

1 Impact of Climate Change on Women Subsistence Farming Practices in Bumula Sub-County, Bungoma County, Kenya

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Abstract

Climate change is expected to adversely affect women subsistence farming practices and make their livelihoods more unsteady than their men counter parts; however, there is limited information on the impacts of climate change on women subsistence farming practices, particularly at a localized scale, yet they constitute an integral part of the population in addressing climate change. This study was designed to examine the impacts of climate change on women subsistence farming practices and their adaptation strategies. To realize the purpose of the study, a cross-sectional survey was adopted. Systematic random sampling method was used to pick desired sample of 396 households from the total of 44,922 households. Descriptive statistics in form of frequency tabulations, together with thematic analysis and image processing were employed. The findings revealed major impacts of climate change included; new variety of pests and diseases, loss of crops and livestock, drying of rivers, water and firewood shortage and increase in HIV/AIDS infections. Based on the findings, the study recommends that the ministry of agriculture should carry out intensive research to come up with effective ways of dealing with the new pests and diseases. More specifically the study recommends that the national and county government should strive to drill boreholes close to homes in order to enable women access water easily and free them more time to spend on their farms and other educative matters.

Keywords: Climate change, subsistence, farming

Introduction

Background of the Study

Subsistence farming according to Barnett (1969) is defined as “farming and associated activities which together form a livelihood strategy where the main output is consumed directly, where there are few if any purchased inputs and where only a minor proportion of output is marketed.” Subsistence farmers in developing countries and especially in sub-Saharan Africa will bear the largest consequences of climate change because climate change is already affecting water and food resources that are essential human essentials and it is even worse felt by the poor subsistence farmers that relies on climate sensitive supply system (Kurukulasuriya *et al.*, 2003). However these impacts will vary in nature and intensity according to specific locations. These then, calls for locational based studies. Reports show that climate change has already caused extensive decline in most of the crops such as beans, maize, sorghum, groundnuts and millet in several countries

such as Eritrea, Gambia, Zambia, Ethiopia, Ghana, Sudan and Kenya included. Yields from rain-fed crops will drop by 50% in 2020 which is now happening and decline net revenues from crops by 90% by 2100 in some countries, deteriorating food insecurity and putting millions of people in jeopardy of hunger, with Africa expected to account for the majority by 2080s particularly subsistence farmers (Fischer *et al.*, 2007; Boko *et al.*, 2007).

Kenya subsistence farming constitutes 85% of all farming activities and contributes significantly to agricultural output especially in rural areas it is the major livelihood activity. Like in other parts of sub-Saharan Africa, subsistence farming in Kenya is highly vulnerable to the impacts of climate change. It is the primary source of food and income for many rural poor, and is basically the only form of household support, but this is being threatened as explained by Harvey *et al.* (2018), that subsistence agriculture is susceptible to climate variability such as floods, increase in temperature. These impacts vary in nature and intensity according to location but most increasingly according to gender.

Women subsistence farmers are disproportionately vulnerable to the negative impacts of climate change since they make up a large number of the poorest in the society that are highly dependent on local natural resources for their living and regularly lack modern training (Denton *et al.*, 2008; United Nations Commission on the status of Women [UNCSW], 2008; European Institute for Gender and Equality, 2010).

Of great concern is that women in sub-Saharan Africa are becoming more and more engaged in the volatile subsistence agriculture where an estimated 60% draw their livelihood as opposed to other more vibrant livelihood activities. In most rural areas of sub-Saharan Africa; women are the major subsistence farmers, providing not only food for household, but also cultivate, sow, weed, harvest and thresh the crops. In the livestock sector, women feed and milk the larger animals, while raising poultry and small animals such as sheep, goats, rabbits and guinea pigs. Also, once the harvest is in, women provide most of the labour for post-harvest activities, taking responsibility for storage, handling, stocking, processing and marketing. In Kenya, as in other parts of Africa, women constitute the highest percentage of subsistence farmers where it is estimated that they perform 70% of food production work, 80% of hoeing, weeding and food storage (Baiphethi & Jacobs, 2020; Henrysson & Joireman, 2009). World Bank (2012) indicates that there are only a few tasks that are done exclusively by men, such as clearing the field, however, women perform all other tasks on their plots, from sowing, weeding to harvesting. In Bumula sub-County in western Kenya, as the case with other parts of the country, women predominate subsistence farming not only due to the gender relationship but also due to migration of husbands into urban areas in search of illusive employment and male indulging in alcohol drinking rendering them weak and thus making the woman to be the sole provider of the household. To a large extent, subsistence farming has provided women with critical sources of income and livelihood in sub-Saharan Africa due to limited and restricted options, unlike their male counterparts who normally engage in

alternative sources of income inform of non-farm activities such as small business enterprise. Therefore, worse impacts on subsistence farming, a life line for women, from climate change spells a doom for women. According to Goh (2012) climate change will greatly affect women subsistence farmers' livelihood and contribute to the already existing gender inequalities across the globe. This calls for efforts aimed at improving women subsistence farmers' resilience to the impacts of climate change. One way of doing so is having a deeper assessment at local scale of the impacts of climate change on women subsistence.

