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Climate Variability and Feminization of Poverty in Tanzania: The Contribution of Gendered Ownership and Access to Household Assets

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Abstract

This cross-sectional study assesses the contribution of gendered ownership, control and access to household assets to feminization of poverty in Iringa District, Tanzania, by using a climate variability lens. The study involved 328 respondents from five villages. Data collection methods included structured interviews, focused group discussions, in-depth interviews and documentary review. The data collected was quantitative and qualitative. The study revealed that households in Iringa District are vulnerable to the effects of recurrent droughts and intermittent floods. Furthermore, it was found out that although men and women in Iringa District are affected by climate variability, women are more vulnerable than men. Women's limited voice in ownership, control, access and equal share of the benefits accrued from household resources increased their vulnerability; this results to feminization of poverty. The study concludes that despite global and local efforts to achieve gender equality by empowering women and girls, in Iringa District, women remain more vulnerable to the effects of climate variability due to, among others, unequal control, ownership, access to and share of the benefits accrued from household assets. It is recommended that women should be placed at the centre of all efforts to realize equality in ownership, control and access to household assets. This will increase women's resilience to the effects of climate variability, thereby reducing climate-induced feminization of poverty.

Keywords: gender, climate variability, feminization, poverty, Tanzania

1. Introduction

Climate change and variability is a global problem affecting different communities and their livelihoods differently due to their inherent differences in exposure, sensitivity, and adaptive capacity (Kangalawe & Lyimo, 2013; Balehey et al., 2018). In Sub-Saharan Africa, many households are vulnerable to the effects of climate variability due to poverty and high dependence on climate-sensitive livelihood sources such as rain-fed agriculture and low ability to adapt (Kotir, 2011). Tanzania is highly vulnerable to the effects of climate variability (UTR, 2012; Kangalawe & Lyimo, 2013). Empirical evidence shows that in Tanzania, incidences of drought, floods, late rainfall onsets, early rainfall

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recession, decreasing average annual rainfall and rising temperature are frequent, intense, widespread and take long (Goulden, 2006; Lyimo & Kangalawe, 2010; URT, 2015). For example, it has been established that over 70% of all-natural disasters are hydro-meteorological and related to droughts and floods (UTR, 2012). These changes have led to reduced crop yields, widespread climate-induced animal and crop pests, diseases, loss of income, damage of infrastructure, recurrent food shortages, and increased poverty (URT, 2012; Mwamfupe, 2014). Tanzania's high vulnerability to the effects of climate variability is due to, among other factors, its great dependence on rain-fed agriculture, with only 2% of arable land being irrigated (URT, 2015). Reed et al. (2013) observed that communities' vulnerability to the impacts of climate change and variability is attributed to many factors, including gender imbalance and unequal access to resources. This study was undertaken to determine the extent to which climate variability affects women's ownership, control, and access to household and livelihood assets.

2. Literature Review

2.1 Gendered Vulnerability to the Impacts of Climate Variability

Gendered norms and power inequalities such as participation in decision-making, knowledge and skills, division of labour, resources ownership, control and access leave men and women with different levels of exposure and vulnerability to climate-induced disasters (Nelson & Stathers, 2009; Balehey et al., 2018). Although both women and men are affected by climate change and variability, women are often more hard-hit (UNDP, 2010). Most women's higher vulnerability is exacerbated by the obtaining social, institutional and legal contexts. Therefore, women's vulnerability to the effects of climate change and variability is a product of their marginalization rather than an intrinsic feature (UNFCCC, 2016).

Rossi and Lambrou (2008) cautioned that the control and access to livelihood resources such as trees, land, water, income, credit, education, livestock, agricultural technology and social networks are not gender-neutral. Consequently, according to Goh (2012), the ownership, control and access to these assets increase the resilience of people to the effects of climate variability. This fact notwithstanding, it is evident that there are many differences in ownership, control and access to the key livelihood assets between men and women (Medeiros & Costa, 2008; Okali & Naess, 2013). For instance, in rural areas, most women own fewer and low-value assets and, in addition, they are likely to lose them through widowhood, divorce or separation (Goh, 2012; Shangwi, 2014). UNFCCC (2016) warns that gendered inequality in power, roles and resources control and access could result in differentiated vulnerability to the effects of climate change and variability. However, Lwando (2013) insists that local-level studies are crucial to validate these arguments.

Goh (2012) upholds that women are affected more by climate variability due to, inter alia, the lack of access and control of livelihood assets. His study, which focused on least developed countries, was basically a review of literature. The author further asserts that empirical evidence in this area is limited and highly contextualized, making it hard to make robust conclusions; suggesting the need for more local-level studies to generate empirical data for stronger conclusions. According to Galiè et al. (2015) and Goh (2012), women's ownership, control and access to resources such as land, finance, knowledge, water and livestock are important for enhancing their resilience to the effects of climate variability and reducing poverty. But how this links to socio-cultural identities in different contexts needs a localised exploration (Moosa & Tuana, 2014).

Several studies (e.g., Balehey et al., 2018; Omolo & Mafongoya, 2019; Rao et al., 2019) have examined the gendered vulnerability to the effects of climate change and variability in Africa. Other studies (e.g., Swai et al., 2012; Nombo et al., 2013; Mnimbo et al., 2016) have examined the effects of climate change and variability on gender and the adaptation/coping strategies in Tanzania. However, none of these studies undertook a detailed examination of the extent to which climate variability exacerbated the feminization of poverty under the influence of gendered ownership, control and access to household assets. However, Nelson and Stathers (2009) cautioned that generalisations about women's vulnerability and climate-induced poverty do not always tell the entire story. Therefore, this study was undertaken to widen the understanding of how climate variability intensifies the feminization of poverty in Iringa District, Tanzania.

2.2 Conceptual Underpinning of Feminization of Poverty

Feminization of poverty implies that poverty levels are intense among women or female-headed households (Medeiros & Costa, 2008). According to Chant (2007), feminization of poverty is built on three premises: women are poorer than men, the intensity of poverty among women is increasing compared to men, and female-headed households are poorer than those headed by men. Medeiros and Costa (2008) insist that feminization of poverty is a process, and so it should not be confused with 'higher levels of poverty', which is a state. Similarly, feminization of poverty is based on a comparison between men and women, and the households they head (Wennerholm, 2002; Medeiros & Costa, 2008). Due to this, it is a relative concept. As already mentioned, this study examines the extent to which climate variability feminizes poverty under the premise of women's limited ownership, control and access to household livelihood assets. Tvedten et al. (2008) observed that feminization of poverty differs across geographical space, time, class and ethnicity. Thus, generalizations should be avoided (Goh, 2012).

2.3 Policy Responses to Gendered Ownership and Access to Resources

Any policy framework that promotes gender-neutral control and access to resources will empower women to build resilience to the impacts of climate change and variability, and other types of socio-economic discrimination (Okali & Naess, 2013). For example, the *Convention on the Elimination of All Forms of Discrimination Against Women* (CEDAW) of 1979, and the *Beijing Conference* on women of 1995 aimed to ensure, among other things, women's equal access to economic resources, including land, credit, science and technology, education and vocational training as a means to empower women and girls (UN, 1996; Lokina et al., 2016). The fifth sustainable development goal (SDG 5) aims to achieve gender equality and empower all women and girls (UN, 2019).

In Tanzania, the Land Act of 1999 and Village Land Act of 1999 promote gender equality in ownership, access and control over land (JICA, 2016). The Tanzania Development Vision (TDV) 2025 is geared towards achieving gender equality and empowering women in all spheres of life, including ownership of resources (URT, 2000). Furthermore, the National Strategy for Gender Development aims to realize gender equality in, among others, access to and ownership of resources (Lokina et al., 2016).

