FARMERS COMPETENCE AND CHALLENGES IN FOOD CROP MANAGEMENT IN THE NDOP PLAIN

Kometa Sunday Shende and Tafuh Desmond Forbah
shendek@hotmail.com
Department of Geography and Planning, Faculty of Arts, The University of Bamenda, Cameroon

ABSTRACT

Agriculture is one of the sectors with the potentials to enhance people's standard of living. Severe hunger and poverty affects nearly one billion people around the world and as a result, the demand for food necessitates improvement in planning and management techniques of food crop production. Given that food crop cultivation remains crucial for livelihood sustenance, management techniques by farmers are largely unsustainable. With continuous increase in population, the demand for food crops remains a threat to the community as the inputs of farmers into the farms does not reflect their output in the Ndop Plain. The supply of food crops is becoming unsecured in view of the post-harvest losses incurred by farmers. Farmers Competence in Food Crop Management holds promises to increase food crop production and minimise post harvest losses. This holds that farmers success in food crop management requires a certain level of knowledge, skills, attitudes and experience acquired through formal and informal training. The study intends to investigate farmers' competence and challenges in food crop management in the Ndop Plain. The study makes use of primary and secondary data collection in which purposive random sampling was used in administering the questionnaires. Primary sources of data collection used in the study include field observation, interview and administration of questionnaires. Direct interviews with resource persons such as the Divisional Delegate of Agriculture and Rural Development, the director of UNVDA, the Mayor of Ndop Centre, Babessi and Balikumbat Councils and the director of Rural Development Consultancy helped to identify farmer's competency in pre and post-harvest management activities that ensures food security in the Ndop Plain. A total of two hundred and fifty three (253) questionnaires were randomly sampled to household directly or indirectly involve in the agricultural sector in the Ndop Plain. With a total agricultural population of 141757 farmers and a sample size of 14176, a sample population size was selected according to the agricultural population of each village in the Ndop Plain. In the Ndop Plain, farmers competency was determined by evaluating farmers level of education, skills in food crop management, experience in food crop production and attitudes towards training in food crop management. The Factor Analysis reveal that challenges of farmers' competence in food crop Management is strongly significant by contributing 63% drawbacks in farmers' livelihood in the Ndop Plain. The study concluded that challenges of farmers competence in food crop Management account for poor food crop production in the Ndop Plain. The study recommends that effective implementation of innovative programs, farmers' education and sensitization on environmental changes and agrarian development programs vis-a-vis food security should be created at all levels.

Key words: Agrarian, livelihood, management, techniques, competence, sustainable

1

INTRODUCTION

Management techniques worldwide remain an important issue to guarantee food security. Severe hunger and poverty affects nearly one billion people around the world as a result, the demand for food necessitates not only increase in food production but also improvement in post-harvest management techniques (World Bank, 2010). Post-harvest management of food crops therefore remains an integral part to ensure food sustenance and enhancement of standard of living. According to FAO (2009), food production would need to grow by 70% in order to feed the growing population which is estimated to reach 9 billion by 2050. Agriculture is constantly being challenged by climate variability which has a great impact in terms of quality and quantity of crops produced (Gustavasson et al., 2013). In Africa, it has been estimated that about 30% of farm produce are lost, and this can rise to 50% for very perishable food crops such as fruits and vegetables (Maremera, 2014).

Approximately 70% of the world's poor are living in rural areas and rely on the agriculture sector, particularly on traditional agricultural systems (Mijatović *et al.,* 2013). About 75% of the populations in Sub Saharan Africa get their food and income from farm lands. When farmers cultivate crops and earn more income, they achieve self-sufficiency and live better lives (Bill & Melinda Gates Foundation, 2011). In order to have a sustained growth and achieve a sustainable agricultural growth pattern, there is need for proper management of pre-harvest and post-harvest losses (Bime *et al*, 2015). Improving on the income of farmers is an efficient tool in reducing poverty and food insecurity (Kirsten *et al*., 2007). Most farmers are faced with challenges of preserving food crops and minimizing post-harvest losses in the Ndop Plain.

Kometa & Yiven (2017) ascertained that agricultural productions have increase whereas very little has been done to improve on post-harvest management techniques of food crops. Socio-economic conditions of farmers in the Ndop plain remains very poor. According to Islam *et al*., 2013, farmers families are the main contributor to the economy and also the major portion of the population to develop a country. It is very important to develop the household situation of the farmer families. For the agricultural sector, in relation to competence, more emphasis must be put on attitudes and people's motivation, both to acquire new knowledge and to apply the skills (Jostein Vik and Egil Petter Straete, 2017). Most farmers in Africa are the hardest working individuals, yet they have little to show for their efforts. Crouch Meghan, 2001 reveals that Agriculture, especially the food crop sector is ignored, neglected and left to fend for themselves employing traditional methods that do not always lead to higher productivity.

Farmer's competency and food crop management in this study is identified by farmer's level of education, farmer's level of self-confident, skills, experience and attitudes towards training in food crop production. Improvement in farmers competence in food crop management would increase the amount of food available for human consumption and enhance global food security which remains a major challenge to the Second Generation Agriculture for Cameroon vision 2035. In 1798, Thomas Malthus in his book titled "Essay on the Principles on Population Growth" predicted that human population was increasing at a geometric rate while food production was increasing at an arithmetic rate. This implies that the population is increasing more than the quantity of food produce and will have negative effects of hunger and starvation if farmers competence in food crop management are not being improved through training by Agricultural Post officers in the Ndop Plain. Later, Esther Boserup in 1965 established that an increase in population enhance more innovation techniques to increase agricultural production. Based on these concepts, Rural innovation systerms especially in agriculture by the Ministry of Agriculture and Rural Development through the training of farmers has developed both technical and managerial competence in food crop production. Eventhough, some of the farmers are resistant to these agricultural training in

food crop management, they relies on past expirience in adapting to the changing natural environmental conditions such as in the Ndop Plain. It is against this background that the study intends to examine farmers competence and challenges in food crop management in the Ndop Plain.

