Journal of Sustainable Development in Africa (Volume 17, No.5, 2015)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

STRATEGIES FOR MANAGING VULNERABILITY OF WOMEN VEGETABLE FARMERS IN THE CENTRAL REGION OF GHANA

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ABSTRACT

Subsistence vegetable farming is a way of survival for most women in the rural areas of Ghana. Thus, women vegetable farmers need to manage their external environment in a sustainable way in order to secure their livelihoods. The paper reports on the strategies for the management of vulnerabilities of women vegetable farmers in the Central Region of Ghana. Understanding the strategies for managing vulnerability will provide more accurate information for decision making, capacity building and practical actions to mitigate vulnerability of farmers for sustainable agricultural production and livelihoods improvement. The multi-stage sampling technique was used and structured and validated interview schedule was used to collect data from 221 respondents. The study revealed that women vegetable farmers were vulnerable to external factors including high price of inputs, price fluctuations, unpredictable rainfall and floods, which they had no strategies to manage. However, they had some strategies for managing vulnerabilities that were within their control. External support through extension training on known strategies, government-led insurance and targeted subsidy schemes, and research on managing vulnerabilities are essential for sustainable vegetable production by women vegetable farmers in the Central Region of Ghana. In order to guarantee the sustainability of the vegetable industry in the Central Region of Ghana, appropriate policies, strategies, and priorities in research and development for managing livelihood vulnerabilities are needed.

Keywords: Women, Vegetables, Vulnerability, Strategies, Sustainability, Ghana

INTRODUCTION

Throughout the world, women represent a substantial, underutilized force for sustainable development. However, such women have been producing about 70% of subsistence crops and playing about 85% major roles in both production and distribution more than their male counterparts (Ministry of Food and Agriculture [MOFA], 2002). Unfortunately, many of these women lack access to necessary agricultural resources, which, if freely accessed, could decrease global hunger by 12-17% and increase sustainability (Singh, Sharma & Sharma, 2013). The issue of vulnerability of rural women in vegetable farming is vital because subsistence women vegetable producers in rural areas are affected differently from their counterparts in the city and men.

Work done by Hasnain (2012) and Bassey (2002) on vulnerability of rural women to environmental issues and food security respectively have all alluded that when women are vulnerable, their livelihoods and their sustainability are affected. Interestingly, not much attention has been paid to the vulnerability of women in vegetable farming in Africa with regards to livelihood security despite the nutritional values of vegetables to us humans and the economic roles of vegetables to Africans, and the dominant role women play in the sector. This research focused on the vulnerability of women vegetable farmers and their adaptive strategies for vulnerabilities in the Central Region of Ghana. Understanding the strategies for managing vulnerability of women vegetable farmers would provide better decision for capacity building and adaptive strategies in dealing with or mitigating vulnerability of women in vegetable farming to ensure sustainable livelihoods and development of the vegetable industry. Specifically, the research was designed to determine:

- the vulnerability of the women vegetable farmers in the Central Region;
- strategies adopted to sustainably manage their livelihoods in the face of their vulnerability; and
- vulnerability factors that best predict the livelihood improvement of the women vegetable farmers

REVIEW OF LITERATURE

Sustainable development is often considered a pathway to sustainability, which in turn relate closely to resilience and vulnerability (Kates, 2001). As such, sustainable development is not possible without addressing the issues of resilience and vulnerability. Sustainable development is often defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (United Nations, 2003). Thus, the term sustainability is associated with maintaining well-being of people over a long indefinite period of time (Kuhlman & Farrington, 2010). According to Pearce, Markandya and Barbier (1989), there are two forms of sustainability - weak and strong sustainability. Weak sustainability refers to the next generation inheriting a stock of man-made and environmental assets no less than the stock inherited by the previous generation, whereas strong sustainability concerns the next generation inheriting only a stock of environmental assets Markandya and Barbier (1989).

