# Impact of Climate Change On Early Childhood Education In Mashonaland East Province of Zimbabwe

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***Abstract***.

*Global warming has become an international concern, since it has contributed to extreme climatic conditions in most parts of the world. This has been attributed to several factors that include industrialization resulting in carbon emission, deforestation and use of chemicals in agriculture. The changes in temperatures influence climate change. Climate change is increasingly disrupting the provision of education in most developing countries. Early childhood education is severely affected because of the ages involved, thus 3-8 years. The paper examined the effects of climate change on early childhood education in Mashonaland East Province of Zimbabwe. It is a region affected by recurrent droughts, erratic rainfall, and extreme temperatures. The paper examined how climate-induced environmental degradation, resource scarcity, and socio-economic instability affected access to safe learning spaces, disrupted educational activities, and hindered cognitive, emotional, and physical development in children. The paper is guided by Bronfenbrenner's Ecological Systems Theory. The theory explains how multiple societal systems such as the microsystem, mesosystem, exosystem, macrosystem, and chronosystem influence child development. A qualitative research approach was employed. It involved assessing infrastructure vulnerabilities, attendance trends, and health outcomes in five purposively selected early childhood development centres in Mashonaland East Province. The case study design was used to study cases in the five selected centres. The paper explored how flooding, heat stress, and water shortages affected learning environments. The notable effects of climate change on young children were malnutrition, fear because of insecure environments, displacement, and trauma. The paper also examined local interventions and adaptive strategies, including school gardening, indigenous disaster-response practices, and mobile play-based learning initiatives during crises to sustain education and promote child development. Findings were that 60% of early childhood development centres experienced recurrent closures during extreme weather, and that food insecurity and caregiver displacement reduced school participation by 40%. The paper recommends integrating indigenous knowledge systems into policy, and investment in climate-resilient infrastructure, trauma-informed teacher training, and partnerships to enhance food and water security, and collective efforts to drill boreholes to enhance food production in drought prone areas.*

**Keywords:** *Climate change; Early Childhood Development; Indigenous knowledge systems; vulnerable communities and Early Childhood Education.*

## I. INTRODUCTION

Globally, climate change has become an urgent developmental challenge, with far-reaching consequences across environmental, economic, and social systems. Children and the aged are among the most vulnerable groups to climate-related disruptions, and in South Africa, in rural and underprivileged contexts, early learners suffer most from structural vulnerabilities exacerbated by climate change (Van den Berg & Makusha, 2018). Global discourse has largely focused on infrastructure damage, displacement, and agriculture. The educational welfare of young children has suffered and at times lost in the milieu, particularly in developing countries. Over one billion children globally are at extremely high risk because of the impacts of climate change, which include heatwaves, droughts, and food insecurity (UNICEF, 2021). In Sub-Saharan Africa, the challenge is more pronounced due to weak adaptive capacity and fragile social services. Droughts and floods destroy educational infrastructure and have also led to malnutrition and illness in young children, which undermine their physical and cognitive development (Save the Children, 2020). Such challenges affect most countries in Sub-Saharan Africa.Zimbabwe is increasingly facing the adverse effects of climate change, including erratic rainfall, rising temperatures, and frequent droughts (Chagutah,

2021). Agricultural productivity has been affected, contributing to food insecurity. Food insecurity has been identified as a direct contributor to restricted growth and poor academic performance among early childhood development learners (Zhou, 2023). Zimbabwe's educational policy frameworks, while progressive on paper, often lack clear alignment with climate resilience, particularly for foundational education. For instance, learners frequently miss school because the surrounding area floods easily, making roads impassable (Manhize, 2019). Flexible school policies and social welfare mitigate the effects of climate events on learners (Brooker and Woodhead, 2018).

**Statement of the Problem**

Climate change has impacted negatively on the education of children at Early Childhood Development (ECD) levels. Such disruptions have a bearing on the domains of child development, which are physical development, moral development, cognitive development, emotional development, social development and creative development. The Report of the Presidential Commission of Inquiry into Education and Training (1999) recommended that Early Childhood Education (ECE) must be the responsibility of the government, under the Ministry of Primary and Secondary Education. As such the Ministry developed a curriculum for ECD. The paper sought evaluate the extent to which climate change had impacted on the implementation of ECD programs in ECD centres in Mashonaland East Province of Zimbabwe.

**Research questions**

The paper aimed to answer the following questions:

- What is the impact of climate change on Early Childhood Education (ECE) in Mashonaland East Province of Zimbabwe?
- What resilience strategies can be developed and promoted to manage the effects of climate change on Early Childhood Education (ECE) in Mashonaland East Province of Zimbabwe?

