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SMALLHOLDER WOMEN OFF-FARM ADAPTATION STRATEGIES TO CLIMATE VARIABILITY IN RURAL SAVANNAH, GHANA

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Abstract

Climate variability (CCV) presents an additional challenge to the agricultural sector and society's livelihood due to its persistent low rainfall and high temperatures. Particularly to face the brunt of climate variability are women smallholder farmers who depend on agricultural production and have limited natural resources to enable them respond to the changing climate. The aim of the study was to investigate smallholder women farmers' off-farm adaptation strategies to climate variability in the Wa West district in the Upper West region. The study adopted a case study designed method with a population of 187 smallholder farmers. Purposive and multi-stage probability sampling were used to select the communities and women respondents for the study. Questionnaires and interviews were used and data collected was analyzed descriptively using Statistical Package for Social Science (SPSS). The results of the study indicated that, smallholder women farmers have adopted mixed off-farm adaptation strategies to climate variability. The study recommends a comprehensive and an integrated adaptation program for the agricultural sector with special focus on smallholder women farmers to include education and training of women on diseases and pest control and prevention, access to credit and value chain development for agro-processing business, and access to climate variability information.

Key Words: Climate Variability; Off-farm Adaptation; Women Farmers; Rural Savannah; Ghana



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1.0 Introduction

Today, sustainable development is a must to benefit current generation without bankrupting the generations to come. However, one of the many threats to achieving sustainable development especially in developing countries is climate variability. The change in climatic conditions across the globe has become a major concern to policy makers, citizens groups, local authorities, and the private sector (Dampney and Essel, 2014). This is because, today, climate variability dictates to society and individuals what to consume. Particularly to face the ramifications of climate variability impacts and risks are smallholder women farmers due to low adaptive capacity and limited adaptation resources. Nellemann et al. (2011) study among women agriculturalists in Asia, reported that women on daily basis face the challenge of harsh climate and environmental conditions particularly cyclones, drought, flood and sea level rise. In Ghana, the impact of climate variability on women and men are differently observed due to gender-specific roles, concerns and needs (Essandoh-Yeddu, 2014; Dampney and Essel, 2014). Critical now is investigating into smallholder women farmers' adaptation strategies to climate variability so as to come out with gendered adaptation practices to ameliorate the disproportionately high burden of the adverse effects of climate variability that women bear.

Rural women contribution to household food security is well noted worldwide. United Nation Development Programme (2011) reported that smallholder women are responsible for half of the world's food production and produce between 60-80% of the food in most developing countries. In Ghana, SEND-GHANA (2014 P.6), reported that, "women are the key players in Ghana's agriculture, constituting over half the agricultural labour force and producing 70% of the country's food stock. However, women effort to contributing to household food security is thwarted partly by climate variability.

The yearly variation of the climate system is not more a hidden story; neither is it poorly understood by farmers. Studies in Nigeria (Abuloye and Moruff (2016) and Ghana (Essandoh-Yeddu, 2014) reported that, women farmers have perceived that the global climate is changing and attributed such changes to rampant occurrence of flood, drought, storms, deficit and excessive rainfall and excessive temperatures which are indices of extremes weather. This is in line with the historical climate data across the globe that over the past decades, temperatures have risen of about 1°C, reduction in mean annual rainfall and sea level rise of about 2.1mm (IPCC, 2009; World Bank, 2010). This places serious threat to the on-farm activities engaged by farmers all these years (Brody et al. 2008). Principal in responding to the annual variation of the climate system towards achieving the sustainable development is adaptation with emphasis on off-farm



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adaptation strategies to fight climate variability. Off-farm adaptation strategies to climate variability in this paper refers to livelihood activities engaged by women farmers aside food crops productions in response to or cope with or adapt to climate variability when they occur. Several studies have reported on the economics of off-farm adaptation strategies and its role in facilitating sustainable development (Niang et al., 2014; Badjeck et al., 2010. Constable (2015) study in Jamaica on the gender dimension of climate change reported that, off-farm adaptation strategies have helped women farmers improve upon their household food security and income. In Burkina Faso, Gonzalez et al. (2011) reported that, women farmers have adapted to petty business, agro-processing and livestock keeping as off-farm adaptation measures to supplement household income. In Ghana, though not specifically on assessing off-farm adaptation of farmers, Environmental Protection Agency (2008) under the Netherlands Climate Change Adaptation Programs (NCCAP) found that women smallholder farmers have engaged in some traditional off-farm coping strategies to climate variability.

In the Wa West district, climate variability and its extreme events such as drought, flooding, and wildfire has been found to be rising in recent times (Dayour et al., 2014). Food crop production which is climate-dependent of all human activities is highly vulnerable to climate variability. Literature has found male farmers to possess power and ability to respond to climate-induced shocks and disasters and adapt to environmental changes and imbalance either by way of adaptation, mitigation or migration better than their female counterparts (Abuloye and Moruff, 2016). The motivation for the paper sets in here to fill the gap of how smallholder women farmers who are noted as victims of climate variability are responding to the situation with emphasis on off-farm adaptation. Again, in situations where attempts have been made to establish the nexus; there still remains a gap of the actual direction of the climate variability drivers and impacts; so as to position the effective approaches of fashioning adaptation measures to this socioeconomic scourge in the district. Off-farm adaptation is seen as a critical tool of promoting women wellbeing and development in the context of climate variability. Due to the district exposure to climate variability and long term climate change impacts and ramifications, this study is worth pursuing to examine women off-farm adaptation strategies, their relative importance to climate variability, and the constraints they face in successful adaptation to climate variability.

