

Household Perceptions on Factors Inhibiting the Adoption of Sustainable Coping Strategies in Chipinge District

E.Chifamba¹, J. Francis², B. Kilonzo³ and S. Mago⁴

Abstract: Food insecurity is central to the fight against diseases and poverty in Africa. This explains why some governments, particularly in emerging economies, strive to identify the factors that incapacitate households to produce their own food. However, despite the existence of institutions and policies that support smallholder food production, the efforts have fallen short of expectations. This has generated serious anxiety and scepticism concerning the role of existing institutions and preferred policies. Thus, an exploratory study on the factors affecting the adoption of sustainable coping strategies among rural households was conducted in Chipinge district. Multistage random sampling method was used to select the study area and the respondents. Structured interview schedule and/or questionnaire were the methods employed to collect data from 120 household heads and 5 extension officers. Principal component analysis (PCA) and descriptive statistics were the analytical tools used to examine the constraints affecting the adoption of sustainable coping strategies. The PCA results revealed that the main challenges inhibiting the adoption of sustainable coping measures were labour, public and institutional constraints; religious values and land related problems; inadequate information on early warning system; limited employment opportunities and credit facility constraints; and poor rural farming projects and essential services provision constraints.

Keywords: Factors affecting, food deficit, poverty, coping strategies, Chipinge District

Introduction

Food deficit is the most dominant point of discussion in any debate about the global economic growth since the Millennium Development Decade (Maxwell, 2006; Irohibe & Agwu, 2014; Yenesew, 2015). Wilhemina (2008) postulates that efforts of varying magnitudes have been exerted to discover sustainable methods of guaranteeing that people have access to the least possible amounts of food critical to survive a healthy and active lives. This vision culminated into a number of conferences, such as the African Union Maputo Declaration of 2003, that emphasized on the increase of national spending on food to at least 12% of the state budget by 2015 (Adenyi & Ojo, 2013; Abur, 2014). Adugna & Fikadu (2016) argue that regardless of this intent, food deficit remains an obstinate challenge in the Sub-Saharan Africa region.

¹ Great Zimbabwe University, Department of Rural & Urban Development. Email: echifamba@gzu.ac.zw

² Institute of Rural Development, University of Venda

³ Institute of Rural Development University of Venda

⁴ Great Zimbabwe University, Department of Rural & Urban Development

Makoti & Waswa (2015) posit that the number of malnourished and hungry individuals in the 2000s rose to 140 million and exceeded 185 million in 2017. In explaining continued increase in food deficit in Africa, Birara *et al.* (2015) argue that policies and initiatives were futile in addressing the fundamental coping threat concerns of insufficient diet, starvation and poverty. Inappropriate policies and interventions have opened up markets to the dumping of farming produce (Adenyi & Ojo, 2013; Asmelash, 2014; Cheema & Abbas, 2016), privatized communal and public natural resources (Maxwell, 2006; Adugna & Fikadu, 2016) and concentrated assets among the rich (Cheema & Abbas, 2016). Babatunde *et al.* (2007) corroborate this assertion by positing that adopted coping strategies are ineffective during manifestation of large covariate challenges. Anselm & Amusa (2010) and Andres & Lebailly (2015) argue that without urgent need to identify the factors inhibiting the adoption of viable coping mechanisms, developing economies will continue to import food from developed nations.

Sub-Saharan Africa has the greatest number of underfed people world-wide (Maxwell, 2006; Tshediso, 2013; Altman *et al.*, 2009). The region harvests insufficient food per individual compared to the amount of food harvested a decades ago (Mulugeta, 2002; Bedeke, 2012; Muche *et al.*, 2014). Yenesew (2015) approximates that two in every five kids below the age of three years are underfed and about 38% are malnourished. These statistics reflect the dire food deficit situation within the African continent due to the failure of preferred coping strategies. There is need to understand the challenges affecting the adoption of sustainable coping strategies, in order to address household food deficit.

