International Journal of Agricultural Science, Research and Technology in Extension and Education Systems (IJASRT in EESs)
Available online on: http://ijasrt.iau-shoushtar.ac.ir
ISSN: 2251-7588 Print
ISSN: 2251-7596 Online
2018: 8(2):111-119

Received: 22 September 2017
Reviewed: 21 October 2017
Revised: 29 October 2017
Accepted: 27April 2018

Assessment on Farm Enterprises, Major Agricultural Risks and Demand for Micro-Insurance Services by Smallholder Farmers in Selected Areas of Benishangul-Gumuz, Western Ethiopia

Alemayehu Abebe
Ethiopian Institute of Agricultural Research, Assosa Agricultural Research Center, P.O. Box 265, Assosa, Ethiopia. Email: alabe_2008@yahoo.com

Abstract

The study was conducted in Assosa district of Benishangul-Gumuz regional state, western Ethiopia, to assess major farm enterprises, agricultural risks and demand for micro-insurance services. Two peasant associations namely, Selga-23 and Kushmengel were selected to represent settler and native farming communities, respectively. Using simple randomized techniques, 86 respondents were selected for the study. Data were collected from both primary and secondary sources. Data were analyzed using SPSS software. Descriptive, T-test, chi-square test and correlation analysis were used for data analysis. Rank index analysis was also done to order multiple variables using Microsoft excel. Results revealed that teff is the most important crop followed by finger millet for settler community whereas, maize the most widely grown crop in native community followed by teff. Cattle, goat and chicken are widely reared livestock species in the study areas. However, both crop and livestock production face natural adversities and climatic factors that is out of control of smallholder farmers. Smallholder farmers tried coping with the risks primarily by selling some of their livestock resources and reducing home consumption. Thus, provision of micro-insurance for smallholder farmers in a coordinated way can be a better way out of this crisis. There is high demand for micro-insurance services in the study area and smallholder farmers showed strong willingness to pay to premiums. Thus, it was recommended that multi-peril crop insurance and indemnity based livestock insurance can be used in study areas based on the nature of agricultural risks.

Keywords: Agricultural Risks, Micro-Insurance, Premium

1. Introduction

Benishangul-Gumuzis the regional state located in the western part of the country. Agriculture is the back bone of the region's economy and the region holds large potential for agriculturaldevelopment. This is due to its fertile land, ample amount of rain, large water bodies, vast forage coverage, and diverse animal resources. The main crops grown in the region include sorghum, maize, teff, sesame, finger millet, rice, cotton, pulses, mango, hot pepper and sweet potato; whereas major livestock kept include cattle, goat, sheep, donkey and chicken. In spite of the huge agricultural potential of the region, production and productivity of the agriculture sector is low and this has resulted in food insecurity. Livestock diseases are widespread and wild forests are often caught by fire. Lack of advanced technologies, inadequate infrastructure, shortage of trained human power and climate change could contribute to the low productivity.

Climate change has far-reaching consequences on food production which comprises crops and livestock mainly arising from its impact on distribution of rainfall and grassland productivity. The direct effects of climate change include higher temperatures and changing rainfall patterns which in

turn could be translated into increased spread of diseases and emergence of new diseases, parasites and weeds. Some of the indirect effects are changes in feed resource linked to carrying capacity of grasslands, buffering abilities of ecosystems, intensified desertification processes, increased scarcity of water resources and decreased crop production (IFAD, 2009). Higher food prices and increasing climate change impacts have added an additional burden on the poor and have contributed to an increasing number of people unable to access sufficient food to meet daily nutritional needs.

According to the report, (IFAD, 2009), climate change is a global phenomenon and its negative impacts are more severe for poor people in developing countries who depend heavily on the natural resource base for their livelihoods. Rural communities in Benishangul-Gumuz largely rely on crop cultivation and livestock raring which are climate-sensitive economic sectors. The sector is challenged by natural catastrophes especially, droughts, floods, excessive rain and pests. When smallholder farmers face extreme weather, they have no capacity to tolerate the problem. They have few options for coping with significant losses arising due to climate related risks. When they face crisis, coping mechanism is either depleting their savings, sacrifice other household expenditures, or sell productive assets and go to a serious problem as a result. Thus, the provision of insurance service to the smallholder farmers in a coordinated manner can be a better way out in the time of crises. Ethiopian Insurance Corporation and other insurance companies in collaboration with Ethiopian Agricultural Transformation Agency have a plan to provide insurance services to 15 million smallholder farmers to modernize their agricultural production. The plan includes smallholder farmers in the Benishangul-Gumuz regional state.

