LOCAL COMMUNITY MEMBERS’ PERCEPTIONS OF RAINFALL SCARCITY AND ITS IMPACTS ON WATER AND FOOD RESOURCES: A CASE STUDY OF MOLETJIE COMMUNITY IN LIMPOPO PROVINCE, SOUTH AFRICA

MODISE Trevor Rehaugetswe1, RANKOANA Agnes2 and MALATJI Moshohli Kenneth3

1Department of Sociology and Anthropology, University of Limpopo, Private Bag x 1106, Sovenga 0727, South Africa. ORCID 0000-0002-8711-6094; Corresponding E-mail: rehaugetswe.modise@gmail.com
2Department of Sociology and Anthropology, University of Limpopo, Private Bag x 1106, Sovenga 0727, South Africa. ORCID 0000-0002-8376-7228
3Department of Sociology and Anthropology, University of Limpopo, Private Bag x 1106, Sovenga 0727, South Africa. ORCID 0000-0002-2596-6448

ABSTRACT: Local communities are conscious of changing climatic conditions, the main variables, and their impacts on human livelihood requirements. This study describes the local community members’ perception of rainfall scarcity and its impact on water and food resources. Semi-structured interviews with a sample of 150 participants produced data about the perceptions of rainfall scarcity, its main variables and the impacts on water and food resources. The health impacts of poor status water resources and poor production of subsistence crops involve lack of reliable water provision for household consumption, and malnutrition and poverty as a result of subsistence crop production. A major recommendation from the study is an exploration of coping, adaptating, and building the resilience capacities of local communities towards the impacts of climate change on water and food resources.

KEY WORDS: Climate change; rainfall scarcity; drought; food insecurity; water resources

1. INTRODUCTION

Climate change is an ecological challenge that contributes to the disruptions of the way of life of human beings through the world, especially in communities that still rely on natural resources to sustain their well-being. Scientists and local community members are aware of the changing climatic conditions by means of variation in temperature and precipitation patterns (Intergovernmental Panel on Climate Change [IPCC], 2007;2014). Changes in landscapes and production systems such as food and water provision are associated with changing climate in local communities (Kabanda & Nenwiini, 2016). Important observations are that local community members understanding of climate change is usually embedded within their ecological knowledge as they observe a change from hotter summer and milder winter, prolonged periods without rainfall, and unusually drought (Bhusal, 2009).

The interpretation and reaction on climate change impacts by local community members is informed by their culture, drawing on indigenous knowledge to find solutions to cope with the impending changes. This corroborates with Salehi et al. (2016) that the global climate change knowledge showed that perception of climate change is sensible, and its awareness is influenced by societal and environmental factors. Farrokhi et al. (2020) concurs that change change perception is influenced by factors such as personal experiences, memories of climate events, and various biases. However, the most notable changes in climatic conditions understood by the local communities are in the form of erratic rainfall patterns resulting in drought, depleting water resources and while some areas are flooded.

Unpredictable precipitation patterns mean an increase and decrease of rain amount (IPCC, 2014). Low rainfall results to crop failure, depletion of surface and ground water supplies, low yields, and depletion of domestic water in a dry region. Zipper et al. (2019) supports that climate change may alter the behavior of rain, which could all have consequences for future water and food availability. Toulmin (2020) observes that rainfall drifts as a result of climate change in the African Continent with some models predicting an increase and others a decrease.

Unpredictable rainfall is negatively impacting the livelihoods of local communities by accelerating poverty, food insecurity, poor health, and living condition, as well as development efforts. This concurs with observations made by Letsastsi-Duba (2010); Rankoana (2016); Kabanda and Nenwiini, (2016) as most communities in the rural regions are predisposed to poor nutrition and clean water supply. Hence, the Fifth Assessment Report (AR5) of the IPCC reinforced the need for communities to employ adaptation measures to safeguard human health from the severe impacts of changing climate (IPCC, 2014).

The effects of climate change are mostly felt by the members of local communities with climate-dependent livelihoods (Mugambiwa, 2018). Against this backdrop, the present study is designed to describe the local community members’ perceptions of climate change and how erratic rainfall impacts the indigenous health care practices in Moletjie community. The interest was to describe the community understanding of erratic rainfall and its impacts on food and water resources as basic determinants of good health in Moletjie community in the Limpopo Province of South Africa.

