



## Full Length Research Article

### RURAL AGRICULTURE, VULNERABILITY CONTEXT AND COPING STRATEGIES OF HOUSEHOLDS IN THE WA EAST DISTRICT

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#### ABSTRACT

There is a growing appreciation of the relationship between livelihood, food security, vulnerability, coping strategies and poverty. This study paper seeks to share light on the linkages between vulnerability and agricultural practices and outcomes as well as the coping strategies based on the perception of households using Wa East as a case study. It was found that the distribution of social services creates preconditions for vulnerability and that the use of traditional farming practices is still predominant. Household adopt problem-focus strategies to cope with the vulnerabilities of their environment. The adoption of sustainable agricultural system and redefinition of components of social contract are imperative at the local level.

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#### INTRODUCTION

In response to meeting basic needs, at the start of the new millennium, the United Nations recognised that many people in developing countries did not have access to most of the basic human needs including food. The Millennium Development Goals (MDGs) were put in place for developing countries to show renowned commitments towards ending global poverty. The progress report of 2013 showed that several of the MDG targets have already been met or are within close reach (United Nations, 2013), yet over 870 million people are chronically hungry (FAO, WFP and IFAD, 2012). To state that all these goals are geared towards needs and aspirations of intended beneficiaries is to restate the obvious and stressing the issue as to their appropriateness. The urgent need to respond to the pressures of meeting the first MDG of reducing extreme poverty and hunger has put a premium on sustainable livelihood and food security. Though the sustainable livelihood offer useful insights (Lu and Lora-Wainwright,

2014; Ramchandani and Karmarkar, 2014), it has a number of limitations (e.g. Tao *et al.*, 2010), yet many development partners have adopted it as a mechanism for implementing their food security projects. The twin concepts of food security and vulnerability are contested subjects with perspectives extending transversely the concern of its definition, chronology, measurement, explanation and normative judgments as well as its epistemological stance. The debate fuelled highly contested viewpoints between the academic disciplines and in the development thinking over the past few decades, giving rise to a food security literature (Reed *et al.*, 2013). Academic commentators and development practitioners point to complex dynamics at the local level that influence the ability of people to access food (Caspi *et al.*, 2012; Chen and Yang, 2014; Gill, 2010; Mahadevan and Suardi, 2013; Kepe and Tessaro, 2014). Our insightful opinions on food insecurity and its causes ever since its rise to prominence in the development theory and practice in the 1970s has gone a long way, yet the root causes like the vulnerability context within which agricultural practices take place are not well explored in research and by the international development community. There is a growing appreciation of the relationship between livelihood, food security, vulnerability and poverty (Reed *et*

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al., 2013; Ziervogel et al., 2006). Most recent researches have been focused on the livelihood conceptual framework and its application in different sectors such as gender (e.g. Kassie et al., 2014; Kiptot et al., 2014), health (e.g. Gill, 2010), land (e.g. Pritchard, 2013; Zhen et al., 2014), climate change (e.g. Shah et al., 2013) and the mechanism of policy intervention in poverty reduction (Glavovic and Boonzaier, 2007; Knutsson and Ostwald, 2006). However, research on the analysis of how the vulnerability context can affect agriculture and the resulting coping strategies in Ghana is still silent. This study seeks to share light on the linkages between vulnerability and agricultural practices and outcomes using Wa East as a case study. It shows the resulting strategies used by households to cope with their vulnerabilities.

## MATERIALS AND METHODS

### Study Area

Wa East District is one of the eleven District Assemblies in the Upper West Region of Ghana. It was carved out of the Wa Municipal Assembly and made an autonomous District Assembly subsequent upon L.I 1746 in July 2004. It is located in the south eastern part of the Upper West Region. Funsu, which is its capital town, is located 115km away from Wa, the regional capital. The district shares boundaries with the Northern Region via the West Mamprusi District to the northwest and the West Gonja District. Within the Upper West region, it shares borders with the Wa West District to the southwest, and the Sissala East District and the Sissala West Districts to the north and northwest respectively. The Wa Municipality and Nadawli District are located to the west and northwest respectively of the study area. It covers a landmass of about 1,078km<sup>2</sup> set between latitudes 9° 55" N and 10° 25"N and longitude 1° 10" W and 2° 5" W.