2.0 Review of related literature

This section performs the literature synthesis of the existing body of knowledge within which our study resides and expects to contribute to. We argue from the systematic review that climate variability and climate change has gendered dimension, little largely overlooked in the development literature. In this section, we explore theoretical and empirical trajectories of the



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ramifications of the nexus between climate change and smallholder women farmers adaptation strategies, using the deductive reasoning from the a global to a local scale.

2.1 Women in Agriculture

Women role in agricultural development in Africa is widely recognized (IFAD, 2011). Based on few countries statistics, Ogunlela and Mukhtar (2009) reported succinctly that women serve as the main food producers in subsistence agriculture in Africa than their men folks. They indicated that, observation made from the Heluo State community in Kenya, revealed that, percentage of work done by women far outweighs those of men. Similarly in Ghana, they observed that, small farm plots managed by women provide about 80% of total food in the country, while in Tanzania and Zambian women who live in rural areas produced 87% and 80% respectively of labour for household crops production. In a report published by World Bank and IFAD (2008) revealed that at least, half of the total labor inputs in agriculture are contributed by women as more men now seek alternative income generating activities in non-farm activities.

In terms of total time use in agricultural activities, IFAD (2011) reported that, women spent longer hours and time on all agricultural activities than their men counterparts. For instance, estimates of time contribution of women to agricultural activities ranges from 30% from The Gambia to 60-80% in different part of Africa including Ghana (IFAD, 2011). FAO (2012) also reports that 65 percent of males spend close to 10 hours per week on domestic activities, 89 percent of females spend 10 hours or more per week and about 20 percent of females allocate more than 60 hours per week to domestic activities such food preparation, feeding the poultry and livestock, collection of water and fuel wood, cleaning up the children, and general tidying up of the home. This goes to strengthen the argument that women farmers play multiple role ever than men do to promote the growth and development of the rural economy in developing and Sub-Saharan countries.

Table 1: Proportion of women in agriculture in some selected African countries.

	Agricultural share of all economically active women (%)			Women share of economically active agriculture		
	1980	1995	2010	1980	1995	2010
Africa	78.8	70.9	62.2	44.3	46.4	48.5
SSA	79.1	72.7	65.0	46	47.1	48.7
Kenya	88.1	82.9	73.9	49	49.5	48.6
Malawi	96.1	95.1	94.0	56.7	56.1	59.2
Mozambique	97.0	95.5	94.0	58.6	63.4	65.2



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Rwanda	98.0	97.3	96.1	55.3	56.1	57
Somalia	90.2	85.4	76.7	44.4	45.3	45.9
Uganda	90.8	86.2	77.5	49.5	49.9	49.5
Tanzania	91.8	89.6	84.0	53.7	54.1	55
Coted'Ivoire	75.0	65.9	45.0	35.3	35.6	36.2
Ghana	56.8	53.4	49.3	45.6	45.1	44.3
Nigeria	57.4	39.4	26.8	36.6	34.8	39.7
Senegal	89.9	84.0	77.2	44.9	45.5	47.4

Source: FAO (2012)

2.2 Women, Climate Variability and Vulnerability

The ordinary use of the word 'vulnerability' refers to the capacity to be wounded, i.e., the degree to which a system is likely to experience harm due to exposure to hazard (Hans-Martin, 2006). Vulnerability for this study is the degree to which women peasant farmers are unable to respond to the adverse impacts and risks of climate variability in the Wa West District. Women vulnerability to climate variability is widely recognized partly because of their low capacity to respond to climate-induced hazards. According to Valerie-Ndaruzaniye (2013), women and girls in Sub-Saharan Africa are noted to be the most vulnerable to the impacts and risks of climate variability not only because they are characterized by low income but also by low capacity and low awareness, including awareness related to environmental disasters.

Bathge (2010) indicated that, women poverty and hence vulnerability to climate variability is due to their lack of land rights, ownership rights for the means of production, technology, finances, information and training, particularly in relation to climate adaptation and disaster prevention. The restriction of women by statutory and customary laws in property ownership, land rights and easy access to credit and extension services according to Brody et al. (2008), reduce women capacity to adopt environmentally sustainable farming practices. At the household level, for instance, studies reported that ownership, access and control of household assets such as hand hoes, land, local chicken, goats, cattle and ox- plough were accessed by both spouses but men were the owners and they controlled the entire household assets (González et al., 2011; Swai et al., 2012).

Again, participation in decision making is a principal ingredient for women's ability to contribute to benefits from climate change discussions, mitigation and adaptation (WEDO, 2008). Participation is critical to sustainable development as lack of participation or social exclusion is



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equated to vulnerability (Sen, 1999). While this is important as recognized by the UN Conference on Disaster Reduction and requested for the participation of women in policy planning and decision-making processes, involving the reduction in climate-related risks (Rodenberg, 2009), and in managing resources, women do not benefit from such representation (FAO, 2008). González et al.(2011) reported that women do not participate in plans and programs for environmental conservation and management and have no control over forest and sources of water as these resources are owned and controlled by men. For instance, at the rural community level, though women are known by their triple role such as reproduction, production and community management, women are left behind when it comes to live-saving decision particularly local resources management where their foot springs dominate.

