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Exploring the Nature and Effects of Climate Change Induced Threats on the Health and Livelihood of Small Scale Farmers in Nega Nega Community of Mazabuka District, Zambia.

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ABSTRACT

Evidence shows that Zambia has over the past years experienced a number of climate-related hazards of which some of these have increased in frequency and impacted negatively the health and livelihoods of communities. This research therefore, explored the nature and effects of climate change induced threats on the health and livelihood of small-scale farmers in Nega Nega community of Mazabuka District, Zambia. The research was undertaken by using a Qualitative interpretive phenomenological design. 30 Purposively selected small scale crop farmers who had lived for more than 5 years in the study area were subjected to an interview. Data was analysed using thematic approach.The main findings of this research were that prolonged periods of drought, excessive flooding, and unpredictable rainfall patterns were the nature of climate induced threats. The research found that decreased yields in crop production,high maize price and poor living conditions were the major resultant of induced climate change threats on the health and livelihood of small scale farmers.This research recommends among others that the Ministry of Green Economy and Environment in Collaboration with the Ministry of Agriculture through district agriculture extension officers should enhance the campaign of tree planting in farming blocks as this may help to restore the lost forests.

Key Words: Climate change induced threats, Health, Livelihood, small scale farmers, Zambia.

INTRODUCTION

Growing empirical evidence shows that climate change poses serious threats to health, agriculture and food security as extreme weather events have reduced crop productivity worldwide and at the same time threatening human life (Lesk et al., 2016). Future projections predict that the average global temperature will rise by 2.0 to 6.4 °C and the increase in sea level will be 59 cm by the end of 21st century. The unprecedented rise in temperature for instance in Malawi had led to an increase in the incidence of heat waves, droughts, floods, and irregular patterns of precipitation (Alotaibi, 2023; Abid and Mehdi,2020).

In view of harzards associated with climatee change, Jamal and Zailina (2016) conducted a study on Climate Change, Extreme Weather Events, and Human Health Implications in the Asia Pacific Region. This was premised on the belief that Asia Pacific region is regarded as the most disaster-prone area of the world. The study reveaed that Extreme weather events included heat waves, cold waves, floods, droughts, hurricanes, tropical cyclones, heavy rain, and snowfalls.

There is a view that although, global climate change is an ongoing process, in recent times, the pace of this change has increased exponentially. This has been attributed to an incease in anthropogenic activities. The average temperature of the globe has increased by 0.9 °C since the 19th century (Zhao et al., 2017), mostly because of greenhouse gas emissions into the atmosphere. As predicted, this increase in temperature is expected to reach 1.5 °C or more by 2050 (Calicioglu et al., 2019).

In light of climate change, Ncube and Francis (2016) conducted a study on Climate change, household

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vulnerability and smart agriculture. This study examined the micro-level effects of climate change, assessed the vulnerability of rural households, and evaluated alternative adaptation strategies. Results indicate that climate change will have a severe impact on crop yields and that households with limited financial resources are the most vulnerable. These households comprise of senior citizens and female-headed households. Similarly, IPCC (2007), note that global climate change will impact on food and water security in a significant but highly uncertain manner in the coming years.

In the context of Zambia, Zambia National Climate Change Policy (2016) shows that , climate change challenges in Zambia are quite substantial due to its high dependence on climate sensitive natural resource sectors for food security, livelihoods and incomes. Empirical evidence shows that Climate shocks in Zambia are constantly increasing, thus pushing most people in rural areas especially small scale farmers into poverty (Ngoma,2021;Sianungu, 2015). Majority of the people in rural areas depend on rain-fed agriculture and must wait a long time before harvesting the crops that they have planted. The agricultural industry is the main source of income for rural communities, and climate change has become a serious worry. Most of these rural households are subsistence smallholder farmers who rely on rainfall for agricultural production (FAO, 2014). However, climate shocks surpass their coping abilities and erode their household assets. Thus, climate shocks' effects on agricultural production must be assessed to help adaptation mechanisms.

According to Zambia National Policy on Climate Change (2016), it is widely recognized that climate change constitutes a significant and serious threat to sustainable development of any country, including Zambia. Evidence shows that Zambia has over the past years experienced several climate related hazards including droughts and dry spells, seasonal and flash floods, and extreme temperatures (Ngoma, 2021; Sianungu, 2015). Some of these, especially droughts and floods have increased in frequency and intensity over the last few decades and have adversely impacted on food and water security, energy, and livelihood of communities. Temperatures also indicate a rising trend with potential for increased heat stress, land degradation and desertification. Such impacts are likely to compound the daunting economic and social challenges the country already faces (Zambia National Policy on climate change, 2016).