Peterman (2011) emphasizes the fact that laws and customs that promote women's access to and control over resources enhance their economic advancement, particularly in Sub-Saharan Africa, where women are more marginalized. Therefore, securing women's rights to resources is a way to enhance their welfare, growth and equity. Despite significant efforts undertaken by the government of Tanzania -- including strengthening the institutional framework for implementing gender equality goals -- gender differences still persist across many spheres in the country, including ownership, control and access to household assets (Lokina et al., 2016).

2.4 Household Vulnerability to the Effects of Climate Variability in Iringa District

Many households in Iringa District are highly vulnerable to the effects of climate variability (Tairo, 2011; Kihupi et al., 2015). The district is located in a semi-arid zone, and the dependence on climate-sensitive livelihood assets by many households such as crop farming increases the propensity of households to be affected by extreme climatic events like droughts (Kihupi et al., 2015; Phillipo et al., 2015). As said earlier, although both men and women are affected by climate variability, the two groups face poverty differently; and can therefore be affected by climate variability differently (FAO, 2011). However, limited information was available on the gendered household assets' ownership and access in Iringa District and how they contributed to gendered vulnerability to the effects of climate variability. Also, little was known about the extent to which climate variability in the district affected women and, therefore, feminized poverty. Hence, this study, attempted to: (i) examine the extent of climate variability in

Iringa District; {ii) determine the effects of climate variability on households' livelihoods; and (iii) examine the extent to which gendered ownership, control and access to household assets are intensified by the effects of climate variability, and hence the feminization of poverty.

2.5 Theoretical Framework

This study was informed by the theoretical framework summarized in Figure 1.

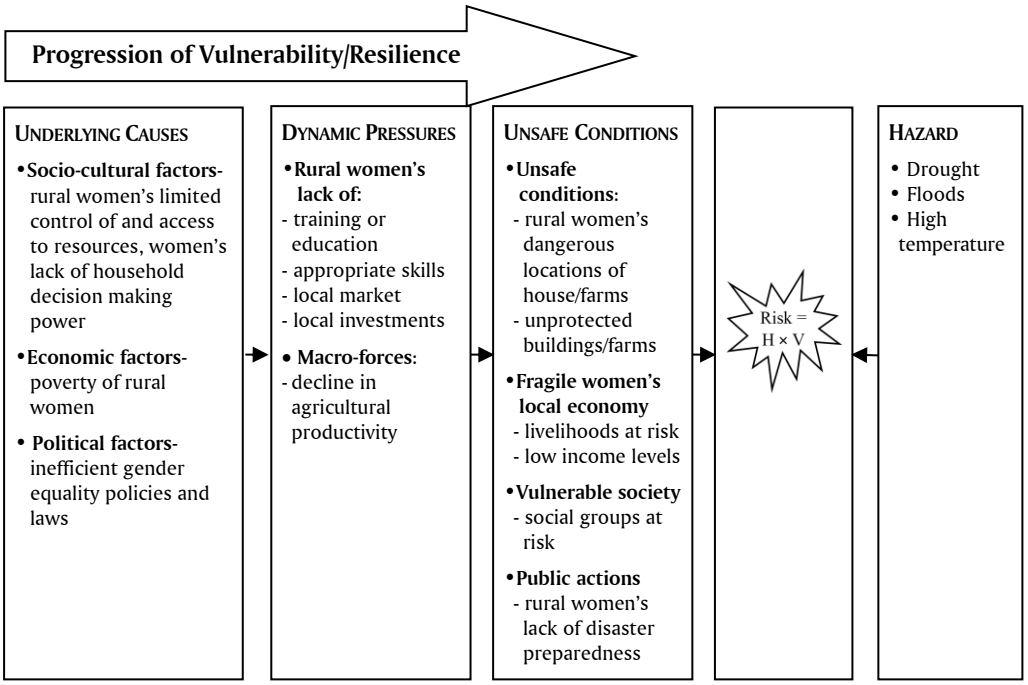

Figure 1: ***The Gendered Crunch Model***
Notes: H and V stand for hazard and vulnerability, respectively.
Source: Modified from Hai and Smyth (2012)

According to what is illustrated in Figure 1, rural women's vulnerability to the effects of climate variability is rooted in socio-cultural factors. These factors include marginalization in the control of and access to financial and natural resources; lack of household decision-making power; economic factors such as poverty of women; and political factors that include inefficient gender equality policies and laws (Rao et al., 2019). Women are vulnerable when they are unable to adequately anticipate, withstand and recover from hazards. Poverty is the main cause of women's higher vulnerability (Hai & Smyth, 2012). Cannon (2009) notes that poverty increases women's vulnerability to climatic shocks disproportionately. Due to this, a flood or a dry spell can cause disaster for poor

households at a local level, while richer households may not be affected to the same extent. Dynamic causes of pressure on most women -- for example, lack of training and education, inappropriate skills, lack of local markets, little local investment and decline in agricultural productivity -- subject rural women to severe effects of climate variability (Chant, 2007; Hai & Smyth, 2012), leading to the feminization of poverty (Goh, 2012; Rao et al., 2019).

When women are unable to withstand the effects of climatic hazards, they become unsafe/vulnerable. Vulnerable conditions include women's fragile livelihoods; lack of credit and savings facilities; dependence on very few climate-sensitive natural resources; unsafe location of houses on flood plains; lack of skills or knowledge; lack of opportunities dictated by gender; and lack of preparedness to climate change and variability. If such vulnerable conditions are met with a climatic hazard -- e.g., floods or drought -- disasters are bound to occur (Wisner et al., 2004; Hai & Smyth, 2012).

To enhance rural women's resilience to the effects of climate variability, there is a need to address the underlying causes of women's vulnerability, the dynamic pressures and the unsafe conditions by enacting and enforcing policies and laws that ensure equality between men and women's control of, and access to, financial and natural resources, among others (Hai & Smyth, 2012). Indeed, helping women gain more access to, and control of, key livelihood assets would help them adapt to the effects of climate variability and achieve many development gains (FAO, 2011).

This study contributes to SDG 5, which seeks to achieve gender equality and empowerment of women and girls. The basic argument is that if women continue to own less and low-value resources, they will be more vulnerable to the effects of climate variability. As a result, control and access to gendered household resources will feminize poverty, threatening the realization of SDG 5. Therefore, understanding the role of climate variability on the feminization of poverty intensified by gendered ownership of household resources, control and access is a prerequisite for realizing gender-neutral resource ownership, control and access, and building a climate-resilient community. Similarly, the study contributes to TDV 2025 that seeks to attain high-quality living standards of its citizens and build a strong and middle-income economy. To attain these goals, policies and actions geared at promoting gender-neutral resource ownership, control and access are crucial to empower women and to build a climate-resilient society, and reduce climate-induced feminization of poverty.

3. Methodology

3.1 Description of the Study Area

This study was conducted in Iringa District (Figure 1). Iringa District lies between latitudes 7^{o} 00′ and 8^{o} 30′ south of the Equator, and between longitudes 34^{o} 00′ and 37^{o} 00′ east of the Greenwich (URT, 2013a).