The determinants of household food deficit in the region are numerous, diverse and composite. The main aspects that contribute to household failure to adopt sustainable coping options include environmental decay (Omonona *et al.*, 2007; Ellis, 2009; Kuwenyi *et al.* 2014), climatic hazards (Maxwell, 2006; Anwar, 2012; Abur, 2014), population growth surpassing farming output (Makoti & Waswa, 2015), uneven macro-economic atmosphere (Isaboke, 2006; Makoti & Waswa, 2015), inconsistent government policies (Muche *et al.*, 2014) and misdirected food security policies (Campbell *et al.*, 1991). Lemma & Wondimagegn, 2014 and Mengistu & Haji (2015) also argue that food security policies and programs are usually superimposed on the poor farmers without their approval. Yet there is consensus that successful programs and projects are usually achieved through integrated and participatory approaches (Maxwell, 2000; 2006). Furthermore, inadequate access to infrastructure (Altman *et al.*, 2009), shortage of food storage amenities (Isaboke, 2006) and low agricultural production (Babatunde *et al.*, 2007) are some of the causes of food deficit. Thus, this current study examined the dynamics hindering the adoption of viable coping mechanisms in order to address food deficit.

Environment, political and socio-economic constraints are the major drivers of food insecurity (Makoti & Waswa, 2015). Rural areas in Zimbabwe are characterized by poverty, persistent drought, rising population growth ratio and ecological decay (ZimVAC, 2016). Nevertheless, a number of studies in the area give more importance to the urban centres. Limited studies hide the major factors inhibiting the adoption of sustainable coping strategies in rural areas. The undertaking of this study at the rural household level is

important because the results give insights to stakeholders concerning the challenges affecting the livelihoods of the rural people.

About 80% of Chipinge's environment is semi-arid (ZimVAC, 2017a), with restricted and unreliable rainfall. ZimVAC (2017a) notes that food security is inevitable due to predictable high herd mortality and harvest failure. ZimVAC (2017b) notes that the land assets such as the vegetation and soils are extremely degraded. This is due to the interaction between ecological and anthropological aspects such as pressure on available natural resources (Mango *et al*, 2014), climate (Dube, 2016), deforestation and the subsequent over-utilization of the land resources (Nyikahadzoi *et al.*, 2012). The study area is more susceptible to food deficit because the economy heavily depends on the farming sector, where environmental hazards are the major determinants of farming productivity.

Despite increasing awareness of the failure of preferred coping strategies, existing literature have focused on the factors deterring farming production rather than those affecting coping strategies. Mombeshora *et al.* (1995) point out that analytical studies that examine factors that inhibit adoption of viable options are at best scanty. The analysis of challenges constraining the success of preferred coping strategies has received limited focus notwithstanding its growing importance for the vulnerable communities. Thus, this study sought to explore the challenges affecting adoption of sustainable coping strategies in Chipinge district in order to identify interventions that assist in addressing the limitations or alleviate the adverse impact of household food deficit.

Material and Methods

Chipinge rural district is located in the south western part of Manicaland province in Zimbabwe and it covers an area of 36,459 square kilometers. The climate is dry and hot for the greater part of the year with an estimated annual average temperature of 25°C. The western part of Chipinge is normally desiccated, particularly the low lying areas of Chipangayi, Chibuwe and the Sabi valley. These areas usually receive very low rainfalls which range between 400mm and 600mm per year. The western part of the district experiences recurrent droughts which regularly result in food deficit and loss of livestock. The rainy season is experienced between November and March (ZimVAC, 2018). In most parts of the study area, soils are sandy, with very low fertility and are subjected to erosion. According to ZimVAC (2018), the population density in Chipinge rural is 32 people per square kilometer. This makes the study area one of the least inhabited areas in the district. Both qualitative and quantitative data were collected in 2018. A sample of 120 households and 10 government and non-governmental agencies was obtained using simple random sampling and purposive sampling respectively. Structured questionnaire and focus group discussions were the major data collection methods used to gather both quantitative and qualitative data.

The study employed both descriptive analysis and Principal Component Analysis (PCA) to analyse data. PCA was used to establish the factors inhibiting the adoption of sustainable coping strategies in the study area. PCA is a method commonly used to extract data from a set of variables. Using PCA, data was reduced

by combining a big number of indicators into limited comparable groups. Each group defined the core aspects of the contributing factors forming the sets. An eigen value was a coefficient attached to eigenvector arranged in sliding order of the eigen value to come up with the principal component in order of importance. Thus, the eigen values measured the covariance of the data. PCA was run on factors inhibiting the adoption of sustainable coping measures in Chipinge district. The PCA extracted five (5) components with eigen values bigger than one (1), explaining a total variance of 51.2 percent. The extracted 5 components explained 11.9%, 11.4%, 10.7%, 9.6% and 7.6% of the total variations as shown in Table 1.

