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Climate change and food insecurity in Mozambique: A review on the effects of climate events on agricultural practices, production models and food availability

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Abstract

Climate change, food and nutritional insecurity are combined with the poverty of several populations worldwide. In Mozambique, ensuring full-time availability and access to food has been a huge challenge, especially when combined with the effects of climate change. To highlight the effects of climate change on agricultural practices, production models and food availability in the Chókwè district, a review was developed covering the various determinants of this topic. The effects range from the worsening of hunger, low agricultural production and income, low nutritional quality, changes in production models, but also encompass a new paradigm of changing the rainy season. Even though it was exhaustive, there are aspects to be considered, such as the case of strategies adapted to mitigate these effects, community resilience, results of the adoption and adaptation to new production models, demographic growth aimed at mitigating the effects of climate change on the food security. Other very important aspects to be addressed are the rainy season and increased temperature, which create uncertainty, aggravating the vulnerability and migration of populations in search of better living conditions. Therefore, it is necessary to consider more studies on new approaches or forms of action in the context of climate change in production processes, in the context of Mozambique. In summary, there must be greater integrated cooperation between the various stakeholders seeking better resource management strategies and ensuring sufficient and sustainable production, in favour of food availability and access in the Chókwè district.

Keywords: Climate changes, Food Availability and Access, Global warming, Rainy Season

Introduction

It is extremely fundamental to seek knowledge related to the impacts of changes on agricultural practices, as these have demonstrated rapid expansion in the last 20 years, putting pressure on the community to search for better methods of reducing their impacts in the context of ensuring food security. mainly in developing countries (Alpino *et al*., 2022) [4]. Nascimento *et al*., (2020) [24], places agriculture and livestock as the area's most sensitive to climate events, and these are directly linked to the balance of the ecosystem and the socioeconomic organization of communities. According to Ardiansyah *et al*., (2022) [1], food security derives from a nation's ability to guarantee food for all, economic sustainability and social stability, promoting the well-being of this population, but in African countries there has been weak progress in this regard, largely due to weak agricultural production combined with the effects of climate change that provide low yields for crops such as rice and corn (Yami *et al*., 2024) [39]. Therefore, it is a certainty that climate change is creating severe events for the world's poor communities, and this issue is not new today. This scenario has been studied and observed for decades looking at crops, pests and diseases (Zhang *et al*., 2023) [41].

For example, according to the report released by FAO (2023), the food insecurity scenario has been worsening since 2019 to 2022 with a previous 7.9% to 9.2% affecting more than 735 million people. So then, Kuzma *et al*., (2023) [21], proposes some actions or strategies such as the conservation of natural areas, efficient irrigation techniques, adoption of energy resources that are not very dependent on water, aiming at sustainable and inexpensive production. According to Ardiansyah *et al*., (2022) [1], it is important to realize that world societies are leaving beliefs and faith aside, but culture still prevails as food is produced without changing production models. In addition, Rao *et al*., (2020) [29], includes climate scenarios in the destruction of agricultural products, which suggests implementing actions that aim to mitigate their impacts on ensuring food for populations, including Mozambique.

According to Barbosa Júnior and Coca (2022) [9], there are studies linked to the mitigation of hunger in countries such as Brazil and Spain called "zero hunger", which involves the application of public policies and a universe of 30 different programs whose focus is to circumvent the causes caused by climatic and structural events of hunger and food insecurity. Yet following the same path, Oliveira (2020) [27] suggested the application of empirically based inventories on the Brazilian and Spanish population in the context of food insecurity in these countries, indicators of poverty, incidence of obesity, number of daily and legal meals that act specifically on the functioning and management of the food security area, which could be a valid option for the reality of Mozambique.

Another relevant study was carried out in North Africa by Turyasingura *et al*., (2023) [36], aiming to bring a perspective of climate-smart agricultural production in the context of sustainable production as a tool for transforming food production systems, aiming to bring satisfactory productivity results amid the uncertainties of climate change that have direct effects on food security

Research carried out in Bangladesh by Rana, (2023) [28], seeking to understand the contribution of agricultural practices in ensuring food security in humanity, showed that the interaction between production, demographic and technological factors in agriculture create a complex of continuous interactions of multiple components over various periods of time, with Mozambique is not alien to this scenario, showing urgency in the application of production systems that guarantee greater crop productivity amid these uncertainties regarding the occurrence of climatic events.