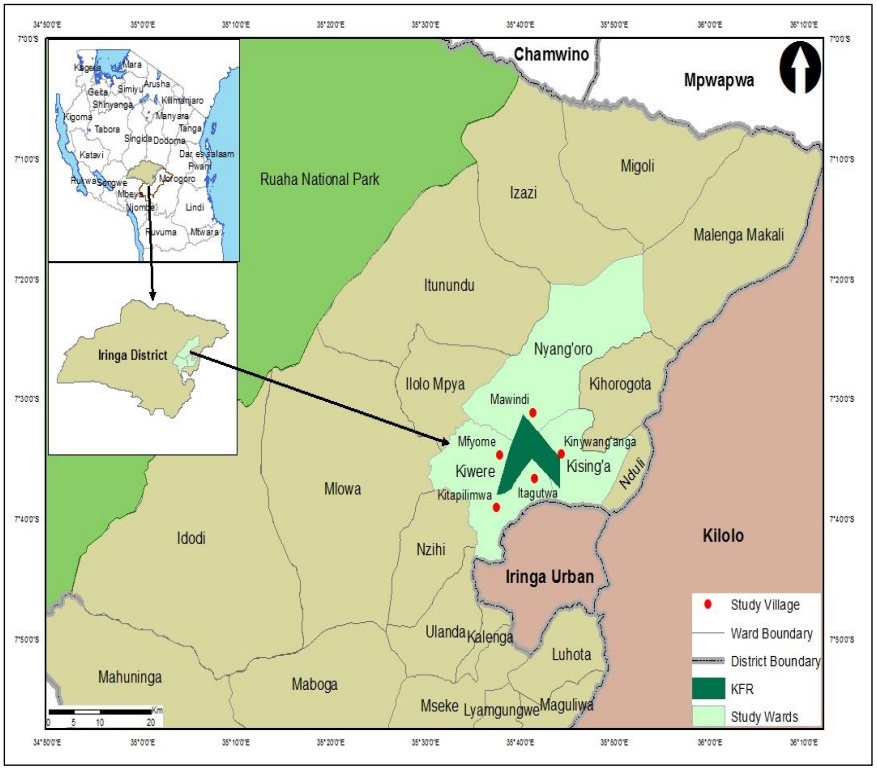

Figure 1: ***Map of Iringa District Showing Location of the Study Area***
Source: Haule, 2019

Figure 1 shows the location of the five study villages: Kinywang'anga (Kising'a ward), Itagutwa, Kitapilimwa, Mfyome (Kiwere ward) and Mawindi (Nyang'oro ward). Iringa District was selected for this study because, firstly, the district was one of the major maize producing districts in Iringa Region, but now agricultural production in the district has gone down due to, among other factors, erratic rainfall (Kihupi et al., 2015; Phillipo et al., 2015). Secondly, the district experiences recurrent drought conditions and rising temperatures (Kihupi, 2016). Therefore, it is more vulnerable to the effects of climate variability than other districts in the region. Thirdly, the villages chosen for the study are more vulnerable to the effects of climate variability than the rest. Lastly, little is known on the contribution of gendered household assets ownership, control and access to women's vulnerability as a result of the effects of climate variability, leading to feminization of poverty.

The climate in Iringa District varies with altitude, which is divided into midland and lowland zones. The midland zone receives moderate mean rainfall ranging from 600mm to 1000mm annually, with mean annual temperature

ranging from 15°C to 20°C. The lowland zone receives low mean rainfall ranging between 500mm and 600mm annually, with mean annual temperature ranging between 20°C and 25°C (URT, 2013a).

3.2 Sample Size and Sampling Procedures

The study used purposive sampling to sample the study villages. Key informants included village executive officers (VEOs), ward agricultural extension officers (AEOs), and elderly farmers who were more conversant with the local environment were selected for focused group discussions (FGDs). Proportional sampling techniques (Israel, 1992) were used to draw a sample from each village, whereby 328 household heads were sampled. It is worth noting that a household was the sampling unit for this study. Thus, lists of household heads aged 18 years and above from the VEOs' office were used to systematically sample the household heads. Table 1 shows the total number of the participants for the study.

Table 1: **Summary of Participants Selected**

Category of Participant	Itagutwa	Kitapilimwa	Kinywanganga	Mawindi	Mfyome	Total No. of Participants
Household heads	79	46	36	38	129	328
FGDs participants	8	8	8	8	8	40
Ward AEOs						3
VEOs	1	1	1	1	1	5
Total	**88**	**55**	**45**	**47**	**138**	**376**

Source: Field data, 2016/2017

3.3 Data Collection

The study used both quantitative and qualitative research designs to collect quantitative and qualitative data. According to Easterby-Smith et al. (2008), the triangulation of research designs increases the validity and reliability of research findings. Primary quantitative data was collected using structured interviews, and a questionnaire tool was used to meet this purpose. Qualitative data was collected using in-depth interviews and FGDs. In each village, one FGD was conducted. Each FGD consisted of 8 participants. Secondary data was collected through documentary review. Meteorological data (temperature and rainfall) of Iringa District for 31 years (1986-2016) was obtained from the Tanzania Meteorological Agency (TMA).

3.4 Data Analysis and Presentation

The quantitative data collected with structured interviews was analysed using the International Business Machines Statistical Package for Social Sciences (IBM SPSS) software version 20, to get frequencies and percentages. Also, the IBM SPSS was used to run the Mann-Kendall Test (Kendall's tau) to determine the trends of rainfall and temperature at 5% level of significance, with $p < 0.05$ for the 31 years in question (1986-2016). Furthermore, the rainfall and temperature data was analysed using the coefficient of determination (R^2) to determine their variability. An R^2 of 1 shows that all variations in the dependent variable are attributed to changes in the independent variable(s); whereas an R^2 of 0 shows no linear relationship between the dependent and independent variables. The Microsoft Excel software was used to draw rainfall and temperature graphs to analyse mean monthly rainfall trends for the three decades. Qualitative data was analysed using content analysis techniques. Quantitative data was presented using tables and figures, whereas qualitative data was presented in the form of descriptions.

4. Results and Discussion

4.1 Households' Perceptions of Climate Variability

Households' awareness of climate variability influences their decisions to cope with, and adapt to, the effects of climate variability, as observed in Mtambanengwe et al. (2012) and Daba (2018). A household survey (Table 2) found that most of the respondents (99.4%) were aware that for 20 years there had been climate variability in the study area.

Table 2: Households' Awareness of Climate Variability (N = 328)

Awareness of Climate Variability	**Gender**					
	Female		**Male**		**Total**	
	Frequency	***%***	***Frequency***	***%***	***Frequency***	***%***
Yes	116	100	210	99.1	326	99.4
No	0	0	2	0.9	2	0.6
Total	**116**	**100**	**212**	**100**	**328**	**100**

Source: Field data, 2016/2017

As can be seen in Table 2, awareness of climate variability between female and male respondents did not show a great difference in the study area. During in-depth interviews with the VEOs of all the studied villages, it was reported that drought was frequent and rainfall was erratic, coupled with ever-rising temperatures. FGDs with the elderly persons in the studied villages revealed that drought was becoming frequent, temperatures were rising, and rainfall onsets and cessations were becoming more unpredictable. The findings imply that the majority of households in Iringa District were aware of climate variability. The findings are almost similar to those of Macharia et al. (2012) who

found out that all respondents in the semi-arid regions of Kenya were aware of climate change and variability. Also, Mtambanengwe et al. (2012) reported that over 95% of the respondents in Makoni and Wedza districts, in Zimbabwe, were aware of climate change and variability. Meteorological data from TMA corroborated these household perceptions for 31 years (1986-2016). The analysis showed an increasing trend in mean annual temperature (R^2= 0.543) and the increase was statistically significant (p = 0.000), as shown in Figure 2.