This calls for localized research in the country in order to find solutions to address the problem of climate change on subsistence farming in the country. Recent studies in the country have tended to focus on the coping strategies of the pastoral communities and hence the need for studies focusing on subsistence farming in the country.

Methodology and Study Setting

The study was conducted in rural areas of Bumula sub County of Bungoma County west of Kenya. It is located between longitude 34 ° 21.4' and 35 ° 04' East and latitude 0 ° 25.3 and 0°53.2' north. Bumula covers an area of 345.2 km² (Figure 1.1). It has a population of 215,892 persons (males 103,368 and females 112,523) with a density of 625 persons/Km² and a household size of 44,922 (KNBS, 2019). The region is mainly inhabited by the Bukusu community and partly other Luhya communities. The region experiences the long rains (March–July) and the short rains (August–October). The annual rainfall ranges between 400mm (lowest) and 1800 mm (highest). The annual temperature varies between 0°C and 32°C due to different levels of altitude, with the highest peak of Mt. Elgon recording slightly less than 0°C. The average wind speed is 6.1 km/hr. (GOK, 2005). However, this trend is changing due to impacts of climate change such as recurrent drought spells, experiences, erosion on river banks, fertile soils eroded by high rainfall, increase in temperatures, abnormal rainfall and new variety of pest and diseases. The region has well drained fertile lands suitable for food crops such as sweet potatoes, cassava, sorghum, millet, bananas, maize, beans and indigenous vegetables as well as cash crops such as palm oil, sugarcane, sunflower, cotton, coffee and tea. Livestock production includes; dairy cattle, goats, sheep and chicken. Out of the total labor force population, 52% are engaged in agricultural production which provides 60% of all household incomes, 19% have wage-employment and 13% are self-employed (GOK, 2005). Land in the region is scarce due to the population pressure, making it individually owned and fragmented therefore farmers practice subsistence farming which is mainly a female activity as most of the men have migrated to cities. As much as women engage in farm activities they don't own existing title deeds as they are in the custody of men, thus land ownership and control is still a preserve of men in Bumula Sub-County.

The study adopted the cross-sectional research design that utilized mixed approaches. The mixed method was relevant because it allowed for collection of both qualitative and

quantitative data at the same time. The study samples were picked from seven sub locations of Bumula sub county namely Bumula, South Bukusu, Khasoko, Kabula, Kimaeti, Siboti and West Bukusu (Independent Electoral and Boundaries Commission [IEBC], 2017). The target population were women who were either heads of the households or the partner to the head of the household and who actively participated in farming. Include were 6 key informants 2 agricultural extension officers, 2 officers from the county department of agriculture and 2 officers from the meteorological department. The study collected both qualitative and quantitative data from primary and secondary sources. The study employed field observation, women subsistence farmer's questionnaire, and interviews for key informant. The choice of the three tools was a data collection triangulation approach aimed at maximizing data sources. Primary data obtained using the questionnaires were analyzed using descriptive statistics in form of frequency tabulations, together with thematic analysis and image processing.

Permission to undertake this research was obtained from the National Commission for Science, Technology and Innovation (NACOSTI). Efforts were made to ensure pre-field work, field work and post-field work logistics have been achieved through the whole process

Findings

Farm Level Characteristics

The findings of farm level characteristics are presented in Table 1.1 shown below

Table 1

Farm Level Characteristics

Land Size: Min=.50 acres; Max =2 0.00 Acres; Mean=3.76 Acres; SD =3.59 Acres			
		n	%
Type of land ownership	Nuclear family owned with title	47	21.1
	Family/clan land	132	59.2
	Government owned but allowed to live and farm	3	1.3
	Leased	29	13.0
	Squatter	6	2.7
	Others specify	6	2.7
		74	33.2
How long have you practiced farming?	5 years and below		
	5 years to 20	91	40.8
	Over 20	58	26.0
		55	24.7
Do you have any other source of income outside farming?	Casual labour		
	Petty Kiosk	65	29.1
	Salary	59	26.5
	Pension	9	4.0
	Other	35	15.7
		203	91.0
What is your staple food	Maize		
	Beans	3	1.3
	Potatoes	9	4.0
	Sorghum	5	2.2
	Rice	3	1.3
	Cassava Others	0	0.0

The average land size available for most women subsistence farmers use was 3.6 acres, the smallest measuring 0.5 acres and the largest measuring 20acres. Most of the land (59.2%) was family /clan land. However, 21.1% of the land used was nuclear family owned and 13.0% was leased. It is evident that majority of the women subsistence farmers have small parcels of land and do not hold direct ownership of the land. Seleti and Tihompho (2014) noted that women in Wazigu Tanzania cannot inherit land. They are only granted food plots by their husbands. This increases women risk levels of losing land at any time thus increasing their vulnerability levels.

