Climate Change as a Food Insecurity Problem in Southeastern Angola

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ABSTRACT

Climate change represents one of the greatest contemporary challenges to global food security, particularly in regions characterized by high socioeconomic vulnerability and strong dependence on natural resources. In Sub-Saharan Africa, the impacts of climate change are exacerbated by structural factors such as poverty, weak institutional capacity, and high dependence on rainfed agriculture. In southeastern Angola, specifically across the municipalities of Mavinga, Rivungo, Tchipundo, and Luiana, climate impacts manifest intensely through prolonged droughts, recurrent floods along the banks of the Cuando River, proliferation of agricultural pests, increasing pressure from wild animals on cultivated fields, and livestock diseases such as rinderpest. This article analyzes the complex relationship between climate change and food insecurity in these localities, employing a qualitative, exploratory, and contextual approach. Data collection was based on semi-structured questionnaires applied to local farmers, and traditional authorities. The questionnaires was applied to 24 participants, with six per locality, ensuring adequate data saturation for qualitative insights in localized community studies. The findings indicate that climatic variability has caused significant losses in both agricultural and livestock production, drastically reducing food availability and the economic access of families to essential nourishment, thereby exacerbating extreme poverty and chronic hunger. Furthermore, integrating environmental communication and media literacy perspectives inspired by broader West and Southern African scholarship highlights the critical role of public awareness and communication gaps in shaping community adaptive responses. The study concludes that food insecurity in southeastern Angola is not a mono-causal phenomenon, but rather the result of a multifaceted interaction among climatic, ecological, and socioeconomic factors. Addressing these systemic challenges requires integrated public policies, targeted investments in resilient agricultural infrastructure, community-based climate adaptation strategies, financial education during harvest months, mitigation of peatland fires in river basins, and effective natural resource management.

Keywords: Climate change; Food insecurity; Drought; Agricultural pests; Environmental communication.

INTRODUCTION

Climate change constitutes a global phenomenon with profound impacts on natural, economic, and social systems, currently recognized as one of the primary threats to food security. According to the Intergovernmental Panel on Climate Change (IPCC, 2023), the increase in global average temperature, the

irregularity of precipitation regimes, and the intensification of extreme weather events directly affect agricultural production, water availability, and the stability of food systems.

In Sub-Saharan Africa, the impacts of climate change are exacerbated by structural factors such as poverty, weak institutional capacity, and high dependence on rainfed agriculture (Niang et al., 2014; Serdeczny et al., 2017). Recent studies demonstrate that climate variability has caused a significant reduction in agricultural productivity, contributing to increased hunger and malnutrition. Angola fits into this context, featuring regions where the effects of climate change manifest with particular severity.

Southeastern Angola, including the municipalities of Mavinga, Rivungo, Tchipundo, and the Luiana, is characterized by a semi-arid climate and productive systems heavily dependent on rainfall. Precipitation irregularity has caused prolonged droughts, while floods from the Cuando River destroy riparian crops. Associated with these dynamics are the proliferation of agricultural pests, the invasion of fields by wild animals, and the occurrence of livestock diseases such as rinderpest, factors that worsen food production losses.

In this context, it becomes relevant to analyze how climate change contributes to food insecurity and the worsening of extreme poverty in these communities. The study aims to analyze the impacts of climate change on food security, identify the main climatic and ecological phenomena affecting production, and evaluate the social implications of hunger and extreme misery, while incorporating vital perspectives on environmental communication and community literacy.

LITERATURE REVIEW

Climate change constitutes a global phenomenon characterized by persistent shifts in climatic patterns, resulting primarily from human activities that intensify greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC, 2023), these changes manifest through increases in global average temperature, precipitation irregularity, and the intensification of extreme weather events such as droughts and floods. These phenomena have direct impacts on natural and socioeconomic systems, particularly affecting agriculture and food security.

Food security is defined by the Food and Agriculture Organization of the United Nations (FAO, 2022) as the condition in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs. Scientific literature evidences that climate change compromises the four pillars of food security: availability, access, utilization, and stability of food. The reduction in agricultural productivity, loss of income, and instability of productive systems contribute to worsening hunger and poverty, especially in vulnerable regions.