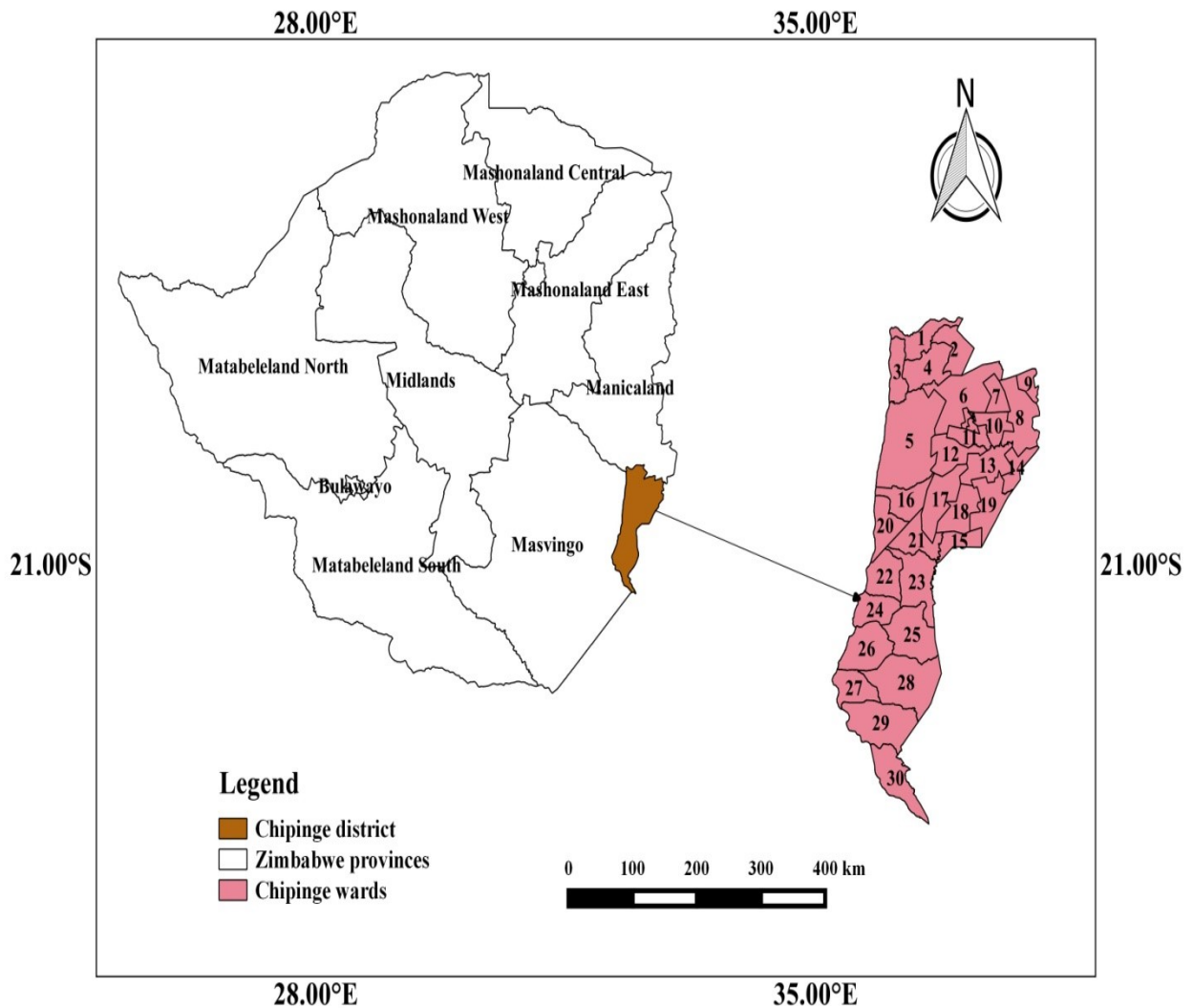


Figure 1: Zimbabwe's provincial map showing the location of Chipinge district

Results

Principal component analysis of constraints affecting adoption of viable coping strategies in Chipinge district