Agriculture that fails to protect and improve rural livelihoods and social well-being is unsustainable. In ensuring agricultural sustainability, there is the need to strengthen the role of farmers in agricultural production systems and a farmer-centred approach is the key to making this a reality (Benidickson, Boer, Benjaamin &

Morrow, 2011). Thus, it is important that development efforts do not increase vulnerability but instead consciously reduce it.

Vulnerability is about the external environment where people normally pursue their livelihoods and their exposure (risk) to the negative effects of the external environment, as well as their resilience in resisting and recovering from external shocks, trends and seasonality (Baumann, 2002). It is also said to be uncertainty or insecurity in an individual, household or community's well-being when there are changes in the external environment (Serrat, 2008). The vulnerability context, therefore, describes seasonalities, shocks and trends that tend to regulate people's livelihoods (Department for International Development [DFID], 2000). Seasonality has to do with seasonal shift in prices, production, employment opportunities, production, health and workload of farmers among other things that happen at certain time of the year (Twigg, 2001). Shocks are the unexpected, intense and distressing events that have sudden significant impact, usually negative on people's livelihoods (DFID, 2001). They include human health shocks, natural shocks (e.g. Dry spell, floods), economic shocks (such as the rapid increase in exchange rates), conflicts and crops/livestock health shocks (DFID, 2001). Trends are the general propensity, movement, or direction in which certain events occur, and affect people's livelihoods at the end and usually on large scale (Twigg, 2001). It may be with regard to population, resource, governance or technological change.

Vulnerability may affect farmers, their productivity and their livelihood outcomes. Vulnerability and production are negatively correlated (Abdullahi, Iheanacho & Ibrahim, 2006; Ezekiel, Olarinde, Ojedokun, Adeleke & Ogunniyi, 2012), in addition, they found an inverse relationship between Dry Spell and production. Serrat (2005) has argued that people's livelihood outcomes can be constrained by their vulnerability context, which is often managed by strategies that the people employ.

In Ghana, households that pursue agriculture-based livelihoods are not only vulnerable to climatic shocks (dry spells, floods, bushfires), but are also vulnerable to market volatility (food price seasonality, rising input prices), and health risks including diseases and malnutrition (Devereux, 2009). In the northern regions of Ghana, farmers are particularly vulnerable to bushfires, dry spells, floods, market volatility, increasing price of agricultural inputs, and human risks such as susceptibility to disease and malnutrition and more than one of these calamities occurring in one year (National Development Planning Commission (NDPC), 2004). Dinye and Ayitio (2013) observed that farmers were particularly vulnerable to inadequate funds which affected their production. Also, vegetable farmers in Ghana are said to be more vulnerable to pests resulting in frequent spraying of pesticides which are not always affordable (Aberra & King, 2005).

Livelihood strategies are usually the combination of capabilities, assets (including both material and social resources) and activities that people decide to carry out in order to achieve their livelihood goals (DFID, 2001). Rennie and Singh (1996) described the strategies as adaptive or coping. They explain adaptive strategies as those measures that an individual or a household consciously adopts as a process of change in response to some economic or environmental long-term trends in order to meet their livelihood needs. In contrast, coping

strategies are short-term responses to seasonalities and shocks to secure livelihoods. Ajetomobi, Ajiboye and Hassan (2010) reported that rice farmers in Nigeria respond to vulnerability of dry spell through irrigation. From Oruonye (2011), farmers using irrigation in the Taraba State of Nigeria have more secured livelihoods. Construction of channels as fire-belts in farms has been used by farmers in the Afram Plains of Ghana in response to seasonal bushfire outbreaks (Codjoe, Atidoh and Burkett, 2011).