The relationship between climate change and food insecurity is particularly critical in developing countries, where subsistence agriculture strongly depends on weather conditions (Wheeler & von Braun, 2013; Morton, 2017). Globally, and according to reports by FAO et al. (2022), Sub-Saharan Africa is considered one of the regions most vulnerable to climate change. According to Niang *et al*. (2014), dependence on rainfed agriculture, coupled with weak technological and institutional adaptive capacity, makes African populations highly exposed to climate impacts, indicating that millions of people in this region face chronic food insecurity, with climate variability being one of the main explanatory factors.

Expanding upon regional African scholarship, recent assessments emphasize that public awareness, community-based environmental communication, and media literacy play indispensable roles in shaping local adaptation and resilience. In their seminal work examining climate change media coverage and literacy in West Africa, Ajala and Ibitoye (2023) highlight how a scarcity of targeted climate journalism and localized environmental communication hampers rural populations' capacity to interpret and proactively respond to climate risks. Complementary studies on communication and storytelling for climate consciousness in African agricultural settings (such as Ajaero & Anorue, 2018) stress that bridging knowledge gaps and enhancing climate literacy among rural communities directly empower grassroots stakeholders to implement sustainable adaptation strategies. These insights align with broader regional scholarship addressing climate impacts,

agriculture, and food security in Angola by underscoring that technical interventions must be paired with effective community communication and education.

Climate change has also contributed to the increased occurrence of agricultural pests in various regions of the world. Increased temperature and altered precipitation regimes create favorable conditions for the proliferation of insects and pathogens that attack crops, significantly reducing food production (IPCC, 2023).

In the African context, literature also highlights the increase in conflicts between rural communities and wild animals, a phenomenon exacerbated by climate change (Serdeczny *et al.,* 2017). Water and food scarcity drive animals to invade agricultural areas, devastating fields and causing significant losses in production. This dynamic is particularly relevant in regions near conservation areas, where coexistence between environmental conservation and food security becomes a growing challenge.

In Angola, the impacts of climate change have intensified in recent decades, unevenly affecting different regions of the country. Southeastern Angola, where the municipalities of Mavinga, Rivungo, Tchipundo, and Luiana are located, exhibits climatic and socioeconomic characteristics that amplify food vulnerability. This region is marked by a semi-arid climate, fragile soils, and strong dependence on subsistence agriculture and traditional livestock farming.

Studies and humanitarian reports indicate that recurrent drought in southeastern Angola has caused frequent crop failures and pasture shortages, resulting in livestock mortality and reduced food availability (FAO, 2022). Beyond drought, floods along the banks of the Cuando River constitute a recurring phenomenon in the municipalities of Rivungo, Tchipundo, Luiana, and surroundings. Although historically floods contributed to soil fertility, their intensification has caused destruction of agricultural fields, population displacement, and loss of essential assets (Serdeczny *et al*., 2017). The intensification of extreme events alters the balance between the benefits and risks associated with river systems, worsening the vulnerability of riparian communities.

Another relevant aspect in the local context is the proliferation of agricultural pests, frequently associated with climate change. Farmers in Mavinga and Rivungo face recurrent insect attacks that destroy plantations, drastically reducing staple food production. These losses worsen food insecurity and force families to adopt coping strategies, such as reducing the number of daily meals. The pressure exerted by wild animals on fields also constitutes a significant problem in southeastern Angola.

The scarcity of natural resources, associated with climatic variability, leads animals to seek food in cultivated areas, provoking conflicts and agricultural losses. This situation reveals the complex interaction among climate change, environmental conservation, and food security. Finally, the occurrence of livestock diseases, such as rinderpest, represents an additional factor of food insecurity. Livestock loss compromises not only the availability of animal-source foods but also the economic capacity of families, since livestock constitutes an important store of value and means of subsistence.

In summary, literature evidences that food insecurity in southeastern Angola results from the interaction among climate change, ecological phenomena, and socioeconomic fragilities. Droughts, floods, agricultural pests, crop invasion by wild animals, and livestock diseases act in combination, worsening hunger and extreme poverty. Understanding this relationship is fundamental for formulating climate adaptation strategies, robust environmental communication, and public policies that promote the resilience of local food systems.