**Significance of the study**

The paper provides vital information that can contribute to the promotion of Early Childhood education in communities that are vulnerable to climate change. The information may assist education planners in designing education programs that take into consideration the climatic conditions of each region. It also demonstrates the close relation between economic development and education.

**Assumptions**

The paper is guided by the following assumptions:

- Climate change has negatively affected early childhood education and development.
- Schools and communities have a role to play in managing the negative effects of climate change on early childhood education.

**Delimitations**

The paper focused on five ECD centres in Goromonzi District of Mashonaland East Province, in Zimbabwe. The centres were purposively selected. They included school-based ECD centres. The paper focused on learning areas such as Language, Mathematics and Science, Physical Education, Visual and Performing Arts, Guidance and Counselling, Information and Communication Technology and Mass Displays. These are learning areas that are intended to contribute to all the child development domains.

**Conceptual Framework**

The paper uses Bronfenbrenner's Ecological Systems Theory (1979) as the guiding conceptual framework to explore how climate change influences early childhood education in Mashonaland East Province of Zimbabwe. Bronfenbrenner maintains that a child's development is influenced by nested environmental systems that are interrelated and evolve over time. Applying this framework helps in understanding both the direct and indirect effects of environmental stressors, such as those caused by climate change on children's growth and development in vulnerable communities.At the microsystem level, which involves immediate settings like the family, caregivers, centres, and community environments, the impact of climate change is direct and often intense. Flooding in Zimbabwe has destroyed early childhood development infrastructure and homes, disrupting children's access to safe learning spaces and stable routines (UNICEF, 2021). Apart from flooding, prolonged droughts have contributed to severe water

shortages, which undermine sanitation and hygiene in homes, schools and early childhood development centres.The mesosystem, which refers to the interactions between microsystems, also faces disruption due to climate-induced displacement. Save the Children (2022) points out that extreme weather events have forced families to relocate, thereby breaking the continuity of care and education. Such disruptions weaken the essential cooperation between caregivers and educators that supports a child's learning and emotional security.

When children are uprooted from their familiar learning environments, they may experience stress, isolation, and interrupted developmental support.The exosystem includes settings that the child may not be directly involved in, but which affect their development indirectly. This includes parental workplaces and local government services. Climate variability has negatively affected agricultural production in Zimbabwe, leading to job losses and income instability (World Bank, 2021). This economic stress reduces parents' ability to provide food, clothing, and educational materials, ultimately impacting children's well-being. On the same note, Plan International (2021) observes that when local governance structures lack the capacity to provide climate-resilient infrastructure or emergency relief, families are left with limited support systems to cope with climate disasters.At the macrosystem level, the broader sociocultural and political environment plays a crucial role. National policies and cultural attitudes toward climate change, education, and child welfare influence the extent of preparedness and response. The Government of Zimbabwe's National Climate Policy (2020) demonstrates efforts to integrate climate adaptation into education planning, but implementation gaps remain, especially in ECD services. At the same time, cultural beliefs and indigenous knowledge systems have a bearing on how communities react to climate change. Traditional beliefs about caregiving and environmental practices can either reinforce resilience or heighten vulnerabilities, depending on how communities perceive and act upon climate threats (FAO, 2021). The chronosystem introduces the element of time, recognizing that developmental outcomes are shaped by the timing and frequency of life events and changes.

In the context of Mashonaland East Province of Zimbabwe, repeated climate shocks such as recurring droughts and floods create cumulative stress for young children and their families. Chronic exposure to environmental hardship can lead to long-term developmental delays, emotional distress, and reduced educational attainment and lasting effects of early life disruptions can persist in adolescence and adulthood (IPCC, 2022).Bronfenbrenner's Ecological Systems Theory provides a holistic understanding of how the various dimensions of climate change intersect with systems that support early childhood development. The framework offers a comprehensive way to trace how environmental stressors at different levels from family to national policy collectively shape the experiences and development of young children in climate-vulnerable regions like Mashonaland East Province of Zimbabwe.

**Theoretical Framework**

**Direct Effects of Climate Change on ECD Centre Functionality**

Climate change has increasingly disrupted the functionality of educational institutions worldwide, but the impact on Early Childhood Development (ECD) centres in rural Sub-Saharan Africa is particularly pronounced. Infrastructural fragility makes ECD centres especially vulnerable to extreme weather events. Persistent droughts and unpredictable rainfall patterns have led to repeated school closures, roof collapses, and deterioration of sanitation facilities in some rural districts in Zimbabwe (Mudzonga & Chigavazira, 2021).