However, in order to implement such agricultural micro-insurance, farm enterprises and associated risks of particular area should be clearly known. Therefore, this assessment was done to produce basic information on the socio-demographics, physical assets and common field crops, farming practices, inputs and services in the sector, risks of crop and livestock production, and demand for agriculture insurance in selected pilot areas of Benishangul-Gumuz.

2. Materials and methods

Study area

This study was done using two Peasant Associations (PAs) namely, Selga-23 and Kushmengel which are located in Assosa district of Benishangul-Gumuz. Benishangul-Gumuz region is located in the western end of the country between geographical coordinates of 90 30'N to 110 39'N latitude and 340 20'E to 360 30'E longitude with a total land area of 50 thousand square kilometre. The PAs are the pilot implementation sites for Promoting Autonomous Adaptation Project (PAAP). The project works to reduce the impact of climate change on the livelihood of the rural poor. The PAs represent two different farming communities of the region. Smallholder farmers in Selga-23 are settlers and practice permanent farming system; whereas smallholder farmers in Kushmengel are native and practice shifting cultivation. Shifting cultivation is an agricultural system in which plots of land are cultivated temporarily, then abandoned and allowed to revert to their natural vegetation while the farmer moves on to another plot.

Sources and methods of data collection

The PAs were purposefully selected for this study as they are implementation sites of PAAP. In a first step, meeting was held among experts and enumerators to discuss on sample size, questionnaire content and sampling technique. Based on the total households of the PAs, the sample size was determined to be 25% of households for Kushmengel and 20% for Selga-23. Based on this, 86 households were selected where 50 and 36 households from Selga-23 and Kushmengel, respectively. Simple randomized sampling techniques were employed to select respondents.

Data were collected from primary and secondary sources. The primary data were collected using semi-structured questionnaire and focus group discussions. Participants of the focus group discussion were key informants (elderly and local administrators). The discussion covered primarily the risks of cattle and crop production, the coping mechanisms of the risks and demand for insurance in the areas. Respondents were individually interviewed using semi-structured questionnaire. The questionnaire covered a large range of variables which include: socio-demographic information, assets, farm enterprises, income sources, risks and coping mechanisms, farmer behaviour with climate change induced risks, membership to local institutions, access to finances, and demand for insurance and basic livestock information. Secondary data also collected from Agricultural Offices of the district on crop yield, availability and amounts of inputs, market information, disease and deaths of livestock resources.

Data Management and Analysis

Data collected were managed in such a way that qualitative as well as quantitative variables can be analyzed. Data were entered into SPSS (version 20) and coded for analysis. Descriptive, Independent

Two Sample T-test, chi-square test and correlation were used for data analysis. Chi-square test was used to determine differences in percent frequency of nominal data. Correlation analysis was done to determine the degree of relationship of random variables like land size and household income, and land size and household size. Rank index analysis was done to order multiple variables using Microsoft excel. For all analysis, the level of significance was set at α of $P<0.05$.

3. Results and discussion

3.1 Demographic Characteristics

Some demographic characteristics of the households are presented in Fig. 1 and Table 1. Majority of the sampled households were male headed. Sixty percent of the respondents were above 35 years, thus in most cases in developing countries like Ethiopia, farmers acquire experience and knowledge through lifetime accordingly they will be in a better condition in terms of acquiring and using indigenous technical knowledge. According to survey result, 90.7 % of respondents were married which could likely be related with higher ages of the respondents.

Education is an important characteristic that determines the farmer's ability to communicate, acquire information and to adopt knowledge and skills related to new technologies. As indicated in Fig. 1, about 78% of sample respondents from both communities are literate. Education status of household heads did not differ between the communities. So, this would likely have a positive effect on adoption of new agricultural technologies and demand of insurance against the risks of crop and livestock production.

