influences forecast use. People who are educated; post primary regard IK as old, an outdated form, backward way of forecasting and therefore embarking on it for seasonal forecasts could be minimal. Whereas those with primary and non -literate levels rely more on this (IK) because they cannot access scientific knowledge, they consider it expensive to access and at the same time, the presentation of the forecast and its mode of communication to policymakers and farmers are critical to application success. While much attention has been paid to the science of climate forecasting and its application for drought mitigation, there is limited understanding of the socio-political environment through which climate forecasts are channeled and interpreted. Once in the hands of policymakers, the science product loses in a very critical sense, its desired objectivity and becomes woven into a complex mesh of social, economic, and cultural realities that influence how information is in fact used. To them IK forecasts is the only forecast they know and rely on. IK should be integrated into the scientific system of forecasting to enhance access and usability of the forecasts (Roncili et al., 2002). These findings are in line with those pointed out by Mwinamo (2001). He argued that lack of understanding of forecasts by dissemination agents lead to apathy and lack of faith of the forecast by the people. He also pointed out that a large segment of rural people are illiterate. This is a challenge to understanding scientific forecasts

Lack of income registered a bigger percentage. This will go a long way in affecting farmers' response to forecasts especially if one does not have his own machinery. Those with their draft will quickly employ a response strategy but those who do not have will wait until their counterparts finish on their farms before they have mercy on them. This highly exacerbates their vulnerability to hunger, because they may delay to take advantage of a good season or to respond to a bad season. This information is in agreement with the findings of Phillips *et al.*, (2001). The Research carried out in

Zimbabwe has shown that just under 58% of communal farmers own their own animal power implying that 42% have to wait for their turn to have their fields ploughed (Phillips, *et al.*, 2001). Although forecasting information may be readily available to communal farmers, lack of draft power and resources limit its effective use. Planting opportunities are missed as farmers wait for their turn to plough. They therefore recommended that communal farmers should have access to inputs and draft power in order to capture the benefits of seasonal forecast information by making timely and appropriate decisions.

Lack of capital is a big challenge to forecast application as depicted by 20.2% (Table 3.4). They considered forecasts very important for their farm decisions but most farmers fail to take advantage of the favorable season since they have limited resources, therefore, even when the forecast is given in advance still they may not employ the expected strategy to avert the risks or maximize their yields.

Land size and storage facilities were factors that least influenced how people respond to the forecasts. Many of them use family labor, and those who cannot are forced to contract people to work on their farms. Many of them still cannot afford this and therefore are forced to till only a small portion. Therefore, the size of land to be cultivated is intertwined with labor availability.

To examine the socio-economic factors influencing the use of forecast information for agricultural production, a correlation was done between socio economic factors and their influence on forecast use. The results showed that the correlation is significant at $p>0.05$ and therefore we rejected the null hypothesis and accept the alternative one that supports that indeed there is a relationship between socio-economic characteristics of a farmer and the use of forecasts for agricultural production. Taking the coefficient of determinant, socio-economic factors contributes 47.6% in the variability to the use of forecast for agricultural production. The remaining variability is contributed by other factors other than socio-economic factors.

		Social economic factor that influences agricultural productivity.
Social economic factors that influences agricultural productivity.	Pearson Correlation	1
	Sig. (1-tailed)	
	N	98
use of IK and scientific forecast information for agricultural production	Pearson Correlation	.690
	Sig. (1-tailed)	.053
	N	11

Table 3.5: Table of correlation

III. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

A. SUMMARY OF THE FINDINGS

It was noted that seasonal climate forecast access does not necessarily translate to forecast application or use. There are other socio-economic factors which influence forecast application in agricultural productivity. It is therefore important to look at the socio-economic base of the society when dealing with the question of forecast application. The socio-economic status of a farmer can either impede or enhance forecast use. The results showed that socio-economic characteristics of a farmer play an important role as far as forecast use is concerned. A number of factors noted to have influence on forecast use were; age (13.2%), income (20.2%), interpretation (17.8%), belief system (11.4%), animal power (9.7%), land size (5.6%), labor (5.4%), and storage facilities (3.7%). These have an effect on the general outcome in terms of yields and therefore food security of the region. Correlation analysis to test the hypothesis that stated; there is no relationship between socio-economic characteristics of farmers and use of either scientific or IK forecasts for agricultural production showed that indeed there is a significant relationship and therefore the null hypothesis was rejected and the alternative one upheld.

B. CONCLUSION

The study revealed that socio-economic status of a farmer may impede or enhance the use of climate forecast information.

C. RECOMMENDATION

Farmers should have access to farming inputs and animal power in order to capture the benefits of seasonal forecast information by making timely and appropriate decisions. There is also need to teach people how the indigenous weather forecasts and Meteorological forecasts can be used for planning purposes. For example choice of a crop to grow in that season. This should be done for both seasonal and short period forecast.

Sustainable land management practices should be adopted by farmers, for example intensification in farming could enhance productivity in the wake of land fragmentation in the region.

Young people should be encouraged to take up farming as an occupation, as an enterprise. They are more likely to employ modern techniques of farming and therefore enhance agricultural productivity. This will boost the food security situation in the region and improve farmers' living standards as well as improving the economy of the country.

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