Of the subsistence farmers, 66.8 % were women with 5 years experience in farming, and 40.8% having an experience of between 5 to 20 years and 26% having an experience of over 20 years. This implies that they have accumulated knowledge in farming locality and may be well equipped to cope with challenges experienced over the years.

The findings of the study also showed that the alternative sources of income apart from farming were running kiosk business at 29.1%, salary 26.5%, and casual labourers are 24.7%. Based on these findings, it is evident that although some women subsistence farmers were engaged in alternative activities, however, these activities can hardly shield them from the climate shocks given that the earning from running kiosk and casual labour are unpredictable, irregular, and low. Rutaisire *et al.*, (2010) point out that the occupation of a household and alternative sources of income available to a household affect their income and workforce for farming activities. Women farmers in Bumula are therefore less likely to afford to engage in paid farm labour and afford to purchase farm inputs to improve their production. Main crops grown maize at 90.1%, sweet potatoes at 2.7%, then sorghum at 2.2%. From the findings it is clear that the main type of crop grown by women farmers which is mainly rain-fed is climate sensitive and is easily impacted negatively by climate changes leading to food security.

During Field observations a number of off-farm activities to subsidize their income from subsistence farming were noted. Key among activities observed included; water vending done by women pulling the cart, charcoal burning, and brick making.

Specifically, results in Table 2 show high levels of agreement and strong agreements to the following: that as a result of climate change, women subsistence farmers have to walk along distance to fetch water; that there is food shortage; victims of HIV/AIDS have risen; climate change has occasioned crops failure; there has been an increase in men (husbands) migrating to urban centers in search of jobs. During flood periods and the dry season in Nigeria, men temporary migrated to urban areas. More so, disasters have increased; new varieties of pests and diseases have emerged; soil degradation has taken place; cases of livestock loss are on the increase; water shortage is being experienced due to drying of boreholes and rivers have also been drying. Nelson and Stathers (2009) indicated that in Tanzania, declining soil fertility unpredictable rainfall, and increased occurrences of crop pest and diseases are leading to more crop failure and livestock deaths a situation that leads to an increase in seasonal migration of men to cities increasing HIV/AIDS infections in the village. Babagura (2010) confirms this in her study in South Africa. Impacts highlighted by the participating women subsistence farmers were corroborated by observations made on the ground and which are portrayed for example long queues by women and girls with many jerricans at the borehole to fetch water, shrinking passing river, emaciated cattle depicted by protruding ribs and damaged crops having holes in the leaves as a result of fall arms invasion.

Table 2

Impacts of Climate Change (n -223)

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
Long distance to fetch water	2	12.1	15	6.7	15	6.7	57	25.6	109	48.9
Shortage of food	2	0.9	17	7.6	37	16.6	74	33.2	93	41.7
Increased cases of HIV/AIDS	32	14.3	31	13.9	10	4.5	67	30.0	83	37.2
Crops failure	6	2.7	9	4.0	7	3.1	94	42.2	107	48.0
Men migrations	28	12.6	12	5.4	27	12.1	99	44.4	57	25.6
Increase in disasters	8	3.6	9	4.0	66	29.6	82	36.8	58	26.0
No pasture	6	2.7	23	10.3	9	4.0	83	37.2	102	45.7
New variety of pests and disease	9	4.0	5	2.2	17	7.6	100	44.8	92	41.4
Soil degradation	12	5.4	24	10.8	11	4.9	73	32.7	103	46.2
Livestock loss	21	9.4	18	8.1	15	6.7	91	40.8	78	35.0
Drying of boreholes	15	6.7	21	9.4	20	9.0	72	32.3	95	42.6
Drying of rivers	15	6.7	6	2.7	17	7.6	86	38.6	99	44.4

Conclusions and Recommendations

The result of the study revealed that climate change is occurring in Bumula sub-county and this has had substantial effects on women subsistence farmers. This is manifested in form of frequency of drought, unpredictable rainfall patterns, temperature variations as a result leading to new variety of pests and disease, long distance and increase in time looking for water sources, loss of crops and livestock, water and firewood shortage, loss of pasture, violence, high rate of men migration and increased in HIV/AIDS infections. To reduce this impacts of climate change on women subsistence farmers, the ministry of agriculture should carry out intensive research to come up with effective ways of dealing with the new pests and diseases. The national and county government should strive to drill boreholes close to homes in order to enable women access water easily and free them more time to spend on their farms. Finally, the national and county government should sensitize the society on the importance of equity in resources allocation; fundamental rights to land inheritance or women farmers stand high chances of losing their resources.

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