Statement of the Problem

Small scale farming is a common farming system in Zambia for people in rural communities like Nega Nega. Climate shock is projected to limit the potential for growth in the agriculture sector globally Nega Nega inclsuive (Dailo,2023;Burke et al , 2016). Low productivity and high levels of poverty, poor soils,poor market systems and unstable prices coupled with the effects of climate change will adversely affect agricultural production, human health and livelihoods on which the majority of the people depend on for income generation (Dailo, 2023; IFPRI, 2020; Sianungu, 2015; Food and Agriculture organisation, 2015; Siderious et al, 2014; Lobel et al, 2011; Lobel 2013). However, the nature and effects of climatic shocks on people's ability to make a living in Nega Nega are not well understood. Most studies on the effects of climate change mainly focus on Zambia in general and agriculture but are never specifc to certain types of farmers as well as effects on their livelihood. It was therefore imperative to explore the nature and effects of climate induced threats on the livelihood of small scale crop farmers in Nega Nega community of Mazabuka District, Zambia.

Theory

This research was anchored on Resilience theory, originally developed by Holling in 1973 and further expanded by other scholars such as Brian Walker and Lance Gunderson. The theory posit that systems have the capacity to absorb disturbances, adapt to changing conditions, and transform in response to shocks and stresses. The theory recognizes that systems are characterized by dynamic interactions and feedback loops between different components, and that these interactions influence the system's ability to withstand and recover from disturbances.

According to Resilience theory, systems can exhibit different types of resilience: engineering resilience, which focuses on the system's ability to bounce back to its original state after a disturbance, and ecological resilience, which emphasizes the system's capacity to adapt and undergo transformations to maintain functionality in the face of change.

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Applying Resilience theory to the study of the nature and effects of climate induced threats on the health and livelihood of small scale farmers allows researchers to explore how the agricultural system and livelihoods respond to these shocks. The theory provides a lens to analyse the adaptive capacities of farmers, communities, and the overall socio-ecological system in the district. It helps to identify the factors and mechanisms that contribute to the resilience of livelihoods and agricultural practices, such as the availability of diverse income sources, access to resources, social networks, and how policymakers and stakeholders can develop strategies and interventions that enhance the resilience of the system and promote good health and sustainable livelihoods in the face of climate shocks.

RESEARCH METHODOLOGY

Research Design

The research was undertaken by using a Qualitative interpretive phenomological design as recommended by Smith et al., (2008). This design was used because only participants who were farmers and had experienced climate shock in their farming activities were eligible to take part. This design is justifiable by the thinking that it can be used when the researcher is trying to understand a phenomenon but cannot do so unless the participants involved have faced that situation (Smith et al., 2008). Therefore, this design helped to generate the lived experiences of small scale farmers of Nega Nega community in Mazabuka district by excluding those that were not practicing farming.

Target Population, Sample Size and Sampling Procedure

The population of this research was selected from small scale farmers of Nega Nega community, in Mazabuka District. The small scale farmers were selected because they have one on one experience with issues of climate change and they were expected to give adequate information on the effects of climate change on their health and livelihood. From the targeted population, 30 small scale crop farmers who had lived for more than 5 years in the community were selected purposively (Greener, 2018). This sample was enough to provide variable information on the topic under exploration (Weller et al. (2018).

Instruments for Data Generation

Primary data was generated using interview guide. The guide composed of semi-structured questions. Interviews were appropriate for this research because through this tool, small scale farmers were able to share their experiences regarding the effects climate shock had on their health and livelihood (Creswell (2014).

Data Analysis and Trustworthiness

Findings of this research were analyzed using thematic approach. The researchers used various themes in line with research objectives of the study. Themes were identified by highlighting material in the interview transcripts that spoke of climate change induced threats and its implications on the health and livelihood of small scale farmers of Nega Nega community. The researchers then selected each of the highlighted phrases and tried to ascertain what meaning can be put forward in the highlighted material. After identifying the themes, the researcher then embarked on the process of recording the themes and describing how they were interrelated. Rewriting continued until the researcher felt that the themes and the relationship between the themes are identified as accurately as possible. Data quality assurance was based on four principals of trustworthiness: Dependability, credibility, confirmability, and transferability.