The sample respondents from native community had significantly ($P<0.05$) larger family than settlers. The larger family size in native community is attributed to polygamy marriage that is familiar in this community. It could be also due to larger land size native communities hold as land size had significant positive correlation ($r= 0.441$, $P<0.001$) with family size. Households with larger land size tend to build larger family size as they need more family labour. This result is in agreement with Alemayehu and Oosting (2016) who reported a significant positive correlation between family size and land size in smallholder dairy farming systems in southern Ethiopia.

As indicated in Table 1, goat and chicken are dominant livestock species of the study area. Sample respondents from native community had significantly lower number of cattle heads ($P<0.001$) than settlers. This could be due to higher prevalence of bovine trypanosomiasis which is a rampant disease in the area. Majority of native community do not keep oxen as they cultivate lands using simple hand-tools, which could be also a reason for lower number of cattle. Low number of chicken and goats in settler community could be due to intensive cultivation of land and low space for scavenging and browse trees which are the main feed sources for chicken and goats, respectively.

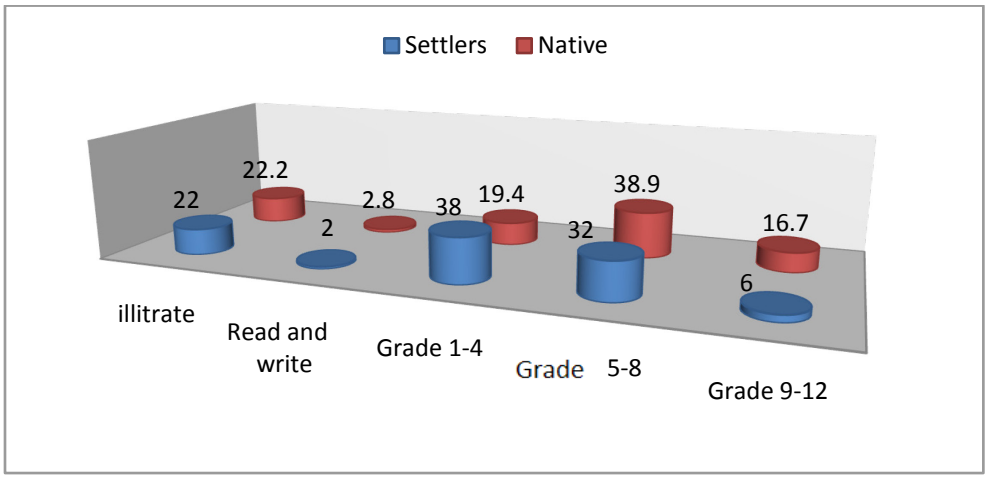

Figure 1. Educational status of sample respondents in the study area

Table1. Family size, land size and livestock composition of the sample households

	Settlers N=50	Native N=36	T
	Mean ± SE	Mean ± SE	
Family size	4.9 ± 0.23	6.0 ± 0.55	-1.951*
Land size (ha)	0.5 ± 0.01	1.5 ± 0.16	-6.288***
Livestock size			
cattle	1.8 ± 0.22	0.3 ± 0.15	5.601***
goats	2.4 ± 0.70	3.7 ± 0.63	-1.335
sheep	0.1 ± 0.05	0.2 ± 0.19	-0.657
Chicken	4.1 ± 0.57	7.9 ± 1.47	-2.436*

*=P<0.05, ***=P<0.001

Table 2. Important crops grown in the study areas

	Settlers		Native	
Crops	N (Index)	Rank	N (Index)	Rank
Finger millet	39 (0.25)	2	29 (0.10)	4
Teff	44 (0.31)	1	77 (0.27)	2
Maize	40 (0.22)	3	87 (0.31)	1
Sorghum	31 (0.13)	4	50 (0.18)	3
Pulses	23 (0.04)	6	19 (0.07)	6
Hot pepper	6 (0.01)	7	0 (0.00)	-
Mango	30 (0.05)	5	23 (0.08)	5