STUDY AREA AND METHODOLOGY

Ndop Plain is found in the low altitude area with low relative relief that is always affected by flood distroying some food crops. This is accelerated by high annual rainfall in the Ndop Plain that ranges from 1000 to 2000 mm (Molua and Lambi 2006) with a mean value of 265mm to 450mm from 1990 to 2016, and an average temperature of 26^0 C. Ndop is located between latitude $5^o42'$ and $6^o10'$ north of the equator and longitude $10^o11'$ and $10^o40'$ East of the Greenwich Meridian (Figure1).
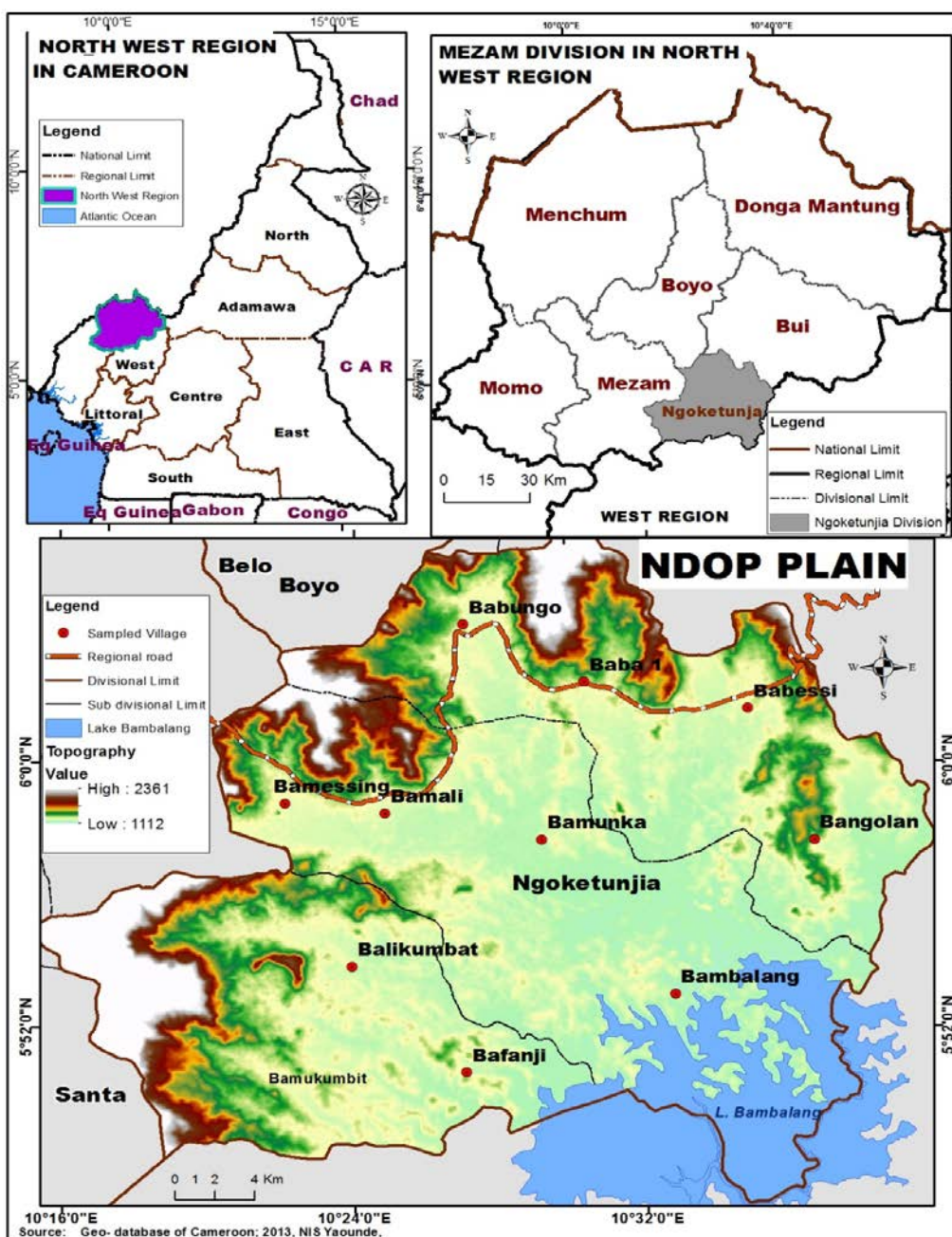

Figure 1: Location of the Study Area
Source: Geo-Data Base of Cameroon (2013)