Ethical Considerations

The research ethics embraced ranged from research description and informed consent, benefits and risk, anonymity and confidentiality and voluntary participation. In the context of research description and informed consent, the researchers had a duty to ensure that the participants are cognisant of the purpose of the study. In the light of this, the researcher informed all the participants the purpose of the study and asked them for their willful participation. In terms of benefits and risks, the participants were informed that positive participation in this study was expected as it would help to find solutions on how to mitigate challenges associated with climate

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shock. Participants were also informed that participation in this study would not subject them to any form of risk. On the aspect of anonymity and confidentiality, the researchers ensured that responses from participants are treated with maximum confidentiality. Names of the participants and their households were not revealed when presenting the findings instead, the researchers used the codes F to mean Farmer. 1 to 30 were used to represent the number of participants. Therefore, all farmers who participated in this research were coded as F1 to F30. In addition, this research was based on voluntary participation. There was no form of coercion or influence to the participants to respond against their will. Participants were also requested to withdraw from participating at any time if they felt that they could not give the required information.

FINDINGS AND DISCUSION

A. Nature of climate change induced threats in Nega Nega community of Mazabuka District

The researchers had an opportunity to interact with the participants as a way of soliciting for their views on the nature of climate induced threats. Participants in this research acknowledged the availability of climate change induced threats in Nega Nega community. key issues that emerged were Prolonged drought, excessive flooding and unpredictable rainfall patterns.

Prolonged drought

Participants mentioned that the most frequent climate shock that small scale crop famers experienced was “prolonged Drought”. Participants lamented that their area rarely received rains. Below are verbal responses supporting prolonged drought as one of the major climate shock affecting small scale crop farmers in Nega Nega community. The following are the verbal responses from farmers represented by codes as indicated under ethical considerations section.

F1 stated : *There has been challenges of rains in this place. You find that after planting, the rains will go for more than a month and maize get destroyed from the heat.*

FSSF6 Mentioned: *For more than five years, we have not been doing farming as expected. The rains have been going even for more than a month. You will find that you are in january but it is very dry.*

F9 stated: *I have lived in this place for more than 20 years and what we are seeing now is worse. In the past years, we were not experiencing drought the way it is now. This time around, you will find that the cloud will form but from nowhere, there will be wind blowing as a result it displaces the clouds. Sometimes the rains will come and jump to another places where there are trees. This shows that there is need to enhance tree planting in this community*

Responses of the farmers suggest that prolonged drought was the most common climate shock that impacted their health and livelihood negatively. Farmers mentioned that their area could not receive the rains as expected. It was argued that a month could elapse without them receiving rains even after planning their crops. They further mentioned that their crops could not survive because of the continued drought. This finding can be likened to a situation established in Malawi by Abid and Mehdi (2020). It was found that droughts among others were the most significant climatic shocks for crop producers in Malawi.

Excessive flooding

The research also revelaed that “excessive flooding” was another climate shock that famers in Nega Nega community experienced but this rarley occurred. It was found that in 2022/2023 farming season, famers had experienced excessive flooding in the month of January which swept away their crops. Nonetheless, participants mentioned that this kind of climate shock was not very common because the type of soil in Nega Nega community and the land scape was able to subdue enough water. Below are the verbal responses authenticating issues surrounding excessive flooding.

F28 observed : *Apart from the challenges to do with drought, we have been experiencing floods but not to the large extent.*

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F24 mentioned: *2022/2023 was a difficult farming season for us farmers. In the beginning we had enough rains to the extent of some fields being affected espcially those that are located in bad areas but most of the fields here do not get affected of the flood because the soil type is able to subdue enough rains.*

F17 stated: *We do experience floods on rare occasions especially this year to the extent of destroying the crops. It was really a sad year because afterward the rains could not continue.*

Findings have shown that flood occurrences had divise effect on farmers' health and livelihood as it had potential to wash away their crops and also causing soil erosion. However, based on the responses given by the famers, it seemed that excessive flooding as a climate shock was not very common. Abid and Mehdi (2020) on the Ex-ante and ex-post coping strategies for climatic shocks and adaptation determinants in rural Malawi also found that to some extent, the country suffered from floods, crop pests, and diseases. Similarly, Lesk, Rawhani and Ramankutty (2016) in United States of America found that floods were among nature of climate change but without any negative implication on crop production.

Unpredictable rainfall patterns

"Unpredictable rainfall patterns" was another climate shock that small scale crop farmers experienced. It was revealed that for more than five years, there was no specific months when the farmers could start receiving rains and begin planting as expected. Below are some of the verbal responses from the participants justfiying unpredicable rainfall patterns.