2.3 Climate Variability, Agriculture and off-farm adaptation

Ghana agricultural sector has demonstrated progressively well as the sector contributes the biggest share to GDP at 30%, and provides livelihoods for 60% of the population (Sarpong and Anyidoho, 2012). However, future growth is threatened by climate variability due to high dependence of its population on natural resources and rain-fed agriculture for their livelihood (Tilberg et al., 2011). Variations in rainfall patterns and increases in temperatures are projected especially for Northern Ghana to bring considerable challenges to the sector that is already experiencing the severity of impacts associated with climate extremes (Stanturt et al., 2011; Al-Hassan and Kuworrnu, 2013). What that means is that high temperatures and declined rainfall projected by various climate models as a result of climate variability will significantly contribute to the overall reduction in agricultural productivity.

While food crops production still remains the most predominant livelihood source of most households and most economies, other economic activities are gaining relevance in this era of climate variability. Climate variability adaptation should be seen as priority towards achieving sustainable development and the sustainable development goals. In the Sahel, households have reduced their vulnerability and increased their wealth through livelihood diversification, particularly when diversifying out of agriculture or specialization (Niang et al., 2014). This was noted in Rasquez and Lambin (2006) meta-study of more than 80 case studies. In their study, they recommended that the focus of smallholder farmers on agricultural food production should be expanded to include other off-farm activities such as migration, trade and other opportunities that present themselves for diversification. Adger et al. (2004) added that adaptation to climate

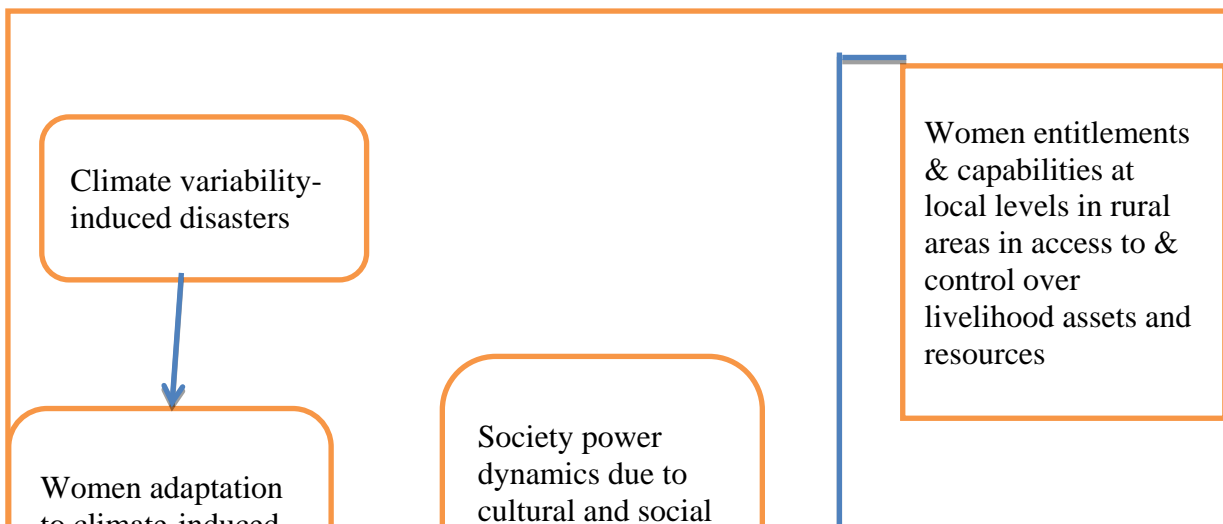


variability is not an event or an isolated activity, it is an integrated whole and a continuous processes involving integration of decisions within the demographic, cultural and economic change as well as information technologies transformation, global government, social conventions and the global flows of capital and labour.

Adaptation, as part of risk reduction and a response strategy to climate variability (Tarchiani et al., 2006), off-farm adaptation strategies should be seen as an alternative to reducing vulnerability. For instance, Mertz et al. (2011) observed livelihood diversification to include off-farm activities as an underlying socio-economic trend that has been noted in many developing countries, where supplementing agriculture with other activities increases wealth while decreasing vulnerability to climatic factors (Mertz et al., 2011). For instance, Motsholapheko et al. (2011) shows how livelihood diversification is used as an adaptation strategies to flooding in the Okavango Delta, Botswana, and Badjeck et al. (2010) recommend private and public insurance schemes to help fishing communities rebuild after extreme events, and education and skills upgrading to enable broader choices when fishery activities can no longer be sustained.

Several literatures have identified off-farm adaptation strategies to climate variability to include migration, petty business, livestock and poultry keeping, agro-processing, bee keeping (Uddin et al., 2014; Chah et al., 2013 and Naab and Koranteng, 2012; EPA, 2008). In CECAR (2016) survey on the integration of sustainable bee keeping with crop production as livelihood diversification and ecosystem enhancement strategy in northern Ghana, found that honey harvesting is one of the provisioning ecosystem services that supplement household income in times of food crop failure. To effectively promote bee production as a livelihood activity, it is important institutions and private sector organizations and development partners begin to channel resources into the area to enhance sustainable production. As stated by Cooper et al. (2008) to manage risks associated with climate variability for reduced vulnerability, it is critical society begins to commit resources to adaptive capacity building including livelihood diversification.