N= number of respondents, Index= sum of crops grown (5* first ranked crop+ 4* second ranked crop+ 3* third ranked crop+2*fourth ranked crop+1*fifth ranked crop)/sum of all weighted important crops grown in the areas

Table 3. Purpose of commonly grown crops in the areas

Crop type	Settlers N (%)			Native N (%)			X^2
	Home consumption	Market	Both	Home consumption	Market	Both	
Finger millet	38 (76.0)	1 (2.0)	10(20.0)	7(19.4)	0(0.0)	13(36.1)	34.621***
Teff	20 (40.0)	4 (8.0)	25(50.0)	2(5.6)	3(8.3)	27(75.0)	14.862**
Maize	32 (64.0)	1 (2.0)	13(26.0)	9(25.0)	2(5.6)	24(66.7)	16.463***
Sorghum	22 (44.0)	2 (4.0)	10(20.0)	5(13.9)	2(5.6)	21(58.3)	14.603**

**=P<0.01, ***= P<0.001

3.2 Farm enterprises

Crop production

The most important crops grown in the two farming communities are presented in Table 2. Cereals dominate crop production in the study areas. Teff is the most widely produced crop in settler community followed by finger millet. On the contrary, maize is the most commonly grown crop in native community followed by teff. Countrywide, teff is the most favourable staple crop for urban and rural consumers of different income levels of households(Amha et al., 2012), and thus, it covers more land than other crops. According to same report, maize is the second most important crop occupying 20 percent of total cereal land. In terms of production, however, maize is the first with 3.8 million ton output nationally.

Report of office of Agriculture and Rural Development of Assosa district indicates that the average productivity (tone/hectare) of finger millet, teff, maize and sorghum from 2011 to 2015 was 1.10, 0.52, 2.46 and 1.60, respectively. The national average yield of teff is 1.2 ton per hectare. The low productivity level of cereals in this area is likely due to poor farming practices. So, the productivity can be improved by using high-yield varieties and improved agronomic practices in regular basis.

Utilization of crops

The main purpose of growing cereals by low income smallholder farmers in the study area is presented in Table 3. There was a significant difference between the farming communities in utilization of crops. Settlers primarily produce finger millet, maize and sorghum for home consumption,

but teff for both home consumption and market. However, majority of smallholder farmers from native community produce cereals both for home consumption and market. The difference in utilization of crops between the two farming communities is mainly attributed to difference in production volume. Settlers have smallsized landsso that their produce is mainly for home consumption. However, both farming communities use teff for home consumption and market which could be associated with its higher market demand and price.

Access to agricultural extension services

As indicated in Table 4, majority of the sample respondents had an access to agricultural extension services provided by local government. The availability of development agents, the proximity of the PAs to agricultural office of the district and Assosa town could be reasons behind the better access to such services. The availability of a well-functioning farmers training centre (FTC) in Kushmengel favoured native community members to access agricultural extension services more than settlers in Selega-23. This indicates the importance of establishing such a farmers training centers in all areas of the district. Though smallholder farmers in the study areas had an access to extension services, it was not in regular basis. So, to improve crop production and productivity, extension services such as use of high-yielding varieties, proper agronomic practices like application of organic and inorganic fertilizers, tillage, optimum weed control, proper post-harvest storage and up-to-date market information should be available on regular basis. In the same manner, there should be regular vaccination and treatment against diseases for the improvement of livestock sector.

Livestock Production

The total number of major livestock resources in the two PAs is presented in Fig. 1. Total number of livestock is related with the number of households in the PAs. As Selga-23 has larger number households than Kushmengel, more number of livestock exists in Selga-23. In both PAs, number of cattle and donkey is in declining trend while number of goats and chickens is increasing. The possible reason for the decline of cattle population in the PAs is an increase in prevalence of bovine trypanosomiasis. This rampant disease less affects small ruminants so that smallholder farmers in the study sites might be substituting cattle by goats. The increasing trend in chicken population could be associated with increasing demand to chicken products in the areas and provision of vaccines, especially for Newcastle disease, by the local government. In overall, as indicated by sample respondents, livestock resource of the areas is constrained by disease and feed shortages which call for an intervention in these areas to improve the sector.