F5 stressed: *This time around it is difficult to tell when you are supposed to plant because sometimes the rains will start in november the other years in december. Its really difficult to plan.*

F11 stated: *We have a challenge to tell when we should plant. This year only those who planted early were able to harvest something. Even those people who talk about weather are not even accurate. sometimes they give us wrong information.*

F22 stated: *Years back was easy to tell when you should start planting. We had a specific month but this time around, it is not easy to predict because sometimes the rains will come as early as november and cut off by early january.*

Findings suggest that it was difficult for farmers to predict when the rains could start raining normally. It was argued that, in the recent past, there was no specific month when they could start receiving rains and begin planting. Farmers mentioned that sometimes the rains could start in December and cut as early as february. They also argued that the dynamics in rainfall patterns had put them in an awkward position because they were not able to predict when they could start planting seriously. The dynamics in weather patterns made some farmers to miss an opportunity to plant early as they were scared that if they plant early, their crops would be affected in an event of the erratic rains. The implication of the finding is that with the unpredictable rains, farmers were not able to plan their planting season well.

Findings on unpredictable rainfall patterns tallies well with a study by Lesk et al., (2016) who found that climate change will lead to heightened occurrence and severity of extreme weather phenomena, thereby presenting substantial hazards to agricultural practises on a global scale.

B. Effects of climate induced threats on the livelihoods of small scale crop farmers

After having an intercation with the participants, it was revealed that decreased yield in maize production, high maize price and poor living conditions were the main findings associated with effects of climate change induced threats on the health and livelihood of small scale crop farmers.

Decreased yield in maize production

The research revealed that one of the major effects of climate shock was a "decreased yield in maize production". Some farmers stated that due to prolonged drought, they were not able to have the expected yield

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and this was a threat to food security at household level. Below are some of the verbal responses on decreased yield in maize production.

F20 stated: *Madma this year is a bad year. There is hunger. Our yields were greatly affected by the drought. we planted a 25kgs of maize but we only havrested less than 10 bags.*

F14 observed: *Our harvests were affected by the prolonged drought. At the time when our maize required enough water , the rains went for a month.*

F18 stated: *For us we did not harvest anything. All the maize we planted dried up because of drought. I don't know what I will do to sustain my family because even the price for maize and mealie meal is now high.*

Finings of this research gives an impression that one of the major effects of climate shock was a "decreased yield in maize production". Some farmers argued that due to prolonged drought, their crops withered in the process hence they were not able to have the expected yield. Farmers argued that the withering of crops had a negative implciation on their yield henceforth possing a threat to food security at household level. The responses gave an impression that the majority of the small scale farmers grow maize mostly for home consumption and for minimal trade in case of any surplus. However, farmers complained that 2022/2023 farming season was a diffculit farming season as the majority of the farmers could not harvest anything after labouring.

The above findings tallies well with Lobell (2013) who conducted an investigation into the impacts of climate variability and extreme weather events on agricultural productivity at a global scale. The study revealed that climate-related disturbances, such as prolonged periods of drought and extreme heat events, exerted substantial adverse effects on agricultural productivity, leading to a consequential decline in farmers' economic returns. Extreme weather events have the potential to result in diminished agricultural productivity, reduced crop yields (Lobell, et al., 2011), and the production of substandard-quality produce. The aforementioned circumstance has a direct impact on the financial earnings of farmers, as it may impede their ability to sell their agricultural goods at prevailing market rates.

The above findings on decreased yield resonate well with Diallo (2023) who examined the Impact of Climate Shocks on Agricultural Productivity and Household Welfare in Niger. The research revealed that climate-related disturbances, such as periods of extreme drought and excessive flooding, had a detrimental impact on agricultural output, leading to a notable escalation in poverty rates among households. Similarly, Burke et al (2015) on effects of temperature shocks on agricultural productivity also found that crop yields were adversely impacted by extreme temperature events, resulting in significant economic repercussions for farmers on a global scale.

High maize price

The study also revealed that due to decreased yield in maize production, farmers experienced "increase in prices of maize". It was found that since the majority of the farmers had low yield, maize was on demand and the majority could afford high price which went to k350 or above per 50kg of white maize. Most farmers interviwed stated that they had challenges of sustaining their households as they could not afford to buy the expensive maize. Below are some of the verbal responses on increase in price of maize.