3

In order to assess Farmers Competence and Challenges in Food Crop Management in the Ndop Plain, the study made use of descriptive research designed. Purposive random sampling of household was carried out that gave a chance for a sample population in all the 13 villages to be chosen without bias. From this sampling technique the 13 villages were selected as the sample population. These villages includes Bali kumbat, Bali Gashu, Bali Gansin, Bamukumbit, Bafanji, Bamessing, Bamali, Bambalang, Bamunka, Babungo, Baba1, Babessi and Bagolan. From the sample of the 13 villages, a sample population size had to be selected according to the Agricultural population size of each village. This was to determine the specific number of questionnaires to be administered to each village with respect to its population and the number of questionnaires to be distributed. With a total agricultural population of 141757 farmers from the sampled villages, a sample population size was selected according to the agricultural population size of each village. In order to obtain the specific number of questionnaires to be administered to each village in respect to its agricultural population and the number of questionnaires to be distributed a sample base was chosen. A sample base of 14176 inhabitants was chosen using 10% of the sample intensity. This implies that for every 14176 farmers, one questionnaire was administered. The used of purposive random sampling technique was based on the fact that majority of the population from which the sample was drawn are farmers and was busy during the period of data collection and only those farmers that were available and willing to participate were included in the process of data collection. As a results of this, the study made use of 253 questionnaires that were designed and administered to the farmers of the 13 villages that make up the Ndop Plain. The study made use of structured questionnaire that provided a systematic ordered way of gathering information from farmers and allowed the collection of precise data. These questionnaires were age selective; (only to farmers who are 19 years and above) since this age group has a better understanding of management techniques of food crop production. Table 1 shows villages and number of farmers sampled.

Table 1: Villages and number of farmers sampled.

Numbers	Villages	Total Population	Agricultural Population	Questionnaires Administered	Questionnaires Retrieved
1	Bamunka	29844	17906	32	31
2	Bamali	12288	7373	13	13
3	Bamessing	21944	13166	23	23
4	Bambalang	23700	14220	25	25
5	Babessi	14769	8861	16	16
6	Baba 1	18617	11170	20	20
7	Babungo	16135	9681	17	17
8	Bagolan	12535	7521	13	13
9	Bali Kumbat	44512	26707	48	46
10	Bafanji	20744	12446	22	22
11	Bamunkumbit	12965	7779	14	14
12	BaliGashu	5186	3112	6	6
13	BaliGansin	3025	1815	4	4
Total	13	236264	141757	253	250

Source: CDP of Ndop centre, Bali Kumbat and Babessi (2017)

4

The approach enabled the collection of both qualitative and quantitative information on various aspects from farmers in the Ndop plain. Primary and secondary sources of data collection were used to obtain information on farmers competence and challenges in food crop management in the Ndop Plain. The study employed extensive field observation, interview and the administration of questionnaire. Field observation was undertaken in two phases covering both the rainy and dry seasons. The first phase ran from March to July 31st 2019. This was aimed at observing and delimiting the study area to have first-hand appraisal on farmers' competence in the process of food crop production and preservation in the Ndop Plain. The second phase of field survey was under taken between August to December 31st 2019 which helps in understanding the challenges faced by farmers in pre and post-harvest management in the Ndop plain. This involved movement to agricultural posts in Babessi, Balikumbat, Bamessing and Bafanji. Farmlands and warehouses were also visited to inquire from key stakeholders such as the Agricultural Post officer of Babessi Sub Division on the methods put in place to improve farmers' competence in food crop management.

Direct interview consisted an important source of information with regards to the contribution of harvest and post-harvest management techniques of food crops in the Ndop Plain. Direct interview with resource persons from MINADER, UNVDA, Councils and NGO such as Rural Development Consultancy (RDC) helped to identify pre and post-harvest management activities ensuring food security in the Ndop Plain. Key informants helped in providing information on the dimensions involved in agriculture and the identification of issues raised. These include interviews with the Divisional and Sub Divisional Delegate of Agriculture and Rural Development, the Chief of Agricultural Development and chiefs of Agricultural Post in Ndop. These were aimed at examining how they ensure sustainable food crop production and preservation as well as farmers ability to adapt to environmental changes in the Ndop Plain. The Mayor of Ndop Central, Bali Kumbat and Babessi Sub Divisions and resources persons from UNVDA and NGOs such as Agricultural Competitive Improvement Project (PACA) and Rural Development Consultancy (RDC) were also interviewed on the activities pertaining to farmers' challenges in food crop production and preservation in the Ndop Plain. From these discussions, information was collected on farmers' competence and challenges in food crop management in the Ndop Plain. Here, quantitative data on pre and post-harvest management techniques were obtained. Questionnaires were used as tools for data collection. Both open and close ended questionnaire were used. A total of two hundred and fifty (253) questionnaires were administered and distributed to the target population directly or indirectly involve in food crop production in the Ndop Plain. Questionnaires were used to obtain information from individuals on pre and post-harvest management Competence of foods crop production by farmers in the Ndop Plain. Both qualitative and quantitative data came from this source. Secondary sources of data used were information on farmers' competence in pre and post-harvest management of food crops that was gotten from the past records in the Sub Divisional Delegation of Agriculture and Rural Development in Babessi, Balikumbat and Ndop Centre. This was to get information on farmers' past experience in pre and post-harvest management competence in food crops production and measures used in reducing challenges of food crop management.

5

The data collected from the field were analyzed using both descriptive and inferential statistical tools. Statistical analyses were in the form of Factor Analysis to verify the hypotheses which states that challenges of farmers competence in food crop Management account for poor farmers livelihood in the Ndop Plain. Data collected from the field was sorted and computed using statistical package for social sciences vision 21 (SPSS 21) and SmartPls 2 in which the data were treated. The results from analysis were presented in the form of tables, charts and photographs to illustrate farmers' competence and challenges of food crops management in the Ndop plain. Data was also presented using maps to show the location of the study area. Tables were used to illustrate farmers' food crops Management activities in the Ndop Plain. The pictures used were to show farmers competence in post-harvest management activities of food crops in the Ndop Plain.

RESULTS AND DISCUSSION

Agriculture remains a major source of livelihoods in the Ndop Plain. Pre harvest and post-harvest management equally contract a major threat to farmers. Agriculture is the main supplier of human needs and it's the largest user of land and water resources in the Ndop Plain. As a result of scarcity in resources, agricultural land and water resources need to be optimized. This entails improvement in farmers' competence in the management of food crops production in the Ndop Plain.