MATERIALS AND METHODS

Methodological Framework & Study Design

The present study was conducted in the municipalities of Mavinga, Rivungo, Tchipundo, and Luiana, located in southeastern Angola. These sites were purposefully selected because they present significant, acute evidence of climate change impacts on agriculture and livestock, alongside severe levels of food insecurity. These areas represent highly vulnerable socio-environmental contexts characterized by a semi-arid climate, fragile sandy

soils, water resource scarcity, and heavy dependence on rainfed subsistence agriculture and traditional livestock raising (Niang et al., 2014; FAO, 2022).

Adopting a qualitative, exploratory, and contextual methodological framework (Minayo, 2017), this design is best suited for capturing the nuanced lived experiences, traditional knowledge, community perceptions, and structural impacts of climate change on food security in rural settings. This approach enables a holistic examination of physical ecological shifts (droughts, floods, pest outbreaks, wildlife incursions, and livestock diseases) alongside their intricate social, communicative, and economic repercussions (Creswell & Poth, 2018).

Participant Selection

Participant selection followed a purposive sampling strategy designed to capture expert local knowledge and frontline experiences with agrarian vulnerabilities. The study engaged a total of **24 participants** (comprising 16 smallholder peasants directly involved in daily agricultural production and 8 traditional authorities responsible for community resource management and local governance). Each of the four targeted municipalities (Mavinga, Rivungo, Tchipundo, and Luiana) contributed 6 participants (4 peasants and 2 traditional authorities).

The selection of 24 participants is methodologically justified through the principle of **data saturation** in qualitative exploratory research. Given the highly homogeneous yet deeply impacted rural profile of these remote southeastern municipalities, thematic redundancy and stable analytical categories were robustly achieved across the four sites by the sixth participant per location. This sample size provides deep, rich contextual narratives without sacrificing analytical rigor, aligning with recognized qualitative standards for localized community case studies (Kvale & Brinkmann, 2015).

Fieldwork Procedures

Fieldwork was conducted across a dedicated multi-month assessment period. Initial community entry involved securing formal authorizations from municipal administrative offices and traditional elders (*Sobas*). Semi-structured questionnaires and open-ended interview guides were administered directly in local languages (supported by Portuguese translation where necessary) by the research team. Field sessions captured detailed accounts regarding precipitation variability, extreme weather frequencies, crop yield failures, pest outbreaks, livestock mortality, coping mechanisms, and local communication channels regarding weather alerts.

Ethical Approval & Informed Consent

The research protocol adhered strictly to ethical guidelines for social and environmental research involving human participants. Institutional ethical exemption and clearance were not grante. Therefor, Prior to questionnaire administration, **informed consent** was verbally explained and secured from every participant. Participants were explicitly informed about the study's academic purpose, data confidentiality, voluntary participation, and their right to withdraw at any stage without consequence. For the publication of fieldwork photographs containing identifiable individuals, explicit verbal and visual consent was obtained from participants (and parental guardians for minors) assuring appropriate privacy protections.

Thematic Coding and Analysis

Data obtained from the semi-structured questionnaires and field interviews were subjected to a rigorous **thematic content analysis** (Kvale & Brinkmann, 2015). The analytical process followed a systematic inductive-deductive workflow:

Field notes, and questionnaire responses were transcribed and cross-verified; Relevant text segments pertaining to climate impacts, livelihood losses, and coping strategies were coded openly using descriptive labels; Codes were clustered into overarching thematic categories, such as *Agrarian Shocks and Crop Failures*, *Livestock Vulnerabilities*, *Wild Animal Conflicts*, *Coping and Survival Strategies*, and *Institutional Gaps &*

Communication Deficits ; The final thematic structure was integrated into the results and discussion, providing a transparent, triangulated narrative connecting ecological shocks with socio-economic food insecurity.