METHODOLOGY

The study used a descriptive correlational survey design with validated structured interview schedule. Three (3) districts (Gomoa West, Gomoa East and Agona West) in the Central Region of Ghana were purposely selected based on high level of vegetable production and the involvement of women in it. The interview schedules used elicited information on background of the farmers, vulnerability of women vegetable farmers and strategies adopted to manage vulnerabilities. A five-point Likert-type scale was developed to measure the vulnerability of the farmers. The scale was from *strongly agree* (5) to *strongly disagree* (1). The Cronbach's alpha coefficient for reliability of the scale items was 0.70 and was considered acceptable (Sekaran, 2005).

Stratified proportionate random sampling was used to select 221 women farmers who belonged to Farmer-based organizations (FBOs) in the three selected districts. Proportionately, 147, 40 and 34 women farmers were then randomly selected from Gomoa West, Gomoa East and Agona West, with target population of 368, 100 and 59 respectively. The data collection was done between 6th of February and 8th of March 2012. With the help of Statistical Product and Service Solutions (SPSS) version 16.0, means, standard deviations, frequencies, percentages, Ordinary Least Square (OLS) multiple regression and Pearson Product correlation were used for the analysis.

RESULTS

Vulnerability of Women Vegetable Farmers

The assessment of vulnerability of the research subjects showed that women vegetable farmers were vulnerable to their external environment (Table 1). Specifically, they were most vulnerable to increases in prices of inputs ($\bar{x}$= 4.2, SD= 0.7) followed by inadequacy of funds ($\bar{x}$ = 4.0, SD= 1.0). They, however, were less vulnerable to social unrest ($\bar{x}$ =1.7, SD= 0.6), theft ($\bar{x}$ =1.8, SD= 0.6) and land disputes ($\bar{x}$ =1.8, SD= 0.7).

Table 1: Perceived Level of Vulnerability of Women Vegetable Farmers

Vulnerability	N	Mean	SD
Vulnerable to increased prices of inputs	221	4.2	.7
Vulnerable to inadequate funds	221	4.0	1.0
Vulnerable to unpredictable rainfall	221	3.7	1.1
Vulnerable to unfavourable prices	220	3.3	1.3
Vulnerable to price fluctuations	221	3.2	1.3
Vulnerable to pest and disease attacks	221	3.1	1.4
Vulnerable to dry spell	221	2.9	1.4
Vulnerable to floods	221	2.8	1.4
Vulnerable to bad health (illness)	221	2.3	1.1
Vulnerable to bush fires	220	2.2	1.2
Vulnerable to insufficient labour	221	1.9	.8
Vulnerable to land disputes	221	1.8	.7
Vulnerable to theft (stolen)	221	1.8	.6
Weighted Mean(***Xw***)		2.8	0.6

Strategies for Managing Vulnerability

In assessing strategies for managing vulnerability, the farmers were questioned on various vulnerability factors, how they were managing them and the perceived effectiveness of the strategies they were using. On the issue of the rising prices of farm inputs, the majority of women vegetable farmers (86%) bought inputs within their budgetary constraints which they said was effective. About 9% of the women vegetable farmers were assisted by their various faming groups. According to them, using farming groups was also very effective while just about 5% were supported by their husbands. This group intimated that the practice was slightly effective. The majority of the farmers (82%) who were vulnerable to inadequate funds used the little money at their disposal to cultivate their vegetables and they said it was effective. About 8% depended on family members for assistance, 5% went for loans from susu operators, 3% depended on NGOs for assistance and the final 2% secured loans from commercial banks. The farmers perceived the last four strategies for managing high input prices as not effective, especially with *susu* operators and commercial banks because they charged exorbitant interest rates. *Susu* is a traditional banking system in which a person (e.g. the farmer) decides to make a daily contribution to another person, the *susu* operator, for an agreed period, usually a month (31 days) as a way of saving up, at a fee to the operator (Rutherford 1999).

Concerning unpredictable rainfall, the majority of respondents (97%) did not employ any strategy while approximately 3% irrigated their farms from nearby rivers. They perceived the practice as effective. Regarding unfavourable market prices, the majority of the farmers (67%) did not do anything about it. A few of the farmers (14%) sent their produce to urban markets for sale which the farmers said was effective. Furthermore, 10% dried, stored and sold their produce (pepper) when prices were favourable and said it was effective. About 9% of the farmers already had customers willing to buy their produce before they harvested, a strategy they found effective.