Table 1 below shows the Varimax-rotated principal component analysis of challenges affecting the adoption of sustainable coping strategies in Chipinge district. Five factors were extracted from the findings based on feedback from participants. The Kaiser criterion (1960) was adopted for choosing the total number of principal factors explaining the data. In this current research, the total number was determined by leaving out factors with matching Eigen values which was below 1. Only variable with significant loading of plus or minus 0.345 and above at ten percent overlapping variance were utilised in describing variables and significant at one percent level of probability. The factors that loaded below plus or minus 0.345 were not utilised. The communality shown in table 1 represents the squared multiple relationship between the item and all other items (Ozor *et al.*, 2010). The factors include, Factor one (Institutional, public and labour challenges); Factor two (religious values and land related constraints); Factor three (ICT and exorbitant cost of farming inputs); Factor four (off farm employment opportunities, loan constraint and the distance from the market challenges) and Factor five (ineffective rural farming projects and programmes and socio-economic service delivery challenges)

After rotation, institutional, public and labour challenges (factor one) accounted for 11.9 of the variance, religious values and land related constraints (factor two) accounted for 11.4, ICT and exorbitant cost of farming inputs (Factor three) accounted for 10.7 and off farm employment opportunities, loan constraint and the distance from the market challenges (Factor four) also accounted for 9.6. The fourth factor also accounted for 7.6. In this current study, the factors that were taken explained 48.5 percent of the total variance in all the 22 inhibiting variable components. Table 1 shows the results of the PCA of factors that inhibit the adoption of sustainable coping measures in Chipinge district.

Institutional, public and labour challenges (Factor 1)

The factors integrated inadequate government policies to empower households (0.753), insufficient access to weather forecasting technologies (0.755), absence of institutional facilities (0.654) and insufficient household access to awareness information on climate change adaptation (0.567), lack of household labour (0.486), and state irresponsiveness to climate hazards. The absence of farming information and viable institutions poses serious problems to households in Chipinge district. Interviews revealed that households are not sentient of the new trajectories regarding climate change and the necessary readjustments required in order to address household food insecurity. These findings corroborate Mengistu & Haji (2015) who

discovered that as household access institutional and public amenities, the probability of choosing viable options increases by 0.052 at $p < 10\%$ (holding the value of other variables constant). Furthermore, these findings corroborate Enete *et al.* (2010) who posit that lack of public and institutional amenities to support household coping capacity affect their adaptation ability in Southern Nigeria.

Table 1: Principal Component Analysis of Challenges Affecting Adoption of Sustainable Coping Strategies in Chipinge District

	Challenge affecting sustainable adoption	Components*					Communality
		F 1	F 2	F 3	F4	F5	
1.	Inadequate weather forecasting	0.756					0.644
2.	Absence of government policies	0.753					0.613
3	Absence of supporting institutional amenities	0.655					0.591
4.	High cost inputs			0.669			0.561
5.	Household religious norms		0.591				0.441
6.	Communal land ownership		0.587				0.400
7.	Lack of collateral security		0.401				0.482
8.	Customary belief systems		0.457				0.512
9.	High cost of irrigation facilities			0.488			0.425
10.	Poor early warning systems			0.428			0.461
11.	Subsistence farming		0.769				0.645
12	Land inheritance		0.743				0.644
13.	Distance from the market				0.613		0.548
14.	Participation in off-farm jobs				0.580		0.412
15.	Poor access to farm land		0.791				0.697
16.	Lack of government intervention	0.417					0.285
17.	Lack of farm labour						
18.	Lack of credit facilities				0.467		0.333
19.	Effects of climate change				0.452		0.314
20.	Poor extension amenities					0.746	0.621
21.	Poor farming service delivery					0.774	0.653
22.	Inadequate storage facilities**			0.630	0.405		0.644
	Percentage of total variance	11.9	11.4	10.7	9.6	7.6	

*Factor 1: Institutional, public and labour challenges; Factor 2: Religious values and land related constraints; Factor 3: ICT and exorbitant cost of farming inputs; Factor 4: Off farm employment opportunities, loan constraint and the distance from the market challenges; Factor 5: Ineffective rural farming projects and programmes and socio-economic service delivery challenges.

** Challenges that loaded under more than 1 factor

Religious values and land related constraints (Factor 2)

The variables that loaded high were poor access to land resources (0.783), high cost of farming land (0.791), communal land ownership system (0.743), customary norms and values against adoption of scientific farming methods (0.655), spiritual beliefs of the household head (0.591), lack of deposit requisite to secure credit (0.402). These results agree with Mjonono *et al.* (2009) who also suggest that inadequate land for agricultural activities in rural areas is the major factor inhibiting the adoption of sustainable coping strategies. These findings also confirm Ozor *et al.* (2011) who exposed that high input cost is also a key barrier to the adoption of viable coping options. Furthermore, Bedeke (2012); Irohibe & Agwu (2014) and Adimassu & Kessler (2016) concur that religious values affect the adoption of coping strategies. In a study among the Oromo ethnic group in Ethiopia, Adimassu & Kessler (2016) discovered that food insecurity affected Muslims more than Christian communities due to their strict choice of coping strategies.