Table 1. Sampling Table of the Study

Location (Municipalities / Regions)	Number of Participants	Participant Profiles	Selection Criteria / Justification
Mavinga	4	• Peasants directly involved in agricultural production	Areas located in southeastern Angola with significant evidence of climate change impacts on agriculture and livestock, showing high levels of food insecurity, semi-arid climate, fragile soils, and dependence on subsistence agriculture.
	2	• Traditional authorities responsible for community management	
Rivungo	4	• Peasants directly involved in agricultural production	Areas located in southeastern Angola with significant evidence of climate change impacts on agriculture and livestock, showing high levels of food insecurity, semi-arid climate, fragile soils, and dependence on subsistence agriculture.
	2	• Traditional authorities responsible for community management	
Tchipundo	4	• Peasants directly involved in agricultural production	Areas located in southeastern Angola with significant evidence of climate change impacts on agriculture and livestock, showing high levels of food insecurity, semi-arid climate, fragile soils, and dependence on subsistence agriculture.
	2	• Traditional authorities responsible for community management	
Luiana	4	• Peasants directly involved in agricultural production	Areas located in southeastern Angola with significant evidence of climate change impacts on agriculture and livestock, showing high levels of food insecurity, semi-arid climate, fragile soils, and dependence on subsistence agriculture.
	2	• Traditional authorities responsible for community management	
TOTAL	**24 participants**	—	—

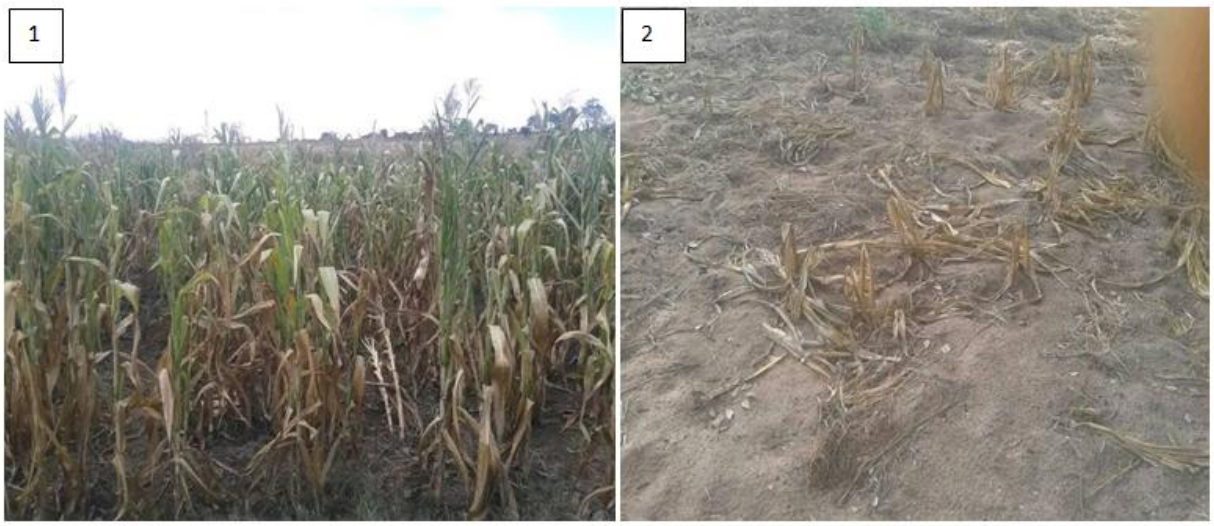
RESULTS AND DISCUSSION

The analysis of data obtained in the municipalities of Mavinga, Rivungo, Tchipundo, and Luiana shows that climate change has caused significant impacts on the food security of local communities (Serdeczny et al., 2017). Among the phenomena most frequently reported by participants are prolonged drought, floods along the banks of the Cuando River, proliferation of agricultural pests, crop invasion by wild animals, and the occurrence of livestock diseases such as rinderpest. These events result in diminished agricultural and livestock production, compromising food availability and the subsistence of rural families (FAO, 2022).

In the studied municipalities, drought was identified as the main factor of agricultural productivity loss. Participants reported consecutive years of insufficient precipitation that compromised the growth of staple crops such as maize, pearl millet, sorghum, beans, and cassava. Rainfed fields, which constitute the basis of local agriculture, suffered significant losses, directly affecting food security. This phenomenon also reduced

pasture availability, resulting in livestock deaths and decreased economic income for families (Niang et al., 2014).

Figures 1 and 2. Degradation of rainfed fields due to prolonged droughts in southeastern Angola.



Source: Fieldwork photographs captured by the authors during research expeditions in Mavinga and Rivungo (fieldwork period: 2025).

Concurrently, floods in cultivated fields along the banks of the Cuando River caused crop destruction (Fig. 3), family displacement, and loss of essential community infrastructure. Although floods historically contributed to soil fertility, the intensification of extreme events has resulted in severe negative impacts, reinforcing food instability and increasing dependence on humanitarian aid (IPCC, 2023).

