

**Exploring Innovative Approaches for Crisis Responsive and Resilient  
Education System: The Case of the War (November 2020-2022) in Tigray,  
Ethiopia**

By

Halefom Gezaei Abera

March 2025

Mekelle University

**Exploring Innovative Approaches for Crisis Responsive and Resilient  
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By

Halefom Gezaei Abera

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We hereby certify that this Dissertation submitted by Halefom Gezaei confirms to acceptable standards, and as such is fully adequate in scope and quality. It is therefore approved as the fulfillment of the Dissertation requirements for the degree of Doctor of Education in Educational Policy and Strategic Management.

**Approval by the Board of Examiners:**

<u>Dr. Nigusse Woldemariam (Asso. Prof., MU)</u>	_____	<u>March 26, 2025</u>
<b>Chairman</b>	<b>Signature</b>	<b>Date</b>

<u>Dr. Mengistu Hailu (Asso. Prof., MU)</u>	_____	<u>March 26, 2025</u>
<b>Internal Examiner</b>	<b>Signature</b>	<b>Date</b>

<u>Dr. Befekadu Kidane (Asso. Prof., AAU)</u>	_____	<u>March 26, 2025</u>
<b>External Examiner</b>	<b>Signature</b>	<b>Date</b>

**Advisors:**

<u>Dr. Mulugeta Tsegai (Asso. Prof., MU)</u>	_____	<u>March 26, 2025</u>
<b>Advisor</b>	<b>Signature</b>	<b>Date</b>

<u>Dr. Janet Guyden (Prof., USA)</u>	_____	<u>March 26, 2025</u>
<b>Advisor</b>	<b>Signature</b>	<b>Date</b>

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## **AUTHOR’S DECLARATION**

I declare that “Exploring Innovative Approaches for Crisis Responsive and Resilient Education System: The Case of the War (November 2020-2022) in Tigray, Ethiopia” is my own work and that the sources that I have used or quote have been indicated and acknowledged by means of complete reference.

**Signature:** -----

**Name:** Halefom Gezaei Abera

**Date:** March 2025

## **DEDICATION**

This dissertation is profoundly dedicated to the resilient children whose fundamental right to education was tragically stripped away amidst the war in Tigray, Ethiopia.

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## ABBREVIATIONS AND ACRONYMS

<b>Acronym</b>	<b>Full Form</b>
4A	Availability, Accessibility, Acceptability, and Adaptability
ACER	Australian Council for Educational Research
ACLED	Armed Conflict Location & Event Data Project
DRC	Democratic Republic of the Congo
EAA	Education Above All
ECW	Education Cannot Wait
EHRC	Ethiopian Human Rights Commission
EPRS	European Parliamentary Research Service
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GCPEA	Global Coalition to Protect Education from Attack
GNN	Global News Network
GPE	Global Partnership for Education
GPI	Global Peace Index
HRW	Human Rights Watch
ICT	Information and Communication Technology
IDP	Internally Displaced Person
INEE	Inter-agency Network for Education in Emergencies
IRC	International Rescue Committee
ITU	International Telecommunication Union
MLR	Multiple Linear Regression
NAEYC	National Association for the Education of Young Children
NCERT	National Council of Educational Research and Training
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organization for Economic Co-operation and Development
OHCHR	Office of the United Nations High Commissioner for Human Rights
OLS	Ordinary Least Squares
OVB	Omitted Variable Bias
PWD	Persons with Disabilities
PTSD	Post-Traumatic Stress Disorder
PTA	Parent-Teacher Association
RAPID	Reach, Assess, Prioritize, Increase, and Develop
SD	Standard Deviation
SE	Standard Error

<b>Acronym</b>	<b>Full Form</b>
SEL	Social and Emotional Learning
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
IDMC	Internal Displacement Monitoring Centre
SSD	Safe Schools Declaration
STATA	Software for Statistics and Data Science
TREB	Tigray Regional Education Bureau
TSA	Tigray Statistical Agency
TEB	Tigray Education Bureau
UIS	UNESCO Institute for Statistics
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children’s Fund
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
UNU-CPR	United Nations University Centre for Policy Research
USAID	United States Agency for International Development
VIF	Variance Inflation Factor
WASH	Water, Sanitation, and Hygiene
WFP	World Food Programme
WHO	World Health Organization

## **ABSTRACT**

*The multifaceted effects and impacts of armed conflict on the education sector have been insufficiently studied despite their frequent occurrence globally, particularly in relation to both previous and recent conflicts in the Tigray region of Ethiopia. This study aimed to explore innovative approaches for a crisis-responsive and resilient education system in the region, utilizing a concurrent-embedded mixed-method research design that was conducted in 28 primary schools across 8 districts of 5 zones, regional Bureau of Education and 10 education NGOs in the region. Data were collected from 300 respondents selected through probability and purposive sampling methods, and the analysis employed both descriptive and inferential statistical tools, supported by qualitative content analysis. The findings revealed that the war in Tigray had a statistically significant negative effects on the education system, the teaching-learning process, and education agents in the region. The crisis exhibited high levels of exposure, sensitivity, and vulnerability, with precise population mean estimates and strong explanatory power. There was a consistent alignment in the perceptions of respondents, and the severity of the war's effects increased proportionally with the extent of the crisis. To address the immediate effects of the war on education, the study identified statistically significant, innovative crisis-responsive approaches characterized by high availability, accessibility, acceptability, and adaptability. These approaches were shown to increase proportionally with the educational features, based on precise population estimates, respondent consistency, and strong explanatory power. Furthermore, to establish sustainable solutions beyond short-term fixes, the study explored statistically significant crisis-resilient strategies that demonstrated strong absorptive, adaptive, and transformative capacities. These strategies also showed proportional growth with an increase in resilience capacities, supported by consistent respondent perceptions, precise statistical estimates, and strong explanatory power. The qualitative data embedded in the research reinforced the quantitative findings, resulting in a comprehensive crisis-response-resilience model for building a resilient education system. Finally, the study offers policymakers, practitioners, and researchers a foundation to further investigate the broader impacts of war on education and to test and validate the proposed crisis-responsive and resilient strategies in real-world contexts.*

**Key Words:** *Education System, Teaching-Learning, Education Agents, Crisis Extents, Education Features, Resilient Capacities, War Effects, Response and Resilient Approaches*

# CHAPTER ONE

## INTRODUCTION

This introduction chapter of the study begins by laying out the background to provide a comprehensive understanding of the research context, identifying the key developments and issues that led to this investigation. From this foundation, the statement of the problem articulates the gaps or challenges that have not yet been sufficiently addressed, establishing the rationale for the research. It also indicated that study is driven by well-defined research questions and hypotheses, which guide the inquiry and outline expected outcomes. The objectives are clearly stated in this chapter, delineating what the research aims to achieve, both in a broad sense and through specific, measurable goals.

The significance of the study is discussed in this section, emphasizing its potential contributions to knowledge, practice, or policy, and how it may benefit researchers, practitioners, and other stakeholders. The scope of the research is outlined in this chapter, specifying the boundaries and focus of the study to ensure its relevance and manageability. Key terms are then defined in the operational definitions section of this chapter one to provide clarity and consistency throughout the study. Finally in this chapter one section, the organization of the research is presented, offering a roadmap of the chapters to guide readers through the flow of the study, from the introduction to the final conclusions.

### **1.1. Background of the Study**

Armed conflict or war has remained a persistent global challenge since World War II, casting a long shadow over societies and profoundly affecting education systems, children, and communities worldwide (Annyssa, 2019). More than half of the world's countries have been involved in at least one conflict since World War II (Carina et al., 2018; UNU-CPR, 2017). Between 2008 and 2022, global peacefulness deteriorated by 3.2%, with the intensity of conflicts increasing by 9.3%, and safety and security declining by 3.6% (GPI, 2022). The economic impact of armed conflicts surged by 27% in 2021, driven largely by the rise in refugees, internally displaced persons, and significant GDP losses as a result of conflicts (GPI, 2022; HRW, 2020).

These conflicts often lead to a decline in peacefulness, escalations of violence, and economic setbacks, with education becoming one of the most significant casualties (UNRWA, 2021; OCHA, 2021; HRW, 2020). Nearly two-thirds of all incidents involving armed conflict globally target educational institutions, leading to the disruption of education systems and having adverse impacts on students, teachers, and communities (GCPEA, 2022; UNICEF, 2020; UNU-CPR, 2017). This includes the military occupation of schools, child recruitment, and widespread school closures, which reverse the progress made in education, particularly in countries without resilient systems (UNESCO, 2011, 2021; GCPEA, 2022).

Sub-Saharan Africa, historically vulnerable to conflict, faces ongoing challenges in developing and sustaining resilient education systems (Mengistu, 2015; Aremu, 2010). Over recent decades, almost three-fourths of the countries in Sub-Saharan Africa (SSA) have experienced armed conflict (Mengistu, 2015; Aremu, 2010). The long-standing tradition of conflict in the region often disrupts governance, and efforts to expand educational coverage are frequently undermined by attacks on schools, teachers, and students (Helena, 2017). Despite initiatives to foster human capital, SSA remains vulnerable to threats against its educational systems, making resilience-building a critical and urgent priority.

Ethiopia, a country historically affected by drought, famine, and occasional civil wars, has one of the highest rates of internal displacement due to conflict (IDMC, 2020). The Global Peace Index (2020) ranks Ethiopia among the least peaceful nations, with recent years seeing an escalation in conflict (ACLED, 2021; International Crisis Group, 2021). The ongoing conflict in Ethiopia continues to undermine educational progress, as schools have become targets in a context lacking a resilient education system (GCPEA, 2022; Alemayehu and Jon, 2012).

Tigray, an ancient and historically significant region, has been particularly affected by the armed conflict that began in November 2020. The region, already grappling with the locust plague and the COVID-19 pandemic, has endured a crisis that has impacted all aspects of life for over two years (Vanden Bempt et al., 2021; Conley et al., 2021; Tewelde, 2021). The war in Tigray has caused widespread school closures, the displacement of millions of students, and extensive loss of life and infrastructure (Gesese et al., 2021; Weldemichel, 2021; Nyssen et al., 2021). In particular, 88% of schools in Tigray have been damaged, and over 2.4 million children both who

were in school previously and projected ones were out of school following the closure of 2,221 primary schools (TREB, 2021) during the war and siege times.

Given the complex dynamics of armed conflict and wars across the globe, conducting detailed studies is crucial to deeply understanding the causes, effects, and impacts of crises on education systems. This research is necessary to explore innovative approaches for recovery and resilience within education systems (UNESCO, 2011; Yuji, 2022). It is essential to enhance the ability of individuals, communities, and systems to navigate through crises, mitigate risks, adapt, and emerge stronger from adversity to safeguard education (Ritesh, 2019; Shah, 2019). Shifting towards resilience-based approaches in education is key to ensuring continuity of learning in times of crisis (Yuji, 2022; Caroline, 2021; Robert, 2016), as demonstrated by the global response to the COVID-19 pandemic, which underscored the importance of creative and flexible education strategies during crises (Boisvert et al., 2020).

With this background, the present study aimed to analyze the effects of armed conflict on the education system, explore innovative recovery approaches, and propose strategies for building a crisis-resilient education system in Tigray, Ethiopia, in the aftermath of the war commenced in November 4, 2020 up to 2022. This research adopted a mixed-methods approach, incorporating both quantitative and qualitative research methodologies.

## **1.2.Statement of the Problem**

In light of the escalating armed conflicts worldwide, research has extensively documented the profound repercussions on the education sector in a scattered way (Spitzer and Twikirize, 2012; González, 2012; Glasgow and Baer, 2011; Rieder & Choonara, 2012; Massad et al., 2012). The alarming frequency of attacks on schools during such conflicts underscores the urgent need to comprehensively examine the overall impact of armed conflict on education. Children, being the primary victims of wars, experience attacks on schools as the most common form of aggression during armed conflicts, constituting nearly two-thirds of all reported incidents globally (UNICEF, 2020). Existing quantitative studies, exemplified by research from Cambodia (Asadul et al., 2015) and Sierra Leone (Tillman, 2018), have established a negative correlation between armed conflicts and children's educational attainment in various regions. Conflict-affected children in countries such as Germany, Austria, Cambodia, Tajikistan, Rwanda, Bosnia, Guatemala, and Afghanistan

complete fewer grades of schooling compared to their non-affected peers (Patricia, 2010; UNESCO, 2011).

However, there exists a significant research gap concerning the broader aspects of education systems, teaching-learning, and education agents in conflict-affected areas. While regression analysis has unveiled the impact of infrastructural destruction and pupil abduction on academic performance in primary education in Uganda (Proscovia, 2016) and a decrease in children's GPA in the Israeli-Palestinian context due to armed conflict (Hendrik et al., 2017), a comprehensive understanding of the dynamics in these crisis settings is lacking where the effects and impacts of the wars and armed conflicts on the education system have not been studied in terms of crisis extents such as exposure, sensitivity, and vulnerability of the noticed crises.

Moreover, innovative recovery approaches and resilient strategies for education continuity during crises, including the recent experience with the COVID-19 pandemic, lack clarity regarding their effectiveness and equity (Boisvert et al., 2020; UNESCO, UNICEF, the World Bank, and OECD, 2021; World Bank, 2022). Resilience in education, a fundamental concept for minimizing disaster and conflict risks, necessitates further exploration, particularly in the context of education systems and agents facing armed conflict crises (UNESCO, 2011; Yuji, 2022). Resilient education systems leverage existing resources, capacities, networks, and assets to support learning in times of adversity (Ritesh, 2019). Though some general response and resilience strategies have been studied to respond education crises, the availability, accessibility, acceptability and adaptability of the response approaches; and the absorptive, adaptive, and transformative capacities of the resilient strategies have not been studied in these contexts.

In the pivotal realm of a nation's progress, Tigray has demonstrated commendable strides in education over the past three decades, notably in terms of outreach and gender equality. Despite grappling with challenges related to the quality of education, Tigray dedicated a substantial 25 percent of its annual budget to this fundamental sector. As of 2019, primary education in Tigray achieved notable milestones, boasting an enrollment of 1,464,385 students across 2,221 primary schools, 271 secondary institutions, and two teachers' colleges, as reported by the Tigray Education Bureau (TREB, 2019).

Regrettably, the devastating conflict that unfolded in Tigray inflicted unprecedented human and material losses, setting the region back by decades. The consequences of this war reverberated

through widespread destruction of infrastructure, acute food shortages, the displacement of over 2.2 million people, and profound psychological and physical trauma within the education community (Gesese et al., 2021; Weldemichel, 2021; Nyssen et al., 2021; Annys et al., 2021). The Tigray regional education bureau reported a distressing closure of 2,221 primary schools, affecting over 2.4 million children both who were previously enrolled and projected yearly enrollees. This closure resulted in significant damage to schools and tragic losses among students, teachers, and other members of the school community (TREB, 2021). Despite the reopening of schools in May 2023, enrollment stands at only 40%, leaving 60% of students out of school due to war trauma, destroyed infrastructure, and a lack of necessary materials. Moreover, there is a critical shortage of teachers, with 14,000, equivalent to 30.4% of the 46,000 teachers in 2020, absent due to casualties, displacement, and unpaid salaries as of 2023 in the region (TREB, 2023).

Despite such sporadic studies and assessments, there existed a substantial research gap in identifying the holistic effects of the armed conflict and in exploring the resilience of education systems, teaching-learning processes, and education agents operating in crisis settings. To date, no comprehensive study has been conducted in the region to thoroughly investigate the repercussions of the armed conflict on education. This lack of in-depth understanding posed a significant challenge in developing effective strategies to address and mitigate the devastating consequences faced by the education sector in Tigray. The researcher, with both knowledge and working experience in the education sector as a humanitarian actor, recognized the critical need for such a study to fill this void.

The absence of comprehensive study findings implied a missed opportunity to build resilient capacities within the education system in the region. Understanding the intricate dynamics of the armed conflict's effects on education was essential for developing targeted interventions that can withstand and recover from crisis situations. A well-informed study could potentially contribute to preventing and mitigating the adverse effects of armed conflicts on education systems.

Overall, despite global studies on the impact of armed conflict on education, significant research gaps remained, particularly in the context of Tigray. There was an evidence gap due to the absence of comprehensive, localized studies examining the broader effects of conflict on the education system, teaching-learning processes, and education agents. A theoretical and conceptual gap existed, as critical crisis-related concepts like exposure, vulnerability, education response

attributes, and resilience capacities remain underexplored. The predominance of quantitative methods like regression also pointed to a methodological gap, limiting deeper contextual understanding. Furthermore, population and geographical gaps highlighted the underrepresentation of education stakeholders and the lack of studies focused on conflict-affected regions like Tigray. There was also a practical and policy gap, with little clarity on effective, context-specific recovery and resilience strategies, and uncertainty around the effectiveness and equity of global interventions underscores a gap in conclusive findings.

Therefore, this study aimed to bridge the existing research gap by concentrating on the assessment of the effects of armed conflict on the education system, teaching-learning processes, and education agents along with their crisis extents. Additionally, it aspired to explore innovative recovery and resilience approaches along with their education attributes and resilient capacities that can be employed to build crisis-resilient education systems in Tigray, Ethiopia, and potentially serve as a model for other worlds facing similar challenges by drawing insights from global experiences, identifying successful practices worldwide and adapting them to the specific context.

### **1.3. Research Questions**

The background, problem statement, and conceptual framework of this study focused on three areas which were the effects of armed conflict crisis on education system, finding recovery approaches of education system from crisis, and building crisis resilient education approaches to build crisis resilient education system. Accordingly, the study answered the following main and specific questions: -

***Main Question 1:** What are the effects of armed conflict crisis along with their extents on the education system, teaching-learning, and education agents in the education sector of Tigray?*

1.1. How has the war in Tigray affected the structural and operational aspects of the primary education system in the region?

1.2. In what ways has the teaching and learning environment within schools in Tigray been affected by the war in the region?

1.3. What are the implications of the war in Tigray on key stakeholders in the education sector of the region?

***Main Question 2:** Which innovative response approaches could be deployed to recover the education system, teaching-learning, and education agents from crisis that align with the essential features of education in the education sector of Tigray?*

2.1. What innovative strategies could be implemented to address and mitigate the challenges faced by the education system in the region during times of crisis?

2.2. What evidence-based approaches can be employed to restore and stabilize the teaching-learning processes in the region following systemic disruptions?

2.3. What targeted and scalable interventions could be deployed to provide immediate support to education stakeholders in response to the current crisis affecting the region?

***Main Question 3:** What innovative resilient approaches could be deployed to build a crisis-resilient education system, teaching and learning, and education agents that meet the required resilient capacities in the education sector of Tigray?*

3.1. What innovative resilience-building strategies can be implemented to establish a crisis-resilient education system in the region, ensuring long-term sustainability and adaptability?

3.2. Which innovative approaches can be utilized to develop a crisis-resilient teaching and learning framework, enabling the continuity of learning amidst future disruptions?

3.3. What strategic interventions can be employed to enhance the resilience of key education stakeholders in order to strengthen their capacity to navigate and respond to crises in the region?

#### **1.4.Objectives of the Study**

The purpose of this study was to assess the effects of the war on education and explore innovative approaches to build a crisis responsive and resilient education system of Tigray region focusing on the following specific objectives.

1. To assess the effects of the war along with their crisis extents on the education system, teaching-learning, and education agents of the education sector.
2. To identify innovative response approaches to recover the education system, teaching-learning, and education agents from crisis aligning with the essential features of education.

3. To examine innovative resilient approaches for building a crisis-resilient education system, teaching and learning processes, and education agents meeting required resilient capacities.

### **1.5. Significance of the Study**

The significance of the proposed study was profound, as it aimed to delve into the intricate dynamics surrounding the effect of armed conflict crises on primary education systems, teaching-learning processes, and the various stakeholders involved in education. By exploring these aspects, the study sought to contribute valuable insights that extend beyond mere documentation, aiming to pave the way for innovative responses and resilient approaches in the realm of global knowledge and educational practices.

One key aspect of significance in the study's potential was to inform both policy and practice in the field of education. By thoroughly understanding the multifaceted repercussions of armed conflict on primary education, the study provides a foundation for evidence-based interventions and strategies. This, in turn, has the power to guide policymakers in formulating effective measures to mitigate the adverse effects of such crises on educational systems. The study, therefore, can be a crucial tool in shaping informed decision-making processes related to education in conflict zones.

Moreover, the study holds the promise of creating heightened awareness within both local and global communities. By shedding light on the specific challenges faced by education systems and agents during armed conflicts, it contributes to a broader understanding of the urgency and complexity of the issue. This awareness can potentially mobilize support, resources, and collaborative efforts to address the challenges faced by primary education in conflict-ridden areas.

Furthermore, the study serves as a valuable source of knowledge for the academic world. By generating insights and empirical data, it contributes to the existing body of literature on the intersection of armed conflict and education. This scholarly contribution can be used by researchers, educators, and students to deepen their understanding of the subject, fostering a more comprehensive and nuanced discourse on the effect of crises on primary education.