In 2010 population census, the district had a population of 72,074 (36,396 males and 35,678 females) which is entirely rural (Ghana Statistical Service, 2012). The climate is tropical continental equatorial type, which prevails throughout the northern part of Ghana. Temperatures are high all-year, ranging between 15°C - 45°C. The temperatures are lowest in December/January, whilst the highest occur in March/April. The rainy season in the Wa East District is a single rainfall regime (May-October) compared to the double maxima rainfall pattern experienced in the southern parts of Ghana. The other half of the year is very dry when the district comes under the influence of the Dry North-East Trades Winds which is popularly called the Harmattan. The Harmattan is characterized by cold, dry and dusty weather during the night becoming hot and very dry during the day occurring between November and April each year.

### Methods

An experience gained through a desk study as well as the reconnaissance surveys were used to detail out the design of the field instruments for the study data. Basically, mixed methods of data collection were employed in the conduction of the research. These comprise of institutional survey and household survey with researcher's effective personal observation as an integral part of each. Both primary and secondary data were collected from institutions whose

operations have or are of geographical and thematic relevance to the socio-economic development of the communities in the district. For households' survey, an estimated sample size of 600 households constituting almost 6% of the sampling frame is used for the study. A proportionally representative sample was chosen in all the established 84 project communities in the district. In each community, 6% of the households living there were covered by the survey. For convenience, the heads of households in the communities who were available as at the time of the visit of the research team were covered in the survey. As much as possible, a purposive effort was made to allocate 45% of the sample to women on grounds of gender sensitivity. In all, 596 questionnaires were successfully completed and constituted the input into the process of analysis. In the district, household were asked questions which acknowledge households' food quality, number of meals and food situations. Each of the questions has four options as for the answer thus (Never-1, Rarely-2, From time to time-3 and Often-4) indicating the measure of the extent of the severity of the situation. As the questions are stated in a positive manner, negative responds indicates how worse the situation is and the vice visa.

**Table 1. Sample responses to questions on coping strategies**

Household	Question				Number of Strategies	Weighted score
	Q1	Q2	Q3	Q4		
1	2	1	3	2	3	8
2	3	2	4	4	4	13

From table 1, number of strategies used by households includes all options except option (1.Never). Household 1 has three strategies it copes with while household 2 has four strategies. The larger the number of strategies, the more food secured the household is and the lesser the number the more food insecure the household is. The second way is by assigning weights of one (1) to four (4) for the various options (1.Never, 2.Rarely, 3.From time to time and 4.Often); the weighted sums of the various strategies can be obtained by adding the various ascribed weights to the options. For instance household one gets a score of eight (8) and this is obtained by adding (2+1+3+2). To understand the existing location and distribution of settlements and functions, the scalogram technique was employed. By this, the settlements were ranked based on the population, and the variety and quality of services they offer. The various functions are scored and weighted according to the level and the total constitutes the centrality index of the respective centres based upon which the hierarchy is drawn.

## RESULTS

### Household Vulnerability Context

#### *Availability of services and facilities*

The pattern of distribution of the population and service functions in the district is lopsided and dispersed. The major settlements are concentrated at the south-eastern part of the district and close to Wa Municipality. The distribution of services and facilities in the district are inadequate and but nevertheless skewed in favour of the capital, Funsu and the major settlements in the district namely, Baayiri, Kundugu, Loggu, Bulenga, and Goripie.