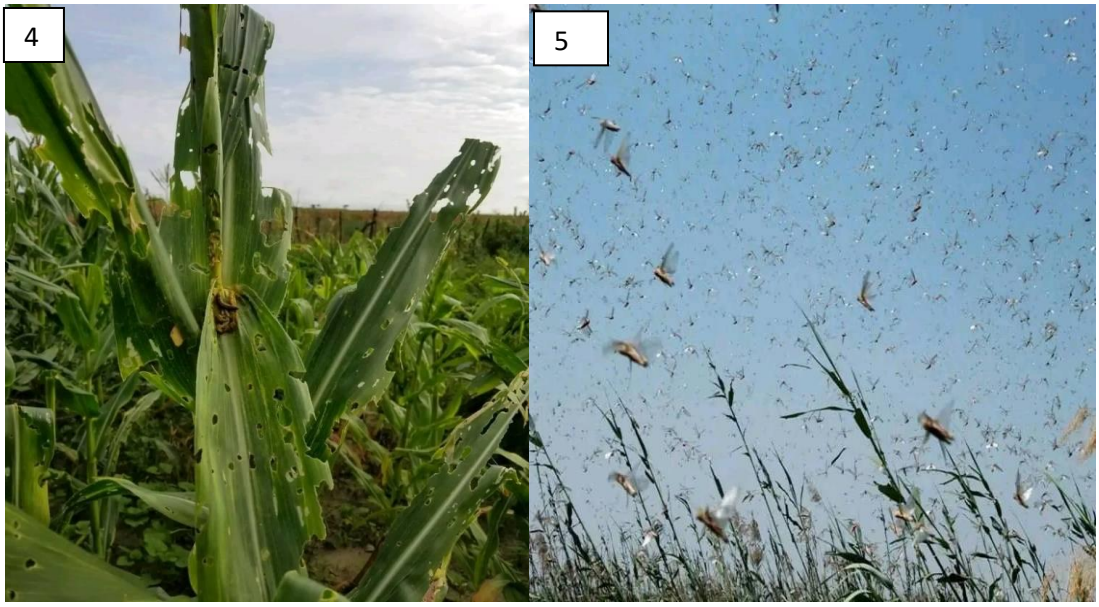
Figure 3. Flooded agricultural field on the banks of the Cuando River.



Source: *Photograph captured by the authors during fieldwork in Rivungo (2025).*

The proliferation of agricultural pests (Figs. 4–5), such as insects attacking maize and beans—notably the fall armyworm (*Spodoptera frugiperda* / *Helicoverpa zea*) and migratory locusts (*Locusta migratoria*)—was another impact reported by farmers in Mavinga and Rivungo, whose images were captured during field study. Increased average temperature and precipitation irregularity created favorable conditions for the reproduction and dissemination of these organisms, further reducing food production and exacerbating food insecurity (Morton, 2017).

Figures 4 and 5. Proliferation of agricultural pests (fall armyworm and migratory locust invasions) in the study area.



Source: *Photographs captured by the authors during fieldwork in Mavinga and Rivungo (2025).*

Participants also highlighted the invasion of fields by wild animals, such as hippopotamuses, elephants, and antelopes, which devour crops in search of food. This phenomenon has intensified due to the scarcity of natural resources and the pressure of climatic variability on ecosystems. Conflicts between wildlife and agriculture directly affect food production and increase environmental management challenges in local communities (Serdeczny et al., 2017).

Furthermore, rinderpest and other livestock diseases represent additional threats to food security. Livestock mortality (Fig. 6) compromises the supply of animal-source products, reduces families' economic income, and limits the capacity to store food reserves. Climatic and social factors create a cycle of continuous vulnerability, in which agro-livestock losses reinforce poverty and hunger (FAO, 2022).

Figure 6. Cattle mortality due to rinderpest and associated epizootic diseases.



Source: *Photograph captured by the authors during fieldwork in Tchipundo (2025).*

The analysis of responses revealed that, despite the perception of the severity of impacts, adaptation strategies remain limited. Faced with reduced food production, many families have resorted to reducing the number of daily meals, diversifying subsistence activities, or gathering wild fruits (Figs. 7). These strategies, while allowing short-term survival, reveal the fragility of local food systems and the persistence of extreme poverty (Wheeler & von Braun, 2013; Creswell & Poth, 2018).