With regard to price fluctuations, the majority of respondents (68%) did nothing to offset the situation. About 27% dried, stored and sold their produce when prices had risen and this was mainly done by those cultivating pepper and the practice was perceived as effective. Also, around 4% of respondents sold their produce in urban centres when prices were fluctuating while 1% belonged to farming groups that dictated the prices of the vegetables and farmers testified these strategies were both effective.

On strategies employed for pests and disease control, 95% of respondents used pesticides to spray their farms and they claimed that it was effective. About 4% of the farmers did not employ any control measure, and 1% followed good agronomic practices which they indicated were effective. Out of 71 respondents who said dry spell was a major problem, about 44% used pumping machines and 29% fetched water manually to irrigate their farms during periods of dry spell. With both strategies, the farmers claimed they were effective. From the results, 27% did not employ any measure because their farms were far from source of water and pumping machines or manual fetching for irrigation was not feasible. For some of the farmers, they could not afford to buy or hire pumping machines.

On vulnerability to floods, about 90% of the women farmers employed no measure while 10% created gutters/channels on their farms to allow the flow of excess water. Those using the channels said the practice was effective. It was realized from the results that of the 45 women vegetable farmers who responded 'yes' to bush fires, 82% did not employ any measure while 18% made farm belts around their fire and respondents claimed it was effective in preventing bush fires.

A total of 40 women vegetable farmers responded 'yes' to bad health, about 81% of them visited the hospital whenever they were ill and that was effective, and 8% did self-medication which they also claimed was effective. From the study, 11% did not employ any measure to deal with their health issues. On the issue of theft, the majority (75%) of the farmers (75%) did nothing to manage it. About 25% of the farmers work through farming groups to monitor or watch over their farms, but found it not effective. With regard to land disputes, a fewer number (6) of the farmers were vulnerable and had no strategy to manage it.

In the case of insufficient labour, 76% of the farmers did all the farm work by themselves; therefore, they said that it was not effective because it was too much. About 18% were helped by their children and it was not effective because the children helped only on weekends. Six percent of the farmers were helped by their husbands, and according to them the practice was effective.

Table 2: Strategies for Managing Vulnerabilities of Women Vegetable Farmers

Vulnerability factor	Strategies to manage vulnerability	Percentage
Increased price of inputs	1. Buy inputs with the little money available	86
	2. Assisted by farming groups	9
	3. Supported by husbands	5
Inadequate funds	1. Used only the money available	82
	2. Assisted by family member	8
	3. Loan from *susu* operators	5
	4. Negotiated with NGOs to come to their aid	3
Unpredictable rainfall	1. No strategy	97
	2. Water their farms	3
Pest and disease	1. Sprayed with pesticides	95
	2. No strategies	4
Unfavourable market prices	1. No strategy	67
	2. Sent produce to urban markets	14
	3. Dried, stored and sold when prices were favourable	10
Price fluctuations	1. No strategy	68
	2. Dried, stored and sold when prices were favourable	27
	3. Sold produce at urban centres	
	4. Belonged to farming associations that dictated prices	4
Dry spell	1. Used pumping machines to irrigate farms	44
	2. Watered farms manually	29
Floods	1. No strategy	90
	2. Created gutters/channels for the flow of excess water	10
Bushfires	1. No strategy	82
	2. Created farm belts around farms	18
Bad health	1. Visited the hospital	81
	2. No measure	11
Theft	1. No strategy	75
	2. Groups monitored farms	25
Land disputes	No strategy	100
Insufficient labour	1. Carried out activities by themselves	76
	2. Helped by children	18
	3. Helped by husbands	6