Farmers Competence in food crops Management in the Ndop Plain

Both technical and managerial competency shows the level at which farmers are able to select appropriate pre and post-harvest management techniques of food crop production in the Ndop Plain. There is disparity in farmer's competency and this was as results of farmer's level of Education, Level of farmer's self-confidence, farmers experience and attitude towards training in food crop management in the Ndop plain. To evaluate farmers technical competency in pre and post-harvest management of food crops farmer's level of Education was investigated. The educational levels of farmers in the Ndop Plain were collected on the basis of the formal level of education attended. On a general base, the level of literacy is low considering their technical knowhow required for proper farm management, pest and disease control, and post-harvest handling practices of food crops production. Level of education is related to literacy which enables a farmer to understand pre and post-harvest handling practices. Figure 2 shows farmer's level of education in the Ndop Plain.
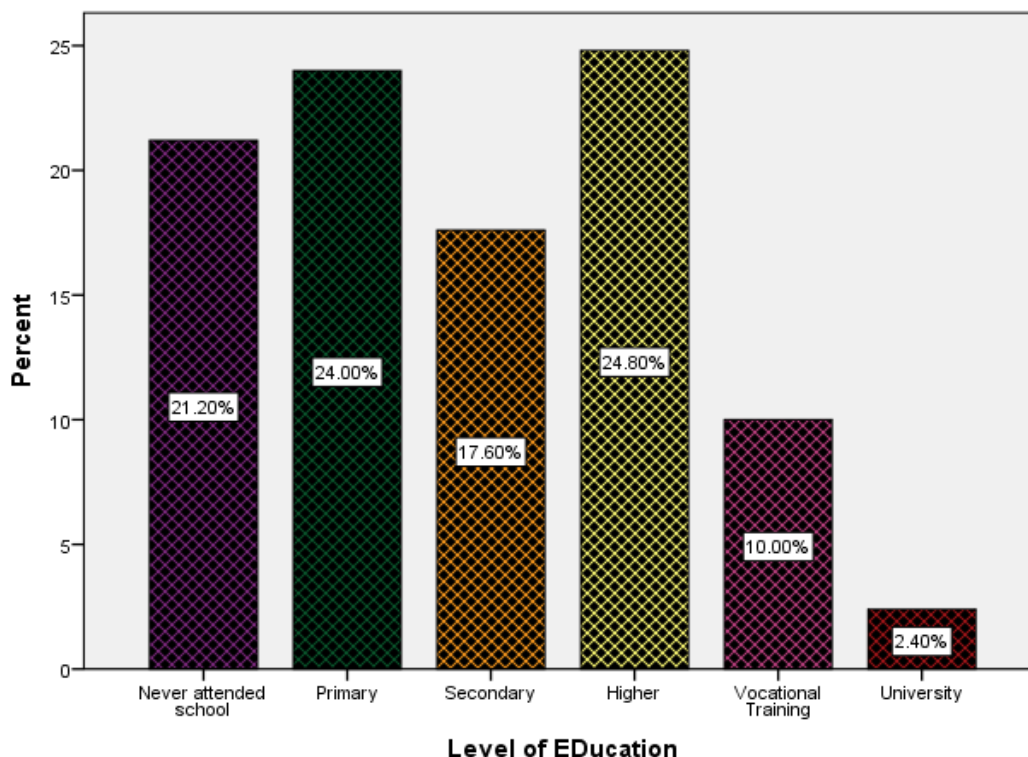
6

Figure 1: Farmers level of education in the Ndop Plain.
Source: Field work (2019)

Figure 2 indicates that, 21.20% of farmers had never attended school while 24% attended up to primary school. This shows that 45.2% of farmers stick to self-confidence competency and past experience in food crop management in the Ndop Plain. With this regard, educational levels of farmers that are low have made them to depend on their indigenous techniques of food crops production such as expansion of farmer sizes, manual harvesting, manual threshing, sun drying and storage using untreated bans that are not sustainable for food crops management in the Ndop Plain. Also, 17.60% of the farmers attained up to secondary level and 24.80% up to high school. These farmers address the issue of indigenous techniques as some of the educated farmers have good knowledge in applying modern management techniques such as the use of fertilizers and intercropping to increase output. This can further be improved if the imbalances of education and the training of farmers are addressed. But the attitude of farmers towards training in food crop management remains very low as only 10% of the farmer's attained vocational training and 2.40 % attended up to tertiary level of education (university). Regardless of the efforts that the government is investing in farmers, the income of most farmers has not changed for an extended period. This is as a result of inadequate access of farmers to education and training in the Ndop Plain. This shows that farmer's level of education is greatly linked to technical and managerial competency of farmers in pre and post-harvest management of food crops in the Ndop plain.

Pre-harvest assessments of food crop production are some of the most important procedures farmers undertake before food crop production in the Ndop Plain. Pre harvest assessment is important in that it shows farmers technical competence in the management of food crops in the Ndop Plain. This includes farmers' feasibility of farm input and land clearance, Land

7

preparation, planting and the monitoring of food crops growth by farmers. Findings show that feasibility study of farm input and Land clearance is one of the main activities necessary when preparing a plot for food crop production in the Ndop Plain. Technical competency in land preparation is one of the most laborious activities performed during crop production and involves digging or plowing the soil for food crops production (Figure 3).