Poor information on early warning systems and ineffective communication and technology challenges (Factor 3)

Factors that loaded high included high expenditure on irrigation amenities (0.487), illiteracy of household members (0.487) and inadequate information disseminated on early warning systems (EWS). The finding on EWS agrees with Mengistu & Haji (2015) who posit that as households access EWS, the probability of them selecting viable coping strategies increase by 0.542 at a $p < 1\%$, holding the value of other variables constant. These findings concur with Mengistu & Haji (2015); Makoti & Waswa (2015) and Ahmed *et al.* (2015) who also noted that access to EWS is a major factor that determines adoption of coping strategies. Preceding studies (Ziervogel *et al.*, 2006; Bryana *et al.*, 2009; Hunnes, 2015) reveal that households with better access to information through farming extension workers invest more in devising sustainable strategies for coping with food deficit.

Off-farm employment opportunities, loan constraint and the distance from the market (Factor 4)

Distance to the market (0.613), participation in off-farm employment (petty trading, artisans, civil service (0.580), subsistence food production (0.517), lack of credit facilities (0.451) were the variables that loaded high. These findings corroborate Bedeke (2012); Abur (2014) and Adeniyi & Ojo (2013) who discovered that inadequate rural credit facilities militate against adoption of sustainable coping options. Mengistu & Haji (2015) and Dube (2016) further confirm that limited access to credit facilities and inadequate information on market products are major factors which inhibit the adoption of sustainable coping options. Furthermore, Adimassu & Kessler (2016) reported negative correlation ($p < 0.10$) between access to the market and access to credit. This means that households with access to markets have a better chance of adopting viable coping options. Conway & Schipper (2011) also argue that households closer to the markets are prone to migrate in order to carry out off-farm activities.

Ineffective rural farming programmes and socio-economic service delivery challenges (Factor 5)

The factors that loaded high included poor extension facilities directed to enhance household coping capacity (0.774) and deplorable farming extension delivery systems (0.746). These results agree with Anselm & Amusa (2010); Adenyi & Ojo (2013) and Andres & Lebailly (2015) who suggest that inadequate rural agricultural extension is one of the factors that incapacitate households from adopting viable coping strategies. Furthermore, Mengistu & Haji (2015) discovered that access to rural farming programmes, increases the probability of choosing viable coping strategies by 0.019 at a $p < 5\%$, holding the value of other variable constant. Babatunde *et al.* (2007) and Dube (2016) posit that farmers' access to extension service is one of the determinants of coping in semi-arid regions.

Discussion

This study focused on the factors that influence the adoption of sustainable coping strategies in Chipinge District. The district is extremely susceptible to food deficit due to climate shocks. This has affected the conventional coping measures. Thus, preferred coping measures have been weakened and are ineffective in overcoming the effects of environmental degradation. This current study identified numerous variables that affect adoption of sustainable coping strategies, grouped in five major components. These components included: (1) institutional, public and labour challenges, (2) religious values and land related constraints (3) Poor information on early warning systems and ineffective communication and technology challenges, (4) off-farm employment opportunities, loan constraint and the distance from the market, and (5) Ineffective rural farming programmes and socio-economic service delivery challenges.

Lack of information on climate change and EWS pose severe problems to preferred coping strategies as most households are oblivious of modern developments concerning climate change. Thus, households are ignorant of the essential coping changes required in order to address household food deficit. Absence of coping capacity due to challenges associated to inadequate access to climate forecasts result in staid gaps between households and practical information that should assist them in their agricultural activities (Isaboke, 2006; Kuwenyi *et al.*, 2014). Abur (2014) and Adugna & Fikadu (2016) posit that climate forecasts are required to assist farmers to make viable decisions on selecting a range of coping options. However, lack of early warning information makes it difficult for household to plan and devise viable coping options. Thus, households continue to become more susceptible to the impact of food shortages in Chipinge district. In terms of practical interventions, stakeholders should invest in revamping both the traditional and conventional early warning systems. The revival of indigenous knowledge systems should be led by the local people because they know the local knowledge systems that have worked in the past under prevailing socio-economic and physical conditions.