A study carried out in the neighbouring country of South Africa by Ogundeji (2022) [26], verifying adaptation strategies to climate change and the impact on food security of small farmers in that country, it was evident that ensuring food security has become a critical challenge, as, climate change represents the main threat to these rural areas due to the practice of agricultural production that is completely dependent on precipitation to obtain water. This scenario reduces water availability, generating water stress and vulnerability to climate events.

The United States of America and the Republic of China are the countries with the most bibliometric studies on the current stage and future trends in relation to food security and differences in the yield of food cultivation systems in the world in the face of climatic events, based on the years 1993 to 2023, which suggests the expansion of this database with studies in other corners of the world, since successful strategies for mitigating these impacts vary from region to region largely due to edaphoclimatic conditions and adaptation of communities to variation and intensity of occurrence of climatic events (Hu *et al*., 2023).

Climate change and agricultural production

In recent decades, the issue of climate change has been linked to the yield of agricultural production (Wang *et al*., 2022) [38]. Issues linked to post-harvest yield, markets, land use and food security in developing countries have been highlighted, due to the variability of climate change (Ardiansyah *et al*., 2022) [1]. It can be evidenced, in accordance to Days, (2023), that the issue of severe water stress as a result of the impacts of climate change, which is expected to affect more than half of the world's population by 2050, as these use portions of fresh water available on the planet disproportionately, putting pressure on the ecosystem. Yet, according Kuzma *et al*., (2023) [21], climate change largely affects agriculture due to the wave of droughts and high temperatures seen in recent times, leading to low productivity and food availability.

Since most of the world's countries practice rainfed agriculture, they present enormous variability in grain production, mainly due to the climate factor. (Nascimento Cintra *et al*., 2020) [24]. According to Ekholuenetale *et al*., (2020) [15], access and availability of food varies depending on the area, but the common fact is that scarcity is largely associated with climate change. Alotaibi, (2023) [3], affirms that the rise in temperature in the atmosphere has negative effects on crop productivity, which makes African communities, including Mozambique, vulnerable to hunger. For Zhang *et al*., (2023) [41], climate change is the main factor that leads to the poor development of crops and, with this, leading to poor quality of food, the way it is arranged and information can be important for predicting climate events.

Food insecurity in Mozambique

Food insecurity according to Bedasa & Deksisa, (2024) [8], derives from the situation in which populations do not have physical, social or economic access to safe and nutritious food at any time to meet their needs (Ardiansyah *et al*., 2022) [1]. In Mozambique, food security is combined with the condition of the existence of food in quantity and quality so that it can meet the food needs of households sufficiently without changing the cultural issues of the same (Ardiansyah *et al*., 2022) [1]. Boosting global agricultural productivity is a mechanism of great importance for ensuring food security, as it has the power to leverage social stability, sustainable development and national economies (Zhao *et al*., 2022) [42]. This situation also affects Mozambique, where it greatly impacts the choice of production system and thus guarantees the food security of communities (Abbas, 2022) [2].

Global warming largely influences the decrease in the availability of fertile land on a global scale, promoting a decline in agricultural income, presenting itself as a serious threat to food security (Rivero *et al*, 2022). But on the other hand, Chikafa *et al*., (2023) [10], in countries in the process of mitigating food insecurity, there is a lack of qualified labor, ability to adopt technologies and high raw material costs, influencing productive income. According to Bento *et al*., (2023) [6], in the Mozambican territory, food insecurity derives from the absence of well-being and satisfaction of food needs, as this must be in sufficient quantities, without risks to health and accessibility and vulnerability to hunger.

In Mozambique, rainfed agriculture is practiced by small producers, being the main source of employment, income, and subsistence, proving a certain vulnerability to guaranteeing food security (Nanelo and José, 2022) [25]. As Mozambique is a country with more than 40% of the population living below the poverty zone, and according to Abbas, (2022) [2], these levels also reveal high levels of susceptibility to satisfactory availability and access to food. Mozambique has also recently experienced an increase in temperature levels, resulting in scenarios of droughts, irregular precipitation patterns, floods, heat waves, habitat alteration and displacement of inhabitants, which are also relevant factors in the emergence of this phenomenon called food insecurity (Dindaroglu *et al*., 2023) [14].