Table 2. Scalogram showing the distribution of functions in Wa East District

Facilities/ services		Nursery	Prim.	JSS	Health Centre	TBA	Post Office	Telephone	Credit Union	Agric Ext. Service	Agric Ext. Service	Borehole	KVIP (Public)	Trunk road	Feeder road	Fuel point	Area council	DA Adm.	Police Station	Weekly Mkt	Total No.of services	Total centrality	% of Total centrality	Order of Settlement	
Weight		1	2	3	3	1	1	1	1	2	1	1	1	2	1	1	1	2	1	1					
Settlement	Pop.																								
Funsi	5,787																					19	873.7	33.5	4
Duccie	5,011																					11	133.7	5.1	5
Baayiri	4,475																					8	85.1	3.3	5
Kundugu	4,175																					12	173.7	6.7	5
Goripie	4,107																					9	124.7	4.8	5
Tanina	3,650																					9	99	3.8	5
Kulpong	2,996																					9	135.8	5.2	5
Buffiama	2,801																					8	72.2	2.8	5
Bulenga	2,620																					13	259.4	10	5
Chawli	2,435																					4	22.7	0.9	5
Loggu	2,435																					9	103.9	4	5
Tinneabe	2,371																					5	28.6	1.1	5
Sawobe	2,331																					4	22.7	0.9	5
Manwe	2,174																					6	48.6	1.9	5
Obuasi	1,827																					4	33.2	1.8	5
Bunaa	1,755																					6	48.6	1.9	5
Balia	1630																					3	13.2	0.5	5
Sombisi	1,576																					6	48.6	1.9	5
Kataa	1,561																					8	80.4	3.1	5
Kpalsaga	1,510																					5	42.7	1.6	5
JatooYim																						3	13.2	0.5	5
Yaala	1222																					8	74.4	2.9	5
Gudayiri	1214																					6	50.8	1.9	5
Duu																						3	17.9	0.7	5
Frequency		9	21	15	9	24	1	1	1	5	24	17	1	8	21	8	2	1	2	7	177		100		
Centrality		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
WCI		11.1	9.5	20	22.2	4.2	100	100	100	40	4.2	5.9	100	25	4.8	12.5	50	200	50	14.3	<b>TOTAL: 2606.8</b>				

This spatial imbalance and concentration of population in the case of Funsu could be explained by the initial investments in infrastructure that have undertaken place during the proclamation of the district. Table 2 shows the availability of services and facilities in the district. From the scalogram analysis in table 2, the district has only two levels, 4<sup>th</sup> Order and 5<sup>th</sup> Order settlements. The district is made up of small settlements scattered all over the landscape. The facilities in the district are not only inadequate but also inequitably distributed showing the vulnerability of some communities over others. Funsu, the District capital, is the only settlement within the 4<sup>th</sup> Order while the rest of the settlements are in the 5<sup>th</sup> Order category. There were no second and third order settlements based on the population and services provided.

Although the impact of the existing spatial system is not very clear, there is the tendency for a substantial number of the people who are scattered in other parts of the district to be gradually drawn towards the centres which are better endowed with service functions if nothing is done to improve to improve the existing situation. The lack of certain services in some communities indicates the level of vulnerability and exposure to hazards, as Wilson (2012) conceptualised vulnerability as a place-bounded rural phenomenon in terms of the lack of social, economic and environmental capital. For instance 43.1% of households with children at school going age (6-12years) have physical access to basic education. Similarly, 51.1% of households have physical accessibility to health services. As the district is an agrarian society, access to agriculture extension service is of importance to agricultural outcomes. However, due to the spatial imbalance and general inadequacies, only 43.5% of farmers have access to agriculture extension services implying the vulnerability of farmers in terms of agriculture. In the district, the extension officer-farmer ratio is 1:2500 against the national figure of 1:1200. The status of these indicators in the district measures the vulnerability situation.

### ***Climate change and its effects***

While as much as 91.9% of the respondents attest to a significant climatic change over the last five years, 8.1% has not observed any changes within the same period. Of those who observe the changes, 17% and 19.9 % view it in terms of drought and floods respectively. Others observe it in terms of storms (8.2%) high temperatures (1.3%) and erratic rainfall (5.4%). The majority (42.1%) observe the change in terms of a combination of drought, floods, erratic rains and high temperatures. The changes in climatic conditions in the area influences the livelihood situation of the people since majority depend on agriculture affirming Eriksen and Watson (2009) postulation that climate change directly affect livelihood sustainability. The effects of climatic change are quite pronounced that 232 (39 %) of respondents complained about its side effects. These include food shortage (34.4%), water shortage (7.4%), heavy storms (3.9%) and houses having collapsed (7.2%). Those who reported the combination of all these negative effects constituted 47.1% hence, indicating their level of vulnerability to the effects of climate change. From the perspective of households, adapting to the effect of climatic change takes the form of resettlement in new communities, digging of wells and cultivation of resistant crops. These strategies are noted to be some of the effective mechanisms toward climate change adaptation (Burney et al.,

2010). Planting of resistant crops is the most widely adopted coping strategy by 56.1% of households while digging of wells is adopted by 15.1%. Some 7.1% of households resettled in different communities as a means of coping with the situation. Those who implemented all the preceding mentioned coping strategies represented 21.8%.