The results reveal the significance of access to information, which is essential to improve households' knowledge and responsiveness to food deficit. Babatunde *et al.* (2007) and Tshediso (2013) suggest that farming related information can be disseminated through communication media such as newspapers, pamphlets, farmers' magazines and radio platforms. The utilization of agricultural development agents in

supporting households on environmental related issues and identification of viable coping options should be strengthened in the study area. Furthermore, improving communication media (such as cell phone network) and availing information concerning ecological variations and apt coping options is critical in Chipinge district. Asmelash (2014) and Cheema & Abbas (2016) suggest that smallholder and subsistence households are vulnerable to climate changes. Therefore, in terms of interventions, stakeholder efforts are required to build household resilience to a range of ecological stresses and shocks.

Inadequate education and limited extension contacts were the major constraints inhibiting the adoption of sustainable coping strategies in the study area. A number of preceding studies (Maxwell, 2006; Muche *et al.*, 2014; Cheema & Abbas, 2016) suggest that the higher the level of farming contacts with extension amenities and education attained, the higher the probability of using sustainable coping strategies. According to Kuwenyi *et al.* (2014) and Adugna and Fikadu (2016) learning increases the capacity of households to take up farming improvements and therefore, enhance their efficiency and output. Extension services provide informal guidance that assists to release the innate talents and intrinsic innovative traits of household members. Furthermore, education enhances farmers' capacity to appreciate, assess and take up novel farming methods that lead to increased household productivity. Stakeholders should direct efforts towards increasing extension contacts in the study area. This strategy can be implemented through integrating stakeholder efforts and assess the comparative advantage of each member.

Market is the main means of accessing pecuniary assets in Chipinge district. Nevertheless, as a distance increases it affects household participation in the market. This situation compels households to rely on their customary coping practices. As a result, households are exposed to food deficit risks due to inaccessibility of market services. Mengistu & Haji (2015) notes that improving market accessibility plays a considerable role in improving coping strategies and the customary livelihood systems of rural households. Otherwise, without improving the access to the market, rural communities in Chipinge district would be forced to depend on outside interventions.

The findings also reveal that availability of household labour is one of the variables affecting the adoption of sustainable coping strategies in the study area. Most households had limited accessibility to labour due to migration of able bodied members. Ahmed *et al.* (2015) and Dube (2016) posit that households with restricted labour have limited coping and adaptation capacities. Thus, in terms of policy implication, there is urgent need to build up labour sharing institutions in the study area in order to improve households' coping capacities.

The results shows that inadequate training on sustainable farming practice pose a challenge on the adoption of viable coping strategies in the study area. Access to training assists households to model their coping options along the practical path of strategies that have succeeded under conditions prevailing in the

study area. However, rural households in Chipinge district depend on already weakening conventional local knowledge than scientific knowledge. Households in the study area value their indigenous knowledge systems than outside information as a result of its realistic and practical background. Nevertheless, any training provided to rural families should improve their local knowledge systems which will enhance the espousal of new information and training. Therefore, in order to enhance community awareness there is urgent need to examine their local knowledge systems, households' needs and capacity.

Conclusion

The results revealed that challenges affecting adoption of coping strategies are multifaceted and complex. Public, labour and institutional constraints; inadequate land, religious beliefs and neighbourhood norms constraints; exorbitant cost of farming inputs, information and technological challenges; distance from the market, access to information, off-farm and rural credit challenges and ineffective rural projects were identified as major constraints. Increasing household coping capacity, as well as availing extension services easily to the rural communities could enhance food coping strategies in Chipinge district and could be relevant to other districts with comparable context and background. This means that both state and non-state actors should intensify efforts on enhancing technological, institutional and land tenure systems as pillars for guiding the adoption of viable coping measures in Chipinge district. Furthermore, stakeholders should support studies on drought-resistant crop varieties in order to enhance household coping capacity. Furthermore, training and educating household heads on better farming practices and increasing agricultural output on a sustainable basis by ensuring ecological steward are key interventions necessary to ensure the adoption of viable coping strategies. The findings in this current study assist policy makers to make informed decisions that facilitate the adoption of sustainable coping options.