Figure 1: Conceptual framework linking women, climate variability and adaptation





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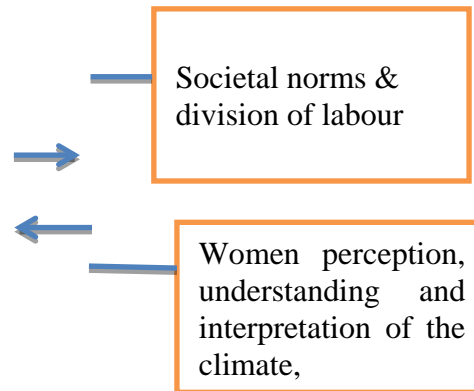
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Source: Adopted from Guloba (2014)

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The contemporary literature on adaptation widely acknowledges that the patterns of vulnerability to climate variability impacts we see today are largely, if not principally, shaped by roles, responsibilities, and entitlements associated with various determinants of social status and expectation, including gender (Constable, 2015). Climate change adaptation and society power dynamics are inextricably linked as gender determines the roles and responsibility and ownership of resources in respond to climate change shocks and stresses. Guloba, (2014) argues that the differentiated power relations between men and women and unequal access to and control over assets mean that men and women do not have the same adaptive capacity. For instance, men have control over all natural resources (land, forest, rivers etc.), political (decision-making, development management etc.), physical resources (infrastructure,), cultural, social resources (networking, migration etc.) and financial resources and could respond to climate catastrophes when they hit the society.

Gender and climate change adaptation are not mutually exclusive. FAO (2012) observed that gender influence climate variability adaptation as gender role shape men and women decision making in all areas of household and community life. Women have limited decision-making powers due to society's adoration and observation of entrenched social norms which disadvantaged women. Thus, the patriarchy system excludes the female child from family decision-making, inheritance and family roles which may enhance better standard of living. This was particularly noted by Brody et al. (2008) that women are less involved in decision making especially decision making involving climate variability adaptation and mitigation

Also, gender difference emanating from the socially defined relation between men and women affect the distribution of agricultural resources and result to differences in agricultural food crops production. For instance, women are noted to land poorer lands for food crops production, less access to extension services, fertilizer and credit to improve performance (IFAD, 2011), hence




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expose to famine or food insecurity if any climate-related disaster occurs. Davenport et al. (2010), also reported that, women have less power over family finances including other assets. Also, women cultural defined role as fulltime housewife (child birth, home chores, laundry, fuel and water collection, arranging room setting, serving guests, child care) make them immobile (Boateng, 2008). That according to Davenport et al. (2010), limits women in accessing information and services which are critical for escaping from the risk of any extreme weather events such as flood.

Carr and Thompson (2014) noted that gender determines the understanding, perception and vulnerability to environmental risks. Thus, the role men and women perform in society provide different understanding of the changing climate and hence may hold different perception about climate variability. People perception, though, may not be in agreement with reality, but they may in a way influence behavior. According to Constable (2015) though women and men may have shared understating and perceptions of climate-related risks and impacts, differences in many socially constructed roles and financial and assets holding situations may lead to disparities in responses by men and women.

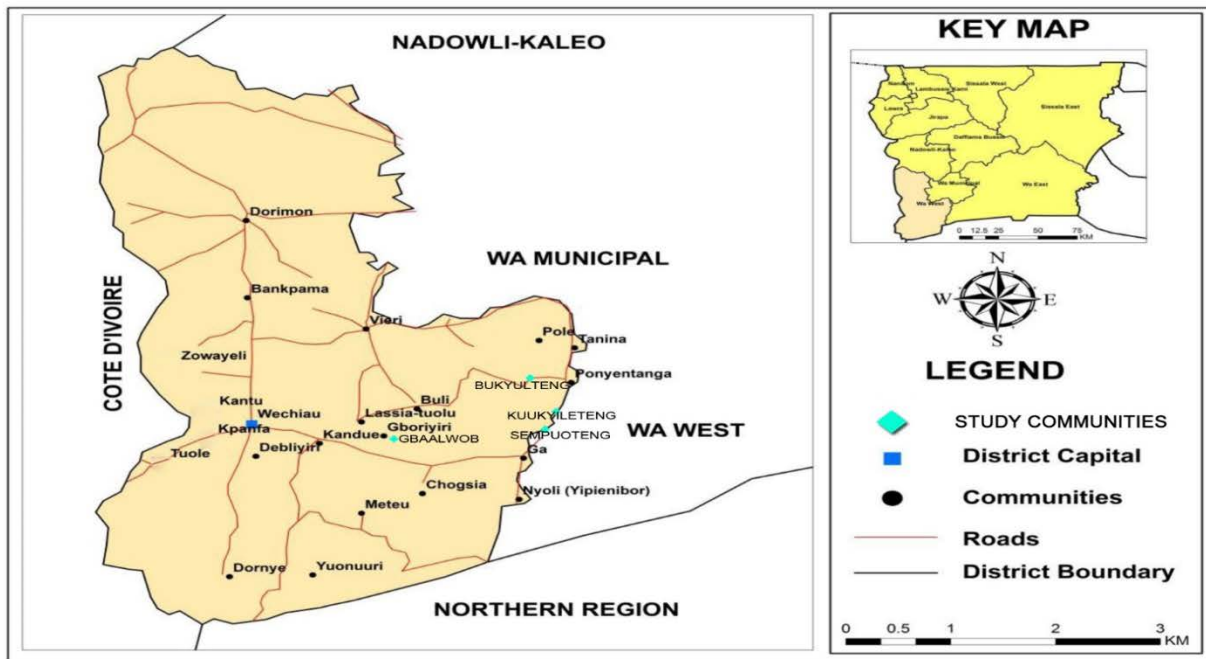
3.0 Materials and methods

3.1 Location and Size

Wa West District is situated in the western part of the Upper West region. It is located approximately between longitudes 9° 40' N and 10° 10' N and also between latitudes 2° 20' W and 2° 50' W. The district share boundaries with Northern region from the south, Nadowli district from the north-west, Wa Municipal from the west and Cote'd' ivoire from the west (Wa West District Assembly Annual Report, 2010). The District has a total land area of approximately 1856.0 square km, which represents about 10 percent of the total land area of the region (GSS, 2010). The District capital, Wechiau, is approximately 15.0 km away from Wa Municipal by rough road. The district is home to a population of 81,348 which represents 11.6 percent of the total population of the region.