Agricultural production models in Mozambique

According to Távora & França (2021) [34], the increase in global temperature leads to changes in precipitation patterns and the impact of this process is visible, as populations begin to adopt new production models aiming to adapt to new challenges in the agricultural context. The adoption of better production models in Mozambique is seen as the best path towards sustainability as it advocates the implementation of sustainable agricultural practices and environmental prevention (Nascimento Cintra *et al*., 2020) [24]. According to Razzaq *et al*., (2022) [30], agricultural production models describe the production mechanisms and harvest yields of different crops in relation to environmental conditions. For Zhu *et al*., (2022) [40], there are few studies that deal with crop yield, using meteorological data in Mozambique, based on the use of statistical linear regression models, which suggests the search for models that best suit with variations in precipitation and rising temperatures.

Salman *et al*., (2021) [31], Mozambican climate susceptibility suggests the search for relevant information to predict the climate condition and production models allow predicting crop yield results. According to Zhao *et al*., (2022) [42], it is extremely important not to ignore climate variation forecast models, as these are important in predicting producers' harvest yields when adopting new production models. For Khan *et al*., (2022) [20], Production models can present satisfactory results when the production factors and agroecological zone in question are combined. Decreasing production is often combined with variations in the rainfall pattern and crop growing season. According to Nanelo and José (2022) [25], in several regions of Mozambique the practice of consortium agroecology predominates, which involves the production of several crops simultaneously in the same agricultural field. According to Uhunamure *et al*., (2021) [37], southern Africa is more guided by organic agriculture where the use of various types of cultivation is evident, namely rainfed, irrigated, monoculture and intercropping.

For Bhatti *et al*., (2021) [7], the use of crop intercropping has been a major focus, including in Mozambique, due to its advantages in diversifying household food production, as well as preserving the ecosystem. The practice of organic agriculture must use principles capable of safeguarding the ecosystem and, in Mozambique, there are rainfed agricultural practices, irrigated, intercropping and monoculture, and it is necessary to seek the potential of each in the context of sustainable yield (Tessier *et al*., 2020) [35].

Study area

The district of Chókwè is located in the province of Gaza-Mozambique. Its area is estimated at around 1,864 km2, with 222,396 inhabitants according to the 2017 census. It is located south of the province of Gaza, in the middle course of the Limpopo River, limited to the north by the Limpopo River, to the south the districts of Bilene and Xai-Xai, to the east bordering the district of Chibuto and west to the districts of Magude and Massingir (Bento *et al*., 2023) [6]. This district has a climate classified as semi-arid, with an average annual rainfall of 530 mm, with a maximum in the months of February (140 mm) and a minimum in July (10 mm), an average annual temperature of 23.6°C and wind speed in around 153km/h, which makes agriculture practiced in this region risky due to limited water availability (Souza *et al*, 2019).

According to Domingos *et al*., (2023) [13], in terms of agricultural production this Chókwè district contributes 27.6% of sweet potato crops, 58% corn, 27.6% rice, 31% cassava, 3 % Tomato, 6.9% Beans, making it important in the context of food production variability which helps combat food insecurity. According to Souza *et al*., (2019), the Chókwè district is mostly made up of small farmers, which makes agricultural practice the main activity in this region. Maize and Rice cereals can be highlighted as the most predominant due to the availability of water, facilitated by the irrigation system that captures water along the Limpopo River, facilitating the irrigation of agricultural fields. Also, according to Souza *et al*., (2019), Rice crops are cultivated during the rainy season, vegetables are predominant in the dry season, while Corn crops predominate in both dry and rainy seasons.

According to Bento *et al*., (2023) [6], the population is estimated at 69,337 inhabitants spread across 7 neighborhoods. Families with members in paid employment (public and private sector employees) represent only 25% of this population, with the remaining percentage indicating the prevalence of disadvantaged families, susceptible to hunger and vulnerability to food insecurity. Also, according to Bento *et al*., (2023) [6], data from the 2019-2020 harvest recorded a maximum production of 525,228.85 tons in relation to various crops, with the Tomato, Corn and White Cabbage crops having the highest quantities, being 99,569. 208, 93,070,500 and 81,108,500 tons respectively. But it is worth highlighting that we find crops such as Rice and Beans, which are naturally dehydrated and stored in small warehouses for consumption and subsequent sowing. For Mesterházy *et al*. (2020) [23], the availability of food in this city is far from guaranteed, as there are no infrastructures capable of meeting the demand for storing these foods and, therefore, guaranteeing food and nutritional security efficiently. Obtaining demographic data such as: number of inhabitants, malnutrition and obesity rates, allows us to obtain the result of population dynamics in relation to their effects on food demand and adaptation to climate change (Kozielec *et al*., 2024) [19]. Another method used in the search for results on food security in relation to climate impacts includes the assessment of imports and exports of cereals such as Corn and Rice produced in Chókwè, using increment and index equations, these being (Kozielec *et al*., 2024) [19]:

$$Incremento: \Delta y\frac{t}{t} - c = yt - yt - c \quad (1)$$

$$Indice: i_{\frac{t}{t}-c} = \frac{y_t}{y_{t-c}} \quad (2)$$

Where

i = index, increment, Δy

y_t = the observed realizations of the variable at time t (t = 1, 2, . . ., n); and

c (c ∈ n) = a constant;