Figure 3: Farmers technical competency in land preparation with machines and hoes
Source: Field Work (2019)

Technically, farmers prepared their lands on one or two separate occasions prior to planting in the Ndop Plain. This preparation begins after the clearing of land following the previous harvesting of food crops. Farmers used their technical competency in tilling the soils mechanically with tractors and manually with hoes prior to planting in the Ndop Plain. With farmers past experience, food crops give the best result when they are planted at the right time and this have made farmers to plant cereals and leguminous crops as soon as rains start in the month of March in the Ndop Plain. The farmers uses both technical and managerial competency after the planting of food crops in the Ndop Plain. Farmers monitor how these crops are growing and prepare for weeding at various stages of plant growth to minimize competition from weeds and unwanted plants that grows together with food crops in the Ndop Plain.

Farmer's managerial competency through post-harvest management planning is the final stage of food crop production with the aim to minimize losses and maintain the quality of food crops for prolonged storage and future use. This is made up of three main stages and includes farmer's competency in feasibility of post-harvest management, preparation of food crops for storage and the monitoring of stored food crops and preservation of seeds. Farmers in the Ndop Plain visit their farms land regularly to locate and observe their crops until harvest. These farmers select good looking heads and harvest them separately as seeds to save for the next farming season. Food crops are mostly harvested when they are fully matured in the Ndop Plain. But some crops like fruits and vegetables are harvested before they are fully matured because they are perishable and are consumed when they are still young. In the case of root crops and tubers the pods can remain in the ground and are harvested when they are matured. Farmers also look for availability of capital, labour, and

8

equipment's for harvesting as well as space for storage. When food crops are harvested, threshing and sorting takes place in the farm before transportation to storage location and markets. Food crops like cereals and leguminous crops get dry before threshing and storage. Findings reveal that there is proper drying of harvested cereals so that they are stored well over a long period. Farmers usually check food crops using their teeth or fingernail to see whether they are well dried or not. Threshing is done on well- smeared and dry ground using sticks in Baba 1, Babungo, Bamali and Bamukumbit. Threshing is conducted only for crops that have been dried enough. Farmers treat their food crops before storage and consistent maintenance to keep the store area clean help protect stored food crops against pests in the Ndop Plain. Treatment of food crops shows an important farmer's technical competency in post-harvest handling activity that maintains the quality and quantity of food crops in the Ndop plain.

Farmers Challenges in Food Crop Management in the Ndop Plain

Food crop management is mainly undertaken by female farmers but they do not have full right over farm lands in the Ndop Plain. Farm lands are mostly owned by men when they are engaged in wage employment and are migrants to semi urban and urban areas of Cameroon for better opportunities. The results in table 2 revealed that majority of the farmers were female with 59.6% which supports the widely encountered phenomenon in Africa and Cameroon in particular.

Table 2: Gender Ratio in food crop management in the Ndop Plain

Gender	Frequency	Percentage (%)
Male	101	40.4
Female	149	59.6
Total	250	100.0

Source: Field work, (2019)

From table 2 there are more female farmers with 59.6% as against 40.4% for male farmers. This indicated that women played significant role in pre and post-harvest management of food crops in the Ndop Plain. These findings show that the training of women more than men on pre and post-harvest management techniques of food crop production would have a greater implication in reducing farmer's challenges. The results also point out that farm ownership should not be left only in the hands of men but also to women so as to ensure equity in the Ndop plain. Ndop Plain is entirely a farming community with very few other professions available to absorb farmers therefore leaving them with no option except farming. This area is made up of young farmers that are not having self-confidence since they does not have much experience in food crop management in the Ndop Plain. The youngest farmer was less than 20 years old in the Ndop Plain (Table 3).

Table 3: Age distribution of farmers in food crop management in the Ndop Plain

Age Distribution	Frequency	Percentage (%)
<20	18	7.2
21-40	148	59.2
41-60	46	18.4
>60	38	15.2
Total	250	100.0

Source: Field work, (2017)

9

Table 3 shows that, Majority of farmers (59.2%) are between 21-40 years old while 18.4% and 15.2% of the farmers are between 41-60 and 60^+ respectively with 7.2% with age less than 20years old. Discussions with the farmers indicate that the youths were moving towards the agricultural sector because it contributes significantly in providing food and income. These youths are mostly school dropouts and can only provide unskilled labour in the Ndop Plain. These have made them to continue facing some challenges in technical and managerial competency in food crop management. Storage rooms of food crops in the Ndop Plain depend completely on the type of crops. Indigenous methods of storage have evolved over long periods and these include the in situ methods of storage as well as barns and pits. Farmers also use drums, pots and bags most especially for easy retrieval and transportation while minority of farmers (6%) use cribs because the material required for their construction is expensive and as such most of them cannot afford (Table 4).

Table 4: Methods of storing food crops in the Ndop Plain

Storage Techniques	Frequency	Percentage (%)
Bans	110	44.0
Bags and Pots	76	30.4
Eves of house roof	49	19.6
Cribs	15	6.0
Total	250	100.0

Source: Field work (2019)

Table 4 shows that 44% of farmers store their food crops in bans while 30.4% store their crops in bags and pots. Farmers also store their crops on the eves of house roof (19.6%) as well as minority of farmers store in cribs (6%) because they cannot afford for it cost. Field survey revealed that most of the farmers use local bans for storage in order to safeguard their farm produce in their houses while some of the farmers hang maize and beans below the eves of the roofs of their houses.