Figure 2: Map of the study area



Source: Wa West District Assembly, 2007

3.2 The study design

The study employed an explorative case study using a mixed method approach. A case study is a systematic inquiry into an event usually with a specific situation which in this context involves climate variability which aims to explore the phenomenon of interest which in the other hand involves women perception of climate variability (Zucker, 2009).

The sampling techniques that were used in this research included the non-probability sampling such as purposive and probability sampling such as multi-stage. The purposive sampling technique was used to select from only 56 communities under CAPECS GROW Project instead of all the communities in the district. Saunder et al. (2012) in their research methodology indicated that purposive sampling does not require any theoretical explanation, but base on individual judgment on the selection of study units that will help answer the research questions and to meet the research objectives. Multi-stage probability sampling procedure was employed to select the sample respondents. With multi-stage sampling, a sample is selected using a combination of different sampling techniques at different stages. Saunder et al. (2012) recommends that to overcome the problem of geographically dispersed population especially



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when face-to-face contact is required, multi-stage sampling technique is considered very useful in that regard. At the first stage, systematic sampling method was applied to select the communities involved. At the second and last stage, simple random sampling technique was employed to select the individual respondents for the study. The researchers used the simple random sampling by first assigning consecutive number from 1 to n, next to each of the women in each community under study (i.e., n= the population of women in each of the study community). Second, a list of random numbers were manually developed to enable the researcher selects the number of women respondents in each community from the total list of women of that community. A total of 187 women farmers were selected for the study.

Questionnaires and in-depth interviews were personally administered to the women respondents at their homes. The use of the questionnaires helped capture large number of women farmers' opinions on climate variability and the interview helped get into details women farmers' experience and perception about changes or variations in the global climate. Questionnaire designed were pilot-tested by the researcher to make sure it was understandable and acceptable to the women farmers. The process ideally involved administering the developed questionnaire to few women farmers and then followed up to get responses on the questions (Chris and Diane, 2004).

Descriptive statistics were used to analyze the quantitative data while thematic analysis was used to analyze the qualitative data. For the quantitative analysis, raw data collected from the field was well sorted out and fed into Statistical Package for Social Scientist (SPSS) for analysis and for the qualitative data, transcription was done through read and re-read to find out emerging themes within the transcript concepts. Attride-Stirling (2001) first two steps (Familiarization with the transcript and Identification of themes) for thematic analysis were then used to analyze the transcript.

4.0 Results and discussion

4.1 Demographic characteristics

From the statistics, majority of the women farmers respondents were within 30-45 years categorize which represented 42%. This was followed by the age group of 46-60, which also represented 26%. 19% of the women respondents were within the age category of 15-29 and finally, 13% of the women respondents were above 60 years. On the level of education of the women farmers, 74% of them had non-formal education, 21% had basic education, eight and two percent had secondary and tertiary education respectively. For marital status, 65% of the women farmers were married, 13% of them were single, (never married), 19% of them were widows, two percent were separated, one percent each for divorced and consensual union.



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4.2 Women off-farm adaptation strategies to climate variability

When women farmers were asked about their off-farm adaptation measures in response to any likely failure of their farm produce or farm crop yields, they mentioned migration, agro-processing, poultry and livestock keeping and stone quarrying/ selling.

For petty business, 30% of the women farmers reported they were engaged in the activity and labeled the adaptation strategy as a common practice among most of them to supplement household income. Several studies have reported on the importance of petty business to climate variability adaptation (Ndamamani and Watanabe, 2015; Kemausuor et al., 2011). In CECAR (2016) work, they found that women have begun to diversify their activities to include petty business such as pito brewing and cakes frying. Women farmers in the interview section reported that, pito brewing (local wine) popularly known among them as “*da-zie or da-gyie*” is one of the commonest petty businesses among women farmers especially during the off-farm season. To better implement the strategy, women farmers revealed that, they formed what they call “*susu*” (women group) where they alternate the business among themselves to ensure that every woman get involved. Similar finding were obtained by Dinye and Derible (2004) in the Kessena-Nankana district in the Upper East Region of Ghana. What that means is that women “*susu*” groups should be strengthened and encouraged to take advantage of the business due to its potential of providing sustainable income for the women and their households. In addition, the promotion of business will not only accelerate growth of rural communities, but build women capacity towards reducing rural poverty as defined by the sustainable development goal (1) of the United Nations.

Also, 26% of the women farmers reported that they were engaged in poultry and livestock keeping. This result was also in line with a study conducted by Chah et al. (2013) which reported that, most women keep poultry, goats, sheep and pigs to supplement family income for sustained household livelihood. Similar results were obtained by Dayour et al. (2014) in Ghana. In their study, they reported that rearing of goats and fowls were found to be common and useful to women farmers as they sell some in the market for food when they experience low food crop yield. In NEPAD (2011) study in Ethiopia reported that rural smallholder women farmers have started to keep livestock and poultry so as to respond to adverse impact of drought and flood which over the years dictate the yield of their food crops. The poultry and livestock keeping among the women have relevance to include major sources of income to the rural women. As a potential numerator for improved household income for improved livelihood, poultry and livestock keeping among the women should be encouraged so as to cushion them when their farm produce fail them due to climate variability and it related-adverse impacts.