Table 4. Extension services and frequencies of the services in the study areas

Extension services	Settlers N (%)		Native N (%)		X^2
	Yes	No	Yes	No	
Agronomic practices	39(78.0)	11(22.0)	30(83.3)	6(16.7)	0.375
Weed control	35(70.0)	15(30)	28(77.8)	8(22.2)	0.646
Post harvesting	38(76.0)	11(22.0)	35(97.2)	1(2.8)	7.373**
Market information	15(30.0)	32(64.0)	16(44.4)	20(55.6)	3.618
Livestock vaccination	32(64.0)	16(32.0)	25(69.4)	11(30.6)	1.548
Livestock treatment	47(94.0)	2(4.0)	35(97.2)	1(2.8)	0.832
Frequency of services	Regularly	Occasionally	Regularly	Occasionally	
Agronomic practices	14(28.0)	29(58.0)	12(33.3)	18(50.0)	0.540
Weed control	9(18.0)	27(54.0)	9(25.0)	20(55.6)	1.127
Post harvesting	13(26.0)	26(52.0)	10(27.8)	25(69.4)	6.641**
Market information	3(6.0)	15(30.0)	1(2.8)	17(47.2)	2.841
Vaccination	11(22.0)	20(40.0)	10(27.8)	16(44.4)	1.033
Livestock treatment	23(46.0)	22(44.0)	19(52.8)	16(44.4)	1.763

**=P<0.01, ***=P<0.001

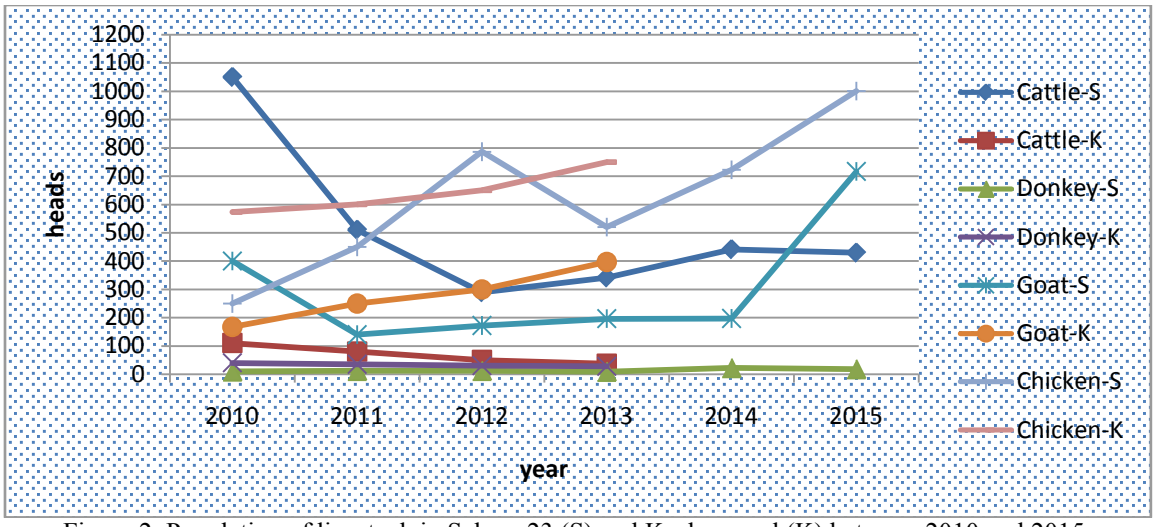

Figure 2. Population of livestock in Selega-23 (S) and Kushmengel (K) between 2010 and 2015. Source: Report of Agricultural and Rural Development Office of Assosa District.