Source: Field data, 2012

Perceived Improvements in Livelihoods from Vegetable Farming by Women

To understand how vulnerability factors affect and contribute to livelihoods of women vegetable farmers in the

study area, livelihood improvement of the farmers was first assessed with reference to their human, physical, natural, social and financial capitals. Each category of capital assets was assessed based on a set of variables, which the farmers believed (using a scale of agreement) had been improved as a result of their vegetable farming business. The composite results showed that the vegetable farmers perceived their overall livelihood to have been improved moderately ($\bar{X}$= 3.1, S.D = 0.3) through vegetable farming (Table 3). The most improved capital assets by the farmers was human assets, that is the sum total of expertise or management ability, aptitudes, knowledge, experience, ability to labour, and the health needed to pursue and achieve their livelihood outcomes through vegetable farming (Asian Development Bank, 2004; Zepeda, 2001). They generally agreed more on human assets ($\bar{X}$= 3.6, S.D = 0.4) as the most available, followed by physical asset ($\bar{X}$= 3.4, S.D = 0.4), natural and social assets in a decreasing order of improvement. The farmers, however, disagreed ($\bar{X}$= 2.4, S.D = 0.5) that financial assets available to them had improved through their vegetable farming. The latter is expected as is the case in most developing countries where access to financial resources including credit is limiting to farmers in general (Boateng et al, 2007).

Table 3: Perceived Level of Agreement on Livelihood Improvement of Women Vegetable Farmers

Livelihood Assets	**N**	**$\bar{X}$**	Level of Agreement	**SD**
Human Assets	221	3.6	Agree	0.4
Physical Assets	221	3.4	Moderately Agree	0.4
Natural Assets	221	3.3	Moderately Agree	0.6
Social Assets	221	2.8	Moderately Agree	0.7
Financial Assets	221	2.4	Disagree	0.5
Weighted Mean ($\bar{X}w$)		3.1		0.3

Scale: 5 = Strongly Agree, 4 = Agree, 3 = Moderately Agree, Disagree= 2, 1 = Strongly Disagree
Source: Field data, 2012

Vulnerability Factors that Best Predict livelihood improvement of Women Vegetable Farmers

Table 4 shows the stepwise regression analysis of vulnerabilities of women vegetable farmers on their perceived level of agreement on livelihood improvement. The results revealed that inadequate funds was the best predictor of vulnerability. This was followed by labour unavailability, unpredictable rainfall and occurrences dry spell.

Using the stepwise regression method, a significant model emerged (R^2=.297, F4, 216=24.2, p<0.05).

Table 4: Stepwise Regression of Vulnerability Factors on Perceived Level of Agreement on Livelihood improvement by the Women Vegetable Farmers

Independent Variable	Step of entry	Beta	R^2	Adjusted R^2	F	Sig
Inadequate funds Labour unavailability Unpredictable rainfall	1	-0.341	0.222	0.218	62.354	.000
	2	-0.227	0.052	0.049	41.167	.000
Dry spell	4	-0.178	0.014	0.011	24.241	.000

n = 220, Source: Field data, 2012. $p < 0.05$

$Y = 3.960 - 0.341X_1 - 0.227X_2 - 0.309X_3 - 0.178X$

DISCUSSION

The findings suggest that the vegetable farmers were generally vulnerable to their external environment. They were more vulnerable to increased price of inputs, inadequate funds and unpredictable rainfall. The inadequate funds could be due to their inability to assess loans from financial institutions due to lack of collateral (Kodiechi). The eroding effect increasing prices of inputs may also account for their inadequate funds. The findings supports the view that farmers in Ghana are vulnerable to rising price of inputs, market volatility (food price seasonality, rising input prices), and climate change which is associated with Dry spell and floods and high disease risk (Devereux, 2009; Domfeh, 2009; Quandzie, 2011). This has repercussions for sustainable development because when farmers are unable to access agricultural resources, the attainment of sustainable development and sustainability becomes a mirage. Accordingly, farmers will not be able to purchase agricultural inputs for production which will affect agricultural production on a sustainable basis and sustainability of their livelihoods.