Again, 35% of the women farmers reported that the engaged in agro-processing as alternative livelihood strategy to response to climate and environmental events such as drought, bush fires,



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and other natural catastrophes. Similar findings were obtained by (Dayour et al., 2014; Ndamani and Watanabe, 2015; Fisher et al., 2015). In the interview section with the women farmers, they reported that to implement the strategy, wild fruits such as “*Nyuuno*” (sheanut) and “*duor*” (dawadawa) which are the major and commonest fruits in the study areas are collected and processed for market. When women farmers were quizzed on the relevance of the strategy to food security in their households, they were quick to indicate that agro-processing particularly the shea butter processing aid them with supplementary income to buy food for themselves, children and households. Dinye and Derible (2004) study on “Reducing rural household poverty among women in the Kassena-Nankana district in the upper east region of Ghana” reported that shea butter processing is an old practice among rural women due to its perceived improvement on women income. For instance, on the relevance of the strategy to livelihood outcomes, a 49 year old widow in Kuukyileteng reported that:

“Shea butter processing is very good. My children and I would have found ourselves in difficult situation: food crisis, inability to farm, inability to buy ourselves clothes. Our food crops for the past years have not been doing well... so we rely on the shea nut for survival. Last year, I was able to get enough shea nuts from the bush to enable me process for our local market. We are praying that next year should more better”

For migration, six percent of the women reported that they migrate to engage in wage labour during the off-farm season. This response was in line with a study conducted by Naab and Koranteng (2012). In their study, they found that migration among people is a known strategy for climate variability adaptation. However, the study using gender lens to explore farmers' adaptation strategies stated that migration among men folks was higher compared to their women counterparts. This implies that migration is not a known adaptation strategies for women especially women who are married as women are noted to be caretakers of home when their husbands are away. Notwithstanding, the few women farmers who migrate have implication for the agricultural sector. Thus, when the women migrants do not return home would result in labour demand for agricultural activities such as weeding, planting of seeds, fertilizer application and caring for poultry and livestock. In addition, if remittances are poor from the women migrants would result in hunger in families and households as the people who are usually left behind are always the vulnerable who cannot engage in proper agricultural activities.

Lastly, four percent of the women farmers reported that, they engaged in stone quarrying/selling as a survival strategy. This activity was practiced in Gbaalwob as majority of the respondents reported that they gathered stones and sold to either builders or contractors. They ascribed their engagement in the activity to the recent construction works going on in the community as people have resorted to putting up block and concrete houses in the village. Though the activity was a temporal, but guaranteed income for the women during the off-season where they have virtually nothing doing.



In a nutshell, the analysis revealed that women farmers' lives depend largely on these off-farm adaptation strategies and any failure in them, in addition to failure of their farm produce would severely affect their lives. In addition, the global fight for sustainable development which must start with the individual, households and their communities, regional, national and international governments would be in jeopardy as women who are noted to be agent of change are left behind in development. Women farmers are already noted to suffer the brunt of climate variability (Brody et al. 2008; WEDO, 2009)) and the off-farm adaptation options should be strengthened to place women lives in a better position to contribute to community and national development.