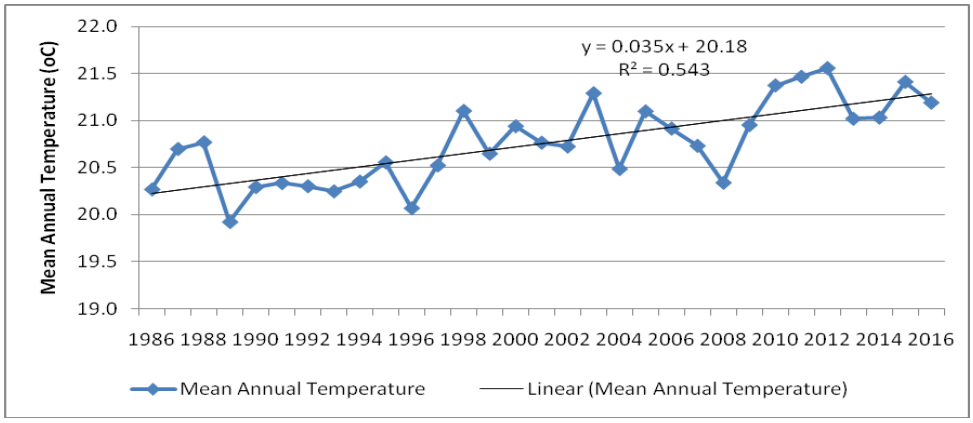

Figure 2: ***Mean Annual Temperature Trend of Iringa District (1986-2016)***

Source: Analysis based on TMA Data from Nduli Airport Weather Station, Iringa

Similarly, total annual rainfall for the same period revealed an increasing trend (R^2 = 0.071), though the increase was statistically non-significant (p = 0.284), as shown in Figure 3.

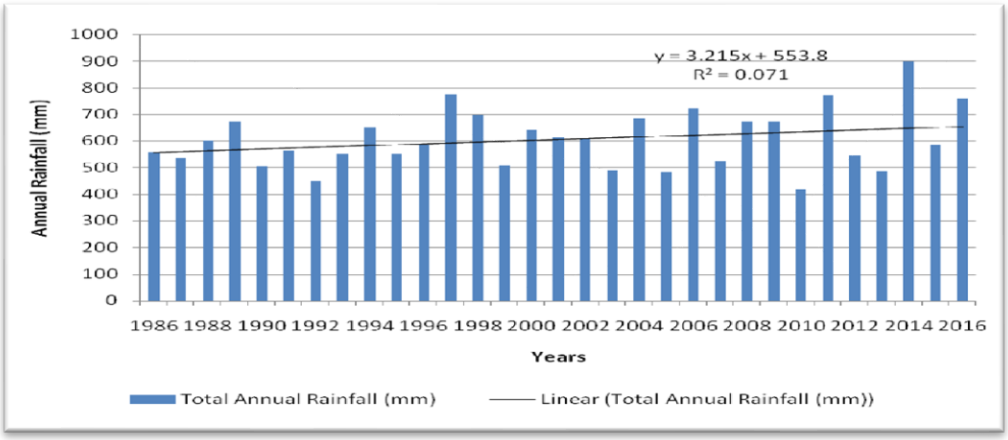

Figure 3: ***Total Annual Rainfall Trend of Iringa District (1986-2016)***

Source: Analysis based on TMA data from Nduli Airport Weather Station, Iringa

Mean monthly rainfall trends are important to households engaged in farming as this information can be used to create a farming calendar, as noted in Mwamfupe (2014). The meteorological data from the TMA for the three decades (1986-2016) were analysed to determine the mean monthly rainfall trends of the study area, and the results are presented in Figure 4.

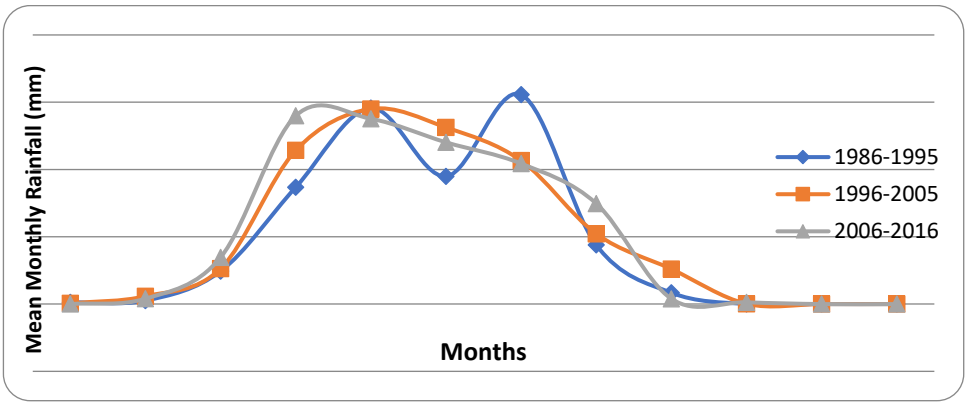

Figure 4: ***Mean Monthly Rainfall of Iringa District for Three Decades***
Source: Analysis Based on TMA Data from Nduli Airport Weather Station, Iringa

The data in Figure 4 shows that the rainfall peak for two decades (1996-2005 and 2006-2016) was in January, but the peak was in March for the 1986-1995 decade. Similarly, for the two decades (1986-1995 and 2006-2016), the dry season came early, in May; while for the 1996-2005 decade, the dry season came a bit late, in June. Early cessation of rainfall affects crops as they dry prematurely. Also, for the 1986-1995 decade, the lowest rainfall peak was recorded in February, while the total November rainfall for the same decade was 243.8mm, with an average of 24.4mm. For the 1996-2005 decade, the total November rainfall was 263.9mm, with an average of 26.4mm; while for the 2006-2016 decade, the total November rainfall was 382.1mm, with an average of 34.7mm. As it can be noted, the November (onset) rainfall for the last 3 decades has been very low, though an increasing trend can be observed. This low onset of rainfall affects rain-fed crop farming in the study area. On the part of rainfall cessation, for the 1986-1995 decade, total May rainfall was 83.8mm, with an average of 8.4mm; for the 1996-2005 decade total May rainfall was 259.5mm, with an average of 26mm; and for the 2006-2016 decade, total May rainfall was 42.6mm, with an average of 3.8mm. This suggests that rainfall cessation is shifting to April, shortening the growing season.

4.2 Effects of Climate Variability on Household Livelihoods

As alluded to earlier, climate variability has negative effects on household livelihoods, and these effects tend to differ across spatial-temporal dimensions,

as observed in Goh (2012), and Shumetie and Alemayehu (2018). The study surveyed household perceptions of the effects of climate variability on their livelihoods and Table 3 presents the findings.

Table 3: Perceptions of the Effects of Climate Variability on Livelihoods (N=328)

Perceived Effects	Itagutwa		Kinywanganga		Kitapilimwa		Mawindi		Mfyome		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Drying of crops before maturity	37	14	36	14	36	14	36	14	119	45	264	81
Decline in crop yields	27	11	51	21	45	19	85	35	34	14	241	74
Loss of income	32	14	28	12	32	14	27	11	117	50	326	72
Collapse of houses	48	21	20	9	31	14	18	8	113	49	230	70
Prevalence of crop pests and diseases	73	33	14	6	33	15	4	2	98	44	222	68
Effects on forest resources	30	14	20	9	38	17	15	7	115	53	218	67
Prevalence of human diseases	60	28	10	5	33	16	2	1	107	51	212	65
Drying of water bodies	22	11	27	13	39	19	33	16	85	41	206	63
Damage of roads	43	24	16	9	36	20	13	7	74	41	182	56
Prevalence of animal pests and diseases	66	36	13	7	34	19	4	2	65	36	182	56
Death of livestock due to drought or floods	33	22	5	3	23	16	3	2	83	57	147	45
Floods wash away crops	36	25	7	5	16	11	3	2	81	57	143	44
Soil erosion	25	24	7	7	18	17	3	3	52	50	105	32
Food insecurity	14	17	19	23	7	9	25	30	17	21	82	25

Note: Based on Multiple Responses Analysis

Source: Field data, 2016/2017

The findings in Table 3 reveal that respondents had different perceptions on the effects of climate variability on their livelihoods. The majority (81%) indicated that climate variability led to the drying of crops before maturity, while 25% had perceptions that climate variability led to food insecurity. The findings resonate with those of Senbeta (2009), Ogalleh et al. (2012) and Shumetie and Alemayehu (2018), who suggest that though the effects of climate variability differ from place to place, they also differ within one local community across different livelihood assets based on their extent of exposure, sensitivity and adaptive capacity. Mongi et al. (2010) further affirm that in semi-arid parts

of the Tabora region, Tanzania, climate variability lowered income and crop yields of rain-fed crop farming. Similar results were also reported by Kihupi (2016), and Phillipo et al. (2015).