Farmers' inability to have access to loan in the Ndop Plain

Loan is an important aspect of pre and post-harvest management planning of food crops production that helps to facilitate agricultural activities not only in the Ndop Plain but the world at large. There are two main sources of loans in the study area that is the formal and informal sources. These sources of loans play a major role in the finance of agricultural activities especially the pre harvest management activities. The informal source of loans is the most reliable source that has gone a long way in assisting farmers in the Ndop Plain (Figure 4).
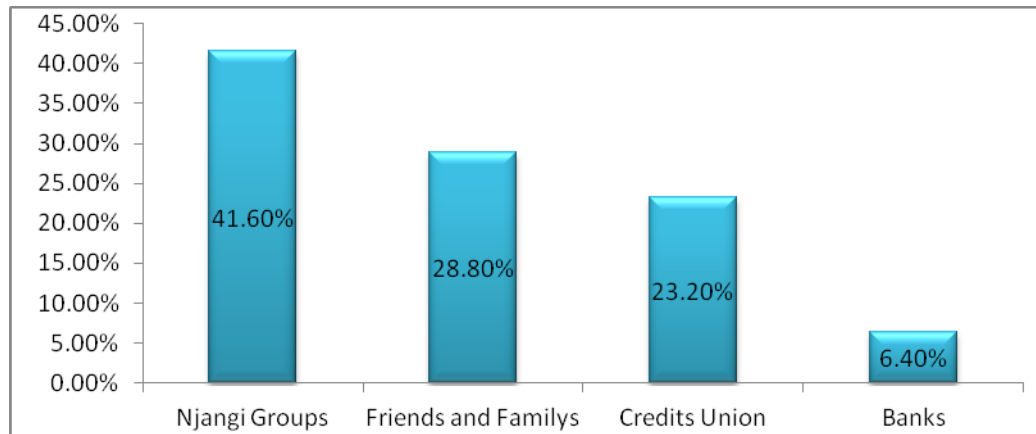
10

Figure 4: Farmers sources of income in food crops management in the Ndop plain
Source: Field work (2019)

From figure 4, banks and credit unions accounted for 29.60% of loans while Njangi group and finance from friends and family constitute the informal source and accounted for 70.40%. Several factors serve as possible measures to improve Farmers competence in pre and post-harvest management of food crops production in the Ndop Plain. In other to use the proposed techniques of analysis, there are pre-test that are indispensable, which were carried out to ensure the validity and reliability of the instrument. Cronbach alpha coefficient as an indicator of internal consistency of the scale was used to assess the degree to which the items that make up the scale were valid for the study. Fornell and Larcker (1981) as well as Nunally and Bernstein (1994) in Thalut, 2017 recommended a cut-off criteria for an items to be reliable, it needs to be 0.70 for both composite and Cronbach alpha test of reliability. The measurement model adopted in this study was reflexive. The test result is presented in table 5.

Table 5: Reliability Statistics

Construct	Composite Reliability	Cronbachs Alpha
FL	0,899765	0,705390
FCPoHMFC	0,933215	0,800725
FCPreHMFC	0,808386	0,768543

Source: Computed using SmartPLS 2, (2019)

The result of the reliability test in table 5 shows that all the constructs in the study are reliable. This implies that they are measuring Farmers competence in Post-harvest management of food crops (FCPoHMFC) and Farmers competence in Pre-harvest management of food crops (FCPreHMFC). The cut-off criteria of 0.7 for the items to be reliable were made by all the constructs. Both composite reliability which include both person and items reliability agree with Cronbach's alpha that the indicators that was used in measuring the constructs were reliable. The questions were made up of 27 items that were condensed into nine variables. These variables are farmer's activity plan of land preparation and planting (FAPLPP), farmer's feasibility plan of farm inputs (FFPFI) and farmers monitoring plan of food crops growth (FMPFCG) that were computed to form pre harvest management planning of food crops production (PreHMPFCP). For post-harvest

11

management planning of food crops production (PoHMPFCP) these variables were farmers' activity plan of post-harvest management (FAPPHM), Farmers ensure sustainability of food crops production (FESFCP) and farmers ensure human capital investment of food crops production (FEHCIFCP). The other three variables that made up farmers livelihood outcomes (FLO) include natural resource base sustainability of food crops production (NRBSFCP), poverty reduction (PR) and affordable post-harvest management equipment of food crops production (APHMEFCP). Factor analysis which is a dimensional reduction technique was used to reduce the dimension of question items to few significant one. It was also conducted to assess the various components which the items load high, to permit the researcher to compute for the attribute dimension of the constructs. However, there are pre-test that are indispensable for PreHMPFCP, PoHMPFCP and FL (Table 6).

Table 4: KMO and Bartlett's Test

PreHMPFCP		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.651
Bartlett's Test of Sphericity	Approx. Chi-Square	875.119
	Df	36
	Sig.	.000
PoHMPFCP		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.800
Bartlett's Test of Sphericity	Approx. Chi-Square	664.447
	Df	36
	Sig.	.000
FL		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.656
Bartlett's Test of Sphericity	Approx. Chi-Square	667.513
	Df	36
	Sig.	.000

Source: Computed Using SPSS version 21, (2019)