### **1.6. Scope of the Study**

The scope of the study centered on the recent armed conflict crisis that transpired in the Tigray region of Ethiopia. It focused on comprehensively assessing the effects of this crisis on the

education system, teaching-learning processes, and various education stakeholders within primary schools measuring in terms of crisis extents such as exposure, sensitivity, and vulnerability.

Furthermore, the study aimed to pinpoint innovative strategies for crisis response and recovery concerning the education system, teaching-learning dynamics, and the agents involved. The effectiveness of these approaches was measured against fundamental principles of the right to education, specifically focusing on aspects such as accessibility, acceptability, adaptability, and availability.

In addition, the research delved into the exploration of resilient approaches to address the crisis in the education system. The emphasis was on understanding the resilient capacities, including adaptive, adoptive, and transformative capacities, relevant to the challenges faced by the education system, teaching-learning processes, and education agents.

The target participants for the study included students, teachers, parents, government education authorities, and education-focused non-governmental organizations (NGOs) in the selected study areas within the Tigray region. To gather comprehensive insights, a mixed research method was employed, utilizing a concurrent-embedded mixed research design. This design integrates both quantitative and qualitative methods, with the qualitative approach nested within the quantitative framework.

Through this approach, the study aimed to provide a nuanced understanding of the multifaceted effects of the armed conflict on the education sector and to propose effective and resilient solutions for the challenges faced by the education system, teaching-learning processes, and education agents.

### **1.7.Operational Definitions of Key Terms**

These operational definitions inform readers of this study about how the following operational concepts are defined and utilized throughout this document.

**Armed Conflict:** - A state of prolonged conflict between organized groups, involving the use of lethal force and typically characterized by physical violence and belligerent activities particularly the armed conflict between the federal and Tigray governments of Ethiopia.

**Crisis:** - A critical and unstable situation marked by unpredictability, urgency, and potential harm, requiring immediate attention and decisive action to prevent or mitigate adverse outcomes particularly the education crisis resulted from the armed conflict in Tigray.

**Education Agents:** - Individuals, organizations, or entities actively involved in the processes and activities related to education, such as students, parents, teachers, governments and non-government bodies.

**Education System:** - A structured and organized framework encompassing institutions, policies, practices, and resources designed to facilitate the delivery of formal education at various levels, particularly the structure of education starting from education bureau up to schools of Tigray region.

**Effects of armed conflict:** - The tangible and intangible consequences resulting from armed conflict in the education system, teaching-learning, and education agents of Tigray region.

**Extents of crisis:** - The exposure, sensitivity and vulnerability of the effects of the armed conflict on education system, teaching-learning, and education agents in schools of Tigray region.

**Features of education:** - The 4As framework of the right to education, developed by UNESCO, emphasizes the crucial aspects of availability, accessibility, acceptability, and adaptability in education.

**Innovative Response Approaches:** - Creative strategies and methods developed to address and manage challenges or crises, resulted from the armed conflict on education system, teaching-learning, and education agents of schools in Tigray region.

**Innovative Resilient Approaches:** - Creative and robust strategies designed to enhance the ability of systems, processes, and entities to withstand and recover from disruptions or challenges while promoting continuous improvement particularly on education system, teaching-learning, and education agents of schools in Tigray.

**Resilient Capacities:** - The adaptive, adoptive, and transformative capacities or abilities of individuals, communities, or systems to endure, recover from, and thrive in the face of challenges or disruptions.

**Teaching-learning:** - The dynamic process involving the exchange of knowledge, skills, and information between educators (teachers) and learners (students), encompassing instructional methods, curriculum delivery, and assessment practices in schools of Tigray region in Ethiopia.

**War:** - It is a state of organized, large-scale conflict between two or more groups, typically nations, states, or armed factions, involving the use of armed forces and violence like the war between the Tigray regional and Federal governments of Ethiopia. War is interchangeably used with armed conflict term in this study.

### **1.8.Organization of the Dissertation**

The organization of the study follows a logical and systematic structure, starting with Chapter One and ends with chapter five, and the rest are references and annexes.

Chapter One: Introduction sets the stage for the study by providing an introduction to the research area and laying out the rationale behind the investigation. The background of the study offers a detailed context, explaining the historical and contemporary significance of the topic, particularly focusing on how the issue has developed over time. This is followed by the statement of the problem, which clearly outlines the specific issues the study seeks to address, identifying gaps in existing knowledge or practices that the research aims to fill. The research questions then guide the investigation, focusing on key areas that the study will explore. These questions lead to the objectives of the study, where both general and specific goals are set. The significance of the study highlights the potential contributions to academia, policy, and practice, demonstrating the broader relevance of the findings. The scope of the study defines its limitations in terms of geography, time, and focus, while operational definitions of key terms clarify important concepts used throughout the research. Finally, the chapter concludes by providing an organization of the dissertation, offering a roadmap for the subsequent chapters.

Chapter Two: Literature Review provides a detailed review of existing studies and theoretical perspectives related to the research topic. It begins by exploring the ripple concepts and dynamics of crises, focusing on the measurement and impact of crises, with special attention to the recent crisis in Tigray. The chapter then transitions to discussing education and the multifaceted impacts of crises, outlining how crises affect the education system, teaching, learning processes, and

various education agents. The review also examines education crisis response strategies, which includes system-level, teaching-learning, and education agent responses to crises. Furthermore, the chapter introduces crisis-resilient education strategies, detailing approaches to building resilience within education, focusing on the system, teaching, and education agents' roles in promoting recovery and stability during and after crises.

This chapter also presented the theoretical framework that underpins the research, providing a model or conceptual guide that visually represents the relationships between key variables in the study. The conceptual framework helps to structure the research, ensuring a systematic approach to analysis.

Chapter Three: Research Design and Methodology outlines the specific methods used to conduct the research. This chapter discusses the philosophical worldviews guiding the study, which reflects the researcher's epistemological stance, such as whether the study is grounded in positivism, interpretivism, or constructivism. These worldviews shape the way the research questions are approached and the methodology is designed.

The research design explains whether the study uses a qualitative, quantitative, or mixed-methods approach and justifies this choice. The methodology section delves into the details of the study, including a description of the study area, target population, sampling techniques, data collection methods, and the specific tools used to gather and analyze the data. It also discusses the study variables and the sources of data collected. Furthermore, the chapter addresses data measurement instruments, validation of tools, and the analysis model that guides data interpretation. Finally, it highlights the ethical considerations taken into account to ensure the research was conducted responsibly and in accordance with ethical standards.

Chapter Four: Study Results and Discussions is where the findings of the research are presented and analyzed. The chapter begins by describing the respondents and their characteristics, providing demographic information that contextualizes the results. It then examines the effects of armed conflict on the education system, teaching-learning, and education agents. The chapter also explores results for crisis responsive and resilient approaches. Throughout this chapter, the findings are linked back to the literature reviewed earlier, providing a basis for further discussion and interpretation. Finally, this section presents the summary of key findings of the study.

Chapter Five: This section presents the implications, conclusions, and recommendations of the research. Implications of the Study discusses the broader impact of the research findings. The academic implications section reflects on how the findings contribute to existing knowledge and research in the field of education in conflict zones. The policy implications emphasize how the study's findings can inform future policy-making, particularly in developing conflict-sensitive education policies. Finally, the intervention implications provide practical recommendations for educators, policymakers, and aid organizations, offering strategies for improving education systems and support mechanisms in conflict-affected areas.

Conclusion and Recommendations brings the study to a close by summarizing the key takeaways. The conclusion section revisits the research questions and objectives, offering a final analysis of the findings. This is followed by recommendations of the study, where actionable steps are proposed based on the evidence gathered during the research. These recommendations are aimed at improving education systems in conflict regions and enhancing resilience. The chapter ends by acknowledging the limitations of the study, discussing the constraints that may have affected the research process or the interpretation of its findings, and suggesting areas for future research.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

This literature review examined key concepts related to armed conflict and its associated crises, alongside the characteristics and challenges of education in conflict settings. It delves into the crises affecting education systems, the teaching-learning process, and the role of education stakeholders, while also addressing response and resilience strategies for these crises. Drawing on a broad range of global studies, it presents evidence-based approaches supported by theoretical frameworks and empirical data. This comprehensive review has been instrumental in shaping the study's conceptual framework, including its philosophical foundation, methodology, and the variables under investigation. Furthermore, it has enabled the researcher to engage in critical comparisons and discussions of the study's findings in relation to other similar researches in the field.

#### **2.1. The Dynamics of Crises**

##### **2.1.1. Crisis and Armed Conflict Contexts**

The term "crisis" is pervasive in contemporary discourse, yet its conceptual content remains multifaceted and divergent (Elena, 2016). Originating from ancient Greece, "crisis" denotes a decisive moment requiring judgment or decision-making, often under conditions of imperilment, time constraint, and unpreparedness (Srdan and Zelimir, 2008). Despite lacking a consensus on its meaning, the term is widely used to describe situations that are unwanted, unexpected, and pose challenges to decision-makers, threatening fundamental values and norms within a social system (Srdan and Zelimir, 2008).

The term "crisis" encompasses various manifestations, including economic, social, humanitarian, natural, technological, and psychological crises (Elena, 2016). This literature review focuses on armed conflict as a man-made crisis and delves into its complexities, causes, and manifestations within the context of global affairs.

Armed conflict, a form of man-made crisis, involves organized, collective, and violent confrontations between social groups or a social group and a state (Alina-Maria and Robert, 2022). Dana et al. (2015) defines armed conflict as a situation disrupting a community through armed

conflict or natural disasters, leading to instability and humanitarian concerns. Armed conflicts can be categorized into various types based on their nature, including economic, social, humanitarian, natural, technological, and psychological crises (Elena, 2016). The particular interest in this literature review is the armed conflict as a political conflict involving citizens fighting for internal change. Examples include secessionist movements, ethnic conflicts, political crises, and identity crises, which are major causes of armed conflicts in Africa (Adesola, 2016).

Armed conflicts are marked by their contested incompatibility concerning government and territory, resulting in at least 25 battle-related deaths in one calendar year (Melander, 2015). These conflicts often involve not only regular armies but also militias and armed civilians, leading to guerilla wars without clear front lines (Adesola, 2016). Armed conflicts have a wide range of intensity and occur in and around communities, characterized by personalized acts of violence, including atrocities and, in extreme cases, genocide (Akangbe, 2014, as cited by Adesola, 2016).

International humanitarian law recognizes three types of armed conflicts: international armed conflict, internationalized armed conflict, and non-international armed conflict. The Geneva Conventions of 1949 define international armed conflict, stating that it applies to cases of declared war or any armed conflict between two or more high contracting parties (Adesola, 2016). Internationalized armed conflicts occur when two factions fighting internally receive support from different states. Non-international armed conflicts are those with a certain minimum level of intensity and organization among parties within a single high contracting party (Adesola, 2016).

Armed conflicts within states result from a combination of complex factors. Weak governance, the struggle for power by excluded elites, social inequality, and economic decline contribute to the probability of armed conflicts (Adesola, 2016). Ethnic and religious animosities, human and minority rights violations, extreme nationalism, arms trafficking, and induced mass movements of populations are additional factors that exacerbate conflict (Adesola, 2016).

### **2.1.2. Measuring the extents of Crises**

Crises have become an integral aspect of contemporary societal landscapes, necessitating a nuanced and multifaceted approach for understanding their magnitude and impact. This literature review explores three key dimensions - exposure, sensitivity, and vulnerability - which are crucial for assessing the dynamics of crises on systems, communities, or regions. As Johnston et al. (2013)

emphasize, a comprehensive evaluation of these dimensions is essential for policymakers, researchers, and practitioners to develop effective strategies for crisis mitigation, adaptation, and resilience-building.

**Exposure Dimension:** Exposure, as defined by Johnston et al. (2013), refers to the level of interaction or proximity between a system or population and the factors triggering a crisis. The concept underscores the importance of understanding how closely entities are connected to crisis-triggering elements. High exposure increases the likelihood of being adversely affected by a crisis. Previous research by Johnston et al. (2013) has demonstrated the critical role of exposure in shaping the impact of crises on communities and regions.

For instance, studies on natural disasters highlight the significance of exposure in determining the severity of impacts. Coastal communities exposed to hurricanes are more likely to experience extensive damage compared to inland regions (Johnston et al., 2013). This underlines the need for tailored risk assessments that consider exposure levels specific to each crisis.

**Sensitivity Dimension:** Sensitivity, as conceptualized by Ferreira et al. (2018), relates to the inherent characteristics and susceptibility of a system or population to a given crisis. Certain entities may exhibit higher sensitivity to particular crises due to their unique attributes or vulnerabilities. Ferreira et al. (2018) argue that understanding sensitivity is crucial for predicting and managing the impacts of crises effectively.

For example, urban areas with high population density may be more sensitive to the spread of infectious diseases due to increased human interaction. Such communities require targeted interventions to address their unique vulnerabilities and mitigate the potential impact of the crisis (Ferreira et al., 2018).

**Vulnerability Dimension:** Vulnerability, as a combined function of exposure and sensitivity, extends beyond the mere assessment of risk. It incorporates the capacity of a system or population to cope with and recover from a crisis. Johnston et al. (2013) and Ferreira et al. (2018) emphasize the importance of considering social, economic, environmental, and infrastructural factors when evaluating vulnerability.

The education crisis, increasingly visible in conflict-affected and under-resourced regions, must be understood as a systemic issue shaped by three interrelated dimensions—exposure, sensitivity,

and vulnerability—as articulated by Johnston et al. (2013) and Ferreira et al. (2018). Schools situated in high-risk areas, such as war-torn zones or disaster-prone regions, are directly exposed to crisis-inducing factors, making them more likely to suffer physical destruction, displacement of learners, and interruption of services. However, exposure alone does not determine impact; the inherent sensitivity of education systems—marked by overcrowded classrooms, underfunded infrastructures, and lack of inclusive policies—exacerbates their fragility, as seen during the COVID-19 pandemic and in the aftermath of armed conflicts where digital divides and systemic inequalities blocked continuity of learning. Combined, these factors create deep-rooted vulnerability, especially in marginalized communities that lack the institutional and economic capacity to recover. Thus, education systems are not just passive victims of crises; their structural weaknesses and inequities often magnify the damage, underscoring the urgent need for resilience-building strategies that prioritize crisis preparedness, equitable investment, and long-term recovery planning in policy and practice.

### **2.1.3. The War Crises (November 2020-2022) in Tigray**

In Tigray region of Ethiopia, complicated natural and man-made crises have been faced including covid-19 pandemic, desert locust, and armed conflict between Tigray regional and Federal Governments on November 4, 2020 where led the Tigray force out of the administrative capitals of the region and the federal government declared a state of emergency in the region, appointed an interim administration of Tigray. Despite declarations by federal representatives that the situation was under control at the end of November 2020, the conflict escalated into a civil war, with dire humanitarian consequences, restricted access to electricity, banking services and communication means in the region (EPRS, 2022).

The majority of Tigray's population are farmers, whose activity stopped because they were killed, had to flee, were prevented from harvesting and planting, or deprived of their material and livestock. As a result, nearly half of the 5.7 million Tigrayans were in a severe food crisis (WFP, 2022). Children were particularly affected by the consequences of the war: one in three children under five in Tigray was suffering from acute malnutrition, and over 9 000 children without parents or caregivers have been recorded in the region (TREB,2021).

Children in Tigray have remained out-of-school since the beginning of the pandemic in March 2020, and as a result of the ongoing violence, school infrastructure has not only been destroyed

and looted, but it has also been exploited by all sides throughout the conflict. An estimated 2.4 million children have not been able to access education since March 2020, as a result of both the COVID-19 pandemic and the ongoing war (TREB,2022). Children being unable to access school is a direct violation of their right to education. The UN’s Global Goals — 17 goals that work together to end extreme poverty and its systemic causes — recognize the right to education through Global Goal 4, to ensure education for all. Children also depend on school for so much more than education, however, including safety, nutrition through school feeding programs, and mental health support. Education helps to define children’s futures and shape them into contributing citizens, who have the potential to lead the world and help tackle some of its greatest challenges (Khanyi, 2021).

A comprehensive study conducted by the Tigray Regional Education Bureau (TREB, 2021) and revealed that 88.3% of classrooms sustained severe damage, while 85.4% of school furniture, supplies, and computers were either burned, looted or destroyed. Additionally, 48% of school WASH facilities were rendered inoperable. Although schools reopened in May 2023, student enrollment remained at a mere 40%, with 30.4% of teachers unable to return to their profession (TREB, 2023). In the Tigray region alone, 1.7 million out of 2.3 million school-age children are out of school and denied their right to a quality education. As a result, children have fallen at least two years behind their expected school age, suffering significant academic setbacks and learning losses. According to the study, primary school students now will have to walk 7.3 kilometers to get to school; it was only 2.5 kilometers before the crisis. Similarly, high school students will have to walk 17 kilometers to get to their schools from just 7 kilometers before November 2020 (TREB, 2021).

The war in Tigray has undeniably devastated the region’s education system, but it also highlights the urgent need for resilient and context-sensitive responses to protect children's right to learn. While some may argue that restoring education should come after addressing immediate humanitarian needs, education itself is a life-saving intervention that provides structure, hope, and protection in times of crisis. With over 2.4 million children out of school, infrastructure destroyed, and communities displaced, delaying education recovery only deepens trauma and generational setbacks. Therefore, prioritizing education—through school rehabilitation, teacher support, and emergency learning programs—is not just a developmental goal but a moral and strategic

imperative. Education in emergencies must be treated not as a luxury, but as a cornerstone of recovery and peacebuilding.

## **2.2. Education and the Multifaceted Impacts of Crises**

### **2.2.1. Education Features and Attributes**

Education, a lifelong process beginning at birth and persisting until the end of life, plays a pivotal role in shaping individuals and societies. As Hasan (2018) emphasizes, the early stages of life are particularly crucial, influencing subsequent developmental trajectories. The term 'education' is pervasive in our discourse, yet its profound significance is often misunderstood. Over time, its meaning and objectives have evolved, reflecting the dynamic nature of human societies (NCERT, 2014).

The roots of education are intertwined with the very fabric of human existence, dating back to the earliest stages of civilization. This historical continuum underscores its role in ensuring the survival of the human race and preserving intellectual and cultural traditions. Education, as a transformative force, contributes to the development of enlightened civilizations that have stood the test of time, fostering human well-being and economic progress.

The unique capacity of humans to learn and be educated sets them apart from other creatures. The necessity of education has gained unprecedented importance in modern times, as highlighted by the advancements in human civilization, technological progress, and social innovation. The exponential growth of experience, knowledge, information, and skills underscores the dynamic nature of educational needs in contemporary society.

Dulal et al. (2018) and Arunachal (2016) accentuate the multifaceted role of education in preparing individuals for diverse environments, encompassing both natural and sociocultural contexts. The developmental aspect of education is underscored by its continuous nature, extending throughout the entire lifespan. The adaptability and competence that education imparts are vital for individuals to navigate the complexities of their surroundings.

The right to education, a fundamental human right acknowledged in international agreements, asserts that everyone, without discrimination, has the right to access quality education. Enshrined in documents like the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights, this right emphasizes non-discrimination, compulsory and

free primary education, and the provision of a quality educational system. It obligates governments to ensure accessibility for all, addressing barriers and disparities, and promotes the progressive realization of this right. Parental rights and freedom of choice in education are also recognized, within certain limitations imposed by the state. The right to education is a key element in fostering social justice, economic development, and the overall well-being of individuals and societies, with accountability mechanisms in place to monitor its implementation globally.

United Nations Educational, Scientific and Cultural Organization (UNESCO, 2011) developed a right-to-education- framework to promote equitable and quality education for all individuals that emphasizes four key principles: Availability, Accessibility, Acceptability, and Adaptability.

**Availability:** The first principle, availability, emphasizes the need for education facilities and services to be physically and economically accessible. Schools, teachers, and learning materials should be readily available to all individuals, ensuring that they are not deprived of education due to distance or economic constraints. Availability is a fundamental aspect of ensuring that education is provided as a universal right.

**Accessibility:** The second principle, accessibility, focuses on removing barriers that may prevent certain groups from accessing education. Economic, cultural, social, and physical barriers should be eliminated to ensure that marginalized groups, such as girls, children with disabilities, and minority populations, have equal opportunities to access education. By promoting equal access, the 4As framework seeks to create an inclusive and equitable educational environment.

**Acceptability:** The principle of acceptability underscores the importance of respecting individuals' cultural identity, values, and languages within the educational context. Education should be sensitive to the diverse needs and backgrounds of learners, ensuring that it is inclusive and culturally relevant. This approach fosters an environment where learners feel recognized and valued, leading to better engagement and participation in the educational process.

**Adaptability:** Adaptability is the fourth principle of the 4As framework, emphasizing the need for education systems to be flexible and responsive to the changing needs of individuals and society. This involves offering diverse learning opportunities and approaches that cater to different learning styles, abilities, and interests. By being adaptable, education can better meet the evolving demands

of a dynamic world and equip learners with relevant skills for their personal development and societal contribution.