According to Kozielec *et al*., (2024) [19], the increment allows the visualization of fluctuations in key food production and export variables and the indices highlight the relative comparison of these fluctuations in relation to a reference period. Therefore, it is possible to determine the degree of evolution of both the structure of production and export of cereals (barley, corn, sorghum, wheat, rice, and others (sorghum, millet, rye, oats):

$$v_{\frac{t}{t}+1} = \frac{1}{2}\sum_{j=1}^{m}|\alpha(t+1)j - \alpha tj| \quad (3)$$

Where:

αtj, α(t+1)j = represent the share of the j-th component of the structure in the years studied and

t & t + 1, with the following conditions satisfied: 0 ≤ atj ≤ 1, m ∑ j=1 atj = 1, t = 1, 2, ..., n.

According to Hu *et al*., (2023), it is necessary to carry out a survey of relevant documents (articles, dissertations, reviews and simple texts) relating to yields from the production of corn and wheat crops from the 1990s to 2023, looking at aspects such as advances in science and technology agricultural production, changes in agricultural markets, increased food production in various parts of the world, as it has been noted that production factors have changed their mechanism of action, providing low yields. For Homann-Kee Tui *et al*., (2023) [17], in order to search for results regarding the impacts of climate change and food security, household surveys and secondary data are carried out, aiming to characterize their productive activities, exploration of the agricultural area and advances in the adjustment of crop and food simulation models. cattle, using consultation, validation, and feedback from experiences.

Ardiansyah *et al*. (2022) [1], to achieve results on the impact of climate change on ensuring food security, mainly rice production, two analysis models are generally applied, these being descriptive and quantitative, where the descriptive seeks, through graphs and tables, to highlight the results of previous studies and the quantitative one uses the econometric approach, which demonstrates the impact of climate, fertilizer subsidies, growth of irrigated rice fields and productivity. Mathematically, the models used in this study are the following:

$$lnprodPit=\alpha+\beta1lnprdvPit+\beta2lnppkit+\beta3Girgit+\beta4Dninoit+\beta5Dninait+eit \quad (4)$$

$$lnprodJit=\alpha+\beta1lnprdvJit+\beta2lnppkit+\beta3Girgit+\beta4Dninoit+\beta5Dninait+eit \quad (5)$$

$$lnprodKit=\alpha+\beta1lnprdvKit+\beta2lnppkit+\beta3Girgit+\beta3Dninoit+\beta4Dninait+eit \quad (6)$$

Where:
The first model (Equation 4) of variables $lnprodPit$It is$lnprdvP_{it}$ = the production and productivity of rice;
In the second model (Equation 5), the variables $lnprodJit$It is$lnprdvJ_{it}$ = corn production and productivity;
In the third model (Equation 6), the variables $lnprodKit$It is$lnprdvK_{it}$ = the production and productivity of soybeans;
The variables Inppkit, Girgit, Dninoit and Dninait, respectively, = the distribution of fertilizer subsidies, the growth of irrigated rice fields, El Nino dummy where D=1 is an El Nino condition and D=0 is a normal condition and La dummy Nina where D=1 is a La Nina condition and D=0 is a normal condition.

According to Nanelo and José (2022) [25], production or cultivation models play a fundamental role in mitigating the impacts of climate change in the Chókwè district and it is proposed to determine the relative frequency of practices adopted by households, which can help understand the stage of these impacts on the ecosystem. Generally, frequency determination follows the following equation:

$$Fr(\%) = \frac{NA}{N} * 100 \quad (7)$$

Where:
Fr = Relative frequency;
N = Universe of each region;
NA = Number of households that mentioned the practice.

Also, according to Nanelo and José (2022) [25], the determination of harvest yield must be considered due to the impacts of climatic events on crops and the strategy defined by the World Bank (2010) is proposed, which considers the area of agricultural production and agricultural income as key variables mainly in rural areas with resource limitations and, therefore, the following equation is proposed:

$$RC = \frac{QPC}{AC} \quad (8)$$

Being:
RC = harvest yield;
QPC = Quantities of harvested product and;
AC = cultivation area.