Table 6 shows the results of Bartlett's test of sphericity, the Kaiser-Meyer-Olkin (KMO) value. The KMO value of 0.651, 0.8 and 0.656 is reasonable to conduct a factor analysis. The p-value of Bartlett's test (p = 0.000), which is below 0.05, is significant at the 99% confidence level. This result indicates that the correlations structure is significantly strong enough to perform factor analysis on the items. It therefore indicates that there is no issue of multi-collinearity in the data. In addition, factor analysis assumed linear relationship between the items. The result presented in figure 5 shows the relationship between the inner models constructs as well as the relationships between the observed variables, or indicators and constructs.
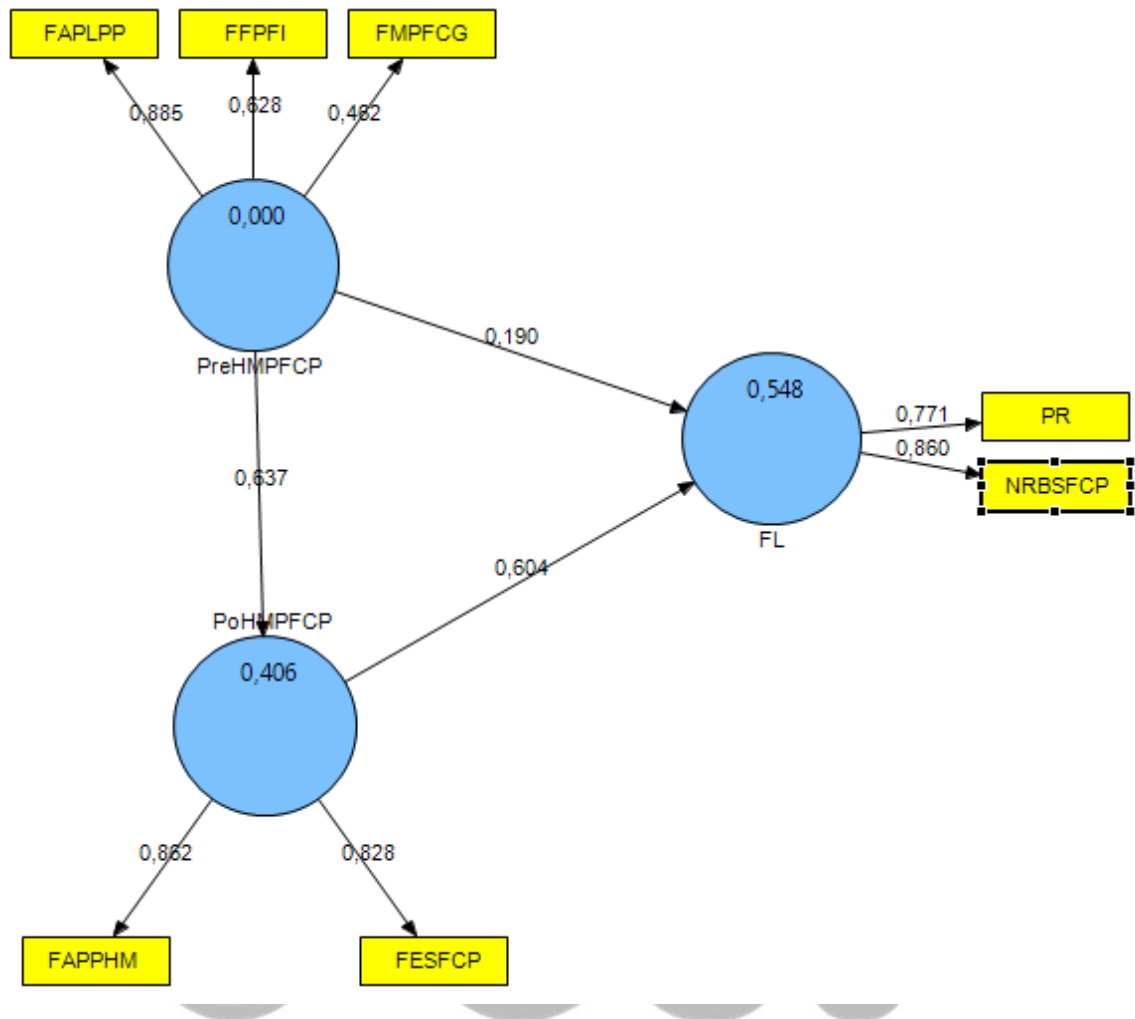
Figure 5: Pre and Post-harvest management planning model for Farmers livelihood in the Ndop Plain

Source: Computed using SmartPLS 2, (2019)

The circle represents the construct while the rectangle represents the observed or manifest variables used in the construction of the model (Thalut, 2016). The circles represent the constructs, and the values inside the circles are the estimates of the squared multiple correlations (R2) for each dependent construct in the model. All the circles have estimates of the squared multiple correlations (R2) except for pre harvest management planning since they are exogenous variables. The used of construct can be justified on the bases of the fact that pre and post-harvest management planning of food crops production and farmers livelihood are multifaceted. This implies that a single observed variable may not be appropriate to proxy for these concepts. The loading factors for the reflexive model were all significant at 0.05 significant levels. Table 5 shows respondent's views on farmers' competence in Pre and post- management of food crops in the Ndop Plain.

Table 7: Path Regression Coefficients

Items	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
PoHMPFCP -> FL	0,604063	0,604853	0,053086	0,053086	11,378861
PreHMPFCP -> FL	0,190315	0,192643	0,063846	0,063846	2,980829
FCFCM-> FL	0,636790	0,645390	0,036758	0,036758	17,323661

Source: Computed using SmartPLS 2, (2019)

The result highlighted in table 7 shows that farmer technical competency in pre harvest management planning of food crop production has a strong positive significant relationship through farmer managerial competency in post-harvest management planning of food crop production in predicting farmer's livelihood outcomes in the Ndop Plain. This significant relationship determines the indirect relationship of pre harvest management planning of food crop production for farmer's livelihood as well as the direct relationship between post-harvest management planning of food crop production in predicting farmer's livelihood. This implies that, a change in post-harvest management planning can generate 60% improvement in farmer's livelihood in the Ndop Plain. Also, pre harvest management planning of food crops production is slightly significant and with a change it can elicit only 19% of improvement in farmer's livelihood in the Ndop Plain. Since challenges of farmer's competence in food crop Management is strongly significant by contributing 63% drawbacks in farmers' livelihood, it permits us to admit the hypothesis of the study which states that challenges of farmers competence in food crop Management account for poor farmers livelihood in the Ndop Plain.