From table 2, farmers used varied strategies to improve their livelihood. They sprayed their farms with pesticides and followed good agronomic practices to offset the vulnerability of pest and diseases. They also irrigated their farms and created channels for the flow of excess water during periods of dry spell and floods respectively. In line with that position of the Overseas Development Institute [ODI] (2009), farmers will adopt all kinds of strategies that will enable them to cope with vulnerabilities which impact positively on livelihood outcomes. For example, the use of agrochemicals to control pests and diseases is consistent with the findings of CTA (2008) and Laary (2012) who have argued that the majority of farmers in Ghana used agrochemicals to manage pests and diseases, which are major causes of crop loss in Ghana. Similarly, Codjoe *et al* (2011) have

explained that some farmers constructed channels on their farms to prevent flooding; irrigate their farms during periods of dry spell to manage the effects of dry spell; and create fire belts to control bushfires. Invariably, these strategies are environmentally friendly and promote sustainable development.

The study suggests that vegetable farming is contributing moderately to the overall livelihoods of women vegetable farmers in the study area. The stepwise regression of vulnerabilities of women vegetable farmers as presented in Table 4 implied that, for every increase in inadequate funds, a 0.341 decrease in the perceived level of livelihood is expected, and for every increase in labour unavailability, a 0.227 decrease in the perceived level of livelihood is expected. Also, for every increase in unpredictable rainfall, it is expected that the perceived level of livelihood will decrease by 0.309. Lastly, for every increase in dry spell, we expect a 0.178 decrease in the perceived level of livelihood.

The results also implied that inadequate funds, insufficient labour, unpredictable rainfall and dry spell accounted for 29.7% of the variation in perceived level of livelihood of the women vegetable farmers, based on the adjusted R^2 values (Table 3). Similar to this finding is that of Abdullahi, Iheanacho and Ibrahim (2006) and Ezekiel, Olarinde, Ojedokun, Adeleke, Ogunniyi (2012) who reported an inverse relationship between dry spell and agricultural production, and consequently livelihood of farmers. Dinye and Ayitio (2013) have also reported that farmers were particularly vulnerable to inadequate funds which affect their production and consequently their livelihoods. It is also similar to the studies of Abdullahi et al. (2006) and Ezekiel et al. (2012) in Nigeria who found an inverse relationship between dry spell and level of crop production.

CONCLUSIONS AND RECOMMENDATIONS

The study showed that women vegetable farmers in the Central Region of Ghana were generally vulnerable to their external environment. Although they perceived vegetable farming to be contributing moderately to their livelihoods, they were highly vulnerable to high price of inputs, inadequate funds and unpredictable rainfall. The farmers were vulnerable to high price of inputs, price fluctuations, unpredictable rainfall and floods had no sustainable coping strategies. For vegetable pests and diseases, most farmers used synthetic pesticides. Regarding vulnerability to dry spells, few farmers irrigated their farms using water. A regression of perceived level of vulnerability showed that inadequate funds, labour unavailability, unpredictable rainfall and dry spell were the best predictors of vulnerability. Together, the variables accounted for 29.7% of the variation in the level of vulnerability of the women vegetable farmers.

To ensure sustainable development of the vegetable industry dominated by women in the Central Region of Ghana, appropriate policies, strategies, and priorities in research and development for managing livelihood vulnerabilities are needed. The Government of Ghana and non-governmental organizations would have a critical role to play in the process, by coming out with measures including extension training, targeted (controlled) subsidy and insurance schemes to assist women vegetable farmers in the country to manage their vulnerabilities better. Equally important is the need for research on factors influencing livelihood sustainability of women farmers in other regions in Ghana, and other agricultural enterprises including processing.

ACKNOWLEDGEMENT

The authors would like to acknowledge the financial support from the Centre for Scientific and Industrial Research (CSIR), Ghana for the research.

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