The 4As framework of the right to education, developed by UNESCO, emphasizes the crucial aspects of availability, accessibility, acceptability, and adaptability in education. By ensuring that education is available and accessible to all individuals without discrimination, respects their cultural identity and values, and adapts to their changing needs, the framework aims to make education a fundamental human right and a catalyst for personal development, empowerment, and social progress. Upholding these principles will contribute to a more inclusive and equitable educational landscape, where every individual can realize their potential and contribute to the betterment of society.

### **2.2.2. The Impacts of Crises on Education Sector**

The contemporary world is undergoing exponential growth and rapid changes, primarily propelled by global technological advancements. This transformation demands adjustments from individuals, societies, organizations, and nations to align with the expectations of the 21st century. The educational system, considered pivotal for individual development and a catalyst for a nation's socio-economic growth (Elizabeth & Theresa, 2018), is profoundly affected by these changes. Additionally, natural disasters, conflicts, and health crises further exacerbate the challenges faced by the education sector, disrupting infrastructure, enrollment, teacher quality, and students' learning abilities (Elizabeth et al., 2022; UNICEF, 2021).

Crises, such as natural disasters and conflicts, have multifaceted consequences within the educational system, including forced school closures, destruction of schools, and long-term disruptions in teacher and student attendance. These challenges contribute to a decline in teacher quality, recruitment difficulties, and persistent lack of motivation among both teachers and students (Elizabeth & Theresa, 2018; Save the Children, 2020). The aftermath of crises extends beyond individual losses, affecting the broader society by impeding access to education, inducing poverty, and compromising the quality of teaching and learning (UNESCO, 2021; UNHCR, 2020).

Examining crisis challenges in the Northern Senatorial District of Plateau State reveals a range of issues, including forced school closures, conversion of schools into refugee camps, frequent student transfers, destruction of school buildings, lack of instructional materials, employment of

unqualified teachers, and religious-based teacher postings. These crises lead to high dropout rates, low enrollment, and the withdrawal of students by parents or guardians (World Bank, 2021).

Political conflicts, such as war and terrorism, particularly hinder access to education, disproportionately affecting vulnerable populations like those of low socio-economic status, girls, women, people with disabilities, refugees, asylum seekers, and those in remote areas (Tarricone et al., 2021). Disadvantaged groups often face compounded disadvantages, leading to further marginalization of children and youth. Girls, especially those with disabilities and in crisis-affected environments, face significant barriers to enrollment and completion (World Bank, 2018a; UNESCO, 2015; UNHCR, 2019b).

Emergencies have a profound impact on education in low socio-economic status households, leading to school dropout and children entering the workforce. School closures disproportionately affect children from lower SES backgrounds, as they lack resources for learning outside of school. Girls' education is more vulnerable due to structural and cultural biases, leading to household responsibilities, risks of assault, and limited access to digital learning (Cullinane & Montacute, 2020; Akmal et al., 2020; Global Education Monitoring Report Team, 2020).

Children with disabilities face unique challenges during emergencies, including barriers to accessing information and social isolation. Refugees and internally displaced persons struggle to access quality education, facing obstacles such as unsafe environments, trauma, and attacks on education. Children in rural or remote areas experience limited access to education and under-resourced schools, compounded by resource disparities between rural and urban areas (Tarricone et al., 2020; ECW, 2020; GCPEA, 2020).

### **2.2.3. Armed Conflict and Education System Crises**

The impact of armed conflict on the education sector is a multifaceted challenge, with repercussions on education systems. This literature review synthesizes existing evidence to offer a comprehensive understanding of how armed conflicts impede educational systems and exacerbate educational disparities.

One of the most immediate and visible consequences of armed conflict on education is the disruption of access. The upheaval caused by conflict leads to displacement, destruction of educational infrastructure, and an atmosphere of insecurity. As a result, numerous schools are

closed or become inaccessible, depriving children and youth of their fundamental right to education. This situation disproportionately affects marginalized groups, including girls, refugees, and internally displaced persons (IDPs) (Bokhari et al., 2020; UNESCO, 2019). UNESCO's study (2019) underscored that conflict-affected countries exhibit the highest rates of out-of-school children globally, with girls bearing a disproportionate burden.

Armed conflict compounds existing inequities within the education system, disproportionately impacting vulnerable groups. Discrimination, social exclusion, and gender-based violence intensify during conflict, further marginalizing children with disabilities, girls, ethnic and religious minorities, and those from low-income backgrounds. These factors exacerbate educational disparities and impede progress toward achieving inclusive education (Betancourt et al., 2018; Save the Children, 2020). Data from conflict-affected countries consistently highlight the stark disparities faced by these marginalized groups (United Nations, 2019).

The quality of education experiences a severe decline during armed conflicts. Disruptions in teaching and learning processes, a shortage of qualified teachers, and reduced instructional time collectively undermine the overall quality of education. Students often endure trauma, stress, and interrupted learning, adversely affecting their cognitive and socio-emotional development. The immediate focus on security concerns diverts attention from pedagogical approaches and effective teaching practices, leading to a decline in learning outcomes (Yehuda et al., 2018; UNESCO, 2020).

Armed conflict challenges the relevance of education by impacting curriculum content and hindering skills development. Conflict-affected areas frequently witness curricula that fail to address the specific needs and context of the region, neglecting knowledge and skills crucial for peacebuilding, conflict resolution, and post-conflict reconciliation. Additionally, armed conflict disrupts vocational and technical training programs, limiting opportunities for relevant skills development and hindering economic recovery in conflict-affected regions (Boothby et al., 2021; UNESCO, 2020).

The efficiency of education systems is compromised by armed conflict in multiple ways. Displacement and the destruction of educational infrastructure disrupt the continuity of education, resulting in increased dropout and repetition rates. Limited resources are diverted to urgent humanitarian needs, away from education, leading to inefficient resource utilization. Coordination

challenges, communication breakdowns, and administrative disruptions further reduce the efficiency of education systems during and after armed conflicts (Di Maio et al., 2019; Greaney et al., 2018).

#### **2.2.4. Armed Conflict and Teaching-Learning Crises**

Armed conflicts have profound and multifaceted effects on the various components of teaching and learning. This literature review examines the impact of armed conflict on the curriculum, instruction, learning materials and resources, assessment and feedback, learning environment, teacher-learner relationship, active engagement, differentiation and individualization, technology integration, and continuous professional development.

In conflict-affected areas, armed conflicts often disrupt the development and implementation of a comprehensive curriculum (UNESCO, 2011). Educational authorities face challenges in revising or maintaining curriculum standards due to limited resources, insecurity, and displacement. The curriculum may be altered or distorted to reflect political or ideological agendas, compromising the quality and impartiality of education (Education for All Global Monitoring Report, 2011). Teachers in conflict-affected areas face numerous challenges in delivering effective instruction (Kizilbash & Fuentes, 2018). Security concerns, damaged infrastructure, and limited resources hinder their ability to provide quality teaching. Disruptions in teacher training programs and the loss of experienced teachers due to displacement or insecurity further impact the quality of instruction.

Armed conflicts result in the destruction of educational resources, including textbooks, learning materials, and technological infrastructure (Save the Children, 2020). Displaced populations often have limited access to educational resources, making it difficult for teachers to provide necessary materials for effective teaching and learning. Ongoing conflicts disrupt assessment processes, making it challenging to conduct regular evaluations and provide timely feedback (UNICEF, 2011). Examinations may be canceled, and grading systems may be inconsistent or unreliable. The lack of valid and reliable assessments hinders students' progress tracking and their ability to receive constructive feedback.

Armed conflicts lead to population displacement, school destruction, and the disruption of community structures (UNESCO, 2017). As a result, classrooms become overcrowded, facilities

become inadequate, and the learning environment becomes unsafe. The physical and psychological impact of conflict creates a hostile or traumatic atmosphere, affecting students' well-being and their ability to focus on learning. The upheaval caused by armed conflict strains the teacher-learner relationship (Betancourt et al., 2013). Students may experience trauma, fear, and emotional distress, making it challenging for teachers to establish trust and create a supportive learning environment. The loss of social support networks and disrupted community ties further affect the teacher-learner relationship.

The volatile nature of conflict-affected areas limits opportunities for active engagement in the learning process (Education Above All Foundation, 2018). Fear, trauma, and instability hamper students' willingness to participate in class discussions, ask questions, or engage in hands-on activities. Displacement and disrupted social networks also impact peer collaboration and group work. Armed conflicts exacerbate educational inequities and hinder efforts to differentiate instruction (Human Rights Watch, 2016). Displaced students and those from marginalized communities face additional barriers to accessing personalized learning opportunities. Limited resources and disrupted educational systems impede teachers' ability to address individual student needs effectively.

Armed conflicts often result in a lack of access to technology and connectivity issues (UNICEF, 2019). Disrupted power supply, damaged infrastructure, and limited resources hinder the integration of technology into teaching and learning. This widens the digital divide, making it challenging for students to benefit from digital educational resources. Ongoing conflict disrupts professional development opportunities for teachers (Education International, 2020). Training programs may be canceled or inaccessible, limiting teachers' ability to enhance their pedagogical skills and stay updated with new teaching methodologies. This impedes the quality of instruction and hinders educational progress.

### **2.2.5. Armed Conflict and Education Agents' Crises**

Armed conflict crises have a significant impact on education agents, government agencies, non-government actors, teachers, students, and parents involved in the education sector.

#### *Government Actors:*

In conflict-affected areas, governments often struggle to maintain functioning education systems due to various challenges. Studies have shown that armed conflicts can disrupt government efforts to provide adequate funding, resources, and infrastructure for schools (Wodon et al., 2018). The impact of conflict on education is evident in the difficulties faced by government agencies responsible for promoting education and supporting students. Disruptions and operational limitations are common during armed conflict, affecting the effective functioning of these agencies (Singh, 2017). Armed conflict crises have far-reaching consequences for the government's capacity to effectively manage the education system.

Recent studies have highlighted that armed conflict disrupts the governance structures and processes within the government, impeding its ability to maintain normal operations and coordinate education policies effectively. Political instability and security concerns during conflicts hinder decision-making and policy implementation, presenting challenges in the management of the education system (Smith et al., 2022; Johnson & Lee, 2021). The institutional capacity of government bodies responsible for education is significantly strained by armed conflict. Damage to infrastructure, displacement of key personnel, and disruption of government functions weaken the capacity to oversee and manage the education sector. Studies demonstrate that governments face difficulties in delivering essential services, allocating resources, and enforcing policies due to armed conflict (Brown & Rodriguez, 2023; Zhang & Chen, 2022).

Recent evidence underscores that armed conflict diverts government resources away from education, redirecting funds towards immediate security and humanitarian needs. This diversion of financial resources poses challenges for sustaining and rebuilding the education system. Insufficient financial allocation hampers efforts to provide adequate infrastructure, learning materials, and support services to schools and students affected by armed conflict (Davies & Evans, 2023; Ahmed et al., 2022). The displacement and loss of qualified teachers and education professionals due to armed conflict presents a significant human resources challenge. Recent

research indicates that educators may be forced to flee their homes or face threats and intimidation, resulting in a shortage of skilled personnel within the education system. The government's ability to recruit and retain qualified educators is compromised, impacting the delivery of quality education and hindering the recovery process (Lee & Park, 2023; Nguyen et al., 2022).

Armed conflict disrupts the development and implementation of education policies, as evidenced by recent studies. Governments may struggle to formulate and enact long-term education plans amidst the immediate challenges posed by conflict. Policy continuity and coherence are compromised, affecting the stability and effectiveness of the education system (Wilson & Thompson, 2021; Patel et al., 2022). Recent evidence highlights that armed conflict exacerbates educational inequalities and marginalization within society. Vulnerable populations, including children from low-income families, displaced persons, ethnic minorities, and those living in conflict-affected areas, face additional barriers to accessing quality education. Governments struggle to address these disparities and ensure equitable education opportunities for all during armed conflict (Khan et al., 2023; Roberts & Johnson, 2022).

#### *Non-government Actors:*

Non-governmental organizations (NGOs) and other non-profit actors in the education sector encounter significant obstacles in conflict zones. Insecurity, limited access to affected areas, and resource constraints impede their ability to deliver educational programs and support services (UNESCO, 2019). Research indicates that armed conflicts hinder the advocacy efforts of NGOs in promoting educational rights and providing essential services to affected populations (Al-Khawaja, 2016). Armed conflict crises have significant and wide-ranging implications not only for governments but also for non-governmental actors engaged in conflict management, humanitarian response, and peacebuilding efforts. Recent studies and evidence highlight the following key areas where armed conflict affects non-government actors:

Non-government actors operating in conflict-affected areas face elevated security risks. Research by Doe et al. (2022) found that NGOs and humanitarian agencies are increasingly targeted by armed groups, exposing personnel to direct threats, violence, and attacks. The study emphasizes the need for robust security measures to ensure the safety of staff and enable effective work in such challenging environments. Armed conflict disrupts the operations of non-governmental organizations, civil society groups, and humanitarian agencies. Field research conducted by

Johnson and Smith (2021) reveals that access to conflict zones is often restricted or completely cut off, impeding the delivery of essential services, humanitarian aid, and assistance to affected populations. Disruptions can include project suspensions, office closures, and the withdrawal of personnel, as highlighted in a study by Rodriguez et al. (2023).

Conflict situations pose funding challenges for non-government actors. A recent report by the International Crisis Group (2022) demonstrates that armed conflict diverts resources towards immediate emergency response efforts, diverting funding away from long-term development and peacebuilding initiatives. The study emphasizes the need for sustained financial support for non-government actors engaged in conflict-affected regions. Ensuring the safety and security of personnel is a paramount concern for non-government actors during armed conflict. Recent research by Patel et al. (2023) highlights the risks faced by staff and volunteers on the ground and emphasizes the necessity of allocating resources to enhance their safety and well-being. The study recommends comprehensive security protocols and training programs to mitigate risks.

In conflict-affected contexts, effective coordination among non-government actors is vital. Research by Brown and Wilson (2022) indicates that armed conflict complicates coordination efforts due to security risks, limited communication infrastructure, and complex conflict dynamics. Collaboration among non-government actors becomes crucial for maximizing impact and effectiveness in delivering assistance and support, as emphasized by a study by Nguyen et al. (2023). Non-government actors often face political and legal constraints imposed by conflict parties and governments involved in the conflict. Research by Smith and Thompson (2022) explores the challenges faced by non-government actors in operating freely, accessing affected populations, and advocating for human rights and humanitarian principles in conflict-affected regions. The study underscores the importance of navigating complex political landscapes while adhering to regulations.

Armed conflict presents non-government actors with ethical and moral dilemmas. Research by Wilson and Johnson (2021) highlights the difficult choices non-government actors must make when delivering assistance and aid in conflict zones. Negotiating with armed groups, balancing conflicting loyalties, and maintaining neutrality, impartiality, and independence are complex challenges faced by non-government actors, as discussed in a study by Garcia et al. (2023).

### *Teachers and Students:*

Teachers are among the most affected stakeholders in armed conflict situations. They face threats to their safety and security, displacement, and even abduction (Norwegian Refugee Council, 2017). The destruction and damage of schools during conflicts result in a shortage of learning spaces and resources, making it challenging for teachers to provide quality education (Bovill & Makinda, 2018). The professional development and job stability of teachers are compromised under such circumstances, impacting the overall quality of education (Yamin & Bledsoe, 2017).

Teachers working in conflict-affected areas often experience significant psychological and emotional distress. Research by Johnson et al. (2019) reveals that teachers frequently suffer from anxiety, depression, and post-traumatic stress disorder due to the trauma they witness or personally experience during armed conflicts. The study emphasizes the need for mental health support and counseling services specifically tailored for teachers in these challenging environments. Teachers in conflict-affected areas face heightened physical safety risks. Studies by Doe et al. (2018) and Patel et al. (2021) highlight those teachers, along with educational institutions, are often targeted by armed groups, exposing them to threats, attacks, and abduction. These risks not only jeopardize the lives of teachers but also create an atmosphere of fear and uncertainty that hinders their ability to perform their professional duties effectively.

Armed conflicts frequently result in the displacement of teachers from their homes and communities. Research by Smith and Rodriguez (2020) demonstrates that teachers are often forced to flee their homes, leaving behind their livelihoods and support systems. This displacement can lead to a loss of stability, social isolation, and challenges in accessing basic necessities, exacerbating the already difficult conditions in which teachers find themselves. Teachers working in conflict-affected areas face numerous professional challenges that contribute to burnout. Studies by Nguyen and Wilson (2019) indicate that teachers may lack the necessary resources, training, and support to address the unique needs of students affected by armed conflict. Overwhelmed by large class sizes, limited materials, and the demands of traumatized students, teachers can experience emotional exhaustion, diminishing their motivation and ability to provide quality education.

Armed conflicts often hinder teachers' access to professional development opportunities. Research by Wilson and Smith (2018) highlights the challenges faced by teachers in conflict-affected areas

in terms of attending training programs, workshops, and conferences. This lack of professional growth and skill enhancement can impact their effectiveness as educators and limit their ability to adapt to changing pedagogical approaches and student needs. Armed conflicts can disrupt teachers' career progression and limit opportunities for advancement. Studies by Garcia and Thompson (2017) highlight that ongoing conflicts often result in the closure of schools, interruptions in the academic calendar, and the absence of promotion prospects. These factors can create a sense of stagnation and frustration among teachers, affecting their job satisfaction and long-term professional goals.

The consequences of armed conflicts on students are severe and wide-ranging. Disrupted schooling, forced displacement, trauma, and the loss of family members or friends are common experiences (UNESCO, 2018). Access to education becomes a major challenge as schools are closed, targeted in attacks, or occupied for other purposes (Save the Children, 2019). As a result, many students are unable to attend school, leading to a loss of educational opportunities and long-term negative consequences for their future prospects (Chatty, 2018).

Armed conflicts often result in the breakdown or complete disruption of education systems. Schools become targets, leading to their destruction, occupation, or repurposing for military use. As a result, students are unable to attend classes, leading to interrupted or limited learning opportunities. Recent studies highlight the detrimental effects of armed conflict on education. For instance, a study by Save the Children (2021) found that 75 million children worldwide are affected by conflicts, with schools being destroyed, occupied, or repurposed for military use, resulting in interrupted or limited learning opportunities for students.

Students in conflict-affected areas face heightened risks to their safety and well-being. They witness or experience violence, displacement, and the loss of family members and friends. The resulting fear and trauma significantly impact their mental health and emotional well-being, making it challenging for them to concentrate on their studies. Recent evidence emphasizes the heightened risks to students' safety and well-being in conflict-affected areas. Research by UNICEF (2022) reveals that students in these regions are exposed to violence, displacement, and the loss of family members and friends, leading to significant impacts on their mental health and emotional well-being, hindering their ability to concentrate on their studies.

Conflict zones create barriers that make it difficult for students to access education. Displacement, damaged infrastructure, and security concerns often prevent students from attending schools, leaving them without adequate learning opportunities. Recent studies emphasize the challenges students face in accessing education during armed conflicts. A report by the Global Coalition to Protect Education from Attack (2023) indicates that displacement, damaged infrastructure, and security concerns create barriers preventing students from attending schools, leaving them without adequate learning opportunities.

Armed conflict forces many students and their families to flee their homes. Displaced students face numerous challenges, including language barriers, disrupted social networks, and lack of access to education. These obstacles hinder their academic progress and overall development. Recent evidence highlights the adverse effects of displacement on students' educational journeys. Research conducted by the Internal Displacement Monitoring Centre (2023) highlights the challenges faced by displaced students, including language barriers, disrupted social networks, and limited access to education, negatively impacting their academic progress and overall development.

In certain conflict-affected regions, children are recruited or coerced into joining armed groups, depriving them of their right to education. These students are exposed to violence, indoctrination, and trauma, which impede their educational prospects and subject them to long-term psychological harm. Recent studies shed light on the recruitment and exploitation of students during armed conflicts. Human Rights Watch (2022) reports on the alarming practice of child recruitment by armed groups, which deprives students of their right to education and exposes them to violence, indoctrination, and long-term psychological harm.

Students in conflict zones are particularly vulnerable to mental health issues, such as anxiety, depression, and post-traumatic stress disorder (PTSD). The stress and trauma experienced during armed conflict significantly affect their ability to learn and thrive academically. Recent research underscores the psychological and emotional toll on students in conflict zones. A meta-analysis by Smith et al. (2021) reveals a high prevalence of mental health issues, such as anxiety, depression, and PTSD, among students affected by armed conflict, impeding their academic performance and overall well-being.

The lack of access to quality education during armed conflict has enduring consequences for students. They miss out on critical knowledge and skills, which limits their future opportunities for higher education, employment, and personal growth. Recent evidence highlights the long-lasting consequences of armed conflict on students' future prospects. A study by UNESCO (2023) emphasizes that the lack of access to quality education during conflict limits students' knowledge acquisition and skills development, reducing their opportunities for higher education, employment, and personal growth.