Most ECD centres in Mashonaland East Province are poorly constructed, use temporary or semi-permanent materials such as mud, thatch, or weakly reinforced bricks which cannot withstand the increased frequency of heavy storms or extreme heat (Chikodzi & Nyoni, 2020). Use of such materials leads to physical damage, unsafe learning conditions, and the suspension of learning activities in some cases. Flooding also often makes schools inaccessible, particularly in areas with poor road infrastructure. Most roads in rural Zimbabwe fall under the auspices of Rural District Councils which often lack the resources to maintain the roads.

**Impact of Climate Change on Nutritional Status and Child Health Outcomes**

Droughts and rainfall variability compromise household food production, directly contributing to malnutrition among young children (UNICEF, 2021). In Zimbabwe, over 30% of children under the age of five experience chronic malnutrition, or stunting, with rates increasing during drought years (Zhou, 2022). Children aged three to five, who are at a critical stage of early childhood development, are particularly vulnerable, as adequate nutrition is essential for both physical growth and cognitive development during this formative period.

Reduced agricultural yields during dry spells diminish food availability both at home and in school-based feeding programs. ECD centres that depend on community donations or subsistence farming for feeding schemes, disruptions in crop cycles caused by erratic weather can leave children attending school without meals, further limiting their ability to focus and learn. Exposure to extreme heat and waterborne diseases resulting from water scarcity and poor sanitation also increases the incidence of diarrhea, heat exhaustion, and skin infections among young learners (Save the Children, 2020; Mutetwa & Murehwa, 2019).

**Challenges Faced by ECD Educators and Caregivers**

Teachers play a pivotal role in the early learning journey of children, yet their efforts are increasingly constrained by the evolving climate crisis. Muringani (2021) observes that rural teachers in Zimbabwe often lack climate literacy and trauma-informed pedagogical training to support learners affected by environmental shocks. The issue of overcrowded classrooms has become a common phenomenon in schools in Zimbabwe, and Mashonaland East is not an exception. Teachers frequently contend with overcrowded classrooms, insufficient teaching aids, and disruptive weather conditions, which are further complicated when extreme weather limits access to schools or disrupts teaching schedules (Mukonoweshuro, 2020).

Climate-induced displacement and food insecurity create unstable home environments, leaving caregivers overwhelmed and emotionally exhausted, thereby reducing their capacity to support learning both at school and at home (Mapuranga, 2020). A rise in school enrolments and curriculum reforms have taken their toll on both teachers and parents. A rise in school enrolments without matching infrastructure has a bearing on the quality of education as the teachers are often stressed, class management and individual learner engagement are compromised. Addressing these challenges requires targeted interventions that enhance teacher training, improve classroom conditions, and provide support for caregivers to mitigate the adverse effects of climate change on early childhood development.

**Feasible and Sustainable Strategies for Building ECD Resilience**

The need for contextually grounded, low-cost resilience strategies that can be implemented in rural ECD environments remains a priority and cannot be overemphasized. It may be necessary to consider the survival and resilience strategies adopted through indigenous knowledge systems for sustainable development. Indigenous knowledge systems, which include rainwater harvesting, seasonal planting, and food preservation techniques, play a critical role in strengthening community-based climate resilience (Chanza & Gukurume, 2018). In some districts of Manicaland and Masvingo in Zimbabwe school-led gardening projects have enabled ECD centres to sustain feeding programs during lean seasons (Makwiramiti, 2021).

Other approaches that can be adopted include mobile play-based learning kits during climate emergencies and caregiver cooperatives that construct low-cost, climate-resilient classrooms using local materials and techniques. This can reduce dependence on external aid and empower local actors. The challenge is that some of the community initiatives lack sustainability as they rely on funding from local and external donors. Once the donors withdraw support, the projects come to an end. Nhundu and Mudzingwa (2022) note that these community-led innovations are often under-documented and underfunded due to limited policy integration and a lack of systematic evaluation. Furthermore, national frameworks such as Zimbabwe's Climate Change Response Strategy (2014) and the Education Sector Strategic Plan (ESSP 2021–2025) make minimal reference to early childhood needs, indicating a persistent gap in both research and policy.

## II. METHODS

The paper employed a qualitative research methodology to explore the impacts of climate change on early childhood education (ECE) in Mashonaland East Province, Zimbabwe. The qualitative approach was chosen for its ability to provide in-depth, contextual insights into lived experiences, particularly in settings where environmental stressors intersect with educational challenges (Creswell & Poth, 2018). By capturing the perspectives of teachers, caregivers, and community members, the paper aimed to develop a nuanced understanding of how climate-induced disruptions affect learning, health, and developmental outcomes for children aged three to eight years in the selected ECD centres.