Table 5. Major income sources of smallholder farmers in the study areas

Income source	Settlers		Native	
	N (Index)	Rank	N (Index)	Rank
Sale of crop	24 (0.40)	1	29 (0.49)	1
Sale of cattle	6 (0.09)	4	5 (0.06)	5
Sale of goat	14 (0.16)	2	11 (0.12)	3
Sale of chicken	18 (0.16)	2	16 (0.14)	2
Daily labour	8 (0.09)	4	3 (0.04)	6
Trade	4 (0.05)	6	3 (0.03)	7
Gold mining	1 (0.02)	7	11 (0.12)	3

N= number of respondents, Index= sum of income sources (4* first ranked income source+ 3* second ranked income source+ 2* third ranked income source+1*fourth ranked income source)/sum of all weighted important income sources

Table 6. Major crop and livestock production risks in settler and native communities of the study area

	Settlers		Native	
Crop production risks	N (Index)	Rank	N (Index)	Rank
Uncontrollable diseases and pests	41 (0.25)	1	29 (0.29)	1
Shortage of rainfall	15 (0.08)	5	7 (0.06)	5
Snow	40 (0.23)	2	22 (0.21)	2
Erratic rainfall	37 (0.15)	4	22 (0.17)	3
Wild fire/lightening	19 (0.06)	7	12 (0.06)	5
Hail	27 (0.16)	3	18 (0.17)	3
Rust	24 (0.08)	5	9 (0.03)	7
Tempest	0 (0.00)	-	3 (0.02)	8
Livestock production risks				
Accident	48 (0.36)	2	67 (0.31)	2
Disease	42 (0.39)	1	98 (0.45)	1
Smoke	39 (0.12)	4	12 (0.06)	4
Fire and/or lightening	30 (0.14)	3	40 (0.18)	3

N= number of respondents, Index for crop risks= sum crop production risks (5* first ranked risk+ 4* second ranked risk+ 3* third ranked risk+2*fourth ranked risk+1*fifth ranked risk)/sum of all weighted crop production risks; Index for livestock risks= sum of livestock production risks (4*first ranked risk+3*second ranked risk+2*third ranked risk+1*fourth ranked risk)/sum of all weighted livestock production risks

Income sources

Major income sources of households in the study areas are presented in Table 5. In both communities, crop production is the most important income source for the households. The second most important income sources for settler community are sale of goats and chicken, whereas for native community it is sale of chickens. Traditional gold mining and goats are the third ranked important sources of income for native community and it is sale of cattle and daily labour for settlers. Gold mining and trade are the least important activities in the settler and native communities, respectively.

3.3 Major Agricultural Risks

Some of major crop and livestock risks reported by the sample respondents in the study areas are presented in Table 6. Agricultural risk is linked with negative outcomes stemming from imperfectly predictable biological, climatic and price variables which include natural adversities, climatic factors out of control of agricultural producers and the adverse changes in both input and output prices (World Bank, 2005). In this regard, unforeseen disease and pest outbreak is the most important risk of crop production for smallholder farmers in both settler and native communities followed by snow. Hail and erratic rainfall are also among the major risks of crop production in the study areas. Rains often cause significant loss when crops are at maturity stage. Thus, for such areas like Benishangul-Gumuz, due attention should be given for the development of late maturing improved seeds to avoid the losses. Other risks such as shortage of rainfall, fire, rust and tempest are important sources of uncertainty for crop producers. This indicates that smallholders producing crops in the study areas face numerous and diverse risks. Livestock loss in the study area often occurs mainly due to disease followed by accident. According to the sample respondents, majority of accidents in livestock especially, in cattle are caused by physical damage by falling in gorges. During group discussion in the PAs, it was noted that ruminant animals are becoming susceptible to diseases and parasites due to insufficient and inappropriate feeds. This is mainly caused by deterioration and shrinkage of grazing lands due to expansion of crop agriculture, changing weather patterns, invasive weeds and dominance of unpalatable grass species.

3.4 Climate change and associated risks

Climate change is a result of greenhouse gas emissions worldwide. Although Ethiopia contributes very limited to greenhouse gas emissions, it is among the vulnerable countries affected by climate change with low adaptive capacity. As indicated in Fig. 3, the onset of rainy season has changed over the last 20 to 30 years in the study area. Smallholder farmers indicated that this change has resulted in erratic rainfall and unpredictable weather conditions. According to Ministry of Water Resources and National Metrological Agency(2007), the causes of vulnerability at country level include: very high dependence on rain-fed agriculture, under-development of water resources, low health service coverage, high population rate, low economic development level, low adaptive capacity, and inadequate road infrastructure in draught prone areas and weak institutions.