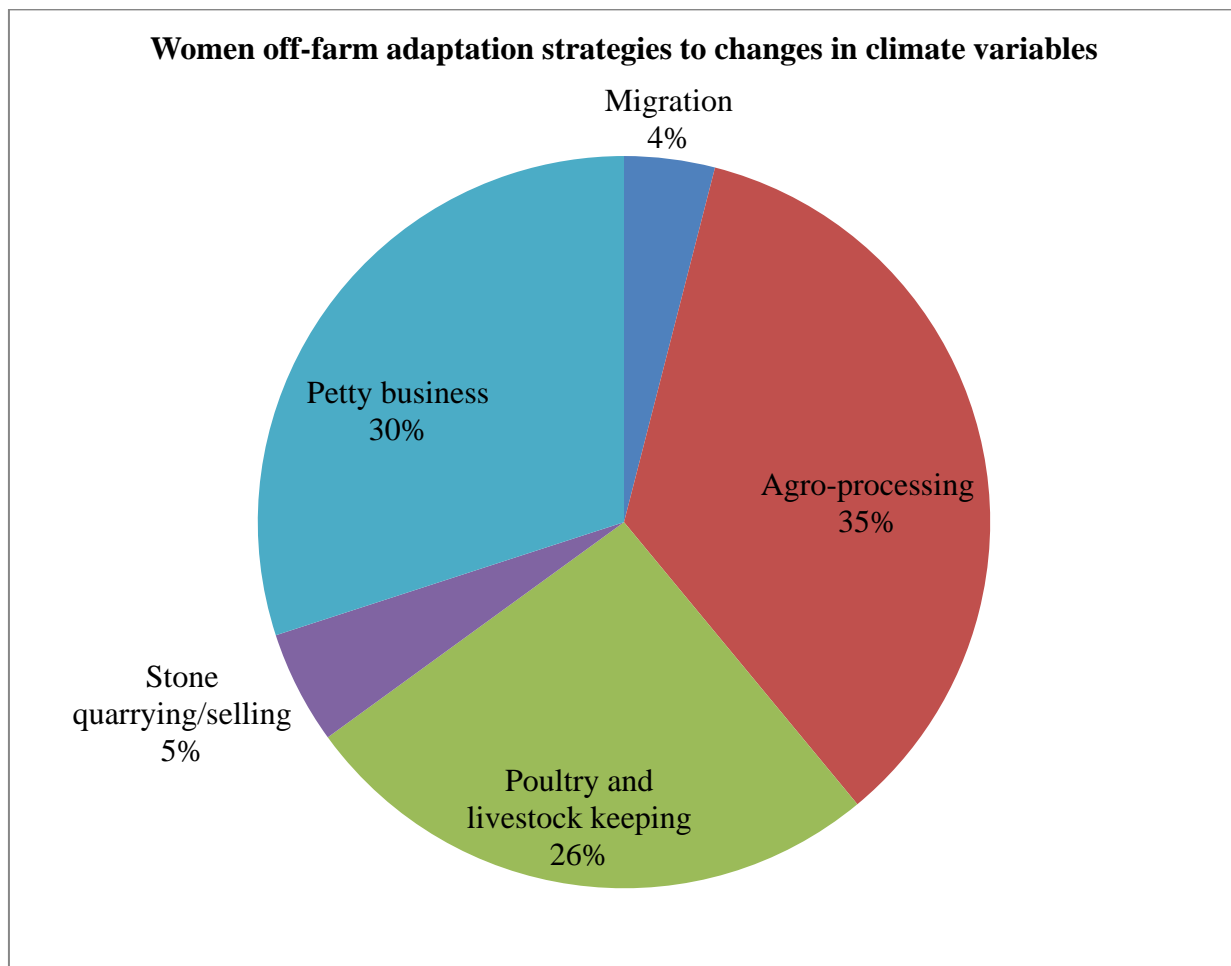


Figure 3: women off-farm adaptation strategies

Source: Field survey, 2017



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4.2.1 Perceived importance of women off-farm climate adaptation strategies

Table 2: Ranking perceived effectiveness of women off-farm climate adaptation strategies

Ranking perceived effectiveness of women off-farm adaptation strategies to climate change and variability						
Adaptation measures	High	Medium	Low	No	ASI	Rank
Agro-processing	180	7	0	0	552	1
Petty business	72	34	58	23	342	3
Poultry and livestock keeping	123	37	27	0	470	2
Migration	32	45	51	59	237	4
Stone quarrying	12	21	34	120	112	5

Source: Field survey, 2017

To identify off-farm adaptation strategies that were perceived effective and of importance to the women farmers over others, an adaptation index analysis was conducted. Women farmers were asked to assess the different adaptation strategies mentioned in the table above by using the four-point rating scale as indicated on the table to rate the effectiveness of each to their food crop production. The relative effectiveness and importance of the women adaptation strategies to climate variables or events was calculated based on the following index formula (Uddin et al., 2014)

$$ASI = AS_n + 0 + AS_i \times 1 + AS_m \times 2 + AS_h \times 3 \dots\dots\dots (1)$$

Where;

ASI= Adaptation Strategy Index

AS_n = frequency of farmers rating adaptation strategy as not effective.

AS_i = frequency of farmers rating adaptation strategy as less effective

AS_m = frequency of farmers rating adaptation strategy as moderately effective

AS_h = frequency of farmers rating adaptation strategy as highly effective

From the analysis, women farmers rated agro-processing as highest which implies that women farmers perceived agro-processing as an effective adaptation measure to climate variability. The highly rated agro-processing could be attributed to women highly dependent on wild fruits particularly shea fruits and dawadawa for butter and dawadawa processing. Shea fruits and dawadawa, though arguably are the life sustaining wires of majority of women farmers in the study communities especially from May to July which is also the yearly season of these fruits. Dinye and Derible (2004) identified shea butter processing as potential sources of increasing



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household incomes in the rural areas and recommend a ready market be developed to aid woman to engage in better business.

Also, poultry and livestock keeping were ranked second by the women farmers as a response strategy to climate variability. What that means is that women farmers recognize the importance of keep poultry such as guinea fowls, chicken and livestock such as goats, sheep including pigs as a response strategy to climate variability. NEPAD (2011) report on Africa gender, climate change and agriculture support program (GCCASP) in Ethiopia recommends that rural women farmers should be organized and improved capacity on poultry and livestock production to fight climate variability for improved income and livelihood.

Again, petty business such as cakes frying, pito brewing and buying and reselling at a later date in the year was rated third by the women farmers. Migration was rated last but second which implies that migration is not a common climate response strategy among the women farmers and lastly, stone quarrying and selling was considered not effective and hence not important to women alternatives response to changes in climate variables.

4.3 Women off-farm adaptation constraints

The assessment of the women farmers' adaptation constraints to successful implementation of their adaptation strategies, revealed that poultry and livestock diseases and deaths, limited financial resources, low market demand and climate variability were their major setbacks in responding to climate variability.

For poultry and livestock diseases and deaths, 27% of the women farmers reported to be a major constraint in keeping poultry and livestock. Similar findings were obtained in NEPAD (2011) report in Ethiopia. In the report, (ibid) attributed prolong drought, increase distance between water and pasture cause problem to the health of cattle, sheep and goats. In this study, women reported that poultry and pigs, for instance, are the most common ones that are susceptible to pest and disease. Diseases and pests of poultry that were mentioned include coccidiosis, infectious, worms, and lice. The importance of poultry and livestock cannot be overemphasized and therefore, husbandry and veterinary services should be made easily accessible to women farmers and the rural areas in general to improve upon animal and poultry rearing.