### Sample

The study involved twenty purposively selected participants drawn from five ECD centres in Mashonaland East Province of Zimbabwe. The participants included eight ECD teachers, seven caregivers, and five local community leaders involved in school governance or disaster response. Purposive sampling was used to ensure that all participants had direct experience with climate-related disruptions in early childhood education and were well-positioned to provide relevant insights (Etikan, Musa, & Alkassim, 2016). Teachers were selected for their firsthand experience managing ECD centres under extreme weather conditions, while caregivers offered perspectives on children's learning and well-being at home. Community leaders, who included village heads and School Development Committee (SDC) members, were included to provide broader insights into local response mechanisms and infrastructural challenges.

### Data Collection Methods

Three qualitative data collection methods were employed to gather rich, contextual data related to the study objectives: semi-structured interviews, focus group discussions, and non-participant observations. Semi-structured interviews were conducted with eight ECD teachers and five community leaders, allowing for probing specific issues such as school closures, coping mechanisms during droughts, and the psychological impacts of climate stress on young children. Open-ended questions enabled participants to elaborate on their experiences, providing patterns across different centres and roles (Brinkmann, 2018). Focus group discussions involved caregivers of enrolled learners and ECD teachers, providing a platform for participants to share experiences and reflect on community-level challenges and solutions. Focus group discussions revealed how caregivers perceive climate-related challenges in relation to children's learning and well-being, and how teachers collectively navigate resource constraints. Non-participant observations were conducted across the five selected ECD centres to document real-time evidence of environmental impacts and adaptive practices. Observations involved recorded instances such as classrooms temporarily closing due to high winds and dust storms, demonstrating how climate change directly affects teaching, learning environments, and children's daily routines.

### Data Analysis

Data from interviews, focus group discussions and observations was analyzed using thematic analysis. Thematic analysis allowed for the identification, coding, and categorization of recurring themes and sub-themes that emerged from participant narratives and field notes. Themes were grouped under key areas such as infrastructural vulnerability, learning areas, psychosocial impacts on learners, disruption of food and water security, and community adaptation strategies.

## III. RESULT AND DISCUSSION

### Physical Infrastructure Vulnerability and Disruption of Learning

Participants consistently reported that extreme weather events such as intense rainfall and prolonged heat frequently damaged ECD infrastructure, resulting in temporary closures and unsafe conditions for children. Several ECD teachers noted that their classrooms, often made from mud and pole or unreinforced brick, could not withstand storms or heatwaves. One teacher remarked:

*"Each time it rains heavily, we are forced to close for days. Our roof leaks, and the floors get muddy—it's not safe for the little ones."*

This corroborates the observations by Mudzonga & Chigavazira (2021), who noted that weather-exposed rural schools in Zimbabwe are structurally fragile. In Mashonaland East, the situation is further

exacerbated by limited government investment in preschool infrastructure, making climate shocks particularly disruptive to teaching continuity.

**Food Insecurity and Health Challenges Among Learners**

Parents and caregivers shared that climate-induced food shortages severely affect children's nutrition and energy levels. In drought years, meals at home become irregular, and many ECD centres dependent on community donations suspend feeding programs altogether. One caregiver explained:

*"Sometimes my child goes to school on an empty stomach. When the crops fail, there is no food at home and no feeding programs at school as well."*

This concern reflects broader data from UNICEF (2021) and FAO (2019), which link climate-induced crop failure to increased child malnutrition. Chronic food insecurity among young children was reported to lead to lethargy, reduced participation, and increased absenteeism. Teachers observed that hungry learners often "zone out" and struggle to stay awake during lessons. Health-wise, teachers and parents noted an increase in diarrheal infections, rashes, and heat-related exhaustion during the hot season especially where water shortages were acute. These views confirm Mutetwa & Murehwa (2019)'s observations that climate variability exacerbates health burdens in already fragile childhood development contexts. However, it is important to note that health effects manifest in day-to-day classroom realities in the form of frequent absences, disrupted immunization schedules and difficulty in concentrating in class. As such, unwell children cannot access the full benefits of ECD programming, thereby negating the principle of educational inclusivity.