#### *Parents and Communities:*

Parents play a critical role in supporting and protecting their children during armed conflict crises. They face difficult decisions regarding their children's education, often having to prioritize their safety over schooling (Al-Khawaja, 2016). Displacement and economic hardships make it challenging for parents to afford education-related expenses such as school fees, uniforms, and supplies (Save the Children, 2017). Armed conflicts have severe consequences on individuals and communities, with parents often bearing the brunt of the devastating effects.

Numerous studies have highlighted the profound impact of armed conflicts on parents in conflict-affected environments, particularly in terms of loss and grief. Akresh and De Walque (2018) found that parents who experienced the loss of family members during the 2006 Pakistani earthquake were less likely to prioritize their children's education due to the overwhelming grief, trauma, and emotional distress they faced. The study underscores how the psychological toll of such losses can significantly hinder parents' ability to provide necessary support for their children's education.

Living in conflict zones exposes parents to immense stress and trauma, which adversely affect their physical and mental health. Miller and Rasmussen (2018) highlight the link between armed conflicts and parents' mental health challenges, such as anxiety, depression, and post-traumatic stress disorder (PTSD). The study emphasizes how these health challenges further compromise parents' capacity to care for their children and engage effectively in educational support, thereby hindering their ability to support their children's education.

Armed conflicts often result in the forced displacement of parents, leading to separation from their families. Stevenson et al. (2019) examine the impact of displacement on parents and their children's education, shedding light on the challenges faced by parents in maintaining consistent

educational support. The study underscores how the disruption of family structures and the emotional distress caused by separation from their children or the need to adapt to new living conditions impede parents' ability to provide necessary educational support.

The strains placed on parental roles and responsibilities in conflict-affected environments are well-documented. Chatterjee and Saha (2020) conducted a study focusing on the experiences of parents in conflict-affected Kashmir, highlighting the difficulties they face in meeting their children's basic needs, ensuring their safety, and providing emotional support amidst the constant threat of violence and instability. The study emphasizes how these challenges make it particularly challenging for parents to prioritize their children's education or engage effectively in educational activities.

Armed conflicts often lead to economic instability and loss of livelihoods for parents. Aladysheva et al. (2021) examined the economic impact of the conflict in Ukraine on parents' ability to provide for their children's education. The study revealed that parents frequently face job loss or reduced income opportunities, making it difficult to meet their families' needs, including education-related expenses. The financial hardships experienced by parents serve as additional barriers to accessing essential educational resources, exacerbating the challenges they face.

Parents in conflict-affected environments often encounter limited opportunities for personal and professional development. Ellis et al. (2020) conducted research on the experiences of forced displacement and refugee youth mental health during the Arab Spring uprisings. The study highlights the scarcity of educational and skill-building opportunities, as well as limited access to healthcare and support services, which hinder parents' ability to effectively support their children's education.

Armed conflicts disrupt social and cultural norms and practices within communities, thereby affecting parents' ability to provide adequate educational support. Said and Brandt (2020) explored the impact of armed conflict on social trust and networks among Syrian refugees in Lebanon. The study demonstrates how the fragmentation of traditional support systems and weakened community networks impede parents' access to resources and assistance for their children's education. Consequently, parents experience a sense of isolation and loss of social cohesion, further hindering their ability to provide the necessary educational support.

### **2.3. Education Crisis Response Strategies**

Education crises pose significant challenges to the access, quality, efficiency, and equity of education, particularly for vulnerable populations such as children in crisis-affected areas, refugees, asylums, displaced individuals, girls, and people with disabilities (Dana et al., 2015). To respond to these education crises, experiences propose to go across preparedness, response, and recovery phases.

**Preparedness Phase:** The preparedness phase involves proactive measures to ensure readiness for educational emergencies. It necessitates the development and implementation of well-documented plans outlining actions to be taken during and after crises. Governments and non-governmental organizations (NGOs) have created planning guides to support schools and local authorities in this process (Readiness and Emergency Management for Schools Technical Assistance Center, 2019). Fredriksen and Bhanji (2018) found that proactive measures such as developing contingency plans, training teachers, and establishing early warning systems significantly improved the education system's resilience during crises.

**Response Phase:** The response phase encompasses policies, plans, and actions designed to address priority areas during an education crisis. The specific response measures may vary based on national and local contexts, including resource availability and prior emergency experiences. Tarricone et al. (2021) emphasize the resumption or continuation of essential subjects such as languages and mathematics while potentially reducing emphasis on other subjects. UNESCO (2017) highlighted the effectiveness of flexible learning approaches, such as distance education programs delivered through radio, TV, and online platforms, in ensuring continued access to education for displaced children and refugees. Usher and Kober (2019) found that targeted interventions, such as remedial programs and catch-up classes, improved learning outcomes for students who had experienced disruptions in their education due to crises.

**Recovery Phase:** The recovery phase focuses on restoring students to their pre-emergency learning trajectories and ensuring continuous learning. A well-prepared education system is better equipped to develop strategies for recovery and resilience (Tarricone et al., 2021). Save the Children (2018) highlighted the success of mobilizing community members as teachers and implementing accelerated learning programs in helping affected students catch up on missed learning and reintegrate into the education system following the Ebola outbreak in West Africa. Patrinos and

Psacharopoulos (2018) found that investments in rebuilding school infrastructure, providing teacher training, and offering psychosocial support to students positively impacted educational outcomes and contributed to the overall recovery of the education system following natural disasters.

To effectively address the multifaceted impacts of education crises—ranging from disrupted access to compromised quality and equity—there is a critical need to incorporate resilient strategies that span preparedness, response, and recovery phases. These crises disproportionately affect vulnerable populations, including children in conflict zones, refugees, girls, and people with disabilities, demanding a comprehensive and forward-looking approach. Proactive planning during the preparedness phase, such as contingency plans and early warning systems, has been shown to significantly enhance system resilience. In the response phase, flexible and context-sensitive interventions like distance learning and remedial programs ensure continuity and inclusiveness in education delivery. Furthermore, the recovery phase emphasizes long-term resilience through infrastructure rebuilding, psychosocial support, and accelerated learning initiatives. Therefore, embedding resilience-building measures across all phases is essential to safeguard educational continuity and equity during and after crises.

### **2.3.1. Education System Crises Response Strategies**

Education crisis recovery approaches encompass a range of strategies and interventions aimed at addressing various challenges in the education system. These approaches are designed to restore and improve access, equity, quality, relevance, and efficiency in education.

Access to education in conflict-affected areas is often hindered by the destruction of infrastructure and the displacement of communities. Rebuilding infrastructure is a critical step in restoring access to education. Research by UNESCO (2016) highlights the significance of infrastructure development in post-conflict settings. For example, a study conducted by Save the Children (2015) in Afghanistan found that the construction and rehabilitation of schools led to increased enrollment rates and improved access for marginalized communities. Temporary learning spaces provide a solution when physical infrastructure is unavailable or unsafe. UNICEF (2020) has implemented temporary learning spaces in refugee camps, enabling thousands of displaced children to continue their education amidst conflict. Mobile and distance learning approaches have shown promise in

reaching students in remote and conflict-affected areas. The World Bank (2017) has emphasized the effectiveness of mobile and distance learning in post-conflict settings. Programs like BRAC in Bangladesh have successfully utilized mobile technology to deliver education to disadvantaged children in remote areas (BRAC, 2017).

Ensuring equity in education is crucial in post-conflict contexts where marginalized groups face significant barriers. Inclusive education policies play a vital role in addressing these disparities. USAID (2020) highlights the positive impact of inclusive education policies in Rwanda, resulting in increased enrollment rates and improved access for vulnerable populations. Targeted support programs, such as scholarships and transportation assistance, can address educational inequities. Evidence from a study by Attanasio et al. (2011) in Colombia shows that conditional cash transfer programs for vulnerable families increased school enrollment rates and reduced dropout rates. Psychosocial support is essential for promoting equity in education for children affected by armed conflict. Save the Children (2013) conducted a study in Uganda that demonstrated the positive effects of integrating psychosocial support services in schools, leading to improved well-being, reduced emotional distress, and better learning outcomes.

Teacher training and support are crucial for improving the quality of education in post-conflict settings. The Abdul Latif Jameel Poverty Action Lab (J-PAL, 2016) conducted a study in Liberia and found that intensive teacher training programs resulted in improved student learning outcomes and increased teacher effectiveness. Curriculum adaptation plays a significant role in post-conflict education recovery. UNICEF (2010) highlights the importance of incorporating peace education and intercultural understanding into the curriculum, promoting tolerance and reconciliation among students from diverse backgrounds. Availability of appropriate learning materials and resources positively impacts educational quality. In South Sudan, the provision of learning materials, including textbooks and educational supplies, resulted in improved student engagement and learning outcomes (USAID, 2015).

Developing a curriculum that reflects the realities and cultural contexts of post-conflict communities enhances its relevance. UNESCO (2013) highlights the significance of a contextualized curriculum in promoting student engagement and cultural identity. In Sierra Leone, the integration of local cultural knowledge and practices into the curriculum improved student participation and understanding. Integrating vocational and life skills training programs into the

curriculum equips students with practical skills relevant to their future. The World Bank (2019) emphasizes the positive outcomes of vocational training programs in Uganda, leading to increased employability and income generation among young people. Community engagement is vital in shaping relevant and responsive education systems. Save the Children (2018) conducted research in Afghanistan, highlighting the positive impact of community participation in decision-making processes. It resulted in increased community ownership of schools, improved infrastructure, and enhanced educational outcomes.

Education financing and resource allocation are crucial for efficient education recovery. The World Bank (2017) emphasizes the importance of increased investment in education and improved resource management. Adequate funding and optimized resource allocation contribute to expanded access and improved learning outcomes. Effective coordination and collaboration among stakeholders streamline efforts and maximize program efficiency. The Inter-Agency Network for Education in Emergencies (INEE, 2019) highlights the role of coordination mechanisms, such as the Education Cluster in Iraq, which improved the delivery of education services and resource allocation. Monitoring and evaluation enable evidence-based decision-making and enhance resource allocation and program effectiveness. UNICEF (2015) emphasizes the significance of comprehensive monitoring and evaluation systems in Somalia, leading to improved resource allocation and program effectiveness.

### **2.3.2. Teaching -Learning Crises Response Strategies**

During crises, such as natural disasters, pandemics, or other disruptive events, the teaching and learning process is significantly impacted. To ensure effective recovery and support the educational needs of students, it is crucial to examine the existing literature on recovery approaches for various teaching and learning elements. This literature review aims to synthesize the current knowledge and identify proven approaches supported by recent citations for recovery in the following elements: curriculum, instruction, learning materials and resources, assessment and feedback, learning environment, teacher-learner relationship, active engagement, differentiation and individualization, technology integration, and continuous professional development.

The recovery approach for curriculum in crisis situations involves prioritizing essential learning outcomes and adapting the curriculum to include real-world and relevant topics. Hanushek et al.

(2021) found that focusing on essential learning outcomes based on evidence of learning impact leads to improved student achievement. Hattie (2020) emphasized the importance of incorporating real-world and relevant topics in the curriculum, which enhances student engagement and application of knowledge. Additionally, interdisciplinary approaches have been shown to foster a holistic understanding of concepts and promote cross-curricular connections (Barron et al., 2022).

A proven approach for instructional recovery is to utilize a variety of instructional methods. Bates (2019) highlighted the importance of incorporating synchronous and asynchronous learning to cater to diverse learning styles and situations. Davis et al. (2021) found that providing clear and structured learning experiences reduces uncertainty and anxiety among students. The COVID-19 pandemic has shown that leveraging technology tools and platforms effectively supports remote and blended learning environments (OECD, 2020).

To recover learning materials and resources, it is crucial to provide diverse and accessible options. Edwards et al. (2021) emphasized the importance of offering a range of learning materials to support recovery efforts. Open educational resources (OER) and digital platforms have been proven to offer flexibility and equitable access to educational content (Hilton et al., 2021). Incorporating multimedia resources and interactive materials has been shown to enhance student engagement and understanding (Mayer et al., 2019).

An evidence-based approach for assessment and feedback during recovery is to implement formative assessments and provide timely feedback. Black and Wiliam (2020) found that formative assessments allow for ongoing monitoring of student progress and identification of learning gaps. Hattie and Timperley (2021) highlighted the importance of timely and constructive feedback tailored to individual student needs, which supports learning growth. Incorporating a balanced mix of traditional and alternative assessment methods ensures a comprehensive understanding of student learning (Pellegrino et al., 2020).

Creating a safe, supportive, and inclusive learning environment is crucial for recovery. Agarwal et al. (2020) emphasized the need for a safe learning environment during crises. Promoting social-emotional learning (SEL) has been shown to foster resilience, well-being, and positive relationships among students and teachers (Durlak et al., 2021). Implementing restorative practices and trauma-informed approaches addresses the emotional needs of students affected by the crisis (Waters et al., 2022). Building and maintaining strong teacher-learner relationships contribute to

successful recovery. Hamre and Pianta (2020) found that effective communication, empathy, and understanding of students' individual circumstances are crucial in fostering positive relationships. Providing opportunities for personalized support and mentorship strengthens the teacher-learner bond (Allen et al., 2022).

Promoting active engagement through student-centered and inquiry-based strategies is a proven approach for recovery. Prince (2019) highlighted the benefits of student-centered approaches in promoting active engagement. Johnson et al. (2020) found that encouraging collaboration, problem-solving, and critical thinking enhances student motivation and learning outcomes. Incorporating project-based learning and hands-on activities has also been shown to promote active engagement and application of knowledge (Krajcik et al., 2021).

Differentiated instruction and individualized learning plans are essential during recovery. Tomlinson et al. (2020) emphasized the importance of differentiating instruction to meet individual student needs. Reis et al. (2021) found that identifying and addressing individual student needs through targeted interventions supports academic growth. Providing options for flexible pacing and varied learning pathways accommodates diverse student abilities and backgrounds (Basham et al., 2019).

Integrating technology effectively supports recovery efforts by facilitating remote learning, enhancing accessibility, and promoting digital literacy skills. Ertmer et al. (2022) found that technology integration supports remote learning environments. Lai and Bower (2021) highlighted the benefits of virtual classrooms, online collaboration tools, and educational apps in enabling interactive and engaging learning experiences. Professional development on effective technology integration is crucial to maximize its potential in the recovery process (Mishra & Koehler, 2019).

Ongoing professional development for educators is essential during crisis recovery. Guskey and Yoon (2022) emphasized the importance of continuous professional development in supporting teacher growth and effectiveness. Kelleher et al. (2020) found that training on trauma-informed pedagogy, resilience-building strategies, and online teaching methodologies equips teachers with necessary skills. Collaborative learning communities and mentoring programs provide support and sharing of best practices (Dawson et al., 2023).

### **2.3.3. Education Agents Crises Response Strategies**

Armed conflicts have severe consequences for education systems, affecting governments, non-government actors, teachers, students, and parents. This literature review explores innovative solutions proposed by researchers and experts to mitigate the impact of armed conflict on education and highlights relevant evidence supporting these solutions.

#### *Government Actors:*

Wodon et al. (2018) emphasize that collaborative partnerships between governments, international organizations, and NGOs are crucial in providing emergency funding, infrastructure support, and teacher training programs in conflict-affected areas. These partnerships enable resource-sharing and expertise, ensuring the continuity of education services during armed conflicts. Wilson and Thompson (2021) advocate for governments to invest in data collection and analysis systems to make evidence-based decisions. By monitoring progress, identifying gaps, and targeting interventions effectively, governments can better allocate resources and plan educational initiatives in conflict-affected areas.

Lee and Park (2023) suggest that governments should develop conflict-sensitive education policies. These policies promote inclusivity, peace education, and reconciliation, fostering social cohesion and resilience in conflict-affected areas. By integrating conflict-sensitive approaches into education systems, governments can address the unique challenges and needs of students and teachers in such contexts. Nguyen et al. (2022) highlight the importance of prioritizing education in long-term recovery and reconstruction plans. Governments need to allocate resources to rebuild damaged infrastructure, rehabilitate schools, and revitalize the education system as a whole. By investing in the long-term recovery of education, governments can restore access to quality education and ensure sustainable development in post-conflict periods.

#### *Non-Government Actors:*

Zhang and Chen (2022) emphasize the collaboration between non-government actors, governments, and local communities. By working together, these actors can provide essential education services, including funding, teacher training, and infrastructure support in conflict-affected areas. Collaborative efforts leverage the expertise and resources of multiple stakeholders, ensuring a more comprehensive and effective response to education challenges.

Ahmed et al. (2022) stresses the role of non-government actors in advocacy efforts to raise awareness about the importance of education during conflicts. These actors can mobilize resources and support from the international community to address the specific needs of education in conflict-affected areas. Brown and Rodriguez (2023) suggest that non-government actors can empower local communities by involving them in decision-making processes. This involvement includes establishing community schools, providing access to alternative learning spaces, and engaging parents and community members in education initiatives. Community empowerment ensures that education efforts are culturally sensitive, responsive to local needs, and sustainable.

#### *Teachers and Students:*

Smith et al. (2022) emphasize the importance of investing in specialized teacher training programs. These programs equip educators in conflict-affected areas with skills in trauma-informed teaching techniques and psychosocial support for students. By providing training and support, governments and non-government actors can enhance the capacity of teachers to address the unique challenges students face during armed conflicts.

Lee and Park (2023) propose offering incentives, security measures, and professional development opportunities to attract and retain qualified teachers in conflict-affected areas. These measures help create a stable and supportive teaching environment, ensuring that students have consistent access to quality education. Smith et al. (2022) suggest establishing peer support networks among teachers. These networks facilitate knowledge sharing, best practices, and emotional support, helping teachers cope with the challenges of working in conflict-affected environments. Peer support networks provide a platform for collaboration and professional growth, strengthening the resilience of teachers in the face of adversity.

Singh (2017) highlights the potential of mobile and remote learning to ensure continuous education during conflicts. By distributing devices preloaded with educational materials and providing internet connectivity, governments and non-government actors can facilitate virtual classrooms, online courses, and interactive learning platforms, enabling students to access education remotely.

Patel et al. (2022) emphasizes the need for psychosocial support for students in conflict-affected areas. Providing counseling services, safe spaces for expression, and activities that promote healing and resilience can help students cope with the psychological impact of armed conflict,

enabling them to better engage in their education. Zhang and Chen (2022) recommend establishing alternative learning spaces, such as community centers or temporary schools, to ensure continuity of education in conflict-affected areas. These spaces provide safe and conducive learning environments, particularly when traditional school infrastructure is damaged or inaccessible.

#### *Parents and Communities:*

Ahmed et al. (2022) emphasizes the importance of engaging parents in the education of their children during armed conflicts. Providing parents with information, support services, and resources empowers them to navigate the challenges of education in conflict-affected areas actively. Parental engagement strengthens the partnership between home and school, enhancing educational outcomes for students.

Brown and Rodriguez (2023) suggest disseminating information to parents on the importance of education and available support services. Clear communication channels and outreach efforts ensure that parents are well-informed about educational opportunities, rights, and resources, enabling them to make informed decisions for their children's education. Khan et al. (2023) proposes providing livelihood support to parents in conflict-affected areas. Vocational training and income-generating opportunities alleviate economic burdens, enabling parents to support their children's education and contribute to their overall well-being.

## **2.4. Crisis Resilient Education Strategies**

The need for crisis-resilient education strategies has become increasingly critical in a world frequently disrupted by conflicts, pandemics, natural disasters, and economic shocks. These crises disproportionately affect vulnerable children and youth, often leading to prolonged school closures, disrupted learning, and increased dropout rates. Crisis-resilient education strategies ensure continuity of learning through flexible, inclusive, and adaptive systems that can withstand and recover from disruptions. Investing in such strategies not only protects the right to education during emergencies but also builds a more equitable, responsive, and sustainable education system for the future.

### **2.4.1. Capacities of Resiliency**

Resilience has become a critical concept for understanding and addressing the complex risks in humanitarian and development contexts (Vaughan, 2018). Derived from physics, resilience initially referred to an object's ability to restore its state after external influences, symbolizing stability and elasticity. Over time, it has taken on a positive connotation, representing the quality that enables individuals to bounce back stronger from life's setbacks (Vladislav et al., 2022). Alternatively, resilience is defined as the capacity of a dynamic system to successfully adapt to challenges threatening its function, survival, or future development (Diana, 2022). This involves enduring crises and thriving in an uncertain world, with indicators such as leadership, culture, courage, a willingness to change, and trusted networks (Ossiannilsson, 2022).

According to USAID, resilience is "the ability of individuals, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses" (Vaughan, 2018). It denotes the capacity to absorb and recover from shocks while positively adapting and transforming structures and ways of life in the face of long-term stresses (OECD, 2014). Given the ever-present nature of change, enhancing our capacity to navigate environmental, agricultural, and political transformations is essential. Resilience involves proactively and positively managing change to contribute to "a just world without poverty." It encompasses the ability to prepare for, respond to, and recover from shocks and stresses, driven by absorptive, adaptive, and transformative capacities at various levels, as identified by Helen et al (2017) and Vaughan (2018). These capacities, interconnected and mutually reinforcing, operate at individual, household, community, district, national, and social-ecological system levels, forming the foundation for improved well-being outcomes and protection.