References

- Abur, C. C. 2014. Assessment of food security status among rural farming households in Guma Local Government area of Benue State, Nigeria. *Humanities and Social Studies*, 1(2): 34-42.
- Adenyi, O. R. & Ojo, A. O. 2013. Food security status of rural farming households in two Ayadire and Ayedaade local Government areas of Osun State South West Nigeria. *Food, Agriculture, Nutritional and Development*, 13(5): 8209-8223.
- Adimassu, Z. & Kessler, L. 2016. Farmers' strategy to perceived trends of rainfall and crop productivity in the central rift valley of Ethiopia. *Environmental Development*, 12 (1): 123-140.
- Adugna, E. B. & Fikadu, A. 2016. Vulnerability to food insecurity and household coping strategies. *Rural Development*, 34(4): 529-542.
- Ahmed, U. I., Ying, L. & Bashir, M. K. 2015. Food insecurity and coping strategies by micro growers in Punjab, Pakistan. *Environmental and Agricultural Sciences*, 3: 31-34.
- Altman, M., Hart, T. & Jacobs, P. 2009. Household food security in South Africa. *Agrekon*, 48 (4): 345-361.
- Andres, L. & Lebailly, P. 2015. The coping strategies to fight against the food insecurity in the Republic of Niger, Paper prepared for presentation at the 2nd AIEAA Conference "Between Crisis and Development: which Role for the Bio-Economy", 6-7 June, 2013 Parma, Italy

Anselm, A. E. & Amusa, T. A. 2010. Challenges of agricultural adoption to climate change in Nigeria. A Thesis from the literature. *Action Science Report*, 4(1): 3-12.

Anwar, A. 2012. Role of participatory rural appraisal in community development: A case study of Barani Area Development Project in agriculture, livestock and forestry development in Kohat. *Academic Research in Business and Social Sciences*, 2(8): 25-35.

Asmelash, M. 2014. Rural household food security status and its determinants. The case of Laelaymychew Woreda Central Zone of Tigray, Ethiopia. *Agricultural Extension and Rural Development*, 6(5): 162-167.

Babatunde, R.O., Omotesho, O. A. & Sholotah, O. S. 2007. Factors influencing food security status of rural farming households in North Central Nigeria. *Agricultural Journal*, 2(3):351-357.

Bedeke, S. B, 2012. Food insecurity and coping strategies: A perspective from Kersa District, East Hararghe, Ethiopia. *Food Science and Quality Management*, 5(1): 17-34.

Birara, E., Muche, M. & Tadesse, S. 2015. Assessment of food security situation in Ethiopia. *Agricultural Research*, 9(2): 55-68.

Bryana, E. Derresa, T. T, Gbetbouo, G.A., Ringler, C. u2009. Adaptation to climate change in Ethiopia and South Africa: Options and constraints. *Environmental Science* 12 (1): 17-35.

Campbell, D. J., Zinyama, L. M. & Matiza, T. 1991. Coping with food deficits in rural Zimbabwe: The sequential adoption of indigenous strategies. *Research in Rural Sociology and Development*, 5(1):73-85.

Cheema, A. R. & Abbas, Z. 2016. Determinants of food insecurity in Pakistan: Evidence from PSLM 2010-11. *Applied Economics*, 26(2): 183-213.

Conway, D. & Schipper, E. L. F. 2011. Adaptation to climate change in Africa: Challenges and opportunities identified from Ethiopia: *Global Environmental Change*, 21 (2): 227-237.

Dube, K. (2016). Implications of rural irrigation schemes on household economy. A case of Lower Gweru Irrigation Scheme, Zimbabwe. *Agricultural Extension*, 44(1): 75-90.

Ellis, F. (2009). The determinants of rural livelihood diversification in developing countries. *Agricultural Economics*, 51(2): 289-302.

Enete, A. A., & Amusa, T. A. 2010. Challenges of agricultural adaptation to climate change in Nigeria: A synthesis of literature. *Field Actions Science Reports*, 4, 1–11.

Hunnes, D., 2013. The effects of weather, household assets, and safety-nets programmes on household food security in Ethiopia using rural household panel data. *Regional Environmental Change*, 15 (1): 1095-1104.

Irohibe, I. J. & Agwu, E. A. 2014. Assessment of food security situation in rural areas of Kano State, Nigeria. *Central European Agriculture*, 15(1): 94-107.

Isaboke, H. N. 2006. Explaining the perception of Smallholders towards weather index micro-insurance alongside risks and coping strategies. *Food and Agricultural Economics*, 4 (4):59-77.