CONCLUSION AND RECOMMENDATIONS

From field observation and analysis, it was concluded that there is indirect relationship of farmers competency in pre harvest management planning of food crop production for farmer's livelihood outcomes as well as there is direct relationship between farmers competency in post-harvest management planning of food crop production in predicting farmer's livelihood outcomes in the Ndop Plain. Due to increase in water availability for irrigation, farmers cultivate food crops throughout the year with the introduction of new crops like ginger, potato, garlic and cucumber. These have led to diverse income sources and improvement of farmer's basic needs in the Ndop Plain. Farmers through their technical and managerial competency also assured water resources through farm ponds in which crops are grown during the dry season through irrigation. This is mostly done by educated farmers who cultivate market gardening crops such as tomatoes, water melon and cucumber. With scarcity of these food crops in the dry season, prices are more favorable providing an increase in farmer's income and the development of the farm-enterprises leading towards their self-reliance. Despites all the efforts put by farmers to improve food crop production, challenges of farmers' competence in food crop Management remains a major issue in the Ndop Plain.

14

The branded determinants of farmers' competence and challenges in food crop management provide practical acumens for policy makers, developers and farmers. Thus this in turn can yield widespread products in terms of the development of quality post-harvest management techniques and farmers educational training programs as well as the plan of supplementary effectual government policies. Outstanding to the disparity of farmers competency in farming and harvesting methods of food crops production, vulnerability aversion, innovative technologies and agricultural conservation development programs need to be personalized to the necessities of farmers. This plan can only be adapted if the regime and development agencies are knowledgeable on the production of public awareness on appropriate management techniques towards the current challenges of farmers competence in food crops management. The Government should embark on projects that can reduce the constraints of food crop production such as road improvement projects as well as putting in place of processing units which can play a crucial role towards post-harvest loss reduction in the Ndop Plain. The government should also provide access to agricultural facilities and encourage new innovations of food cop production such as irrigation, especially in the drier months that would improve yields. Government policy with regard to farmers' support should focus on facilitating the farmers' to access reliable water supply for production throughout the year. This is advantageous as irrigation would provide farmers with options of when to produce and consequently the ability to avoid production only in the rainy season where losses due to pests and diseases are relatively high.

REFFERENCES

Alexandratos, N. and Bruinsma J. (2012). "World agriculture towards 2030/2050: The saving water. *From Field to Fork-Curbing Losses and Wastage in the Food Chain 2012 revision" Working paper: FAO: ESA No. 12*-03, p.4.

Bill & Melinda Gates Foundation (2011). *Agricultural Development, Partial owners in a local farming cooperative.* Katumani, Machakos District, Kenya.

Bime M. J., Ngala N. M., Jaza, A. F., Mawo M.L. (2015). *An Analysis of the Pre and Post- Harvest Management Techniques in Rice Production: The Case of UNVDA Ndop, North West Region, Cameroon.*

Crouch Meghan (2001). "The Challenges Food Crops Farmers Face in the Ahanta West District: Friends of the Nation Demonstration Farm,a Possible Solution." African Diaspora ISPs Paper 53.

FAO (2009). *Framework Paper on Post-harvest Loss reduction in Africa*. Rome Italy 56p.

Gustavsson, J., Cederberg, C., Sonesson, U. & Emanuelsson, A.(2013).*The methodology of the FAO study: global food losses and food waste - extent, causes and prevention*, SIK (http://www.sik.se/archive/pdf-filerkatalog/SR857.pdf)

Islam, M. J. Hoque, M. A. Momen Miah and S. Sheheli.(2013). Competency Assessment of the Farmers on the Application of one house one farm approach ISSN 1017-8139

Jostein Vik and Egil Petter Straete (2017). Embedded Competence: A Study of Farmers' Relation to Competence and Knowledge, www.centmapress.org

Kirsten, J., May, J., Hendriks, S.L., Lyne, M., Machethe, C. and Punt, C. (2007). The poverty alleviation and food security role of agriculture in South Africa.

In: *Bresciani, F. and Valdé, A. (eds). Beyond food production: The role of agriculture in poverty reduction.* Rome: FAO.

Kometa, S. & Yiven, B. (2017). Post-Harvest Challenges of Food Crops in Jakiri Sub division, Cameroon. *A Threatto Food Security*.

Maremera. G,(2014*). Assessment of Vegetable Postharvest Losses among Smallholder Farmers in Umbumbulu Area OfKwazulu-Natal Province, South Africa.*

Mijatovic-Rustempasic, S., Tam K.I., Kerin T.K., Lewis J.M., Gautam ,R,. Quaye, O., Gentsch J.R., Bowen M . D. (2013). Sensitive and specific quantitative detection of rotavirus A by one-step real-time reverse transcription-PCR assay without antecedent double-stranded-RNA denaturation. *Journal of Clinical Microbiology.51(9)*:3047–3054. doi: 10.1128/JCM.01192-13. [PMC free article] [PubMed] [Cross Ref].

Molua, E. L., & Lambi, C. M. (2006). Climate, Hydrology and water Resources in Cameroon (pp. 1-37)*. CEEPA Discussion Papers, Special Series on Climate Change and Agriculture in Africa.* Centre for Environmental Economics and Policy in Africa (CEEPA), University of Pretoria, South Africa. Retrieved from http://www.ceepa.co.za/docs/CDPNo17.pdf

Thalut, N. (2017). *Integration of financial exclusion into sustainable rice production for poverty reduction in Ndop*. Bambili: University of Bamenda library.

World Bank (2010). *Missing Food: The case of postharvest grain losses in Sub Saharan Africa.* The World Bank, Washington DC, USA. ADR Report No 54857 pp 115.

16