**Absorptive Capacity:** Absorptive capacity represents the capacity to proactively prepare for, mitigate, or prevent negative impacts caused by shocks. It involves the utilization of predetermined coping responses to preserve and restore essential structures and functions. Helen et al. (2017) argue that absorptive capacity is necessary to ensure stability and limit the adverse effects of shocks on individuals, households, communities, businesses, and authorities. Vaughan (2018) and TANGO (2018) highlight specific examples of absorptive resilience capacities, such as disaster risk reduction, financial services, and health insurance. These measures aim to minimize exposure and sensitivity to shocks through preventative strategies and appropriate coping mechanisms.

Moreover, the Organization for Economic Co-operation and Development (OECD, 2014) provides further evidence of absorptive capacity, including practices such as early harvest, temporarily removing children from school, and delaying debt repayments. These examples demonstrate how individuals and communities can employ absorptive capacity to mitigate the immediate impacts of shocks and enhance their resilience.

**Adaptive Capacity:** Adaptive capacity pertains to the ability to make intentional incremental adjustments in anticipation of or in response to change, aiming to create more flexibility for the future. It recognizes that change is ongoing and unpredictable, necessitating continuous adjustments, learning, and innovation. Helen et al. (2017) emphasizes the importance of adaptive capacity in managing and adjusting to changing situations. They argue that flexibility is key to enabling incremental changes that enhance resilience.

Vaughan (2018) and TANGO (2018) provide examples of adaptive resilience capacities, such as income diversification, market information, and trade networks. These strategies enable individuals and communities to make informed choices and adapt their livelihood and other strategies in response to longer-term social, economic, and environmental changes.

The OECD (2014) supports these findings by presenting additional instances of adaptive capacity, including livelihood diversification, involving the private sector in delivering basic services, and adopting drought-resistant seed varieties. These examples illustrate how adaptive capacity empowers individuals and communities to adjust and modify their characteristics and actions, thus mitigating future risks and capitalizing on opportunities.

**Transformative Capacity:** Transformative capacity encompasses intentional changes aimed at addressing the root causes of risk, vulnerability, poverty, and inequality. It seeks to create more equitable risk-sharing systems and eliminate structural failures that perpetuate risk and poverty. Helen et al. (2017) assert that transformation involves fundamental changes in the deep structures that underpin vulnerability and risk, as well as the distribution of risk within societies and the global community.

Transformative resilience capacities, as identified by Vaughan (2018) and TANGO (2018), include governance mechanisms, policies, regulations, cultural and gender norms, community networks, and social protection mechanisms. These elements collectively constitute the enabling

environment for systemic change. The OECD (2014) adds to this by providing examples of transformative capacity, such as introducing conflict resolution mechanisms, implementing urban planning measures, and taking actions to combat corruption. These examples demonstrate the potential of transformative capacity to create fundamentally new systems that render shocks inconsequential.

#### **2.4.2. Programming for Resilience in Education**

Resilience has become a crucial aspect of educational programs, aiming to address the challenges posed by various shocks and stressors within the education system. This literature review examines the key questions that education programs should consider when designing, implementing, monitoring, and learning from activities with a resilience approach. By exploring these questions, educators can develop comprehensive strategies to build resilience and enhance the overall well-being of learners, schools, communities, and institutions.

**Resilience to What?** To effectively build resilience, it is essential to understand the range of known and potential shocks and stressors that impact the education system. Shocks are acute deviations from long-term trends, resulting in significant negative effects on people's well-being, assets, livelihoods, safety, and their ability to withstand future shocks. Stressors, on the other hand, are chronic, long-term pressures that undermine system stability and increase vulnerability. Identifying these shocks and stressors is crucial for developing targeted resilience strategies (USAID, 2020).

**Resilience for Whom?** The impacts of shocks and stressors within the education system vary across different stakeholders. Vulnerable individuals and groups require specific attention when implementing resilience-focused education programs. This includes learners, schools, wider school communities (including parents and community leaders), and institutions related to education. Targeting these groups effectively requires utilizing data from education or protection needs assessments. The concepts of exposure, sensitivity, and vulnerability help differentiate the impacts on various stakeholders within the education system (USAID Education Policy, 2018).

Exposure refers to the physical contact between stakeholders and shocks or stressors. For instance, school communities located near an earthquake's epicenter would experience greater exposure than those farther away. Sensitivity refers to the degree to which a shock or stressor affects stakeholders.

It can depend on the characteristics of the shock or stressor itself and the social, economic, or environmental factors of the stakeholders. Vulnerability is a combination of exposure and sensitivity, with the most vulnerable stakeholders experiencing the impacts most acutely (Shah et al., 2016).

**Resilience of What?** Identifying the necessary assets, skills, knowledge, resources, and networks that can be built through education programming is crucial for absorbing, adapting to, or transforming systems in response to shocks and stressors. These assets, referred to as resilience capacities, can be categorized as absorptive, adaptive, and transformative. Absorptive capacities help minimize exposure and sensitivity to shocks and stressors through preventative measures and coping strategies. Adaptive capacities enable stakeholders to make informed choices and changes in response to long-term changes. Transformative capacities empower communities and institutions to establish an enabling environment for systemic change (Diwakar and Shepherd, 2018; Béné, Headey, et al., 2016; USAID, 2020).

**Resilience through What?** Leveraging existing resilience within a community or education system requires identifying specific assets that can be strengthened to achieve a resilient response. This includes knowledge, skills, and dispositions that can be enhanced at the individual and community levels. Additionally, institutional capacity and sector reform initiatives play a vital role in building resilience at the institutional level (USAID, 2020).

**Resilience to What End?** Education programs need to identify specific learning or educational outcomes related to resilience. These outcomes should align with the interests of learners, schools, communities, institutions, and partner governments. They can include sector-specific outcomes such as improved learning outcomes, equity and inclusion for marginalized populations, enhanced safety, or sustained education services. The choice of outcomes can be guided by the Education Policy and may extend beyond the education sector to align with broader development objectives (USAID, 2020).

### **2.4.3. Crisis Resilient Education System**

“Systems” refers to central processes, practices, networks, and relations that public and private bodies (e.g., institutions and people groups) engage in. For example, education policies, legislation, and sociocultural practices are systems that can influence and be influenced by

education in emergencies situations. These may occur in formal and informal contexts and are overarching in their reach. Consequently, systems can also include government initiatives, infrastructure, coordination and management, communication, monitoring, assessment, and evaluation (Tarricone et al, 2021). The education system encompasses various interconnected processes, practices, networks, and relationships involving public and private entities. During emergencies, such as natural disasters or pandemics, these systems play a crucial role in ensuring the continuity of education (Tarricone et al., 2021). This literature review explores resilient approaches in the education system, focusing on key factors that contribute to effective response and recovery in emergency situations.

Planning for education in emergencies requires mapping the risks and vulnerabilities within the education system. This involves identifying institutions and processes that are susceptible to external shocks. Documentation and communication of emergency planning procedures at both the system and school levels are essential. Education authorities should provide macro planning documents and guides to support schools in developing individualized subsidiary plans. Emergency response and recovery plans should outline the necessary resources, actions, tasks, and data required during each phase of an emergency. Institutional continuity plans ensure the sustainability of core functions, including alternative teaching methods and support for vulnerable children (Tarricone et al., 2021; Kousky, 2016).

Effective coordination and collaboration among stakeholders are crucial in mitigating learning losses during emergencies. Governments need to demonstrate leadership and collaborate vertically and horizontally with all relevant agents to plan and implement key policies and practices. Intergovernmental organizations and NGOs closely cooperate with host countries and each other, identifying ways to integrate services and support education in emergencies. Intergovernmental organizations provide high-level support, such as financing and development of education sector plans, while NGOs offer complementary services and programs (Tarricone et al., 2021; Kaffenberger, 2021; Nicolai et al., 2020; Reimers & Schleicher, 2020; Robinson & Curtiss, 2020).

Timely and effective communication is vital for maintaining education during emergencies. Leading agents, such as government agencies, should communicate policies and practices to education agents, reinforcing coordination efforts. Communication should be tailored to the audience and utilize various channels, such as in-person communication, telephone conversations,

online platforms, official websites, social media, newsletters, and traditional media. Information communicated should cover the impacts of emergencies on education, effects on children, alternative arrangements in place, and the responsibilities of teachers, parents, and children (Reimers & Schleicher, 2020; Tarricone et al., 2021).

Expanding access to digital technology and strengthening information and communication technology (ICT) infrastructure is essential. Vulnerable points in the infrastructure should be minimized, and multiple lines of connection established to facilitate the recovery of education during emergencies. Governments play a crucial role in providing and improving ICT infrastructure to support distance learning. This involves enhancing infrastructure, connectivity, and partnership agreements with telecom service companies and internet providers (IIEP-UNESCO, 2020a; Tarricone et al., 2021).

Ensuring safe and secure school facilities is critical for protecting the physical safety of students and staff during emergencies. Structurally secure buildings are particularly important in the face of natural disasters and other hazards. Inclusive design should be considered to ensure accessibility for students with reduced mobility. Additionally, schools should have facilities that support health and safety protocols, including water, sanitation, and hygiene (WASH) measures. This may involve providing necessary equipment, implementing hygiene practices, and refurbishing schools to meet health and safety requirements (GPE, 2020n; UNICEF, 2020b).

An effective education system requires robust monitoring processes to collect, store, and analyze up-to-date data. Monitoring systems should encompass data on school operations, student engagement, learning outcomes, and demographic information. Large-scale assessments enable the measurement and monitoring of student learning progress, informing targeted support for low-performing schools and disadvantaged populations (Reimers & Schleicher, 2020; Robinson & Curtiss, 2020; Tarricone et al., 2021).

#### **2.4.4. Crisis Resilient Teaching-Learning System**

Teaching and learning in education involve diverse activities, resources, delivery platforms, assessments, pedagogies, and practices, influencing the resilience of education systems (Tarricone et al., 2021). This literature review underscores the significance of these factors in fostering resilience, with a focus on the role of decision-making entities in effective teaching and learning.

To cultivate resilience, establishing protocols for curriculum delivery across various platforms is imperative. Integrating content on emergency causes and outcomes within broader curricula enhances students' awareness and preparedness. Social and emotional learning (SEL) programs also contribute positively to resilience by improving academic achievements and fostering pro-social behaviors (Kankaraš & Suarez-Alvarez, 2019; Weiss-Yagoda et al., 2019). SEL programs aid emotional regulation, a crucial element in overcoming trauma, positioning education as a vital support system (Reimers & Schleicher, 2020).

Addressing the challenges of school closures requires effective remote learning strategies. Digital learning faces barriers due to limited internet connectivity, especially in rural areas (UNICEF and ITU, 2020). Broadcast media (TV and radio) and mobile phones offer alternative modalities, but their implementation varies globally. Paper-based take-home packages, despite accessibility, pose challenges in distribution and interactivity (UNESCO, UNICEF, the World Bank, and OECD, 2021).

Assessment is crucial in post-emergency education recovery, providing insights for informed teaching practices. Digital assessment tools offer targeted feedback on student progress, aiding in identifying learning loss and recovery (Reimers & Schleicher, 2020; Beatty et al., 2020; Kaffenberger, 2021; Tarricone et al., 2021). Assessments, including those from the UIS MILO study, play a key role in advancing learning progress, particularly for vulnerable students (UIS, 2021; Belisle et al., 2016).

#### **2.4.5. Crisis Resilient Education Agents**

Education systems face numerous challenges during emergencies and crises. To address these challenges, innovative approaches are required to create resilience among government, non-government actors, teachers, students, and parents. This literature review explores evidence-based strategies and practices that have proven effective in fostering resilience within the education sector.

##### *Government Actors:*

In order to create resilience within the education sector, governments can adopt innovative approaches. One such approach is to establish cross-sector collaborations and partnerships with non-governmental organizations (NGOs), private entities, and international agencies. This

collaboration helps leverage expertise, resources, and knowledge for improved education outcomes, especially in emergency and crisis situations (Brookings Institution, 2019). Another strategy is to develop comprehensive emergency management plans that outline roles, responsibilities, and protocols for educational institutions during crises. Well-prepared emergency management plans have proven effective in ensuring a coordinated response and enhancing resilience (REMS Technical Assistance Center, 2019).

Governments should also invest in research and development to identify emerging challenges in education and foster innovative solutions. The Organization for Economic Co-operation and Development (OECD) emphasizes the need for governments to allocate resources towards research and development, as it is essential for addressing emerging challenges and promoting innovation in the education sector (OECD, 2019). Furthermore, providing funding and support for capacity-building programs that enhance the resilience and preparedness of educational stakeholders is crucial. The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes the importance of financial resources and support for capacity-building programs during emergencies (UNESCO, 2020).

Lastly, governments should foster policy environments that encourage flexibility, adaptability, and innovation in the education sector. The World Bank highlights the significance of policy environments that promote these qualities, as they ensure resilient education systems capable of effectively responding to crises and emergencies (World Bank, 2020).

#### *Non-Government Actors (NGOs):*

Non-government actors, such as NGOs and community organizations, can contribute to education resilience through various approaches. One approach is to facilitate training programs and workshops for NGO staff. Capacity-building programs for NGO staff have been recognized as instrumental in enhancing their preparedness and response capabilities during education emergencies (INEE, 2020). Collaborating with governments, schools, and local communities to develop community-led initiatives is another effective strategy. Such initiatives strengthen education resilience during emergencies, and the Global Education Cluster, a network of NGOs and international organizations, actively promotes this collaborative approach (Global Education Cluster, 2020).

Advocating for policies that prioritize education in emergency response and recovery efforts is crucial for non-government actors. The Education Cannot Wait fund advocates for policies that prioritize education during emergencies, highlighting the fundamental right of children to education in crisis situations (Education Cannot Wait, 2021). Non-government actors should also focus on developing innovative funding mechanisms and partnerships to ensure sustained support for education during crises. The Global Partnership for Education emphasizes the need for innovative funding mechanisms, including public-private partnerships and innovative financing instruments (Global Partnership for Education, 2020).

Additionally, non-government actors can utilize technology and digital platforms to disseminate information, resources, and support to schools, teachers, students, and parents. UNICEF has successfully employed technology and digital platforms to ensure the continuity of education for children in emergency situations, particularly during the COVID-19 pandemic (UNICEF, 2020).

#### *Teachers and Students:*

Teachers play a crucial role in fostering education resilience during emergencies. Providing ongoing professional development opportunities that focus on resilience-building, crisis pedagogy, and trauma-informed teaching practices is essential. The International Bureau of Education emphasizes the importance of such professional development opportunities to support teachers in emergency contexts (International Bureau of Education, 2020). Fostering collaboration and learning communities among teachers is another effective approach. By facilitating collaboration and the sharing of experiences, strategies, and resources, teachers can enhance their resilience during emergencies. The Teachers in Crisis Contexts Learning Hub is an example of a platform that promotes such collaboration among teachers (Teachers in Crisis Contexts Learning Hub, 2020).

Incorporating technology tools and online resources into teaching practices is crucial for flexibility and adaptability during emergencies. The European Commission highlights the importance of integrating technology into teaching practices, as demonstrated during the COVID-19 pandemic (European Commission, 2020). Teachers should also have access to mental health and well-being support, including counseling services and self-care resources. The World Health Organization emphasizes the need for comprehensive support systems to address teachers' mental health and well-being during emergencies (WHO, 2020).

Encouraging innovation in teaching methods, such as project-based learning, blended learning, and flipped classrooms, is essential for engaging students during emergencies. The EdTech Hub highlights the effectiveness of these innovative teaching methods in ensuring continuity of education during crises (EdTech Hub, 2020).

Promoting student agency by involving them in decision-making processes related to emergency planning and education initiatives is an important approach. The United Nations Office for Disaster Risk Reduction emphasizes the significance of promoting student agency and involvement to enhance their resilience and preparedness in emergency situations (UNDRR, 2021). Providing socio-emotional support programs is vital for helping students build resilience, coping skills, and emotional well-being during crises. The International Rescue Committee emphasizes the need for such programs in crisis-affected contexts (IRC, 2020).

Fostering digital literacy and technological skills enables students to adapt to distance learning and online collaboration platforms during emergencies. The Global Partnership for Education recognizes the importance of fostering these skills among students (Global Partnership for Education, 2020). Creating safe spaces within schools and online platforms where students can express their concerns, ask questions, and seek support is essential. Plan International emphasizes the significance of these safe spaces during emergencies (Plan International, 2020).

Encouraging student-led initiatives that address community challenges and promote social responsibility empowers students and contributes to resilience-building efforts. The UN Sustainable Development Goals highlight the importance of student-led initiatives in promoting social responsibility (UN Sustainable Development Goals, 2020).

#### *Parents and Communities:*

Establishing effective communication channels between schools and parents is crucial for providing timely information, updates, and resources during emergencies. The National Parent Teacher Association emphasizes the importance of these channels for effective communication (National PTA, 2020). Conducting workshops and training sessions for parents on supporting their child's education at home, including digital literacy and online safety, is another valuable approach. Save the Children conducts such workshops and training sessions for parents (Save the Children, 2020).

Facilitating parent support groups or communities fosters peer-to-peer support and the exchange of experiences among parents during emergencies. The Harvard Graduate School of Education highlights the benefits of these support groups or communities (Harvard Graduate School of Education, 2020). Involving parents in decision-making processes related to education policies, emergency planning, and school reopening strategies ensures their active participation and engagement in education resilience efforts. UNESCO emphasizes the importance of parent involvement (UNESCO, 2020). Providing accessible resources and materials that support parents in creating a conducive learning environment at home is essential. The National Association for the Education of Young Children recognizes the need for such resources, especially during emergencies (NAEYC, 2020).

### **Literature Review Summary:**

The literature review revealed several critical research gaps in the impact of armed conflict on education. First, there was an evidence gap due to a lack of localized, comprehensive studies on how conflict affects education systems, teaching, and educational agents, particularly in regions like Tigray. A theoretical and conceptual gap existed, as key concepts such as exposure, vulnerability, and resilience remain underexplored, and no unified framework exists to understand these dynamics. The methodological gap was evident, with an overuse of quantitative approaches that fail to capture the nuanced, multidimensional impacts of conflict. There were also population and geographical gaps, as research has largely neglected education stakeholders and regions directly affected by conflict, with Tigray being underrepresented. Furthermore, a practical and policy gap persisted, as region-specific recovery and resilience strategies have not been adequately studied or implemented. Finally, there was uncertainty about the effectiveness and equity of global recovery approaches, highlighting the need for more context-sensitive research.

As a result, this review substantially contributed to the study by synthesizing insights into the effects of armed conflict on the education sector. It examined the organization of education systems, teaching and learning processes, and the roles of educational agents through both global and local perspectives. By doing so, it identified the extent of the crisis, including factors like exposure, sensitivity, and vulnerability, providing a framework to assess the levels of war-induced disruption to various educational components used in this study.

Additionally, the review helped the study in identifying established education crisis response strategies tailored to specific war-related effects within the education sector used in this study. These strategies, linked to key educational attributes such as availability, accessibility, acceptability, and adaptability, are essential for evaluating the effectiveness of proposed crisis response measures. The literature also highlighted resilient education strategies aimed at mitigating the effects of war, as well as crisis response mechanisms within each sector. It further identified the critical capacities of education resilience, including absorptive, adaptive, and transformative capabilities, which are vital for assessing the strength and resilience of proposed strategies.

Ultimately, the literature review played a crucial role in shaping the study's conceptual framework by integrating both theoretical and empirical evidence. It also guided the researcher in selecting the most suitable research philosophy and methodology for the study.

## **2.5. Conceptual Framework of the Study**

The conceptual framework of this study has been adapted from multiple frameworks. The education system, teaching-learning, and education agent's component in this framework has been adapted from education in emergency policy monitoring framework for building a resilient education system developed by Tarricone et al. (2021) as a rapid review of the education in emergencies literature in Australian Council for Educational Research (ACER,2021). This framework helped to classify proposed effect indicators of armed conflict, recovery and resilient approaches under these mentioned components in this adapted framework.

The RAPID framework for learning recovery and acceleration developed by World Bank and its partners (2022) where the abbreviation R denotes for Reach every child and keep them in school; A for Assess learning levels regularly; P for Prioritize teaching the fundamentals; I for Increase the efficiency of instruction including through catch-up learning; and D for Develop psychosocial health and wellbeing, has helped to construct education recovery and resilience approaches in this conceptual framework of the study. The 4 'A's right to education framework used by UNESCO (2011) also helps this framework to evaluate each of the proposed education crisis recovery approaches in terms of availability, accessibility, acceptability, and adaptability.