2. METHODOLOGY

2.1 Study area

The study was conducted in Moletjie in the Capricorn District of the Limpopo Province of South Africa (Figure 1). The Limpopo Province is in the north of South Africa neighboring Mozambique, Botswana, and Zimbabwe, it lies between latitudes 22-25°S and longitudes 27-32°E (Google earth, 2021). The climate within the area is hot and usually warm and
temperate. There is less rainfall in winter than in summer, the common temperature in Moletjie is between 20.0 °C to 28.0 °C. Precipitation averages 713 mm. Precipitation is its' lowest in July/August, with a mean of 1 mm. Most precipitation falls in December, with a mean of 179 mm and therefore the average temperatures vary during the year by 8.0 °C (StatsSA, 2015). Moletjie is populated by Bapedi speaking people who still practice subsistence food production and rely on the river and ponds as the main water resources.

4. RESULTS AND DISCUSSION

The study presents the community perceptions of rainfall scarcity and its impacts on water and food resources, and how these impacts further affect the health conditions of participants. Food and clean water are basic needs for human health, hence, such resources should be accessible at suitable amount and eminence, and accessible to everyone (UN Department of Economic Social Affairs, 2018).

Participants’ perception of rainfall scarcity

Participants stated visible changes in rainfall timing and quantity. Changes in precipitation differ due to regional variations (Giorgi et al., 2019). An upsurge in yearly rainfall is experienced in high latitudes and the equatorial regions under the RCP8.5 scenarios, whereas a decreased annual precipitation is experienced in the subtropics (IPCC, 2014; Giorgi et al., 2018). There is a projected increase of rain in the African continent by the twenty-first century of which the Southern African regions are to expect a decrease (Niang et al., 2014).

Rainfall timing

Respondent 14 reported that:

“Usually, it rains from late September, but not in these recent years. Rainfall is not experienced like before we are exposed to extreme weather patterns. It is no longer cold during the winter season as in the past 20 to 30 years ago. When it’s hot, it’s like it’s burning.”

Respondent 46 supported that:

“About 30 years ago, when the rainy season came, we would notice through the cloud setting, but today clouds may gather and disappear without experiencing rainfall. We knew that we had to experience the first rain before planting, to soften the soil. We knew that in the upcoming months there would also be a specific type of rainfall, but today it rains randomly, we are no longer able to predict rain as the seasons have changed.”

Change in rainfall patterns is one of the primary impacts of climate change. This is supported by Stephanie (2013) that scarcity of rainfall is the most observable indicator that results to drought. This is especially impactful for farmers who depend on rainfall to determine sowing and harvesting periods. Timing rainfall based agricultural activities is commonly practiced in arid and semi-arid climates with very short cool and wet seasons (Mugambiwa, 2018).

Rainfall quantity

Respondent 6 reported that:

“Recently we receive less rainfall than in the past twenty years when we used to get enough rainfall to enable planting and raising health livestock. The rain lasts for a shorter period with thunderstorms.”

Participants’ perceptions of rainfall scarcity are corroborated by Grover (2014) that the indigenous and scientific community are aware of variables such as erratic rainfall and drought of which plays a significant role as extensive experimental knowledge is contributed to climate decision making. The IPCC (2013) confirms that climate change is affecting rainfall patterns. As a result, in high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Participants’ observations of variations in the timing and quantity of rainfall corroborate Thomas et al. (2007) findings that rainfall timing, frequencies and intensities are observable in the Limpopo province.

3. DATA COLLECTION AND ANALYSIS

The study participants were selected through purposive sampling to make up a sample of 150 Participants. The sample was made up of equal numbers of males (75) and females (75). The main criteria used was a selection of community members with permanent residency in the community. The participants’ age ranged between 30 and 85 years. The purpose and goal of the study were clarified to the participants. An interview schedule was developed to enable quality data collection process. Validity of the data collection tool was ensured by designing the questions that captured information about community members’ understanding of climate change, its impacts on the key water and food sources as basic determinants of health. In this way, the researchers ensured the reliability of the interview schedule to obtain consistent responses from participants. The interviews were conducted face-to-face and each was scheduled for 1½ hours. Data were captured through notetaking because most participants were not comfortable with audiotaping of the interviews. Thematic content analysis was used to analyze the data. The method was used to identify, analyze and report themes and sub-themes within data.

Figure 1. Location of the Capricorn District with the Limpopo Province, South Africa.
Impact of rainfall scarcity

Participants perceived change in precipitation patterns grounded by their knowledge of its effects and consequences. Climate change is affecting the timing and amount of rainfall, which ultimately affects the rain-fed livelihood patterns. The consequences of these, impacts the indigenous health care mechanisms such the provision of household food security and the procurement of safe and quality water. Therefore, the participants’ indigenous health care mechanisms were negatively impacted. Africa is facing challenges which poses complete threats to its water and food systems, public health, farming resulting to severe poverty.