The VEO of Kinywang'anga attributed the effects to late rainfall onset, which delayed sowing, low rainfall and early rainfall cessation. The ward AEOs informed that temperature rise increased soil moisture stress through evapotranspiration. An in-depth interview with the AEO of Kiwere ward revealed that due to climate variability, the average maize harvest per acre during the time of the study was between 2-3 bags, while a farmer who had observed all scientific farming procedures harvested between 30-40 bags of maize per acre 20 years before. As for Mawindi and Kinywang'anga, the situation was even worse. The AEO of Nyang'oro ward disclosed that 15-20 years before, an acre of maize was able to produce between 8-10 bags, while the same acre produced very few bags of maize at the time of the interview. FGDs explained that farmers were forced to incur costs to buy chemical fertilizers and expensive pesticides to treat climate-induced pests and diseases as adaptation strategies, making crop farming costly. Similarly, climate-induced pests and diseases affected the harvested and stored food and cash crops, compromising their quality. As a result, the crops commanded low market prices, affecting household income. FGDs in Mfyome noted that some villagers had stopped growing tobacco because, apart from other factors, climate variability had reduced crop yields, contributing to the loss of household income.

4.3 Determinants of Women's Vulnerability to the Effects of Climate Variability

As already noted, this study examined local perceptions of social groups that were more vulnerable to the effects of climate variability. The household survey results revealed that close to three-quarters of the respondents (62%) indicated that women were more vulnerable to the effects of climate variability, followed by children (23%), the elderly (11%), and men (4%). The findings differ from those by Senbeta (2009) whose study found out that only 10% of the respondents were of the opinion that women were more vulnerable to the impacts of climate change and variability. Also, the findings differ from those by Omolo and Mafongoya (2019), who found out that it was only the elderly women who were the most vulnerable group to the effects of climate variability. The plausible explanation for the differences could be disparities in exposure and sensitivity to the effects of climate variability.

The study further revealed that in the study area, the main factors for women's higher vulnerability to the effects of climate variability were their great dependency on, and engagement in, rain-fed crop farming (57%), the fact that they are the main caregivers of the family (28%), and their inability to easily migrate (15%). In-depth interviews with the VEOs and FGDs in Kinywang'anga,

Mawindi and Mfyome ascertained that most of the women in the study area were more vulnerable to the effects of climate variability because most had little education, earned low income, and the majority were engaged in rain-fed crop farming. The findings are affirmed by Kibona (2009) and Lwando (2013), who found that most women's vulnerability was attributed to their poverty and high engagement in climate-sensitive activities such as crop farming, animal keeping and petty trade.

The study examined five key vulnerability variables to determine their contribution to gendered vulnerability relating to effects of climate variability and feminization of poverty in the study area. These variables, and the extent they affect women, are elaborated in the sections that follow.

4.3.1 Education

The education level of the head of household influences the degree of vulnerability to the effects of climate variability. According to Omolo and Mafongoya (2019), the lower the education level, the higher the vulnerability to the effects of climate change and variability. The study examined the education level of the respondents based on their gender and the findings are presented in Table 4.

Table 4: Level of Education of Respondents (N = 328)

Education Level	**Gender**					
	Female		**Male**		**Total**	
	Frequency	***%***	***Frequency***	***%***	***Frequency***	***%***
Illiterate	8	6.9	12	5.7	20	6.1
Adult education	2	1.7	6	2.8	8	2.4
Primary education	104	89.7	172	81.1	276	84.2
O'level secondary education	2	1.7	21	9.9	23	7
Tertiary level education	0	0	1	0.5	1	0.3
Total	**116**	**100**	**212**	**100**	**328**	**100**

Source: Field data, 2016/2017

The data in Table 4 shows that although most of the respondents (84.2%) had primary education, only 9.9% of the male respondents had ordinary level secondary education compared to only 1.7% of the female respondents. Furthermore, although enrolment of girls in secondary education has increased tremendously in Tanzania (World Bank, 2018), URT (2018) pointed out that in Tanzania 15% of females had completed secondary school in urban areas compared to only 4% of females in rural areas. The findings of this study also indicate that many women in rural areas, are less educated, which increases their propensity of being affected by climate variability, hence feminization of poverty. This is because less-educated individuals are likely to have limited ability to adapt to climate variability (Mhinte, 2000). The findings echo those by Omolo and

Mafongoya (2019), who also confirmed that literate male respondents were greater in number than literate female respondents, increasing the likelihood of female respondents being more vulnerable to climate variability.

4.3.2 Income

Household vulnerability to the effects of climate variability is greatly determined by their income level as observed in Balehey et al. (2018) and Alhassan et al. (2019). Though there is no one-to-one relationship between poverty and vulnerability (Nelson & Stathers, 2009), Posner and Weisbach (2011) indicated that poor people are 80% more likely to be vulnerable to the effects of climate change and variability than the well-off. The study surveyed household income based on gender of the respondents and the findings are presented in Table 5.

Table 5: Distribution of Respondents' Average Monthly Income (N = 328)

Income (TZS)	**Gender**					
	Female		**Male**		**Total**	
	Frequency	***%***	***Frequency***	***%***	***Frequency***	***%***
10,000-39,000	71	61.2	104	49.1	175	53.4
40,000-69,000	30	25.9	51	24	81	24.7
70,000-99,000	9	7.8	22	10.4	31	9.5
100,000-129,000	3	2.5	13	6.1	16	4.9
130,000-159,000	2	1.7	5	2.4	7	2
160,000+	1	0.9	17	8	18	5.5
Total	**116**	**100**	**212**	**100**	**328**	**100**

Source: Field data, 2016/2017

The findings in Table 5 show that the majority of female respondents (61.2%) earned an average of TZS 10,000-39,000 per month, compared to 49.1% of male respondents. Furthermore, while 8% of the male respondents earned TZS 160,000+, only 0.9% of female respondents earned the same amount of money. It is important to note that at the time of undertaking this study, US$1 was equivalent to TZS2,220. According to the World Bank (2019), the international poverty line is USD 1.90 per day, and Tanzania's national poverty line is TZS49,320 per month. In general, although most of the respondents in the study area have a low income, comparatively, female respondents earn even lower income than male respondents. Since climate variability reduces the income of the respondents (Table 3), women are more affected because they already earn a lower income, increasingly feminizing poverty. FGDs in Kinywang'anga and Mawindi were concerned that climate variability increased the cost of agricultural production in terms of buying improved seeds and pesticides, and carrying out irrigation. So, households that earned lower income were more affected by climate variability.

The VEOs of Mfyome and Itagutwa were of a similar opinion: that female-headed households were highly affected by climate variability because they were the sole bread earners of their families despite their low incomes. This increased their poverty and the risk of being food-insecure. The VEO of Kitapilimwa admitted that most women spent most of their income to buy food; so, as climate variability further lowered their income, household food security was also greatly threatened.

4.3.3 Assets

Household access to, control and ownership of productive assets such as land, livestock, and finance enable members to create stable and productive lives, increasing their resilience to the effects of climate variability, as acknowledged by Balehey et al. (2018) and Omolo and Mafongoya (2019). The study, therefore, examined the main livelihood assets owned by the respondents. Figure 5 presents the results.