Looking at the approach of Bento *et al*., (2023) [6], it proposes indicators that were used in this region (Chókwè) aiming to search for information regarding the state of food and nutritional security. These indicators range from education level, family income to availability of food for consumption. Below is Table 1, which shows the indicators and variables to be observed, in relation to the stages of food security.

Table 1: Indicators used to assess the nutritional and food security status of the population of the Municipality of Chókwè.

Indicator and relationship	Variable	Note	Indicator
Household characteristics ----- -------- -----			
Education level (+)	Illiterate Basic Average Higher	0 4 6 10	Critical Unstable Stable Great
Food availability (+)	unsatisfactory Reasonable Average Satisfactory	0 4 6 10	Critical Unstable Stable Great
Family consumption (+)	unsatisfactory Reasonable Average Satisfactory	0 4 6 10	Critical Unstable Stable Great
Access to food (+)	unsatisfactory Reasonable Average Satisfactory	0 4 6 10	Critical Unstable Stable Great
Food consumption (+)	unsatisfactory Reasonable Average Satisfactory	0 4 6 10	Critical Unstable Stable Great

+/- Indicates the highest or "satisfactory" level of each characteristic. Source: Bento *et al*., 2023 [6].

Another aspect that must be incorporated in this region is the assessment of the temperature condition depending on the crops to be produced where, according to Zhao *et al*., (2022) [42], the record for daily temperature variation, looks at the average temperature (T_{med}), maximum temperature (T_{max}) and minimum temperature (T_{min}), precipitation (Prec.), and solar incidence per hour (ISh), in a certain period (years) of a specific agroecological zone.
To determine susceptibility, solar incidence is given by the following equation:

$$ISh = \begin{cases} e^{-[(Si - So|b)]^{2}} \\ 1 \end{cases} \quad \text{Where: } Si < So \text{ or } Si > So$$

Where:
ISh = represents the daily solar incidence when the daily percentage reaches 70%;
Si = represents the solar incidence per hour (h) and
b = the constant to be determined according to the agroecological zone in question.
The arithmetic mean of the day's specific solar incidence on a crop is the same for the period.
Temperature susceptibility can be determined by looking at the following equation:

$$ST = \frac{[[(Ti-T1)]](T2-Ti).^{B}]}{[[(To-T1)]](T2-To).^{B}]}, \quad (10)$$

Where

$$B = \frac{[\![(T2 - T0)]\!]}{[\![(To - T1)]\!]} \quad (10)$$

Where
ST = temperature susceptibility;
Ti = average daily temperature (°C);
To = optimum temperature (°C) in different crops;
T1= low limit temperature (°C) in different periods;
T2 = maximum limit temperature (°C); in different periods.

The values of To, T1 and T2 must be listed in a table to be consulted where the specific arithmetic mean of the day corresponds to the period.
Regarding susceptibility to the precipitation event (SP), it is calculated following the following equation:

$$PS = \begin{cases} P/Po \\ Po/P \end{cases} \begin{cases} Pi < Po \\ Pi \geq Po \end{cases} \quad (11)$$

Where:
P = precipitation in (mm) and
P_o = physiological need required by the culture, which can be calculated by the following equation:
P_o = Kc*ETo (12)
Where:
Kc = Crop coefficient (-); and
ETo = Crop evapotranspiration (mm).

Possible interventions aimed at mitigating climate impact on food security, in the context of agricultural practices, production models and food availability

Strategies aimed at mitigating the climate impact on agricultural practices and ensuring food security in Chókwè involve the application of sustainable technologies aimed at preserving the ecosystem. Food production based on organic agriculture and demographic growth still presents its weaknesses in the context of productive income and, not only due to soil conditions, irrigation of agricultural fields but also, due to the intensification of climatic events with particular emphasis on the increase of global temperature. Although Dias, (2023) [12], argues that the global warming effect is causing changes in precipitation patterns, affecting agricultural practices and food security, however Bedasa & Deksisa, (2024) [8], include demographic factors that suggest population growth, which puts pressure on the agricultural sector in providing food.