### ***Economic Trends and household Livelihood***

A number of factors influence the economic trends of the people in terms of their livelihood. Some of these include inflation, high rates of taxes and falling market prices for farm produce. Households that had their members being affected by these trends formed 56.9% as compared to 43.1% who found no relationship with these economic trends as far as the livelihood of their members is concerned. While inflation was identified as the dominant economic trend having effects on the livelihood by 50.3% of the people, falling market prices for farm produce also affected 32.3%. Those people who were of the view that the combination of all the economic trends inclusive of high taxation constitute 17.4%. These trends reduce the purchasing power of household to buy goods and invest in modern agriculture. For instance the District Agriculture Development Unit (2013) noted that the price of a bag of sulphate fertilizer doubled within 2012 thereby affecting farmers' ability to buy and apply fertilizer. Households are therefore vulnerable to these trends of economic shocks. The specific effects of the economic trends were expressed in terms of party politics, ethnic, land and chieftaincy conflicts among others. Of all these, conflicts of land ranks high as 42% of respondents believe that one of the major effects is the prevailing economic trends. Party politics and ethnic conflicts represented by 19.8% and 12.2% of the respondents respectively cannot be sidelined as contributory effects of the prevailing economic trend.

### ***Current Monthly Income and Expenditure of Households***

From the survey majority earn their incomes through the sale of crops and animals. The mean monthly income of the respondents was GH¢ 24.3 (US\$ 8). According to Ghana Living Standards Survey Round 5, average monthly income of Ghana is GH¢101.4 (US\$ 37) while that of Upper West Region is GH¢50.5 (US\$ 17). The district figure is far below the regional and national figures. That notwithstanding as much as, 58.9% even earn less than GH¢20.00 (US\$ 6.6) per month. This clearly indicates vulnerability of the people in the district in terms of their income coupled with large household size of 15 persons. Their food and general consumption needs as well as their livelihood security are also at risk. Out of those who earn less than GH¢20.00 (US\$ 6.6), 63% are males and 37% are females, hence males are more vulnerable than females in terms of income and expenditure. The lower economic status reduces their purchasing power for food and ability to adopt modern agricultural practices. It should however be noted that, majority of households practice non-monetary livelihood strategies and as such significant amount of income source are not accounting. Lack of income does not necessary leads to vulnerability but creates preconditions for it.

### ***Agriculture context***

Wa East District is predominantly a peasant and labour intensive agricultural economy. The study showed that 86.8 %

of the household have agricultural land of which 55.2 % were males while 44.8 % constitute female. About 67% of farmers rely on animal drawn implements while 33% of farmers use labour-intensive methods of the hoe and cutlass. In the pursuit of their livelihood activities, in addition to crop cultivation, households rear animals and poultry for both marketing and consumption. Access to land is very critical to sustainable livelihood because farming is the main occupation of majority of households in the district. There are 84.3% of households which use land for farming as freeholders thereby making them perpetual owners of the land for agriculture and any other purposes. However, the gender specifications show that out of those who have their own land, 66.7% are males and 33.3% are females. Female's low access to land has been one of the major factors of vulnerability and exclusion in most part of the district. This assertion confirms Holden et al., (2006) debate that women are most vulnerable in terms of land rights.

The size of land for agricultural purposes varies considerably from household to household. The average agricultural land owned by 86.8 % of the households is 2.6 acres. This means that when households are empowered through farm inputs and implements, they can cultivate their land to earn considerable income for proper standard of living. Table 3 shows capacity and suitability of the district for agricultural production in terms of land size availability. Ideally, as a matter of prospect, the area under inland waters could be improved into irrigation farming with modern schemes as a response to food shortages during the dry season. Similarly, 75% of agricultural land is still not being used. The inability to make use of these prospects is as a result of the economic and environmental vulnerability context of households.

**Table 3. Suitability of Agricultural Production**

Item	Land Size	Percentage
Total land area	1078 sq.km.	100
Agricultural land area	75,600 ha	70
Area under cultivation	18,900 ha	25*
Area under Inland Waters	1078 ha	1
Forest and Game	31,112 ha	29
Area under irrigation	Not available	Not available

Source: District Agriculture Development Unit (DADU), 2013

\*Note that area under cultivation is part of agricultural land area, hence 25% of that is used for cultivation.