Also, 43% of the women farmers reported that, limited fund constraints them from successful adaptation to climate variability. Similar findings were found by Antwi-Agyei et al. (2013) in Ghana. In their systematic literature review of 13 published papers on barriers to climate change adaptation in Sub-Sahara Africa with Ghana in focus identified limited financial resource as the major barrier to climate change adaptation. Women farmers in this study indicated that due to weak financial resource base, engaging in a better and sound agro-processing, petty business and




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purchasing and rearing of improved varieties of sheep, goats, fowls, piggery and cattle have been affected which has a lot of consequences on food security

Again, 19% of the women farmers indicated climate variability play an antagonist role in adaptation process. Studies have identified the impact of climate variability on women adaptation process (Huho and Mugalavai, 2017; Ramakrihna et al., 2014). Thus, women shea butter processing and pito brewing depend on shea trees and food crops. These natural plants and food crops are dependent on favorable climate and weather variability to give better outcomes. However, women respondents reported that, there are into a fighting battle with climate variability as it unpredictable yearly variations affect their livelihood. Women farmers added that the exposure of the wild fruits and food crops to harsh climatic condition affect their shea collection and processing. For instance a 53 year old woman in Sempuoteng reported that:

“Huum.... these days we do not get shea nuts due to climate variability. Rainfall and drought have been affecting them year in and year out. Where the shea tree expect to get rain to fruit and mature, it would not fall. The little fruits it may even bear, would be brought down by heavy rainstorm. Last year like this, we did not get much shea nuts due to lack of rain. We have to just pray... may be someday, who knows, might be better”.

Lastly, 11% of the women indicated that, low market demand of locally produced pito and shea butter affects their petty business. This according to the women invariably affects their income and household food security. To ensure action to fight climate variability and its adverse impact, end poverty and hunger through achieved food security and improved nutrition and sustained livelihood for healthy lives and well-being which are at the heart of sustainable development and sustainable development goals, women petty business should be promoted so as to contribute better to society and climate variability adaptation. One way to do this is to identify and develop shea butter value chain within and without the country to enhance production. As reported by Dinye and Derible (2004) shea butter processing has the potential to reduce poverty among rural women through improved incomes.

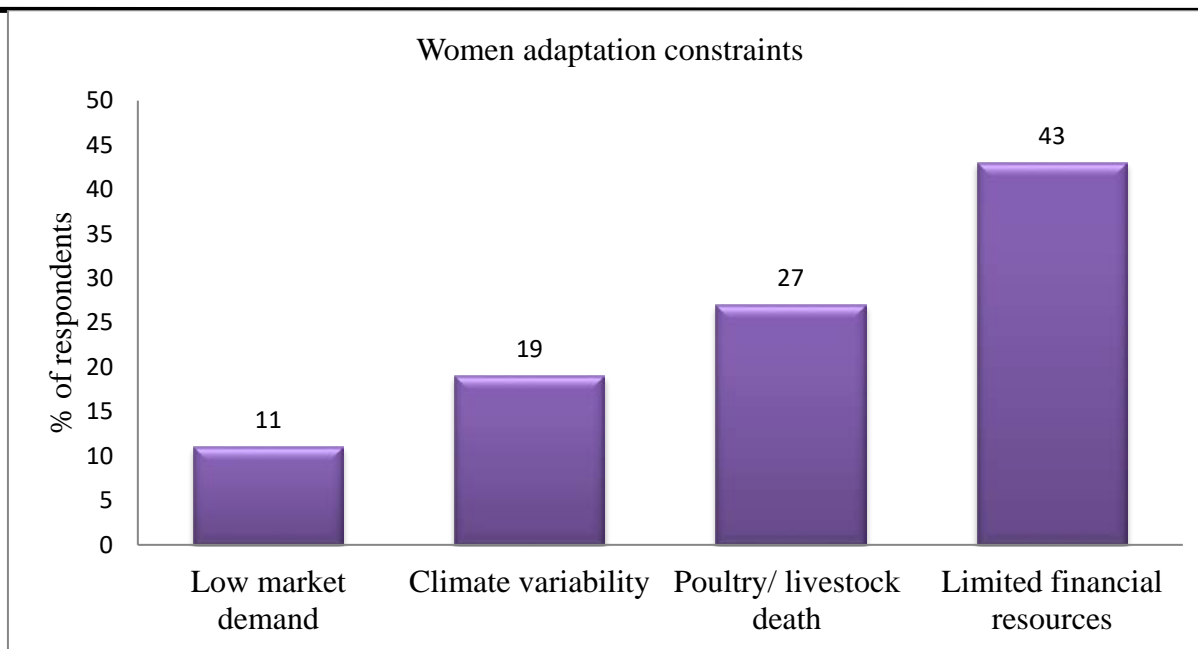


Figure 4: Women off-farm adaptation constraints

Source: Field survey, 2017

4.4 Conclusion and implication for sustainable development

The study has found that smallholder women farmers have been practicing traditional off-farm coping and adaptation strategies and have developed their own ways of assessing prospect for favorable household or family food to agro-processing, buying and selling, petty business, stone quarrying and selling, livestock and poultry keeping and migration. However, these strategies are constrained by limited financial access, climate variability, poultry and livestock diseases and death, and low market demand of their products to counter future climate variability vulnerability considering the projected exacerbation of climate variability.

The paper strongly recommends that to fight climate variability adverse consequences on the poor women is by integrating adaptation measures into sustainable development and poverty reduction strategies. Particularly important in this regard, is supporting women farmers who are worldwide noted as vulnerable to climate variability to adapt to the adverse impact of climate-induced events. The support could take the form of strengthening their already on-going off-farm adaptation options or profiling their local environment to identify new but untapped adaptation strategies to better position women farmers in their quest to securing sustainable livelihood and resilient development. It is one of such ways that can provide options for poor smallholder farmers to reduce their vulnerability to current and future risks, and contribute towards achieving the sustainable development goals by 2030.



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Conflict of interest

The authors declared no conflict of interest

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