Figures 7. Diversification of livelihood sources through the gathering of wild forest fruits by local residents.



Source: *Photographs captured by the authors during community fieldwork in Luiana and Mavinga (2025).*

The analysis of traditional authorities' discourses also revealed the absence of effective public policies for climate adaptation at the local level, compounded by a significant gap in environmental communication and climate literacy as highlighted in regional comparative scholarship (Ajala & Ibitoye, 2023). The lack of irrigation infrastructure, water storage systems, and support programs for family farming was pointed out as a major factor worsening climate impacts. These results reinforce literature highlighting the importance of governance, institutional capacity, and media awareness in reducing climate vulnerability (Morton, 2017; Ajaero & Anorue, 2018).

In terms of discussion, data suggest that food insecurity in southeastern Angola is directly compromised by a combination of climatic, ecological, and socioeconomic factors. Drought and extreme floods represent immediate production shocks, while pests, wild animals, and livestock diseases act as continuous pressure factors. The interaction of these elements creates a scenario of chronic vulnerability, highlighting the need for integrated policies addressing disaster mitigation, strengthening family farming, sustainable wildlife management, and animal disease control (Wheeler & von Braun, 2013; FAO, 2022).

Results also point to the importance of local adaptation measures, such as early warning systems for extreme events, resilient agricultural techniques, and community-based natural resource management. Literature shows that in semi-arid regions of Sub-Saharan Africa, implementing these strategies significantly contributes to reducing food insecurity, promoting sustainability and resilience among vulnerable communities (Niang et al., 2014).

Beyond purely climatic factors, since 2017 there have been conservation agriculture projects whose applicability has been quite successful by some farmers; however, limitations persist, such as the non-use of improved seeds and the inoperability of seed banks. Additionally, fires in the peatland areas of the Cubia River in Mavinga, and the Cuando, Utembo, and their tributaries in Rivungo, Tchipundo, and Luiana constitute another critical problem related to climate change. Financial education also emerges as a decisive factor contributing to food insecurity: during harvest months in these municipalities (April, May, June, and July),

families engage in unnecessary spending, causing them to run out of food reserves and seeds for the next agricultural season by September. Therefore, the findings of this research indicate that climate change in southeastern Angola has complex and interrelated impacts on food security, involving crop and livestock loss, wildlife conflicts, and the spread of livestock diseases.

These results reinforce the urgency of integrated public policies, investments in resilient infrastructure, and community adaptation strategies to mitigate the vulnerability of rural populations. In this regard, the presence of social organizations such as ACADIR is recognized for developing conservation agriculture activities in the municipality of Luiana (Tchingalule, 2026).

CONCLUSION

The present study evidences that climate change constitutes a central factor in food insecurity in southeastern Angola, particularly in the municipalities of Mavinga, Rivungo, Tchipundo, and Luiana. Phenomena such as prolonged drought, floods along the banks of the Cuando River, proliferation of agricultural pests, crop invasion by wild animals, and livestock diseases like rinderpest directly compromise agricultural and livestock production, reducing food availability and access. Results point to a complex interdependence among climatic, ecological, and socioeconomic factors that intensify rural communities' vulnerability. The lack of effective adaptation strategies, structured public policies, and environmental communication mechanisms limits families' response capacity and accentuates extreme poverty and hunger. Faced with this scenario, it is urgent to implement integrated climate mitigation and adaptation policies, including support measures for family farming, sustainable natural resource management, pest and disease control, financial education, and early warning systems for extreme events.

In finaly, food insecurity in southeastern Angola depends on a multidimensional approach that simultaneously considers climatic, ecological, and socioeconomic impacts, strengthening community resilience and ensuring access to sufficient and nutritious food. This study provides important subsidies for planning local interventions and more effective public policies.

Distribution of Tasks

Joaquim Tchingalule and Joaquim Mule Tchikuenje Jamba: Responsible for the research and digitization; Natália Essenje and Firmino Kassanha Nunda Chimangunga: Responsible for data analysis.

Conflict of Interest

The authors declare that there are no conflicts of interest in this study and that the ethical procedures established by this journal have been followed. Furthermore, they confirm that this work has not been published, either partially or entirely, in any other journal.

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