3.5 Coping strategies to mitigate risks

Coping strategies of smallholder farmers in the study areas in time of risk is presented in Fig.4. In both communities, sale of livestock is the most important strategy to mitigate risks. This is in agreement with findings of (MOFED, 2010) that in most rural areas of the country low-income smallholder farmers sale their livestock to smooth consumption. Other important informal way of mitigating risks in the study areas include working as daily labourer and reduction of home consumption. Drawing from savings, relying on government aid, borrowing from relatives and migration are other coping mechanisms smallholder farmers used to buffer risks in order of importance. According to Carter (2008), relying on informal ways to mitigate shocks may perpetuate subsistence, hinder farm capital formation, and limit agricultural productivity. However, understanding the mechanisms how smallholder farmers mitigate risks is important as it provides insight into the proper development and application of appropriate insurance products that address their needs and concerns.

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Past time (20-30yrs)	Dry season			Long rainy season							Long	
Current	Long dry season					Long rainy season						

Figure 3.The past and current onset and offset of rainy season in the study areas

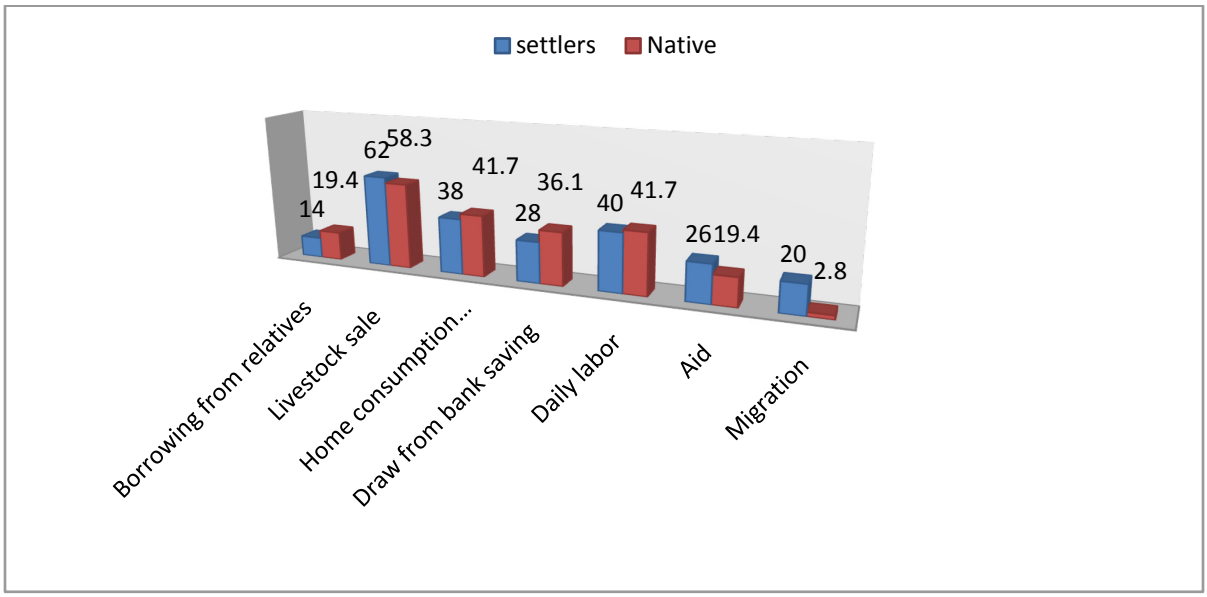

Figure4. Risk coping strategies of settler and native communities in Assosa district.

Table7. Crops and livestock types to be insured in two farming communities of the study area

	Settlers		Native	
Crop	N (Index)	Rank	N (Index)	Rank
Finger millet	39 (0.25)	2	29 (0.10)	4
Teff	44 (0.31)	1	77 (0.27)	2
Maize	40 (0.22)	3	87 (0.31)	1
Sorghum	31 (0.13)	4	50 (0.18)	3
Livestock				
Cattle	48 (0.41)	1	19 (0.34)	2
Goat	45 (0.30)	2	26 (0.41)	1
Sheep	43 (0.18)	3	13 (0.13)	3
Poultry	40 (0.12)	4	17 (0.12)	4