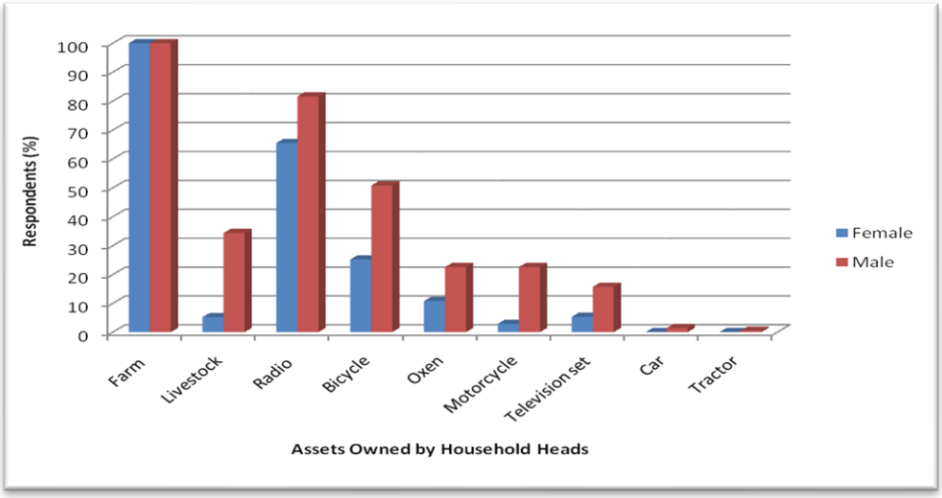

Figure 5: ***Gender-based Ownership of Some Household Assets***

Note: Based on Multiple Responses Analysis

Source: Field data, 2016/2017

The data in Figure 5 shows that most of the assets were owned and controlled by male respondents. For example, while 34.4% of male respondents owned livestock, only 5.2% of female respondents did. Also, while 22.6% of male respondents owned oxen, the asset was owned by 10.8% of the female respondents. Furthermore, 22.6% and 2.9% of male and female respondents, respectively, owned motorcycles. Male respondents who owned cars and tractors were only at 1.4% and 0.5%, respectively. In-depth interviews with the

VEOs found that, culturally, most valuable household assets such as cattle, oxen, motorcycles, cars and tractors were owned and/or controlled by male household members.

On the part of land, though Figure 5 shows that just as many women as men owned farms, in-depth interviews with the VEOs made it clear that most of the women just had access to land, but they did not own it. Kabeer (2001: 123) wrote: "*…while women may have access to land, they do not usually have title to it, resulting in insecurity of tenure*." FGDs and in-depth interviews with the VEOs proved that many people acquired land through family sharing and inheritance, a practice that favoured male household members. FinScope Tanzania (2017) proves this case as it reports that only 4 out of 10 women in Iringa own land. A study by Hemed (2015) further affirms that only 32% of women own land in Iringa district. The current study confirmed the scenario and found out that most women in the district have limited ownership, control, and access to key livelihood assets, which increases their vulnerability to climate variability and feminization of poverty. Again, Guloba (2014) reported that most female-headed households not only owned very few, but also very poor quality household, enhancing the feminization of poverty.

4.3.4 Access to Loans

Access to loans empowers households to enhance their resilience to the effects of climate variability, as noted in Alhassan et al. (2019). The household survey revealed that only 17.4% of the respondents in the study area had secured loans from financial institutions in the past 10 years (Table 6).

Table 6: Household Access to Loans (N=328)

Access to Loan	Female		Male		Total	
	Frequency	*%*	*Frequency*	*%*	*Frequency*	*%*
Yes	12	10.3	45	21.2	57	17.4
No	104	89.7	167	78.8	271	82.6
Total	**116**	**100**	**212**	**100**	**328**	**100**

Source: Field data, 2016/2017

A gender-wise examination of Table 6 shows that only 10.3% of the female respondents had secured loans in the last 10 years, compared to 21.2% of male respondents. The findings suggest that male-headed households have a higher chance of accessing loans than female-headed households. FGDs and in-depth interviews with the VEOs confirmed that soft loans helped households buy farm inputs like improved seeds, fertilizers, pesticides, and also pay farm workers. It is worth noting, therefore, that since crop yields and household income are reduced by climate variability (Table 3), and since most of the female respondents earn lower incomes compared to men (Table 5), the prior's limited access to soft loans increased their vulnerability to the effects of climate variability, hence the feminization of poverty.

The results are in line with those obtained by URT (2013b: 238), which reported that there were 107 women economic groups with a total of 666 members (an average of 6 members per group) in Iringa district in 2012. Out of these, only 55 groups (an average of 330 women) received loans from the government. Meanwhile, the 2012 National Population and Housing Census shows that Iringa district had a population of 245,032 people, of whom 138,284 (56.4%) were women (URT, 2013a). This further proves that the majority of women in the district have no access to loans, increasing their vulnerability to the effects of climate variability. The results concur with those by Alhassan et al. (2019), who found out that in Ghana, female-headed households with limited access to credit were more vulnerable to the effects of climate variability. A study that was carried out in the Nile Basin, Ethiopia, by Deressa et al. (2009), found that access to soft loans empowered farmers to buy farm inputs and irrigation facilities. Similarly, Yirga (2007) noted that there was a positive correlation between adoption of agricultural innovations and the availability of loans in the central highlands of Ethiopia.

4.3.5 Main Economic Activities

The main economic activities of the respondents determined their vulnerability to the effects of climate variability because some of the economic activities are climate-sensitive. Households whose livelihood sources have been diversified into on-farm, off-farm and non-farm activities are better positioned to withstand climatic shocks, as noted in Kangalawe and Lyimo (2013). The study examined households' main economic activities and the results are presented in Table 7.

Table 7: Main Economic Activities of the Respondents (N=328)

Occupation	**Gender**					
	Female		**Male**		**Total**	
	Frequency	***%***	***Frequency***	***%***	***Frequency***	***%***
Crop farming	110	94.8	138	65.1	248	75.6
Mixed farming	6	5.2	73	34.4	79	24.1
Employment and farming	0	0	1	0.5	1	0.3
Total	**116**	**100**	**212**	**100**	**328**	**100**

Source: Field data, 2016/2017

Looking at Table 7, it becomes apparent that all the respondents were dealing with crop farming though some (24.1%) were mixed farmers and one respondent (0.3) was a farmer and a watchman at Itagutwa's piped water intake. A gender-wise analysis revealed that most of the female respondents (94.8%) dealt with crop farming, with only 5.2% dealing with mixed farming, while male respondents dealing with crop farming and mixed crop farming were 65.1% and 43.4%, respectively. The findings suggest that most of the female-headed

households had their livelihoods drawn mainly from crop farming. Since crop farming in the study area is rain-fed and therefore climate-sensitive, climate variability affects women's livelihood source the most, reducing crop yields and household income. This implies that the effects of climate variability push many women to severe poverty. In-depth interviews with the ward AEOs of Mawindi and Kinywang'anga proved that recurrent droughts and erratic rainfalls in the study area increased the costs of agricultural production, and reduced crop yields per unit area and household income. So, households that seriously depended on rain-fed crop farming were more affected by climate variability.

5. Conclusion

The study has shown that there is climate variability in Iringa District in terms of frequent droughts, rising temperatures, low and erratic rainfall and occasional floods. The study has also found that many households in Iringa District are vulnerable to the effects of climate variability. However, taking into account the key variables that have serious implications on gendered vulnerability to climate variability, the empirical evidence shows that women are more vulnerable to climate variability compared to men in Iringa district. In the study area, compared to men, women are less educated, earn less, own fewer and lesser valuable assets, and constitute the majority of farmers that depend on rain-fed crop farming which is climate-sensitive, and have limited opportunities to secure soft loans from financial institutions and the government. These factors increase their vulnerability to the effects of climate vulnerability, which devastates their meagre and climate-sensitive livelihood sources. This intensifies their poverty level, hence feminization of poverty.