The district currently practice semi-mechanised system of farming which involves agronomic farming techniques, row planting, use of farm yard manure, agro-chemical application, tractor ploughing etc. However the commonest practice which is still prevalent in the district is the traditional methods of farming. The district's current practice of farming therefore lies between the traditional practice and the mechanised/modern farming. The details comprising the activities under the traditional and improved methods of farming currently used by households are been set out in table 4. According to MoFA/DADU (2013), 90% of households in the district practice the traditional methods of farming, 7% of the households practice semi mechanised system which is hybrid of the traditional practices and modern practices, and only 3% practice the modern system of farming, indicating their level of vulnerability since traditional farming systems are associated with lower yields. These findings contradict Williams et al., (2007) assertion that modern farming systems

are increasingly adopted to meet current climatic conditions. In order to expand production, the use of labour is inevitable more especially in rural settings. The sources of farm labour show that 54.7% use casual labour, 45.3% indicated non-use of any form of casual workers. Labour utilisation range from hiring, family and communal labour. The survey revealed that people who use casual labour, 24% use hired labour, 41.6% resorted to family labour whilst 12.6% used communal labour. The average production cost per acre for various crops vary with respect to the combination of the choice of inputs and method of farming practices. The implication is that most of the households in the district cannot afford the cost of the inputs for use on their farms against the background of the average monthly income of the target households that is estimated to be GH¢24.3 (US\$ 8). For instance, fertilizer (NPK), bullock ploughing and tractor ploughing are higher than the estimated monthly income of the target households and therefore cannot be purchased by most households. The cost input mixture per acre includes; seeds, bullock plough, fertilizer, hoe, cutlass, and casual labour since they are the commonest practices in the district. The average investment per acre using modern method is GH¢140 (US\$ 47), which further aggravates the vulnerability of majority of the households who cannot afford the cost of the average investment per acre as average monthly income is approximately US\$ 8.

### Agricultural Yields

Output levels of crops production is determined by various factors such as farming practices, soil fertility, climate and application of fertilizers. According to DADU (2013), the yield per hectare of maize in the district is 4.13 metric tonnes which is greater than the regional value of 6.78 metric tonnes per acre. Also, soya bean yield in the district is indicated to be 4.16 metric tonnes per acre as against the regional figure of 3.12 attesting to fact that the district is one of the major districts in the region growing soya bean. Table 5 shows the yield of some of the crops cultivated in the district. The difference between the districts production level and the region is partly due to the soil fertility context (DADU, 2013) and making the district part of an agriculture corridor of Ghana could improve national food security.

Food and livelihood insecurity is endemic because the food production has for the past couple of years not been enough resulting in shortages relative to needs. The people rely on rain-fed agriculture, a situation that is becoming precarious in the face of the adverse effects of weather and therefore climatic change. Extended periods of droughts followed by heavy rains have been experienced with consequences of flooding and soil erosion, representing higher levels of vulnerability of households. This confirms Dercon, (2004) and Carter et al., (2007) assertions that climatic shocks such as droughts, floods, and soil erosion not only lead to loss of life, but also long-term loss of livelihoods through loss of productive assets, impaired health and destroyed infrastructure. There has been a decline in soil fertility due to demographic pressure and nature of traditional agricultural practices maintained by the people hitherto. Following periods have been shortened and crop rotation more or less abandoned through the use of shifting cultivation.

**Table 4. Current Agricultural Practices by Households**

Activity	Traditional Practice	Modern Practice
Site selection	Over cropped land	Fallowed land
	Easy animal access	Not easily accessed by animals
	Not much care for topography	Level ground
Land preparation	Compound farming	Distance farming
	Burning	Slashing and application of herbicides (glyphosate)
	Ploughing along slopes (prone to soil erosion)	Ploughing across slope
Seed selection	Manual breaking of soil blocks	Harrowing to break soil blocks
	Own seeds	Improved seeds purchased
	Slow growth	Grows faster
	Low yield	Yield is large
Planting	Disease prone	Disease resistant
	Drought sensitive	Drought resistant
	Random planting	Row planting (80cm b/n & 40cm w/n row)
	Many seeds per hole	Two seeds per hole
Fertilizer application	Plants compete for nutrients	Plants get enough nutrients
	No fertilizer application	2 bags of NPK & 1 bag of sulphate/acre
	Thin plants	Thick plants
Weed control	Pale leaves	Dark green leaves
	Manual weeding	Application of herbicides (Lasso-atrazine)
	Weedy field	Field without weeds
Pest control	No pest control	Application of insecticides (orthene and Rimon)
	Presence of stem borers	5% infested with stem borers
	Streak virus infection	Infested plants uprooted & buried
Yield	6 bags per acre for maize	15 bags per acre for maize
	4 bags per acre for soya beans	10 bags per acre for soya beans