**Strained Teachers and Unprepared Caregivers**

A dominant narrative from participants was the increasing emotional and logistical burden placed on teachers and caregivers. Teachers reported that classroom routines were regularly disrupted due to extreme heat or flooding, making consistent instruction difficult. One teacher stated:

*"Some days it's just too hot to teach. Children cry or fall asleep, and I have no fans or resources to make them comfortable."*

Caregivers also expressed the feeling of being overwhelmed and unsupported. Many are subsistence farmers who must juggle drought-stressed livelihoods with childcare responsibilities. As one grandmother caring for four children shared:

*"If I go to the field and it doesn't rain, I must try again tomorrow—and the children stay home. No one helps me. I am tired."*

This demonstrates a state of hopelessness and resignation to fate. The ideas concur with the concerns raised by Mapuranga (2020), who found that caregivers in rural Zimbabwe are often overburdened by the dual pressures of household survival and child development. Teachers also noted that many caregivers were too emotionally exhausted or uninformed to support learning at home. The paper observed that caregivers were not passive actors, but simply lacked the resources, knowledge, or psychosocial support to cope with the compounding effects of climate change.

**Child Development and Learning Areas**

The aim of child development is to address at least six main aspects which are Health, Physical, Social, Moral, Emotional, Cognitive and Creative development. To address these six domains the ECD curriculum identifies at least eight learning areas which are Language, Family and Heritage Studies, Mathematics and Science, Physical Education, Visual and Performing Arts, Guidance and Counselling, Information and Communication Technology and Mass Displays. An observation of the timetables in the classrooms visited showed that the learning areas appeared on the timetables and were planned for and the aims and objectives were clearly stated in the plan books. Teachers noted that it was not possible to implement the curriculum since weather conditions dictated attendance in the ECD centres. One teacher noted that:

*Scheming and planning are requirements at all levels of the school curriculum. However, we rarely meet the aims and objectives of the syllabus because of disruptions caused by extreme weather conditions in all the seasons. Attendance is affected by floods during the rainy season, extreme heat during the hot season and the cold in winter.*

Weather patterns and climate changes have a bearing on both early childhood education and early childhood development. While it is important to address the challenges that impact on local communities, some of the problems are macro in nature. For example, economic performance of a country has a bearing on employment, social development, poverty and the ability of families to sustain themselves.

**Local Resilience and Community-Driven Innovation**

Despite the severe challenges, participants revealed promising grassroots strategies being adopted to cope with climate shocks. Community gardens managed by parent committees were cited as a key innovation sustaining feeding programs during lean periods. One school head explained:

*Even when crops fail at home, our school garden still provides some vegetables for the children. Parents take turns watering it.*

These findings corroborate the observations of Chanza & Gukurume (2018), who advocate for integrating indigenous knowledge and localized adaptation practices into formal educational planning. They concur with Nhundu & Mudzingwa (2022) who argued for better document and scale community-led resilience efforts. However, it can be noted that resilience innovations are reactive coping mechanisms, which may lack sustenance.

## IV. CONCLUSIONS

The paper explored the impact of climate change on early childhood education (ECE) in Mashonaland East Province of Zimbabwe. Findings indicate that climate-induced disruptions such as droughts, erratic rainfall, flooding, and extreme heat significantly compromise learning environments, reduce school attendance, and negatively affect the physical, cognitive, and emotional development of children aged three to eight years. Such disruptions have a bearing on the coverage of the syllabus and the learning areas. Teachers and caregivers face challenges including empty classrooms in one instance and overcrowded classrooms in other instances, limited teaching resources, and the psychological stress of supporting children during climate-related crises.

The paper also highlights the importance of community-led adaptive strategies such as school-based gardening, rainwater harvesting, and the use of indigenous knowledge systems, which enhance resilience and continuity of learning. While some schools had garden projects, the sustainability of such projects during droughts could not be ascertained. Schools and communities play crucial roles in managing and mitigating the effects of climate change on ECE. However, the effects of such interventions remain limited because of other social factors such as poverty and unemployment.Climate change poses both immediate and long-term challenges to ECD learners and that proactive, locally adapted interventions while crucial for safeguarding early learning may not be enough in extreme cases. National government strategies and measures remain paramount. There must be a clarion call for all the layers demonstrated in Bronfenbrenner's Ecological Systems Theory to contribute in the fight against global warming and climate change.

## V. RECOMMENDATIONS

- The Ministry of Primary and Secondary Education and local authorities should invest in climate-resilient ECD infrastructure by promoting the use of local, heat-resistant materials and installing solar-powered boreholes with rainwater harvesting systems.
- National policymakers and legislators should integrate ECD priorities into the Zimbabwe National Climate Policy and revise the Education Act to reflect climate-related challenges in early childhood learning.
- Teacher training institutions and education officials should incorporate trauma-informed, climate-sensitive teaching methods into pre-service and in-service training for ECD educators.
- The Ministry of Agriculture and school administrators should work together to establish drought-resistant school gardens that support consistent and nutritious feeding programs.
- Community leaders and curriculum developers should incorporate indigenous knowledge systems into ECD programming to strengthen local relevance and climate resilience.

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