The measure of crisis extents and resilience capacities parts are adapted from the framework of education and resilience used by USAID in 2019 as a mapping of resilience capacities in the education sector adapted from Béné, Heady, et al. (2016) and further used in 2020 indicated that originally developed by Shah (2019) as a framework of transforming systems in times of adversity in relation to education. This USAID’s framework is contributing to this adapted framework in providing the concept of shocks and stressors along with their extent of crisis such as exposure, sensitivity, and vulnerability of proposed effects of armed conflict on education system, teaching-learning, and education agents. It also helps to examine proposed innovative resilience approaches to crisis resilient education system in terms of absorptive, adaptive, and transformative resilience capacities.

Adapting the above multiple frameworks, the following figure outlines the conceptual framework specifying the impact of armed conflict crisis on education system, teaching-learning and education agents with specific impacts under these categories with their corresponding measuring variables. It also outlines the crisis recovery and resilient approaches for each of the impacts aforementioned with their own corresponding relevant measuring variables as figured out below.

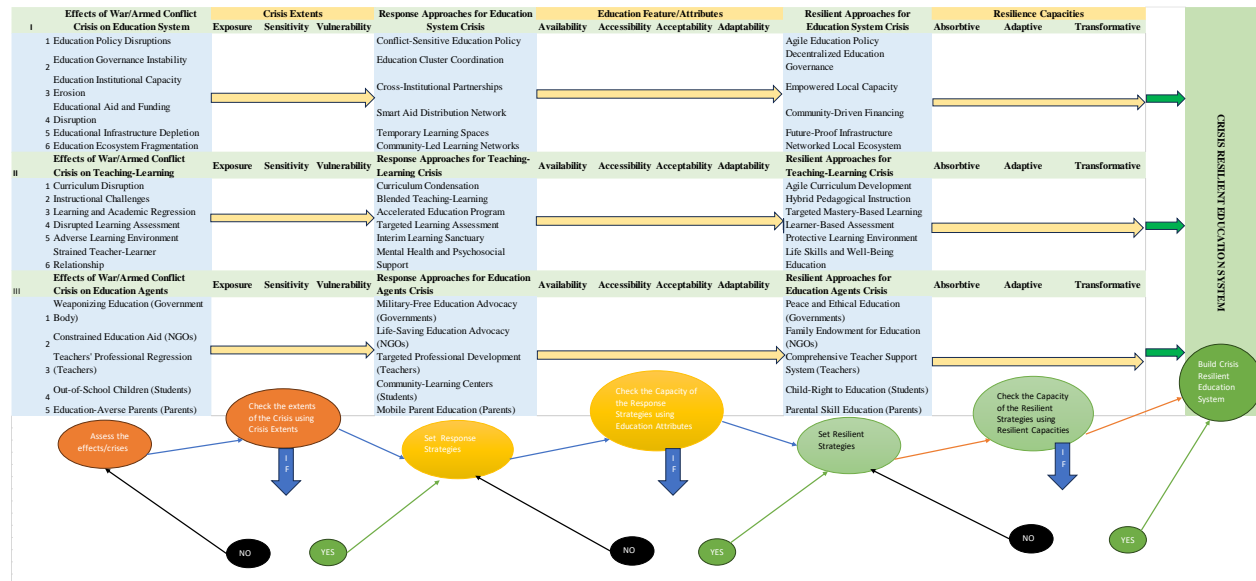


Figure 1: Conceptual Framework of the Study

The framework is adapted from USAID (2020- 2019), World Bank (2022), ACER (2021), and UNESCO (2011). Understanding from the above conceptual framework, the first column (objective 1) assesses the effects of the armed conflict on education system, teaching-

learning, and education agents measured in terms of the extents of crisis; the second column (objective 2) identifies and proposes innovative response approaches or strategies to each effect of the armed conflict; and the third column (objective 3) examines and proposes innovative resilient strategies to each proposed recovery approach. Descriptions of all items or variables in this framework have been explained in each respective parts of the results, discussions, and annexed.

The effects of the war, along with the response and resilience strategies outlined in the aforementioned framework, are classified as dependent variables, whose values are contingent upon the independent variables. These independent variables include factors such as the extent of the crisis, educational attributes, and resilience capacities. The extent of the crisis- encompassing dimensions like exposure, sensitivity, and vulnerability serves as an independent variable, measuring the effects of the war. Similarly, educational attributes- such as availability, accessibility, acceptability, and adaptability are considered independent variables, influencing the response strategies. Resilience capacities, including absorptive, adaptive, and transformative capacities, function as independent variables that shape the resilience approaches. Once the effects of the war are thoroughly assessed, measured through the extent of the crisis, tailored response strategies for each impact are developed. In parallel, resilience strategies addressing both the effects and responses are devised, ultimately contributing to the establishment of a crisis-resilient education system.

## CHAPTER THREE

### RESEARCH DESIGN AND METHODOLOGY

This section outlines the philosophical perspectives guiding the study, encompassing the paradigmatic, axiological, ontological, and epistemological foundations. These philosophical underpinnings informed the development of the research design and methodology, ensuring that the study's objectives are effectively addressed.

This section provides a comprehensive examination of the research design employed by the researcher to address the research questions associated with each study objective. It outlines the methodology in detail, beginning with a description of the study areas and the characteristics of the target population. The section further explains the sampling design and techniques used to ensure a representative selection, as well as the study variables and data sources.

Additionally, it covers the data collection methods, including the tools and instruments utilized, along with the processes for validating these instruments to ensure reliability and accuracy. The discussion then moves to data analysis, presenting the tools, techniques, and statistical models used to interpret the collected data. Finally, the section concludes by addressing the ethical considerations adhered to throughout the research process. This includes the researcher's commitment to maintaining confidentiality, informed consent, and overall ethical integrity during the study's execution.

#### 3.1. Philosophical Worldviews of the Study

In this study, the researcher adopted a specific philosophical framework to shape the approach towards comprehending and addressing the profound effects of the armed conflict crisis on the education system, as well as exploring response and resilient strategies in Tigray's primary schools. These philosophical perspectives play a pivotal role in influencing the study's paradigm, axiology, ontology, and epistemology for each defined objective (Creswell & Creswell, 2018).

The researcher's choice of paradigmatic philosophy reflects the fundamental perspective on how knowledge is acquired. Within the academic landscape, four common paradigms emerge: post-positivism, which is associated with quantitative research; constructivism, which aligns with qualitative research; transformative, which centers around driving political change; and

pragmatism, which adopts a problem-centered, real-world approach by integrating both qualitative and quantitative methods (Joy & Sherry, 2014; Creswell & Creswell, 2018). As a result, the paradigmatic worldview chosen for this study is pragmatism where the researcher integrates both qualitative and quantitative methods, draw upon a diverse set of research tools and techniques to explore and verify the effects of the crisis on teaching-learning processes, education agents, and the overall education system along with their innovative response and resilient approaches. This paradigm allows the researcher to bridge the gap between theory and empirical observations.

Moving on to axiology, the researcher acknowledged the significance of their own values, attitudes, and biases and how these elements might influence the research process. The axiological continuum represents a spectrum ranging from research that is tightly bound to specific values, value-free research, to research that maintains a conscious awareness of its embedded values (Peter, 2015). In pursuing this study, the researcher adopted a value-consciousness axiological worldview. The researcher is acutely aware of the importance of respecting and considering the values, beliefs, and cultural aspects relevant to the study. Ethical considerations are paramount throughout the research process, ensuring that the values of respondents, communities, and the environment are acknowledged and respected. By adopting a value-conscious approach, the study aims to conduct the research that aligns with ethical principles and promotes inclusivity and cultural sensitivity.

Ontology, another crucial aspect, delves into the philosophical examination of the nature and structure of reality. It shapes the researcher's understanding of what can be known about the world. The ontological continuum encompasses a range of beliefs, from the perspective that reality is constructed and multi-faceted, to the belief in an objective, external reality that can be comprehended (Peter, 2015). The ontological worldview guiding this study is grounded in the recognition of multiple constructed realities. The researcher acknowledged the experiences and perceptions of various stakeholders within the study. By embracing this ontological philosophy, the study seeks to collect data from diverse participants, including policymakers, teachers, students, and parents, to capture the multiplicity of realities and understand the crisis's nuances from different perspectives.

Epistemology, in turn, deals with the individual lens through which researchers interpret knowledge in the world. It encompasses different stances, such as objectivism, which posits an

external and objective reality; subjectivism, which emphasizes the role of the individual's subjective experience in shaping knowledge; and inter-subjectivism, which highlights the shared understanding between researchers and subjects (Joy & Sherry, 2014). The epistemological worldview guiding this study encompasses both objectivism and subjectivism, culminating in inter-subjectivism. The researcher recognized the value of objective responses gathered through quantitative methods. Simultaneously, the researcher acknowledges the significance of subjective insights and qualitative data to understand the nuanced experiences and perspectives of those affected by the crisis. By combining both epistemologies, the study seeks to enrich its knowledge contribution and develop a comprehensive understanding of the crisis's implications for Tigray's primary schools.

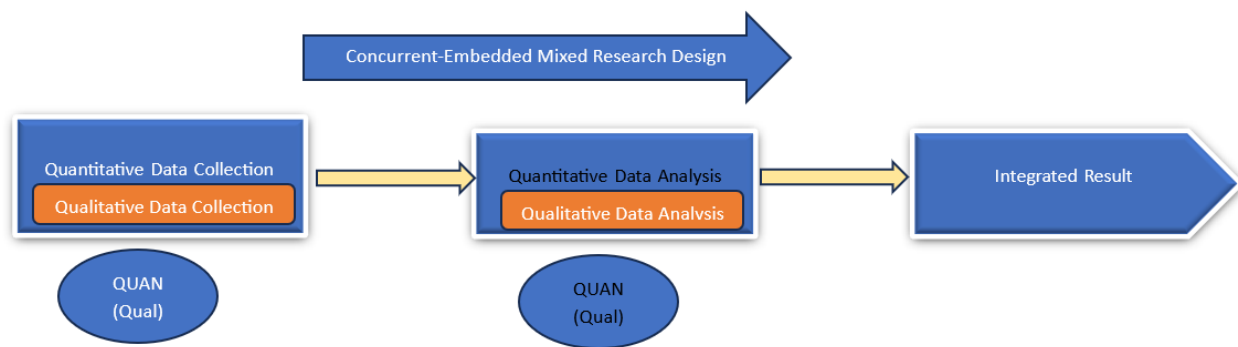
This multifaceted philosophical foundation shapes not only the researcher's perspective but also the nature of the interaction with the subject matter, as well as the selection of inquiry methods used to gather knowledge; and the philosophical worldviews for each objective and question of this study.

### **3.2. Research Design of the Study**

From the three types of research designs, such as quantitative, qualitative, and mixed methods design, the research design selected for this study was a mixed-methods research design, with a specific emphasis on a concurrent-embedded mixed-methods approach. In this study, the adoption of a mixed-methods design allowed for the synthesis of both quantitative and qualitative research techniques, ensuring a comprehensive and multifaceted examination of the research objectives.

Mixed-methods research designs are recognized for their capacity to provide a more complete understanding of complex research problems by amalgamating the strengths of both qualitative and quantitative approaches. This integration facilitates a more nuanced exploration of the subject matter, capturing not only numerical data but also the rich contextual insights inherent in qualitative analysis. Within the realm of mixed methods, the concurrent-embedded design holds prominence. Coined by Creswell and Creswell (2017), this approach involves the simultaneous implementation of both qualitative and quantitative data collection and analysis methods. Crucially, one method is embedded within the other, allowing for an intricate interplay between the two, enriching the overall research findings, where the qualitative was nested within the quantitative method particularly in this study.

Creswell and Clark (2018) argue that the concurrent-embedded design is particularly beneficial when researchers seek to explore a research question from multiple angles, using different data types to enhance the overall validity and richness of their findings. The simultaneous collection and analysis of both quantitative and qualitative data in this design facilitate a more holistic and synergistic approach to research. Deploying the concurrent-embedded mixed method design in this study, the quantitative part followed survey design whereas the nested qualitative part used narrative design to explain and build the quantitative results, and is shown as in the figure below adapted from Creswell and Clark (2018).



*Figure 2: Concurrent-embedded Mixed Research Design*

### 3.3. Methodology of the Study

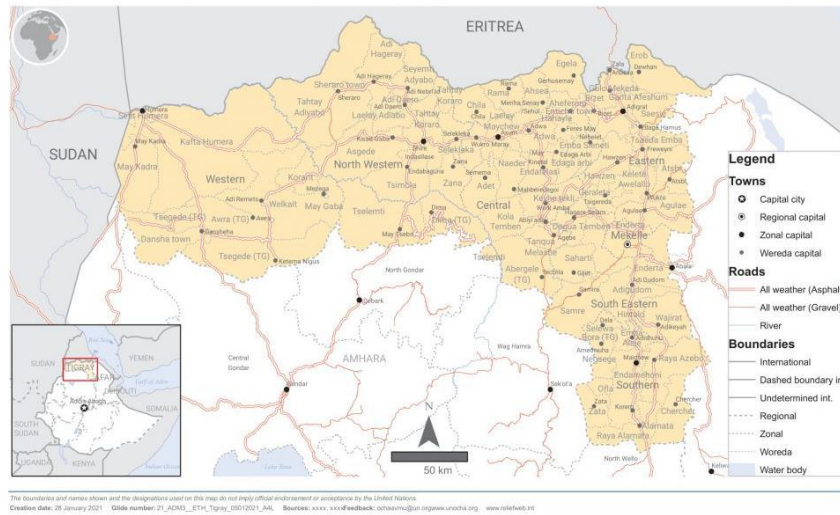
#### 3.3.1. Description of the Study Area

This research has been conducted in the Tigray region, Ethiopia. Tigray is one of the nine regional states of Ethiopia, located at latitudes from 12°14'50.50" to 14°53'48.03" and longitudes from 36°26'48.74" to 39°0'59.09". The region is the ancestral home of the Tigray, Erob, and Kunama people. It shares common borders with Eritrea to the north, the State of Afar to the east, the State of Amhara to the south, and the Republic of Sudan to the west. Currently, the region is administratively divided into 7 zones, 92 woredas (districts), and 814 tabias (sub-districts) (TSA, 2018). However, the education system in Tigray has been severely impacted by conflict, leading to widespread disruption and closures. As a consequence, 2,221 primary schools have been shut down, leaving over 2.4 million previously enrolled primary school children and others without access to education. A staggering 88% of schools have been damaged, and tragically, many

students, teachers, and other members of the school community have lost their lives (TEB, 2021). The study will specifically focus on six districts out of the 28 targeted by the Imagine 1 Day International Organization in the Tigray region. These districts are as follows: Kola Tenben from the Central zone, Gheralta from the Eastern zone, Hawelti, Adi-haqi, and Semien from Mekelle zone, Seharti from the South Eastern zone, and Bora and Raya Chercher from the Southern zone.

Kola-Tenben, situated in the Central zone, has experienced a devastating war, resulting in the closure of 41 primary schools and leaving hundreds of thousands of children out of school. The study was conducted in three primary schools and the district education office in this area. Gheralta, in the Eastern zone, has also faced destructive war during the recent conflict, leading to the closure of 16 primary schools and affecting children's access to education. The study encompassed two primary schools and the district education office in Gheralta. Mekelle, the capital city of the Tigray region, houses 44 public primary schools and has been targeted by air strikes during the conflict. It has accommodated a significant number of internally displaced people from various zones of the region. In this city, the study was conducted in five primary schools across three sub-cities.

Seharti, located in the South Eastern zone, has experienced a devastating war that resulted in the closure and damage of 28 primary schools, causing children to be unable to attend school. The study involved two primary schools in this district. Bora, in the Southern zone, has also faced consecutive devastating wars, leading to the closure of 14 schools and leaving children without access to education. The study has taken place in seven primary schools in this district. Raya Chercher, another district in the Southern zone, has endured consecutive armed conflicts, resulting in the closure of 24 primary schools and impacting children's education. The study included five primary schools in this district as part of its research focus.



*Figure 3: Map of Tigray region of Ethiopia, Adopted from OCHA (2021).*

The study was conducted in primary schools and initiated by the recognition of primary education as a critical stage in a child's academic journey, serving as the foundation for lifelong learning. This phase plays a pivotal role in shaping cognitive abilities, critical thinking skills, and fostering a love for learning. The mastery of fundamental concepts in primary school contributes to future academic success, laying the groundwork for advanced studies. Additionally, primary education is crucial for the development of social and behavioral skills, allowing students to navigate interactions and adapt to structured environments. It also facilitates early identification and intervention of learning challenges, positively impacting student outcomes. Furthermore, primary education plays a key role in character development, preparing students for future career paths, and promoting cultural and civic awareness. Parental involvement is emphasized as a crucial aspect of primary education, creating a collaborative partnership between home and school for a positive educational experience.

### 3.3.2. Target population

The target study areas were Imagine 1 Day International Organization project area zones, districts, and schools where these areas had education in emergency interventions which were important for the researcher to deploy his data collection particularly for the crisis response and resilient strategies. From the schools in each district, only schools under the intervention of the organization

were target study areas. The target population for this study comprised individuals directly related to the education system, teaching-learning processes, and educational agents.

Across the education system component of the objectives of the study, participants directly associated with it, including policy makers at regional education bureaus, district education offices, school leaders, and NGOs have actively participated to assess the effects of armed conflict crises on it, identify innovative response approaches, and examine innovative resilient approaches to address the system crisis.

Within the context of teaching-learning processes, individuals directly involved in teaching-learning processes, including school teachers and students of primary schools have participated to assess the effects of armed conflict crises on teaching-learning, identify innovative response and resilient approaches to address the crisis, As for educational agents, the agents themselves, particularly students, teachers, parents, education authorities, and NGOs have participated to assess the effects of armed conflict crises on these agents, identify and examine innovative response and resilient approaches to address the crisis on the education agents. The total study impacted 143 primary schools, 8 wereda education offices, one regional education bureau, and 10 education NGOs: all 172 areas comprising 1,190 population size as indicated in the table below.

Table 1: Population Size by Strata

District Name	# of Schools/study areas	Students (Monitors) Population	Teachers Population	Population			Total Population
				Parents (PTA) Population	Government Education Authorities Population	Education NGO Experts Population	
Kola Temben	41	124	54	70	0	0	248
Geralta	18	54	24	31	0	0	109
Adihaqi-Mekelle	5	15	7	8	0	0	30
Hawelti-Mekelle	5	15	7	8	0	0	30
Semien-Mekelle	8	24	11	14	0	0	49
Seharti	28	85	37	48	0	0	170
Bora	14	42	19	24	0	0	85
Raya-Chercher	24	73	32	41	0	0	146
Education Offices	8		0	0	120		120
Education Bureau	1	0	0	0	103	0	103
Education NGOs	20	0	0	0	0	100	100
<b>Total</b>	<b>172</b>	<b>432</b>	<b>191</b>	<b>244</b>	<b>223</b>	<b>100</b>	<b>1190</b>

### **3.3.3. Sampling Design and Techniques**

As a mixed-methods research type of this study, and following concurrent-embedded mixed methods design, identical concurrent mixed sampling design has been applied from the eight mixed sampling designs such as identical concurrent, identical sequential, parallel concurrent, parallel sequential, nested concurrent, nested sequential, multilevel concurrent, and multilevel sequential (Creswell and Creswell, 2018). In an identical concurrent sampling design, quantitative and qualitative data are collected from the same people (identical) at approximately the same time which is concurrently.

For the embedding quantitative part, the study used a multi-stage sampling procedures to draw a representative sample from the target population and study areas, where study areas were selected using convenient technique for available intervention and participants through proportionate stratified random sampling technique in which the entire target population is divided into homogeneous subgroups or strata (Creswell and Creswell, 2018) across the components of the study objectives such as the education system, teaching-learning, and education agents. The strata include primary school students, teachers, parents, government education authorities, and education NGOs, each providing insights into the impact of armed conflict on education, response and resilient approaches to the education crisis. The concept of stratified sampling, particularly optimal allocation, was formalized by Jerzy Neyman in 1934. Neyman introduced what is known as Neyman's allocation, which determines how to optimally allocate samples across strata to minimize variance within the sample. His work laid the foundation for modern sampling methods, including both proportionate and disproportionate stratified sampling.

As to the embedded qualitative part, the study employed the non-probability sampling technique as a general sampling design strategy, selecting from the five broadly used non-probability sampling techniques often employed to select a sample for a qualitative study, viz.: Purposive Sampling Technique, Quota Sampling Technique, Judgment Sampling Technique Snowball Sampling Technique and Convenience Sampling Technique. This study, however, made use of purposive sampling by selecting individual participants who are relevant to respective questions of the study, and of course the sample respondents in the quantitative part have also participated

in this qualitative part through identical concurrent mixed methods sampling technique as stated in this section above (Gravetter and Forzano, 2012; Creswell & Creswell, 2018).

To determine the total sample size for all the population strata stated above, Slovin's formula has been used. The results of calculations using the Slovin formula have been used as the basis for the sample size, which must be taken from the entire population for all observed strata. Slovin's formula is a statistical method used to estimate the sample size from a population when the total population is known, and the margin of error is acceptable. It is commonly applied when conducting surveys or research to determine the appropriate number of respondents from a larger population as noted in the formula below.

$$n = \frac{N}{1 + N \cdot e^2}$$

Where: **n** = the desired sample size; **N** = the total population size (1,190) and **e** = the margin of error (0.05).