**Table 5. Selected Estimated Crop Yield in Metric Tonnes**

Crop	2013		
	Area (Acres)	Yield (MT/Acre)	Total Yield (MT)
Maize	20,945	4.13	13,824
Soya beans	20,900	3.50	11,704
Cowpea	4,267	2.50	1707
Yam	7,450	30.00	35,760
Groundnut	27,705	3.75	16,623

### Food security and coping strategies context

#### Indices of Household Coping Strategy Analysis

The ability of households to adapt to present or future threats of food shortage and diversity of meals and nutritional levels is a major indicator and outcome for determining household food security. This affirms Barrett et al., (2001) assertion that households employ different off-farm adaptation practices to cope with production and consumption shortfalls through diversification. Households use various ways and means to sustain their livelihood in terms of food consumption. Various households can have different combination of options by responding to the questions in table 6. The kind of coping mechanisms used by various households can be grouped into three as shown in table 6.

**Table 6. Coping Mechanisms**

Question	Food Security Components	
Q1	Reduce the number of meals served	Food availability
Q2	Dietary Diversity –plant protein,	Food access
Q3	animal protein and carbohydrates	
Q4	Reduce the portion/ sizes of meals	Food utilization

From table 7, it can be deduced that households in the district are unable to feed themselves year round since majority use various mechanisms to cope with. However, alternative means of improving their livelihood year round is through the sales of livestock, family remittances, reduction in food intake,

consumption of less preferred foods and seasonal migration.

From table 7, households with weighted score of coping strategies ranging 13-15 are in the first hierarchy hence they are food secured. The higher the weights the more food secured the household is and the vice visa. In the district, 5% of the households are highly food secured and 7% are totally food insecure. In cumulative terms a total of 49% were food secured whilst 44% of the respondent households were in a state of vulnerability since they were lying on the margin of crossing into a state of food security or insecurity. Seven percent were found to be in a state of insecurity hence by implication, general access all year-round is not assured in the district. With regards to food shortages, table 8 shows the various coping strategies used by households to solve food insecurity situation.

**Table 7. Hierarchy of Household indices coping strategies**

Hierarchy	Description	Range of Score	No. of Households	Percent (%)
1 <sup>st</sup>	Highly secure	13 – 15	29	5
2 <sup>nd</sup>	Secure	10 – 12	265	44
3 <sup>rd</sup>	Marginally secure/insecure	7 – 9	264	44
4 <sup>th</sup>	Insecure	4 – 6	38	7
Total			596	100

**Table 8. Coping Strategies during Food Shortages**

Coping strategy	Percentage (%)
Reduce number of meals taken in a day	70.5
Hire out family labour	7.6
Depend on remittances from relatives	3.7
Depend on neighbours for some meal	3.1
Credit food	10.6
Skipping meals	4.5

With reference to table 8, 70.5% reduce the number of meals taken per day by households during food shortage, 4.5% skip meals in order to cope with the situation while 10.6% depend on credited foods from neighbours. Food insecurity in the

district happens often during the lean/hunger season thus between December to March each year. During this period, off-season activities such as handicrafts, petty trading and surface gold mining are used as means of livelihood. According to DADU (2013), dietary patterns and habits of households indicates that carbohydrate intake is always high in order to sustain themselves, communal/group eating is common (men, women and children according to age groupings) and an average of two meals per day by individuals.