Temperatures in Chókwè have also been increasing and solar incidence, precipitation and the physiological needs of crops have been changing in order to adapt to climate change and, to overcome this scenario, it is necessary to monitor the incidence of light on crops. , optimal water need for the crop and determine its susceptibility to temperature variations, which will help in a certain way to monitor the growth and/or development of these crops, providing better nutritional and harvest results. Regarding production models, it should be noted that the practice of crop intercropping has shown satisfactory results, as it allows the production of several crops simultaneously and predicts satisfactory results for harvest variability, suggesting more options or range of feeding. Still in the same context Tanure *et al*., (2023) [33], talks about the dependence that small producers have on climatic factors for agricultural production, which according to Abbas, (2022) [2], in a more specific approach to Mozambique, is causing significant impacts on the choice of production model and consequently on food security.

There are also types used in this region, being irrigated and monoculture, but these are applied depending on the dry and rainy seasons. In this case, the temperature aspect is one of the most important factors to consider, as they directly impact the final production yield, which is why monitoring the daily temperature is important as it must be in harmony with the physiological needs of the culture.

The Chókwè district still faces a serious problem of susceptibility to hunger and vulnerability to food insecurity and, in order to resolve this dilemma, it involves implementing the strategies described by Secretariado Técnico de Segurança Alimentar e Nutricional (SETSAN), FAO and the World Bank, which involve enhancing crop production local areas, dissemination of processing and conservation technologies for foods of plant and animal origin, sustainable production. The development of mechanisms and infrastructures for storing cereals and some vegetables through dehydration works as one of the main strategies that not only guarantee the longevity of food but also preserve the quality of these foods.

Small producers in this region have managed to obtain income from several harvests, but their value chain is not yet robust, which creates a devaluation of their income due to the poor flow route of these foods and, therefore, the implementation of a specific value chain for small producers, combining the application of quality indicators, satisfactory yield prediction models, and the search for the history of certain crops can be a viable mechanism aimed at increasing the flow of commercial exchange of the foods most produced in this region for others with little production, vice versa. It is evident in this research that climate events such as rising temperatures, water stress, sustainability of practices and changes in agricultural models have an extremely strong impact on ensuring food security, especially in underdeveloped countries.

On the other hand Ardiansyah *et al*., (2022) [1], encompasses technology as one of the factors to take into account, as it dictates the input and output relationship in the context of productivity but, in a broader study carried out in Bangladesh by Rana, (2023) [28], suggests investing in conservation agriculture as it has great potential for ensuring food security in the face of the challenges of climate change. According to Abbas, (2022) [2], in Mozambique there is a replacement of commonly used production systems, in order to respond to temperature variations and guarantee a satisfactory production response, a fact shared by Turyasingura *et al*., (2023) [36], sustaining the susceptibility and vulnerability of these communities to food insecurity due to current climate events.

For Alotaibi, (2023) [3], climatic events provide an increase in temperature and variation in precipitation behavior, affecting, according to Arivelarasan *et al*., (2023) [5], agriculture and the guarantor of food security in developing countries such as India. Although Mahajan *et al*., (2023) [22], places some events not parallel to the climate, such as soil salinity and heavy metal toxicity in the low productivity presented by small producers, in a broader survey of farmers with a probability of increasing production, Homann-Kee Tui *et al*., (2023) [17], reveals that these have poor soils that influence productive yield. For Chikafa *et al*., (2023) [10], small producers favor the design of crops in the same area and this scenario creates difficulties in obtaining better inputs, prices and negotiating power, as Marchi *et al*., (2024) [11], proposes the adoption of sustainable agricultural practices, conservation of natural resources, promotion of family farming and access to markets.

Final remarks

This study aimed to evaluate the effects of climate events on agricultural practices, production models and food availability in the Chókwè district. This work identified that the situation of access and availability of food in this region is still worrying and the change in precipitation patterns and increase in temperature are factors that further exacerbate this dilemma. Gaps were found in the context of monitoring the parameters temperature, precipitation, and solar incidence, from the point of view of guaranteeing the yield of agricultural production. It was noted that temperature and precipitation make it difficult to apply intercropping, monoculture, and irrigation agricultural practices, which are more prevalent in this region. With the study it is recommended:

1. Preparation of an updated database on precipitation and temperature patterns in different rainy seasons and ensuring the monitoring of the physiological needs of crops.
2. Intensifying community counselling on the use of intercropping agriculture, aiming to obtain crop variability at harvest time.
3. Disseminate food conservation techniques, aiming to reduce post-harvest waste and improve the availability of this food in communities.
4. Inclusion of women in decision-making, within households, allowing for greater decision-making within communities.

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