Subsistence crop production in Africa is sensitive to the consequences of climate change as it relies primarily on rainfall, which is heavily affected by climate change across the globe (IPCC, 2013). Changes in rainfall distribution, river drying up and water bodies recession are all visible ways that climate change has affected water resources in Africa (IPCC, 2014). Sub-Saharan Africa (SSA) depends on rain for water and food provision (Thompson et al., 2010). For instance, the frequency of rain-fed farming makes its food arrangements highly sensitive to the fluctuating patterns in rain (Thompson et al., 2010).

Water scarcity

Respondent 7 expressed that:

“Drought is a major problem in our community. Lack of rain in the community affects us very badly because we hardly get enough water for cooking, bathing, and cleaning. We are forced to use the little we have to cook, clean, bath and drink. Due to water scarcity in the community, some community members who cannot afford to buy water drink with animals from the dams and fountains. This results in sicknesses like dysentery and cholera, which are some of the dangerous diseases experienced in the community. This means that we are not productive because we do not have the strength to do anything.”

Erratic rainfall impacts the natural water resources through one main primary mechanism that is drought. The major water systems such as lakes and rivers are projected to condense in response to the decline in rainfall and an increase in evaporation (Bates et al., 2008). However, studies attested that climate change has an impact on looming water scarcity when compared to other anthropoidal activities (Niang et al., 2014). For Bhaga et al., (2020) supports that drought has intensified in the East and Southern Africa due to erratic rainfall and increased evapotranspiration. Climate change has various influence on the provision of water in African countries. These include drought, rise in sea-level, drying up of rivers, poor water quality in surface and groundwater systems, precipitation, and water vapour pattern distortions (IPCC, 2008).

Subsistence food production

Participants stated that they achieve their household food requirements through rain-fed subsistence crop production, which is depressingly impacted by droughts and unpredictable rainfall that results to the damage of crops and lower productivity.

Scarcity of rain affects subsistence food production and growth through drought. Participants observed that continued period of lack of rainfall results to drought, which negatively impacts rain-fed subsistence crop production. Drought can destroy entire yields or can result in drastically reduced production, even for subsistence farmers.

Respondent 1 articulated that:

“Our community is characterized by subsistence food production; due to rainfall scarcity, we are no longer able to plant different types of crops. As we are forced to plant crops that can withstand this severe condition. Even so, we still find it difficult to plant as we do not have enough water or rain to water the crops.”

Respondent 66 explained that:

“The impacts of water scarcity in the community are severe because we are forced to buy food of nutritional value, which is costly especially to us who are unemployed and struggling to travel to town to buy food. This leads to hunger and poverty because back then we would sell some of the harvested crops to maintain our livelihood. Even if we harvested, we could not sell as there are never enough crops harvested for selling.”

Farming is the primary food source in every local community in SSA. Where majority communities in local areas rely on rain as an element for high crop production, especially during damp seasons (Thompson et al., 2010; Herrmann & Mohr, 2011). Southern African has an 18% of crop loss in the twenty-first century (Ofori et al., 2021). Hence, most SADC countries have experienced erratic rainfall and droughts leading to poor agricultural harvests, loss of livestock, an increase in food prices, food shortage and famine, which negatively impacted most local community that mainly on natural resources to sustain their wellbeing (Nhemachena et al., 2020). The inconsistency of rainfall influences performance in growing, maintaining, harvesting, storing, processing and consuming crops (Ofori et al. 2021).

5. CONCLUSIONS

This paper has described the local community’s perceptions on scarce rainfall and its impacts on water and food resources. It has presents various participants’ understanding of rainfall scarcity. The main observation is that rainfall scarcity is an outstanding climate change variable which has changed in timing and quantity. These changes negatively affected water and food resources. The health impacts of poor status water resources and poor production of subsistence crops are remarkable. Water levels in the rivers and dams dropped; water is contaminated, resulting with less water for bath, wash, and cooking. The impacts of erratic rainfall on food insecurity are well-indicated by subsistence crops essential to human consumption, health, and well-being. However, community members’ health and well-being are compromised by what they perceive as climate change in the form of erratic rainfall patterns. The study results necessitate an exploration of lessening, managing, adapting, and profiling the resilience capacities of the local communities towards the impacts of climate change on resources such as water and food.
ACKNOWLEDGEMENTS

The participation of the Moletjie community members.

REFERENCES