N= number of respondents, Index= sum of important crops/livestock to be insured (4*first ranked+3*second ranked+2*third ranked+1*fourth ranked crop/livestock)/sum of all weighted crops/livestock to be insured

3.6 Demand for micro-insurance and willingness to pay premium

Smallholder farmers in both farming communities in the study area have showed interest for both crop and livestock insurance. Smallholder farmers in settler community reported crops such as teff, finger millet, maize and sorghum to be insured in order of importance. In the same manner, smallholder farmers of native community reported that maize, teff, sorghum and finger millet were crops to be insured in order of importance. Concerning the livestock types to be insured, settler community members give priority for cattle followed by goats, whereas natives prioritize goats followed by cattle (Table7). The type of livestock or crop demanded to be insured is associated to the level of importance of particular livestock species or crop to the livelihood of respective farming community.

In fact it would be difficult to measure the demand and actual willingness and ability of smallholder farmers in the study area to pay for micro-insurance without deep analysis on quantitative estimates of interest in specific products. However, on the basis of quantitative and qualitative information from this study, it can be said that certainly there is strong interest in insurance of agriculture. This study revealed that 77% of participants have a capacity to buy a premium of 1000Birr (50 USD) once in a year.

4. Conclusion and recommendations

Integrated crop-livestock production system is practiced in the study area. Smallholder farmers are

engaged in subsistence agriculture where crop production is traditional and rain-fed with very limited areas under irrigation. The sector is challenged by natural disasters such as unforeseen diseases and pest outbreak of crops, disease and death of livestock, erratic rainfall, flood, snow and wild fire. This indicates that smallholder agriculture, especially crop production in the study areas face numerous and diverse risk. Smallholder farmers cope up these risks by selling productive assets like livestock resources, relying on non-farm income and reduction of household consumption. Thus, provision of micro-insurance service to smallholder farmers can be a better way to avoid crises. In connection with numerous and diverse crop production uncertainties in the study area, multi-peril crop insurance should be used rather than index-based weather insurance. The later insurance type is mainly used in drought-prone areas which is not a major problem in this case. Multi-peril crop insurance, however, does not cover losses resulting from poor farming practices, low commodity prices, theft and specified perils that are excluded in some policies. Consequently, improved crop production techniques should be employed and there should be a systematic way to avoid a moral hazard among the insured. Intensive discussions, awareness creations and monitoring should be done among insured to avoid moral hazards. To reduce risk of livestock losses due to diseases and accidents, it is important to have indemnity based livestock insurance for important livestock species as smallholders showed strong willingness to pay premiums.

Acknowledgments: This study was funded by Promoting Autonomous Adaptation Project of Assosa district.

References

1. Alemayehu, A. and Oosting, S. (2016). Smallholder dairy production in mixed farming systems of southern Ethiopia: Constraints and options for intervention, World Journal of Dairy & Food Sciences:11 (1): 62-79.

2. Amha. W., Peck, D., Berhane, G., Assefa, Y. and Kidanu, B. (2012). Diagnostic study of providing micro-insurance services to low-income households in Ethiopia: an input to national micro-insurance strategy. Addis Ababa; .Report submitted to the federal cooperative agency (FCA) of Ethiopia.

3. Carter, M. (2008). Inducing Innovation: Risk Instruments for Solving the Conundrum of Rural Finance. Keynote paper prepared for the 6th Annual Conference of the AgenceFrançaise de Development and the European Development Network. Paris, France.

4. IFAD (International Fund for Agricultural Development). (2009). Livestock and climate change.

5. Ministry of Water Resources and National Meteorological Agency (NMA). (2007). Climate change national adaptation programme of action (NAPA) of Ethiopia. Addis Ababa: Federal Government of Ethiopia.

6. MOFED (Ministry of Finance and Economic Development). (2010). Ethiopia: Building on Progress A Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/06–2009/10) Volume I: Main Text. Addis Ababa, Ethiopia: Ministry of Finance and Economic Development.

7. World Bank. (2005). Managing Agricultural Production Risk: Innovations in Developing Countries. Washington, DC: World Bank; Report No. 32727-GIB.