## DISCUSSION

### Need to rethink the distribution of social services

By virtue of some households' location, they are deprived of certain basic social services like education, health and sanitation. Maxwell *et al.*, (2012) found that in South Sudan, lack of access to social services created a precondition for conflicts and vulnerability. The situation is not different in the district as the human capital is compromised by acute access to basic social services. Social service delivery should be seen as a practical contributor to peace and secured livelihood (Pantuliano *et al.*, 2008). For instance, access to reproductive health services could lead to improvement in the economic livelihood of women (Canning and Schultz, 2012; Gillespie *et al.*, 2007; Channon *et al.*, 2010). However, the geographic imbalance in the distribution of such social services is a challenge to the livelihood of households in areas without these services and facilities. Inaccessibility to social service is the underlying root cause of poor economic livelihood, food insecurity and poverty of women (Ravindran, 2014). In the district, access to social service is a key contributory factor to enhancing the capability of households to overcome their vulnerabilities and poverty circumstances. Sen (1997) argues that capabilities enhance people's ability to be agents of change. It is therefore imperative to rethink the methods of service distribution in the district by moving away for geographic concentration (growth poles) concept to using the needs approach.

### Sustainable agriculture is an option

It is observed from the case study that agricultural yield with modern farming is greater than the use of traditional methods, yet majority of households practice the traditional methods. A dichotomy is created between concerns of food security and environment sustainability using either modern or traditional methods. For instance traditional cattle farming is accounting for 18% of greenhouse gas emission rather than the combined effects of global transportation emissions on environment (Steinfeld *et al.*, 2006). Similarly, modern methods like the use of fertilizer and pesticides are also noted to be unsustainable. If sustainability is viewed in terms of practice, then household in Wa East should apply traditional methods of farming, on the contrary if it is viewed as a goal, then farming should focus on the outcome. The alternative option is going for sustainable agriculture which is self-reliance, minimize fertilizer and pesticide use, multifunctional and integrative (Pretty and Hine, 2001). It will enable farmers to improve local production and lower cost using the appropriate technology that suit their context. A study by Badgley *et al.*, (2007) found that using organic methods could produce food to sustain the current and

future populations as well. Similarly, Pretty *et al.*, (2006) found that in 286 projects reviewed, sustainable agriculture increased production by 79%. The utopian promises of modernised agriculture in Ghana's national development agenda compels the state to redefined the components and content of its social contract as a response to sustainability as both a practice and a goal. This includes scaling up extension service, institutionalising sustainable framing schemes and financing mechanisms.

### Imperative to use problem-focus coping strategies

From the case study, there exist several coping strategies that are responses to immediate household problems and circumstances. Carver and Connor-Smith, (2010) argued that hundreds of coping mechanisms exist though they are not classified under broad categories. However, Taylor, (2006) noted that a combination of these strategies are usually employed but using problem-focus strategies could best suit the needs of households. In the district, the strategies employed are immediate responses to the problems of food insecurity and they are directly related to the needs of the households. On the contrary, some proponents argue that it is more appropriate to start with an analysis of strengths rather than needs (Rakodi and Lloyd-Jones, 2002). From this perspective, coping should be a positive anticipation to problems which indicates proactive responses (Brannon and Feist, 2009). Putting the vulnerability context of the district in terms of spatial imbalance of access to social services and climate change effects comprises households' ability to act proactively towards food insecurity. Also the future consequences of proactive strategies on other aspects of livelihood are still unknown and may be costly. It is therefore pragmatic for households to use problem-focus strategies as they respond to immediate household needs. The current problem-focus strategies are less expensive for households. The problem-focus also improves social capital through remittance and borrowing as coping strategies.

### Conclusion

The research suggests that vulnerability context in terms of economic status and climate change creates a precondition for traditional agricultural practices. The effects are observed in terms of household ability to adopt and implement modern agricultural practices. The resulting effects are reduced yield and subsequently food shortages and food insecurity. Low economic statuses of household, geographic imbalance in the distribution of social service and the seasonality of economic trends have also created the necessary prerequisites for household vulnerability. In response to these predicaments, households adopt problem-focus strategies to cope with the vagaries of the weather and low income. Development partners and the district should adopt the needs approach to distributing social services and under circumstances when services are concentrated in specific settlement, transportation infrastructure should be made available. The idea that both traditional and modern farming methods have adverse effects on environment brings an ethical powerful argument in favour of sustainable agriculture system. It is therefore imperative for the district to institutionalise sustainable agriculture system including irrigation schemes for the current and over 75% of agricultural land yet to be developed. The district could

become food secured if the social contract between the people and the local government is redefined as a response to meeting basic human needs both reactively and proactively. This will automatically confer up-scaling of agriculture obligations on local government to ensure food security and distribution of social services. Further quantitative analysis is required to establish the degree of association between vulnerability context and agriculture.

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