It is recommended that the government and other stakeholders translate into action all policies and legal statements intended to help women own, control, and have access to key livelihood assets needed to enhance their resilience to the effects of climate variability. To achieve this policy goal, the government and other stakeholders should ensure that women have a voice in identifying what benefits they would prefer, and how they would wish to receive them.

References

Alhassan, S. I., Kuwornu, J. K. & Osei-Asare, Y. B. 2019. Gender Dimension of Vulnerability to Climate Change and Variability. Empirical Evidence of Smallholder Farming Households in Ghana. *International Journal of Climate Change Strategies and Management, 11*(2): 195–214. Doi 10.1108/ijccsm-10–2016–0156.

Balehey, S., Tesfay, G. & Balehegn, M. 2018. Traditional Gender Inequalities Limit Pastoral Women's Opportunities for Adaptation to Climate Change: Evidence from the Afar Pastoralists of Ethiopia. *Pastoralism: Research, Policy and Practice, 8*(23): 1–14. https://doi.urg/10.1186/S13570–018–0129–1.

Cannon, T. 2009. Gender and Climate Hazards in Bangladesh. in Terry, G. (Ed.. *Climate Change and Gender Justice* (pp. 11–17. Warwickshire: Practical Action Publishing Ltd. and Oxfam GB.

Chant, S. 2007. *Gender, Generation and Poverty: Exploring the 'Feminization of Poverty' in Africa, Asia and Latin America.* Cheltenham: Edward Elgar Publishing.

Daba, M. H. 2018. Assessing Local Community Perceptions on Climate Change and Variability and Its Effects on Crop Production in Selected Districts of Western Oromia, Ethiopia. *Climate Weather Forecasting*, *6*(1): 1–8. doi: 10.4172/2332–2594.10002.

Department for International Development (DFID. 2008. The *Impacts of Climate Change on the Vulnerability of the Poor*. London: DFID.

Deressa, T. T., Hassan, R. M., Ringler, C., Alemu, T. & Yesuf, M. 2009. Determinants of Farmers' Choice of Adaptation Methods to Climate Change in the Nile Basin of Ethiopia. *Global Environmental Change*, 19: 248–255.

Dery, I. 2015. Access to and Control Over Land as Gendered: Contextualizing Women's Access and Ownership Rights of Land in Rural Ghana. *Journal of Development Studies*, *45*(2): 28–48.

Easterby-Smith, M., Thorpe, R. & Jackson, P. R. 2008. *Management Research*. (3rd Ed.. London: Sage Publishers.

Finscope Tanzania. 2017. *Iringa Regional Report*. Dar es Salaam: Financial Sector Deepening Trust (FSDT).

Food and Agriculture Organization (FAO). 2011. The *State of Food and Agriculture 2010–2011–Women in Agriculture: Closing the Gender Gap for Development*. Rome: Food and Agriculture Organization.

Galiè, A., Mulema, A., Benard, M. A., Onzere, S. N. & Colverson, K. E. 2015. Exploring Gender Perceptions of Resource Ownership and Their Implications for Food Security Among Rural Livestock Owners in Tanzania, Ethiopia and Nicaragua. *Agriculture and Food Security*, *4*(2): 1–14.

Goh, A. H. 2012. A *Literature Review of the Gender-Differentiated Impacts of Climate Change on Women's and Men's Assets and Well-Being in Developing Countries.* (Capri Working Paper No. 106. Washington, DC: International Food Policy Research Institute. http://dx.doi.org/10.2499/capriwp106.

Goulden, M. 2006. *Livelihood Diversification, Social Capital and Resilience to Climate Variability Amongst Natural Resource Dependent Societies in Uganda*. School of Environmental Sciences, University of East Anglia.

Guloba, M. 2014. Analysis of Adaptation to Climate Variability and Change in Uganda: A Gender and Household Welfare Perspective. Doctoral Dissertation, University of Dar es Salaam.

Hai, V. M. & Smyth, I. 2012. The *Disaster Crunch Model: Guidelines for a Gendered Approach.* Oxford: Oxfam GB.

Haule, T. R. 2019. Role of Non-Timber Forest Products in Communities' Adaptation to Climate Variability Effects in Iringa District, Tanzania. Doctoral Dissertation, University of Dar es Salaam.

Hemed, B. R. 2015. Factors Influencing Ownership of Modern Houses Among Households in Iringa District, Tanzania. MA Dissertation, Sokoine University of Agriculture.

Israel, G. D. 1992. *Determining Sample Size*. Institute of Food and Agricultural Sciences. University of Florida. Available at Https://Www.Gjimt.Ac.In/Wp-Content/Uploads/2017/10/2_Glenn-D.-Israel_Determining-Sample-Size.Pdf. Accessed 11/07/2020.

Japan International Cooperation Agency (JICA). 2016. *Country Gender Profile: Tanzania Final Report*. Japan: JICA.

Johnson, N. L., Kovarik, C., Meinzen-Dick, R., Njuki, J. & Quisumbing, A. 2016. Gender, Assets, and Agricultural Development: Lessons from Eight Projects. *World Development*, 83: 295–311. http://dx.doi.org/10.1016/j.worlddev.2016.01.009.

Kabeer, N. (ed.). 2001. *Empowerment from Below: Learning from the Grassroots*. London: Verso.

Kangalawe, R.Y. & Lyimo, J. G. 2013. Climate Change, Adaptive Strategies and Rural Livelihoods in Semi-Arid Tanzania. *Natural Resources*, 4: 266–278.

Kibona, E. 2009. Climate Variability and Change Adaptation Strategies and Implication to Gender Roles in Simanjiro District. Msc Dissertation, University of Dar es Salaam.

Kihupi, M. L., Mahonge, C. & Chingonikaya, E. E. 2015. Smallholder Farmers' Adaptation Strategies to Impact of Climate Change in Semi-Arid Areas of Iringa District, Tanzania. *Journal of Biology, Agriculture and Healthcare*, *5*(2): 123–131.

Kihupi, M. L. 2016. Effectiveness of Smallholder Farmers' Adaptation Strategies in Improving Well-Being in Light of Climate Change in Iringa District, Tanzania. Doctoral Thesis, Sokoine University of Agriculture.

Kotir, J. H. 2011. Climate Change and Variability in Sub-Saharan Africa: A Review of Current and Future Trends and Impacts on Agriculture and Food Security. *Environ Dev Sustain,* 13: 587–605. https://doi.org/10.1007/S10668–010–9278–0.

Lokina, R., Nyoni, J. & Kahyarara, G. 2016. *Social Policy, Gender and Labour in Tanzania. THDR 2017: Background Paper No. 7.* Economic and Social Research Foundation Discussion Paper No. 68. Dar es Salaam.

Lwando, C. 2013. Climate Variability and Gender: Emerging Experiences from Western Zambia. *Environment and Natural Resources Research*, *3*(4): 133–146.

Lyimo, J. G. & Kangalawe, R. Y. 2010. Vulnerability and Adaptive Strategies to the Impact of Climate Change and Variability. The Case of Rural Households in Semi-Arid Tanzania. *Environmental Economics, 1*(2): 89–97.

Macharia, P. N., Thuranira, E. G., Ng'ang'a, L. W., Lugadiru, J. & Wakori, S. 2012. Perceptions and Adaptation to Climate Change and Variability By Immigrant Farmers in Semi-Arid Regions of Kenya. *African Crop Science Journal*, *20*(2): 287–296.

Medeiros, M. & Costa, J. 2008. is There a Feminization of Poverty in Latin America? *World Development*, *36*(1): 115–127.

Mhinte, A. R. 2000. Analysis of Rural Households Coping Strategies Against Seasonal Food Insecurity in Kilosa District, Morogoro. Msc Dissertation, Sokoine University of Agriculture.