Thus, the total sample size for all population strata was 300. Once we have gotten the total sample size of the entire target population, proportionate stratified random sampling has been deployed to select the participants from each stratum of students, parents, teachers, education government authorities, and education NGOs from each stratum of study areas using proportionate stratified random sampling formula. This proportional sample size calculation has also been done for each study area, particularly for 28 primary schools, 8 wereda education offices, 1 regional education bureau, and 10 NGOs working on education as indicated in the table below and formula.

$$n_i = \frac{N_i}{N} \times n$$

Where:  $n_i$  = the sample size from stratum  $i$  ;  $N_i$  = the population size of stratum  $i$  ; **N** = the total population size (sum of all strata populations); and **n** = the total sample size to be drawn from the overall population.

Thus, from the 300 sample respondents, 109 class representative students (monitors) and 48 teachers have participated in the teaching-learning; 56 government education authorities and 25 education NGOs in education system; and all on their respective areas as education agents.

**Table 2: Population versus Sample Size by Strata**

Study Area	Population Versus Sample Size														
	# of study areas		Students (Monitors)		Teachers		Parents (PTA)		Education Authorities		Education NGO Experts		Total		
	PN	SS	PN	SS	PN	SS	PN	SS	PN	SS	PN	SS	PN	SS	%SS
Kola Temben	41	8	124	31	54	13	70	18	0	0	0	0	248	62	25%
Geralta	18	3	54	14	24	6	31	8	0	0	0	0	109	28	26%
Adihaqi-Mekelle	5	1	15	4	7	2	8	2	0	0	0	0	30	8	27%
Hawelti-Mekelle	5	1	15	4	7	2	8	2	0	0	0	0	30	8	27%
Semien-Mekelle	8	2	24	6	11	3	14	4	0	0	0	0	49	13	27%
Saharti	28	5	85	21	37	9	48	12	0	0	0	0	170	42	25%
Bora	14	3	42	11	19	5	24	6	0	0	0	0	85	22	26%
Raya-Chercher	24	5	73	18	32	8	41	10	0	0	0	0	146	36	25%
Education Offices	8	8		0	0	0	0	0	120	30		0	120	30	25%
Education Bureau	1	1	0	0	0	0	0	0	103	26	0	0	103	26	25%
Education NGOs	20	10	0	0	0	0	0	0	0	0	100	25	100	25	25%
Total	172	47	432	109	191	48	244	62	223	56	100	25	1190	300	25%

*Note: PN is Population Size and SS is Sample Size*

### 3.3.4. Study Variables and Sources of Data

This section elucidates the study variables pertaining to each objective of this research, along with their respective data sources. For the first objective, the study focused on effect indicators of the armed conflict crisis on the education system, teaching-learning, and education agents. These indicators are evaluated in terms of their extent of crisis, encompassing exposure, sensitivity, and vulnerability as recommended by USAID (Shah, 2019). Here, the dependent variables are the effect indicators themselves as outlined in the first column of the conceptual framework, while the independent variables comprise crisis exposure, sensitivity, and vulnerability. Data for this objective were sourced from both qualitative and quantitative methods, drawing from primary and secondary sources.

Moving on to the second objective, the study delved into innovative crisis recovery or response approaches tailored for the education system, teaching-learning, and education agents. These approaches are characterized by essential features such as availability, accessibility, acceptability, and adaptability as indicated by Education Above All (EAA,2019). The proposed innovative recovery approaches represent the dependent variables in this case as mentioned in the second

column of the conceptual framework, while the listed features of education act as the independent variables. To gather comprehensive evidence and results for this objective, a combination of qualitative and quantitative data was collected from primary and secondary sources.

Finally, the third objective centered around innovative resilient approaches for each aspect of the education system, teaching-learning, and education agents amidst the crisis. The evaluation of these approaches incorporates resilient capacities, namely adoptive, adaptive, and transformative capacities as tested by USAID (Shah, 2019). The proposed innovative resilient approaches form the dependent variables here as put in the third column of the conceptual framework, while the resilient capacities mentioned earlier serve as the independent variables. To obtain a nuanced understanding of this objective, data were collected from both qualitative and quantitative sources, spanning primary and secondary data reservoirs.

In conclusion, this study employed a multifaceted approach, skillfully incorporating qualitative and quantitative data, as well as primary and secondary sources, to investigate and analyze the diverse study variables across the three objectives. This meticulous methodology promised to yield robust findings and valuable insights into the intricate interplay between the armed conflict crisis and the education system, paving the way for innovative recovery and resilient strategies.

### **3.3.5. Data Collection Techniques and Tools**

Concurrent-embedded mixed methods research entails the simultaneous collection of both quantitative and qualitative data, with one method intricately woven within the other. In this study, qualitative data were seamlessly integrated or nested within the concurrently collected quantitative data, employing the techniques and tools discussed in this section.

For the quantitative component, data collection was conducted using multiple methods to ensure comprehensive coverage and accuracy. One of the primary tools employed was close-ended surveys and questionnaires, distributed in both physical and digital formats. Paper forms were handed out to participants for manual completion, while soft copies were sent via email for electronic responses. Participants included teachers, representatives from government education authorities, and members of educational NGOs. This approach provided structured data to quantify various perspectives and insights. Structured interviews were also a key method of data collection. These interviews were carried out in person, following a predetermined set of standardized

questions with fixed response options. The participants in this phase consisted of students and parents, allowing for consistent data collection across different demographics.

In parallel with the quantitative methods, qualitative data were gathered to add depth and context. Open-ended questions were incorporated into surveys and questionnaires, encouraging participants—such as teachers, government education officials, and education-focused NGOs—to provide detailed, narrative responses. This method captured rich, descriptive data that provided nuanced insights into the research topics. Field data were further enriched through field notes and observations, where the researcher employed both structured and unstructured techniques to document specific behaviors and events. This method involved the researcher’s active participation in the environment being studied, ensuring a deep understanding of the context.

Additionally, unstructured interviews were conducted with students and parents. These interviews, characterized by open-ended conversations without a predetermined script, allowed participants the freedom to share their experiences and thoughts in their own words. This participant-centered approach enabled a more flexible and in-depth exploration of their views. Focus group discussions added another layer of qualitative depth. Moderated discussions with small groups of students, teachers, and parents facilitated dynamic interaction and collective exploration of specific topics. This method capitalized on group dynamics to uncover shared experiences and generate richer insights. To further contextualize and triangulate findings, document analysis was employed. This method involved a systematic review of relevant written, visual, or audio materials, including pre-existing documents such as reports, letters, diaries, newspapers, or other recorded content. Document analysis helped to provide a broader understanding of the issues at hand by incorporating historical or contextual data.

To ensure accessibility and clarity for all participants, each of the data collection tools was prepared in both the local language, Tigrigna, and English. This bilingual approach accommodated the linguistic needs of respondents and enhanced the quality of the responses. The table below presents a detailed breakdown of respondents for each data collection tool and the items constructed for this study. The total 87 items of the data collection are distributed among the respondents and tools below.

**Table 3: Items by Respondents and Data Collection Tools**

Data Collection Tool	Items by respondents				
	Students	Teachers	Parents	Education Authorities	Education NGOs
<b>Quantitative Data</b>					
Close-ended survey questionnaires		21		21	21
Structured Interviews	21		3		
Secondary Data	21	21	3	21	21
<b>Qualitative Data</b>					
Open-ended survey questionnaires		21		21	21
Unstructured interviews	21		3		
Focus Group Discussion	21		3		
Field Notes and Observation	21	21	3	21	21
Document Analysis	21	21	3	21	21
Total unrepeated items	21	21	3	21	21

The above 87 items were also categorized by respondents, study objective and their components indicated in the table below where ES-education system, TL-teaching learning, and EA-education agents.

**Table 4: Items by Respondents and Objectives**

Respondents	Effect-objective 1			Response-objective 2			Resilience-objective3			Total
	ES	TL	EA	ES	TL	EA	ES	TL	EA	
Students		6	1		6	1		6	1	21
Teachers		6	1		6	1		6	1	21
Parents			1			1			1	3
Edu. Auth	6		1	6		1	6		1	21
Edu.NGOs	6		1	6		1	6		1	21
Total	12	12	5	12	12	5	12	12	5	87

### 3.3.6. Data Measurement Instruments

The quantitative data collected through close-ended survey questionnaires, structured interviews, and analysis of existing records were evaluated using Likert and Numerical Rating scales. The Likert scale, a widely recognized psychometric instrument in social sciences, was employed to assess individuals' attitudes, opinions, and perceptions on specific topics. Originating from the work of psychologist Rensis Likert, this scale presents respondents with a series of statements, allowing them to express varying levels of agreement or disagreement. In contrast, the Numerical Rating Scale, a prevalent tool in research and surveys, was used to assign numeric values to

participant responses, quantifying the intensity or degree of their reactions within a predetermined range.

The data for each objective were categorized according to key components of the education system, including the system itself, the teaching-learning process, and the stakeholders involved. For the first objective, proposed indicators measuring the impact of armed conflict on these components were developed. Respondents were asked to evaluate these indicators on a 5-point Likert scale, taking into account the criteria of exposure, sensitivity, and vulnerability as outlined in the annexed data collection tool. The second objective centered on identifying innovative crisis responses for the education system components. These responses were assessed based on the 4A framework of education: availability, accessibility, acceptability, and adaptability. Participants rated the effectiveness of these responses on a 1-5 scale, following the provided criteria. For the third objective, the focus was on proposing crisis-resilient approaches for the education system. Respondents were tasked with evaluating and rating these approaches based on their capacity to enhance resilience, using the categories of absorptive, adaptive, and transformative resilience, according to the outlined criteria.

The researcher employed a comprehensive range of qualitative instruments to analyze the nested data gathered from diverse sources, including open-ended survey questionnaires, unstructured interviews, focus group discussions (FGDs), document analysis, field notes, and observations. Each instrument played a critical role in the data collection and analysis process, ensuring depth and precision in interpreting complex qualitative insights.

Additionally, the researcher applied both thematic and content analysis techniques to identify patterns and relationships within the data. Content analysis was used to systematically examine textual, visual, or audio materials, revealing recurring themes and connections. Thematic analysis, on the other hand, focused on recognizing, analyzing, and reporting key patterns. These methods were especially valuable in analyzing data from document reviews, FGDs, and unstructured interviews, enabling the researcher to draw meaningful conclusions based on identified trends.

For the collection of audio-visual data, the researcher employed recording equipment during interviews, FGDs, and participant observations. These recordings were critical for capturing nuanced information that might be overlooked in real-time, ensuring that the richness of the discussions was preserved for later, in-depth analysis.

By combining these qualitative instruments, the researcher was able to ensure a rigorous, multi-faceted approach to data collection and analysis, leading to a deeper understanding of the research findings supporting the quantitative results and building it.

### **3.3.7. Validation of Tools and Instruments**

The researcher undertook a meticulous validation process for the data collection tools, techniques, and measuring instruments to ensure the precision, dependability, and relevance of the data gathered for this study. Several validation mechanisms were employed for the respective data collection tools, each designed to enhance the integrity of the research findings.

Pilot Testing was conducted to implement a scaled-down version of the data collection method among a subset of the target population. This preliminary phase aimed to identify and resolve any potential issues with the tools or instruments prior to full-scale implementation. Through this process, the researcher refined questions, evaluated the clarity of instructions, and ensured the overall effectiveness of the data collection process, ultimately leading to improved outcomes.

Before the actual data collection, the instruments were piloted in three non-sample woredas—two rural and one urban—within the Central and Mekelle zones. Six primary schools were selected for this pilot, with four located in rural areas and two in urban Mekelle. Participants included students, teachers, education office staff, and NGO representatives from each woreda and school. The pilot was conducted to evaluate the validity and reliability of the instruments using Cronbach's Alpha and Half split Method just to check different questions of the study, and the findings are presented in the table below.

As demonstrated in the table below, the Students and Teachers Questionnaire, which examined the effects of the Tigray war on the teaching-learning process, achieved a Cronbach's Alpha of 0.911. This indicates excellent reliability, as values exceeding 0.9 reflect high internal consistency (Tavakol & Dennick, 2011). Additionally, the split-half reliability analysis showed a reliability coefficient of 0.864 for Part 1 (even-numbered items) and 0.899 for Part 2 (odd-numbered items). Overall, these reliability scores confirm that the instrument used for assessing the effects of the armed conflict on education is highly reliable for both students and teachers.

**Table 5: Pilot Testing and Reliability Results**

Tools for types of respondents on Effects of Tigray war on education system and teaching-learning	Number of cases			Number of Items	Reliability tests		
	Valid	Excluded	Total		Cronbach's Alpha	Half split Method	
						Even items	odd items
Teaching-Learning Questionnaire items for teachers and students	154	13	169	18	0.911	0.864	0.899
Education System Questionnaire items for government education experts and NGOs	68	1	69	18	0.945	0.92	0.882

Additionally, the reliability tests conducted during the pilot study on the effects of the Tigray armed conflict on the education system revealed a Cronbach’s alpha of 0.945 for the questionnaires administered to the education office, education bureau, and NGOs, indicating excellent reliability. Similarly, the split-half reliability analysis produced a score of 0.92 for Part 1 (even-numbered items) and 0.882 for Part 2 (odd-numbered items), reflecting strong overall reliability. These findings demonstrated that the instruments used for assessing the effects of the armed conflict on the education system among government and NGO experts are highly reliable. Consequently, this tool is considered a highly effective instrument for evaluating the effects of armed conflict on the education system within these organizations.

Content Validity was another critical aspect of the validation process. The researcher engaged experts to review the data collection tools, such as survey questionnaires, ensuring that they accurately measured the intended constructs or variables. This validation method involved a thorough assessment of the relevance, appropriateness, and alignment of the tools with the research objectives, confirming that the questions effectively addressed the key aspects of the study. Additionally, the researcher implemented rigorous training for interviewers and moderators to ensure standardized and consistent administration of questions. This training provided guidance on maintaining neutrality, avoiding bias, and adhering to the research protocol. Such preparation significantly reduced variability in data collection, thereby enhancing the reliability and validity of the information gathered.

To further strengthen the research findings, the researcher employed source verification and triangulation techniques. By cross-checking data with multiple sources, the researcher was able to confirm the accuracy and reliability of the information, thereby mitigating the risk of relying on inaccurate or biased data. This strategy ensured consistency across various sources, ultimately

enhancing the overall robustness of the research outcomes. Through diligent attention to these aspects of data collection tools, techniques, and measuring instruments, the researcher confidently employed a concurrent-embedded mixed methods approach. This comprehensive strategy yielded rigorous, trustworthy insights aligned with the study's objectives, reflecting a commitment to high standards of research integrity.

### **3.3.8. Data Analysis Tools and Techniques**

#### **Data Analysis Tools:**

The researcher employed a concurrent-embedded mixed methods analysis approach, integrating both quantitative and qualitative data analysis tools and techniques to provide a comprehensive examination of the study variables and meet the research objectives. Through the combined use of these quantitative and qualitative tools, the researcher was able to rigorously investigate the research variables and draw well-founded conclusions, addressing the study's objectives with depth and precision.

For the quantitative aspect of the study, which involved closed-survey questionnaires, structured interviews, and existing documents, the researcher utilized a range of analytical tools to ensure robust data analysis. Microsoft Excel, known for its user-friendly interface and powerful analytical features, was leveraged for basic arithmetic calculations, statistical functions, mathematical operations, and data visualization. Excel's versatility enabled the researcher to conduct an in-depth quantitative analysis. Additionally, SPSS version 27, along with STATA, was employed to perform more advanced statistical analyses suitable to their respective data. Widely recognized in academic, government, and business sectors, SPSS and STATA facilitated the efficient import, cleaning, and management of large datasets. The researcher applied SPSS and STATA for conducting descriptive statistics, inferential analyses, and generating visual representations of the data, which enhanced the interpretation of statistical findings.

On the qualitative side, the study relied on data from open-ended survey responses, unstructured interviews, focus group discussions, document reviews, field notes, and observations. To process this data, manual transcription software (MTS) was utilized to convert spoken language from audio recordings into written text. This tool, designed specifically for researchers working with interviews and focus group data, employed speech-to-text algorithms to streamline the

transcription process. The local language, Tigrigna, was also translated into English using both Google Translation Software (GTS) and manually. In describing the quantitative results into qualitative narrations, and analyzing qualitative data, artificial intelligence (AI) tools have been helpful in terms of language proficiency and accuracy of the gathered information.

### **Data Analysis Techniques:**

In this research, the researcher employed a range of advanced data analysis techniques to derive meaningful insights from the collected quantitative and qualitative data. Through this systematic and multi-faceted approach, the researcher was able to provide a thorough and insightful analysis, offering a comprehensive understanding of both the quantitative and qualitative dimensions of the study.

The *quantitative data*, gathered through meticulously designed tools, underwent both descriptive and inferential statistical analyses to ensure comprehensive understanding and interpretation. Descriptive statistical methods were applied to succinctly summarize and present key characteristics of the dataset. These included measures of central tendency, such as the mean, and measures of dispersion, such as the standard deviation and standard error. The mean provided a central value, representing the overall trend within the data, while the standard deviation quantified the variability or spread. The standard error, on the other hand, was used to estimate the precision of the sample mean in representing the population. Additionally, inferential statistical techniques, such as Multiple Linear Regression (MLR), were employed to draw broader conclusions about the population based on the sample data. MLR, a statistical method used to model the relationship between multiple independent variables and a single dependent variable, allowed the researcher to determine how variations in the predictor variables influenced the outcome variable. For instance, the effects of the war on the education sector were determined by the crisis extents, the response approaches by the education attributes, and resilient approaches by resilient capacities as detailed in the results section.

In parallel, the researcher utilized multiple *qualitative data analysis techniques* to rigorously analyze the non-numerical data collected through open-ended surveys, unstructured interviews, focus group discussions, field notes, and observations. These techniques aimed to systematically interpret the data and extract relevant themes and patterns. Thematic analysis was employed to identify, analyze, and report recurring themes within the qualitative data. The researcher carefully

discerned patterns that emerged across the dataset, allowing for the identification of core themes that captured the essence of participants' responses. Through content analysis, the textual data was systematically examined to identify and quantify specific words or phrases by using Google Translation and AI software for the purpose of refining spoken words, translation and language coherence only. This method facilitated the detection of overarching patterns and trends within the data, enabling the researcher to draw meaningful inferences based on the frequency and context of key terms. Narrative analysis focused on the stories and experiences shared by participants was also employed. This technique delved into the structure, content, and meaning of these narratives, aiming to provide insights into the participants' lived experiences and the broader social and cultural context of their responses.

### **Integration Techniques:**

To achieve an *integrated* understanding of the research findings, a concurrent-embedded mixed-methods approach was adopted, merging quantitative and qualitative data through mixed model analysis. The researcher used an explain-build technique, where qualitative findings were employed to explain and build upon the quantitative results. The qualitative data provided deeper insights into the patterns and trends revealed by the quantitative analysis, helping to clarify underlying reasons and contextual factors. This integration enriched the overall understanding of the research problem by adding depth, meaning, and perspective to the numerical findings. By combining the strengths of both data types, the researcher uncovered nuanced patterns and relationships that might not have been evident through separate analyses.

### **Interpretation Techniques:**

In *interpreting* the findings, the researcher provided explanations that illustrated how the quantitative and qualitative data complemented each other. This step involved exploring how the two data types enhanced the validity of the results, ultimately leading to a richer and more comprehensive understanding of the research questions. Finally, the researcher engaged in an interactive or iterative analysis process, allowing the results from one type of analysis to inform subsequent analyses of the other type. This dynamic and continuous refinement of insights ensured a deeper and more integrated interpretation of the findings, contributing to a robust and well-rounded exploration of the research topic.

The table below summarizes the data type, collection techniques, instruments, and analysis techniques for the concurrent-embedded mixed research questions of this study.