F26 mentioned : *madam the drought that we had affected our yields and those that were luck are selling their maize at a high price. Currently we are buying a meda of maize at around k30 to k40.*

F10 Lamented: *The drought really affected the maize production and this has caused the price to increase because only few people have maize.*

F9 stressed: *The majority of farmers did not do well this year madam and those that have maize have taken advantage of the situation by increasing the maize price. Right now we are a buying a 50kg bag of maize at k350 and sometimes slightly above that. The situation is likely to be worse in the subsequent months.*

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F2 narrated: T*here is too much hunger in this community. the price of maize is just too much and the majority of people here are not working.*

Findings shows that since the majority of the farmers had low yield or nothing at all, the maize was on demand and those who took advantage of the scarcity by increasing the price as far as k350 or slighly above per 50kg. Findings suggest that decreased yield and high price of maize caused food insecurity and hunger in Nega Nega community as the majority of household could not afford to purchase expensive maize . Worse still, the majority of small scale farmers complained that food aid by the government was not sustainable due to the limited packages given and in most cases due to the senior citizens. This reasonates well with a study by Sianungu (2015) in Zambia on the implications of climate variability and change on rural household food security in Zambia which revealed that due to climate variability, rural household food security situation was fluid (not static) and that 78 percent of the rural households had experienced food shortages while 22 percent did not.

Poor living conditions

The study also revealed that climate shock led to “poor living conditions” of small scale farmers in Nega Nega community. Farmers stated that farming was only source of income to support their livelihood but in an event the yield was low, it was difficult for them to meet different needs. Below are some of the verbal responses justifying poor living conditions as a result of climate shocks.

F19 mentioned: *The issue of drought has really affecetd our way of life. We have 8 children and we don’t know how we are going to manage them. These needs to eat, they need to bath, they need to dress but for now we have no capscity.*

F30 Lamented: *Drought has affected the normal way human beings should live. My children have grown up and their level of consumption has increased and yet we only have limited bags of maize. We cannot even think of selling to meet our basic needs.*

F21 stressed: *We have no enough food and the feeding scale has changed. Food is really needed. Let the government look into this issue as soon as possible*.

Findings of the study gave an impresion that the majority of households depended on farming as the only source of income to meet basic needs. Farmers argued that in as much as they grew maize for home consuption, they were able to sale the surplus so as to meet basic needs but in an event the yield was low, it was difficult for them to meet basic needs. They articulated that they had a lot of financial obligations at household level but climate shocks appeared to pose economic hardships.

The economic consequences of climate change on agriculture in developing nations were evaluated through a study conducted by the International Food Policy Research Institute (IFPRI). The research emphasised that climate-related disturbances, such as floods and droughts, had a direct impact on agricultural revenue and heightened the probability of poverty among farming households (IFPRI, 2020). Equally, Siderius et. al (2014) argued that the occurrence of climate shocks has the potential to engender income instability among farmers as it can lead to substantial fluctuations in their revenues on an annual basis. This presents a considerable obstacle for farmers in terms of future planning, farm investment, and obtaining loans for agricultural endeavours.

Poor living conditions experienced by farmers is also well reflected by the Food and Agriculture Organisation (FAO) of the United Nations. The report titled "Climate Change and Food Security: Risks and Responses" (Food and Agriculture Organization, 2015) underscores the escalated financial burdens associated with the process of recuperation and reconstruction following occurrences of severe weather phenomena. Thus, it has been ascertained from this study and other referenced supporting studies that climate shocks have diverse impacts on health and livelihood experience. The most common being financial burden to meet basic needs.

Contrary to poor living conditions as a result of climate shocks in Nega Nega community , Jamal and Zailina (2016) in Asia found that Climate Change and Extreme Weather Events have been leading to deaths and

injuries, as well as debilitating and fatal communicable diseases. However, this is not the case with Nega Nega community as incidences of death due to climate change were not recorded.

CONCLUSION

The research findings have provided valuable insights into various crucial aspects pertaining to the nature and effects of climate change induced treats on the health and livelihood of small scale crop farmers of Nega Nega community. The research established that prolonged periods of drought, excessive flooding, and unpredictable rainfall patterns were the nature of climate induced threats. Regarding the effects of climate shock on the livelihood of small scale crop famers, the reseach has shown that climate shocks leads to decreased yields in maize, high maize price and poor living conditions.Therefore, findings of this research and theoretical underpinning suggest the need to effectively implement specific interventions that aim at guaranting good health and livelihood of small scale crop farmers.

RECOMMENDATIONS

1. The Ministry of Green Economy and Environment in Collaboration with Ministry of Agricuture through district agriculral extention officers should enhance the campaign of tree planting in farming blocks as this may help to restore the lost forests.

2. The Ministry of Green Economy and Environment should give timely and authentic updates to farmers on weather patterns as this may help farmers to prepare adquately before farming season commences.

Competing interest

There is no competing interest emanating from the authors

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