Mnimbo, T. S., Mbwambo, J., Kahimba, F. C. & Tumbo, S. D. 2016. A Gendered Analysis of Perception and Vulnerability to Climate Change Among Smallholder Farmers: The Case of Same District, Tanzania. *Climate and Development, 8*(1): 95–104. Doi: 10.1080/17565529.2015.1005038.

Mongi, H., Majule, A. E. & Lyimo, J. G. 2010. Vulnerability and Adaptation of Rain-Fed Agriculture to Climate Change and Variability in Semi-Arid Tanzania. *African Journal of Environmental Science and Technology, 4*(6): 371–381.

Moosa, C. S. & Tuana, N. 2014. Mapping a Research Agenda Concerning Gender and Climate Change: A Review of the Literature. *Hypatia*, *29*(3): 677–694.

Mtambanengwe, F., Mapfumo, P., Chikowo, R. & Chamboko, T. 2012. Climate Change and Variability: Smallholder Farming Communities in Zimbabwe Portray a Varied Understanding. *African Crop Science Journal, 20*(2): 227–241.

Mwamfupe, A. 2014. Assessment of Local Perceptions and Potential Roles of Local Institutions in Climate Change Adaptation in Rufiji District, Tanzania. Doctoral Thesis, University of Dar es Salaam.

Nelson, V. & Stathers, T. 2009. Resilience, Power, Culture, and Climate: A Case Study from Semi-Arid Tanzania, and New Research Directions. in Terry, G. (Ed.. *Climate Change and Gender Justice* (pp. 57–70. Warwickshire: Practical Action Publishing Ltd. and Oxfam GB.

Nombo, C. I., Urassa, J. K., Mbwambo, J. S., Mattee, A. Z., Mamiro, D. P., Kabote S. J. & Synnevåg, G. 2013. A Gendered Analysis of Climate Change Impacts and Adaptations in Semi-Arid Area Farming Systems of Tanzania. *Journal of Continuing Education and Extension, 4*(1): 212–227.

Ogalleh, S. A., Vogl, C. R., Eitzinger, J. & Hauser, M. 2012. Local Perceptions and Response to Climate Change and Variability: The Case of Laikipia District, Kenya. *Sustainability*, 4: 3302–3325. Doi: 10.3390/Su4123302.

Okali, C. & Naess, L. O. 2013. *Making Sense of Gender, Climate Change and Agriculture in Sub-Saharan Africa: Creating Gender-Responsive Climate Adaptation Policy*. Working Paper No. 057. Sussex: Future Agricultures Consortium, IDS.

Omolo, N. & Mafongoya, P. L. 2019. Gender, Social Capital and Adaptive Capacity to Climate Variability. A Case of Pastoralists in Arid and Semi-Arid Regions in Kenya. *International Journal of Climate Change Strategies and Management, 11*(5): 744–758. Doi 10.1108/IJCCSM-01–2018–0009.

Peterman, A. 2011. Women's Property Rights and Gendered Policies: Implications for Women's Long-Term Welfare in Rural Tanzania. *J Dev Stud., 47*(1): 1–30.

Phillipo, F., Bushesha, M. & Mvena, Z. S. 2015. Women Farmers' Characteristics and Perception Towards Climate Change and Variability in Iringa District, Tanzania. *Journal of Environment and Earth Science, 5*(8): 120–128.

Posner, E. A. & Weisbach, D. 2011. *Climate Change Justice*. Princeton: Princeton University Press.

Rao, N., Lawson, E. T., Raditloaneng, W. N., Solomon, D. & Angula, M. N. 2019. Gendered Vulnerabilities to Climate Change: Insights from the Semi-Arid Regions of Africa and Asia. *Climate and Development, 11*(1): 14–26.

Reed, M. S., Podesta, G., Fazey, I., Geeson, N., Hessel, R., Hubacek, K. & Thomas, A. D. 2013. Combining Analytical Frameworks to Assess Livelihood Vulnerability to Climate Change and Analyse Adaptation Options. *Ecological Economics*, 94: 66–77.

Rossi, A. & Lambrou, Y. 2008. *Gender and Equity Issues in Liquid Biofuels Production: Minimizing the Risks to Maximize the Opportunities*. Rome: FAO.

Senbeta, A. F. 2009. Climate Change Impact on Livelihood, Vulnerability and Coping Mechanisms: A Case Study of West-Arsi Zone, Ethiopia. Msc. thesis, Lund University.

Shangwi, I. S. 2014. *Role of Operative Micro-Finance on Poverty Alleviation in Tanzania: The Need for a Holistic Research Approach.* Economic and Social Research Foundation Discussion Paper No. 65. Dar es Salaam.

Shumetie, A. & Alemayehu, Y. M. 2018. Effect of Climate Variability on Crop Income and Indigenous Adaptation Strategies of Households. *International Journal of Climate Change Strategies and Management, 10*(4): 580–595. https://doi.org/10.1108/ ijccsm-04–2016–0039.

Swai, O. W., Mbwambo, J. S. & Magayane, F. T. 2012. Gender and Adaptation Practices to the Effects of Climate Change in Bahi and Kondoa Districts, Dodoma Region, Tanzania. *Journal of Sustainable Development, 5*(12): 65–77.

Tairo, V. E. 2011. Utilization of Woody Plants During Times of Food Scarcity from Selected Dry Lands of Iringa District, Tanzania. Doctoral Thesis, University of Nairobi.

Tvedten, I., Paulo, M. & Montserrat, G. 2008. *Gender Policies and Feminization of Poverty in Mozambique*. Chr. Michelsen Institute Report. Bergen: CMI.

United Nations. 1996. *Report of the Fourth World Conference on Women. Beijing, 4–15 September 1995*. New York: United Nations.

—. 2019. The *Sustainable Development Goals Report 2019*. New York: United Nations.

United Nations Development Programme (UNDP). 2010. The *Contribution of UNDP-GEF Adaptation Initiatives Towards MDG3. Millennium Development Goals and Climate Change Adaptation*. New York: UNDP.

United Nations Framework Convention on Climate Change (UNFCCC). 2016. *Strengthening Gender Considerations in Adaptation Planning and Implementation in the Least Developed Countries*. Least Developed Countries Expert Group, Bonn: UNFCCC.

United Republic of Tanzania (URT). 2000. The *Tanzania Development Vision 2025*. Dar es Salaam: Planning Commission.

—. 2012. *National Climate Change Strategy*. Dar es Salaam: Vice President's Office, Division of Environment.

—. 2013a. *Iringa Rural District Council Socio-Economic Profile, 2013*. Dar es Salaam: National Bureau of Statistics, Dar es Salaam and Iringa Rural District Council, Iringa.

—. 2013b. *Iringa Region Socio-Economic Profile, 2013*. Dar es Salaam: Ministry of Finance, National Bureau of Statistics and Iringa Regional Secretariat.

—. 2015. *Agricultural Sector Development Strategy II: 2015/2016–2024/2025*. Dar es Salaam: Ministry of Agriculture, Food Security and Cooperatives.

—. 2018. *Tanzania Human Development Report 2017: Social Policy in the Context of Economic Transformation*. Da Es Salaam: Economic and Social Research Foundation.

Wennerholm, C. J. 2002. The *Feminization of Poverty: The Use of a Concept*. Stockholm: Swedish International Development Agency.

Wisner, B., Blaikie, P., Cannon, T. & Davis, I. 2004. at *Risk: Natural Hazards, People's Vulnerability and Disasters* (2nd Ed.. New York: Routledge.

World Bank. 2018. *Student Learning Outcomes in Tanzania's Primary Schools: Implications for Secondary School Readiness*. Washington, DC: World Bank.

—. 2019. *Tanzania Mainland Poverty Assessment*. Washington, DC: World Bank.

Yirga, C. T. 2007. The Dynamics of Soil Degradation and Incentives for Optimal Management in Central Highlands of Ethiopia. Doctoral Thesis, University of Pretoria.