Kuwenyi, S., Kabuya, F. I., Masuku, M. B. 2014. Determinants of rural household's food security in Shiselweni Region, Swaziland: Implications for agricultural policy. *Agriculture and Veterinary Science*, 7(11): 44-50.

Lemma, Z. & Wondimagegn, M. 2014. Smallholders' vulnerability to food insecurity and coping strategies: In the face of climate change, East Hararghe, Ethiopia. *Economics and Sustainable Development*, 5(24): 86-100.

Makoti, A. & Waswa, F. 2015. Rural community coping strategies with drought-driven food insecurity in Kwale County, Kenya. *Food Security*, 4(3):3: 87-93.

Mango, N., Zamasiya, B., Makate, C., Nyikahadzoi, K., & Siziba, S. 2014. Factors influencing household food security among smallholder farmers in Mudzi district of Zimbabwe. *Development Southern Africa*, 31(4):625-640.

Maxwell, S. 2000. Measuring food insecurity: The frequency and severity of coping strategies. *Food policy*, 21(33): 291-303.

Maxwell, S. 2006. *Household food security: Concepts, indicators, and measurement*. IFAD and UNICEF, Roma. Mimeo, International Disaster Institute, London, UK.

Mengistu, D., & Haji, J. 2015. Factors affecting the choices of coping strategies for climate extremes. The case of Yabello District, Borona Zone, Oromia Regional State, Ethiopia. *Science Research*, 3(4): 129-136.

Mombeshora, B., Mavedzenge, B., Madhara, M., Chibudu, C., Chikura, S. & Scoones, I. 1995. Coping with risk and uncertainty. ILEIA Newsletter Vol. 11 No. 4 p. 10. [Electronic]. Available: www.metafro.be/leisa/1995/11-4-10.pdf [2010, April 16].

Muche, M., Birara, E. & Tesfalem, B. 2014. Determinants of household food security among South-west Ethiopia rural households. *Food Science and Technology*, 2(7): 93-100.

Mulugeta, T. 2002. Determinants of household food security in Eastern Oromia, Ethiopia: The case of Boke District of Western Hararghe Zone. An M. Sc. Thesis presented to the School of Graduate Studies of Alemaya University, Alemaya. 151p.

Musiyiwa, K., Leal, F., Harris, D & Nyamangara, J. 2012. Implications of climate variability and change for smallholder crop production in different areas of Zimbabwe. *Environmental and Earth Sciences*, 6(8): 394-401,

Nyikahadzoi, K., Siziba, S., Mango, N., Mapfumo, P., Adekunle, A. & Oluwole, B. 2012. Creating food self-reliance among smallholder farmers of eastern Zimbabwe: Exploring the role of integrated agricultural research and development. *Food Security*, 4: 647-656.

Omonona, B. T., Agoi & Adetokunbo. A. G. 2007. An analysis of food security situation among Nigerian Urban Households: Evidence from Lagos State, Nigeria. *Central European Agriculture*, 8(2): 397- 406.

Ozor, N., Madukwe, M. C., Enete, A. A., Amaechina, E. C., Onokola, P., Eboh, E. C., Garforth, C. J. 2010. Barriers to climate change adaptation among farming households of Southern Nigeria. *Journal of Agricultural Extension*, 14 (3): 241-253

Sen, A. 1981. *Poverty and Famines in the World*, 258p, FAO, Rome: Italy.

Tshediso, J. S. 2013. Determinants of food security status of household receiving government grants in Kwakwatsi, South Africa. *Mediterranean Journal of Social Science*, 4(1): 147-153.

Wilhemina, Q. 2008. Food security situation in Northern Ghana: Coping strategies and related constraints. *Agriculture and Research*, 3(5): 334-342.

Yenesew, S. 2015. Causes and coping mechanisms of food insecurity in rural Ethiopia. *Agriculture and Biology*, 6(5): 123-133.

Ziervogel, G., Bhanwani, S. & Downing, T. E. 2006. Adapting to climate variability: Pumpkins, people and pumps. *National Resources Forum*, 30 (1): 294-305.

ZimVAC. 2016. 'Zimbabwe Rural Food Security Assessment, June 2016.' ZimVAC, Report No. 5, Harare.

ZimVAC. 2017a. 'Zimbabwe Rural Food Security Assessment, November 2016.' ZimVAC, Report No. 1, Harare.

ZimVAC. 2017b. 'Zimbabwe rural food security assessment, June 2008.' ZimVAC, Report No. 2, Harare.