**Table 6:** Instruments for Data Collection and Data Analyses Methods Associated with Appropriate Questions

Main Questions	Data Type	Method of Data Collection	Instruments	Data Analysis
1. What are the effects of armed conflict crisis and their extents on the education system, teaching-learning, and education agents in primary schools?	Quantitative and Qualitative Primary and Secondary	Open and close-ended survey questionnaire, structured and unstructured interview, existing data/document, focus group discussion, field notes and observations	Likert Scales, Numerical Rating Scales, Thematic and Content, Audio and video recording, transcription	Quan: Descriptive Statistics (mean, standard deviation, standard error), Inferential Statistics (regression), Qual: (explain-build Analysis Interpretation & Explanation Interactive or Iterative Analysis)
2. Which innovative recovery approaches could be deployed to recover the education system, teaching-learning, and education agents from crisis that align with the essential features of education in primary schools?	Quantitative and Qualitative Primary and Secondary	Open and close-ended survey questionnaire, structured and unstructured interview, existing data/document, focus group discussion, field notes and observations	Likert Scales, Numerical Rating Scales, Thematic and Content, Audio and video recording, transcription	Quan: Descriptive Statistics (mean, standard deviation, standard error), Inferential Statistics (regression), Qual: (explain-build Analysis Interpretation & Explanation Interactive or Iterative Analysis)
3. What innovative crisis resilient approaches could be deployed to build a crisis-resilient education system that meet the required resilient capacities in primary schools?	Quantitative and Qualitative Primary and Secondary	Open and close-ended survey questionnaire, structured and unstructured interview, existing data/document, focus group discussion, field notes and observations	Likert Scales, Numerical Rating Scales, , Thematic and Content, Audio and video recording, transcription	Quan: Descriptive Statistics (mean, standard deviation, standard error), Inferential Statistics (regression), Qual: (explain-build analysis Interpretation & Explanation Interactive or Iterative Analysis)

### 3.3.9. Data Analysis Model Description

The researcher applied a comprehensive quantitative analysis, supported by nested qualitative insights, utilizing both descriptive and inferential statistical models to address each objective. The descriptive analysis assessed the means of responses rated on a 1-5 scale, classifying results into four categories: low [1-2], medium (2-3], high (3-4], and very high (4-5] as experienced by Best and Kahn (2006). Additionally, standard deviation was calculated to examine data variability, where values below 10% of the range indicated low variability with data points concentrated around the mean, while values exceeding 20% suggested high variability with a broader spread of data points. The analysis also included the standard error to evaluate the precision of the sample mean in estimating the population mean, with values under 5% indicating high precision and those over 10% reflecting greater uncertainty or lower precision in the population estimate (Field, 2018).

In addition to the descriptive statistical analysis, the researcher employed a multiple linear regression model to enhance the inferential analysis, focusing on the model's fitness, statistical significance, and predictions for each research question. Prior to applying the regression model, critical assumptions were tested, including Ordinary Least Squares (OLS), heteroscedasticity, omitted variable bias, and multicollinearity checks. The OLS assumption tests confirmed that the relationship between the independent and dependent variables was linear (Linearity Test), the residuals were independent (Independence of Errors Test), and the variance of the residuals was constant across all levels of the independent variables (Homoscedasticity Test). Additionally, residuals followed a normal distribution (Normality of Errors Test), and multicollinearity—where independent variables are excessively correlated—was ruled out, as no perfect multicollinearity was detected (Multicollinearity Test).

To further refine the analysis, the Breusch-Pagan or White test was used to check for heteroscedasticity, ensuring the residual variance remained constant. If heteroscedasticity was detected, adjustments were made to the model's standard errors. The Ramsey RESET test was employed to detect any omitted variable bias, ensuring that no relevant variable influencing the dependent variable was excluded from the model. Lastly, the Variance Inflation Factor (VIF) test was used to assess multicollinearity between independent variables, with values greater than 10 indicating problematic multicollinearity that could compromise the stability of the coefficient estimates.

Once all assumptions were validated, the researcher constructed a multiple regression model tailored to address each research question aligned with the study's objectives. The first objective centered on evaluating the impact of the Tigray war on the region's education system, teaching-learning processes, and education stakeholders, which were treated as dependent variables. These variables were measured through three independent crisis dimensions: the extent of exposure, sensitivity, and vulnerability to the effects of the conflict. The structure of this analysis model is outlined below.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 L_i + \sum_{j=1}^6 \beta_j S_j + \epsilon_i$$

Where:

- $Y_i$ : The overall outcome variable measuring the effect of the Tigray war on education system, teaching-learning and education agents' for respondent  $i$ .
- $X_1$ : Exposure to the Crisis (rated from 1 to 5).
- $X_2$ : Sensitivity of the crisis (rated from 1 to 5)
- $X_3$ : Vulnerability to crisis (rated from 1 to 5)
- $L_i$ : Dummy variable for spatial differences
- $S_1, S_2, \dots, S_6$ : Dummy variables representing the specific effects of the Tigray war on each education system, teaching-learning, and education agents.
- $\beta_0$ : The intercept term.
- $\beta_1, \beta_2, \dots, \beta_4, \dots, \beta_j$ : Coefficients representing the influence of each effect of the war and crisis extents
- $\epsilon_i$ : The error term representing unexplained variation.

The second objective of the study aimed to explore innovative response and recovery strategies for mitigating the effects of the Tigray war on the education system, teaching-learning processes, and education stakeholders, which were treated as dependent variables. These were assessed through key educational features—availability, accessibility, acceptability, and adaptability—serving as the independent variables. The framework for this model is presented as follows.

$$Y_i = \beta_0 + \beta_1 A_1 + \beta_2 A_2 + \beta_3 A_3 + \beta_4 A_4 + \sum_{j=1}^6 \beta_j R_j + \beta_5 L_i + \epsilon_i$$

Where:

- $Y_i$ : The outcome variable measuring the response approaches for respondent  $i$ .
- $A_1$ : Availability (rated from 1 to 5).
- $A_2$ : Accessibility (rated from 1 to 5).
- $A_3$ : Acceptability (rated from 1 to 5).
- $A_4$ : Adaptability (rated from 1 to 5)
- $R_1, R_2, \dots, R_6$ : Dummy variables representing the specific response approach for education system, teaching-learning, and education agents' crises
- $L_i$ : Dummy variable for spatial differences
- $\beta_0$ : The intercept or constant term.
- $\beta_1, \beta_2, \dots, \beta_6$ : The coefficients representing each response approach and features of education

-  $\epsilon_i$ : The error term accounting for unexplained variation.

The third objective of the study sought to examine innovative resilience strategies, treated as dependent variables, to address the effects of the Tigray war on the education system, teaching-learning processes, and education stakeholders. These strategies were evaluated based on their resilient capacities—absorptive, adaptive, and transformative considered as independent variables. The researcher developed the model structure for this analysis, as outlined below.

$$Y_i = \beta_0 + \beta_1 R_1 + \beta_2 AR_2 + \beta_3 R_3 + \sum_{j=1}^6 \beta_j A_j + \beta_5 L_i + \epsilon_i$$

Where:

- $Y_i$ : The overall outcome variable measuring the resilient approaches for respondent  $i$ .
- $R_1$ : Absorptive Resilience Capacity (rated from 1 to 5).
- $R_2$ : Adaptive Resilience Capacity (rated from 1 to 5).
- $R_3$ : Transformative Resilience Capacity (rated from 1 to 5).
- $A_1, A_2, \dots, A_6$ : dummy variables representing the specific crisis resilient approaches for each education system, teaching-learning, and education agents
- $L_i$ : Dummy variable for spatial differences
- $\beta_0$ : The intercept term.
- $\beta_1, \beta_2 \dots \beta_5$ : The regression coefficients representing each resilient approaches and capacities
- $\epsilon_i$ : The error term, capturing the variation not explained by the model.

### 3.4. Ethical Considerations

In examining the effects of armed conflict on the education system and exploring potential recovery and resilient strategies, the researcher adhered to several key ethical considerations, each of which is essential to ensuring the integrity and welfare of all participants involved.

Informed Consent was a fundamental aspect of the research process. The researcher prioritized obtaining voluntary and fully informed consent from all participants, including teachers, students, and education officials. This entailed providing clear explanations about the study's purpose, potential risks and benefits, and participants' rights, including their freedom to withdraw at any stage without facing any negative consequences. Protection of Vulnerable Populations was another critical focus, given the sensitivity of the research subject. Armed conflict often disproportionately

affects children and communities in crisis. The researcher took extra precautions to safeguard the well-being, privacy, and dignity of these vulnerable groups. In many instances, local community leaders and organizations were engaged to ensure that participants' best interests remained at the forefront of the research.

To further minimize risk, the researcher took great care in Avoiding Harm and Trauma. Recognizing that discussions about conflict could re-traumatize participants or cause emotional distress, the study was designed to mitigate these risks. Where necessary, support services were made available to participants who might have been negatively impacted by the research process. Data Privacy and Anonymity were stringently upheld throughout the study. Given the sensitive nature of the information collected, all data were anonymized and securely stored to prevent any unauthorized disclosure of personal information, thereby safeguarding participants from potential harm. Additionally, the researcher was committed to Avoiding Bias throughout the study. Acknowledging the potential for personal bias, the researcher employed objective methods in data collection, analysis, and reporting, ensuring that the findings accurately reflected the realities of the participants without influence from subjective interpretations.

Lastly, the research underwent Ethical Review and received ethical clearance from Mekelle University's Department of Educational Planning and Management. This review process guaranteed that the study met established ethical standards, ensuring the protection and rights of all participants. By adhering to these ethical principles, the researcher conducted a study that not only sheds light on the profound impacts of armed conflict on education systems but also provides innovative approaches to support the recovery and resilience of education in crisis-affected schools. Ethical clearances from the study areas have also been issued finally.

## CHAPTER FOUR

### STUDY RESULTS AND DISCUSSIONS

This section presented both the quantitative and qualitative findings of the study, engaging in a thorough discussion by comparing, contrasting, and critically analyzing the results in relation to similar studies conducted in other contexts. First, it offers a detailed analysis of the respondents and their characteristics in alignment with each research objective. Second, it examined and discusses the effects of the recent Tigray war on the education system, including the teaching-learning process and key education stakeholders in the region. Lastly, it explored innovative crisis response strategies and resilient approaches, addressing immediate educational needs while proposing sustainable long-term solutions.

#### 4.1. Respondents and Characteristics

Respondents of this study have been categorized under three components of the three objectives of the study such as those who participated under the education system, teaching-learning, and education agents' parts across the assessment of the effects of the armed conflict and exploration of crisis response and resilient approaches of education system as indicated in the tables below.

##### 4.1.1. Respondents for Education System

Across the assessment of effects of armed conflict on education system and exploration of response and resilient approaches to the education system crises, 75 relevant respondents with 30 education office experts, 27 education bureau experts, and 18 education NGO experts detailed in the table below have participated to answer the education system related research questions.

**Table 7:** Respondents Analysis for Education System Questions

Respondents' Location	Education Office Experts			Education Bureau Experts			Education NGO Experts			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
Central Zone	3	0	3	0	0	0	0	0	0	3	0	3
Eastern Zone	3	0	3	0	0	0	0	0	0	3	0	3
South Eastern Zone	3	0	3	0	0	0	0	0	0	3	0	3
Southern Zone	5	1	6	0	0	0	0	0	0	5	1	6
Mekelle Zone	13	2	15	0	0	0	0	0	0	13	2	15
Education Bureau	0	0	0	23	4	27	0	0	0	23	4	27
Education NGOs	0	0	0	0	0	0	16	2	18	16	2	18
<b>Total</b>	<b>27</b>	<b>3</b>	<b>30</b>	<b>23</b>	<b>4</b>	<b>27</b>	<b>16</b>	<b>2</b>	<b>18</b>	<b>66</b>	<b>9</b>	<b>75</b>

The distribution of the participants in the table below by affiliation shows that 40% of the respondents are Education Office Experts, 36% are Education Bureau Experts, and 24% are from Education NGOs. This indicates a relatively even spread across different types of educational institutions, although the Education Bureau has the highest single group representation. From the 81-sample size planned in the proposal, 92.59% of them have participated in this study process where the gap was in the education NGO experts in which 18/25 have participated.

#### 4.1.2. Respondents for Teaching-Learning

In the assessment of effects of the armed conflict on teaching and learning along with the exploration of response and resilient approaches, 157 participants comprising 109 students and 48 teachers have participated from five zones of the Tigray region as indicated in the table below.

Table 8: Respondents Analysis for Teaching-Learning Questions

Respondents' Location	Students			Teachers			Total		
	M	F	T	M	F	T	M	F	T
Central Zone	18	13	31	12	1	13	30	14	44
Eastern Zone	9	5	14	4	2	6	13	7	20
South Eastern Zone	13	8	21	7	2	9	20	10	30
Southern Zone	20	9	29	11	2	13	31	11	42
Mekelle Zone	8	6	14	5	2	7	13	8	21
Total	68	41	109	39	9	48	107	50	157

The Central Zone and Southern Zone have the highest number of respondents (28% and 27%, respectively). The Eastern Zone and Mekelle Zone have the lowest number of respondents (13% each). Students constitute a significantly higher percentage of the respondents (69%) compared to teachers (31%). All the sample sizes of the students and teachers planned in the proposal have participated in the process of the study.

#### 4.1.3. Respondents for Education Agents

Throughout the assessment of the effects of armed conflict on the education agents and the exploration of response and resilient approaches to the crises, 290 education agents with a composition of 109 students, 48 teachers, 58 parents, 57 education government experts, and 18 education NGO experts as indicated in the table below.

Students formed the largest group of participants in the study, making up 38% of the total sample. Teachers accounted for 17% of the total participants. Parents comprised 20% of the participants.

Education Government experts made up another 20% of the total participants, and the smallest group among these participants are Education NGOs. In all participation processes of the education agents, females accounted 25.86%. From the sample size of the planned 300 respondents, 96.67% have participated in the data collection process where the gap was in 58/62 parents and 18/25 education NGO experts have participated in the study.

**Table 9:** Respondents Analysis for Education Agents' Questions

Respondents' Location	Students			Teachers			Parents			Education Gov Experts			Education NGO Experts			Total		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Central Zone	18	13	31	12	1	13	14	4	18	3	0	3	0	0	0	47	18	65
Eastern Zone	9	5	14	4	2	6	7	1	8	3	0	3	0	0	0	23	8	31
South Eastern Zone	13	8	21	7	2	9	8	4	12	3	0	3	0	0	0	31	14	45
Southern Zone	20	9	29	11	2	13	11	5	16	5	1	6	0	0	0	47	17	64
Mekelle Zone	8	6	14	5	2	7	2	2	4	13	2	15	0	0	0	28	12	40
Education Bureau	0	0	0	0	0	0	0	0	0	23	4	27	0	0	0	23	4	27
Education NGOs	0	0	0	0	0	0	0	0	0	0	0	0	16	2	18	16	2	18
<b>Total</b>	<b>68</b>	<b>41</b>	<b>109</b>	<b>39</b>	<b>9</b>	<b>48</b>	<b>42</b>	<b>16</b>	<b>58</b>	<b>50</b>	<b>7</b>	<b>57</b>	<b>16</b>	<b>2</b>	<b>18</b>	<b>215</b>	<b>75</b>	<b>290</b>

#### 4.2. Effects of Armed Conflict on Education System.

The first question of the first research objective aimed to assess the effects of the war in Tigray on the region's education system, particularly in relation to education policy, governance, institutional capacity, infrastructure, and the broader education ecosystem. The study's questions, addressing these critical areas, were answered by experts from district education offices, the regional education bureau, and educational NGOs. Respondents assessed the severity of the war's impact on these education factors using a 5-point rating scale, where 1 indicated minimal impact and 5 represented the highest level of crisis.

Three key dimensions were used to measure the extent of the crisis: exposure, sensitivity, and vulnerability, and supported by qualitative data analysis. According to Saavedra (2016), *exposure* refers to the degree to which the education system is directly affected by the conflict, including physical destruction, disruption, and destabilization. *Sensitivity* captures the susceptibility of education systems to negative consequences, shaped by pre-existing vulnerabilities and conditions (Idris, 2024). *Vulnerability*, as defined by Hagenlocher et al. (2016), reflects the level of risk and

fragility within the education system, determining its likelihood of being adversely impacted by the conflict.

A comprehensive statistical analysis was performed, beginning with descriptive statistics, focusing on means and standard deviations, and progressing to inferential techniques, notably multiple linear regression analysis, to assess the crisis factors across various dimensions. All assumption tests confirmed the robustness of the model, facilitating a rigorous and reliable examination of the crisis factors affecting the teaching-learning system discussed in this section below.

#### 4.2.1. Education Policy Disruptions

Education policy disruptions are the disruptions caused by armed conflict crisis that affect the formulation and implementation of education policies at various levels, leading to inconsistencies and deviations from planned educational strategies (Bussieweke & Mula, 2024). Quantitative and qualitative results detailed in this section indicated that the war in Tigray of Ethiopia has brought education policy disruption in the regions education system.

**Table 10:** Descriptive Statistical Results for Education Policy Disruption

Education Policy Disruption - Descriptive Statistics				
Crisis Extents	N	Mean	Std. Error	Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Exposure to Crisis	75	4.7600	.07313	.63331
Sensitivity of the crisis	75	4.6667	.07903	.68445
Vulnerability to Crisis	75	4.7733	.07247	.62759
Valid N (leastwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

Quantitatively, the descriptive statistical analysis presented in the table above demonstrates that the education policy in Tigray was significantly exposed to disruption (M = 4.7600), highly vulnerable (M = 4.7733), and exhibited considerable sensitivity (M = 4.6667) as a result of the ongoing conflict in the region. The low standard errors of the crisis measures, all falling below 5% of their respective means (Std. Error: 0.072–0.079), suggest that the sample means provide a precise estimate of the population mean. Additionally, the low standard deviations, which are less than 10% of the data range (Std. Dev: 0.62–0.68), indicate that the data points are closely clustered

around the mean. This reflects a high degree of consistency in the responses, with respondents expressing similar views and insights on the impact of the war on the disruption of education policy in Tigray.

To enhance the findings of the descriptive statistical analysis, an inferential statistical approach, specifically a regression model, was applied as shown in the table below. The regression model exhibited an excellent fit, with an  $R^2$  value of 0.9924, indicating that 99.24% of the variance in education policy disruptions can be attributed to the variables included in the model. This high  $R^2$  value suggests that the model effectively captures the key factors driving education policy disruption. Additionally, the F-statistic of 456.33, accompanied by a p-value of 0.0000, highlights the overall statistical significance of the model, confirming that the variables collectively exert a significant influence on education policy disruption.

**Table 11:** Education Policy Disruptions – Inferential Statistics/Regression Analysis

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to Crisis	0.2327002	0.037636	6.18	0.000	0.1574907	0.3079097
Sensitivity of the Crisis	0.0108121	0.0051312	2.11	0.039	0.0005582	0.0210659
Vulnerability to Crisis	0.3179702	0.0408784	7.78	0.000	0.2362812	0.3996591
_cons	0.9777667	0.1863568	5.25	0.000	0.6053624	1.350171
$R^2$	0.9924					
F(5, 63)	456.33					
Prob > F	0.0000					
N	69					

An increase of one unit in exposure to crisis corresponds to a 0.2327 increase in education policy disruptions, controlling for other variables. This effect is highly significant ( $p < 0.01$ ), indicating that exposure plays a crucial role in exacerbating disruptions. Additionally, a one-unit increase in sensitivity of a crisis leads to a statistically significant 0.0108 increase in disruptions, with the effect being significant at the 5% level ( $p = 0.039$ ). Furthermore, a one-unit increase in vulnerability to crisis results in a 0.318 increase in disruptions, a strongly significant finding ( $p < 0.01$ ), underscoring that vulnerability to crisis exerts a substantial influence on the extent of education policy disruption.

Supporting the quantitative results, the qualitative data revealed significant instability and distortion within the education policy in Tigray due to the war. One participant from education

office noted, "The existing education policy was changed during the war and the new education system created instability among students, teachers, and parents" (EO-KT-01). This instability was echoed by another participant who stated, "The war has greatly distorted the policy of education in Tigray" (EO-KT-02). The war has also created substantial challenges in policy implementation. One major issue was the inability of Tigray to update its primary education curriculum: "Different from the regions in the other part of the country, Tigray solely has not been able to formulate, adapt or revise its primary education curriculum for years during the active conflict" noted from one respondent from NGOs (NGO-8).

Similar disruptions in education policy formulation and implementation were reported in Syria, where armed conflict caused inconsistencies in education governance and policy-making (Al Hessian et al., 2020). Both Tigray and Syria experienced policy reversals and fragmentation as a direct result of leadership collapse during armed conflicts (Dryden-Peterson, 2016). In Afghanistan, education policy disruptions were primarily driven by external forces, such as international actors or political interference from insurgent groups, leading to shifts in curriculum and governance priorities (Nicolai et al., 2015). In contrast, in Tigray, the instability came directly from internal conflicts, with local education governance collapsing due to war-driven leadership vacuums and a lack of resources. Education policy disruptions are a common consequence of armed conflict across different regions. However, the extent to which internal versus external forces drive these disruptions can vary. Tigray's situation highlights the need for a more resilient, locally managed education governance system, which could better withstand internal conflicts, as opposed to relying solely on external actors for educational stability, as seen in Afghanistan.

#### **4.2.2. Education Governance Instability**

Education governance instability is the instability and uncertainty in the management and oversight of the education system due to armed conflict, often resulting in changes in leadership, decision-making, and administrative processes (Lin, 2023). Descriptive and inferential statistical results of quantitative and qualitative data analysis results discussed in this section revealed that the war in Tigray led the education governance of the region into instability.

**Table 12:** Descriptive Statistical Results for education Governance Instability

Crisis Extents	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Exposure to Crisis	75	4.7200	.09214	.79797
Sensitivity of the crisis	75	4.6667	.07187	.62240
Vulnerability to Crisis	75	4.7733	.06994	.60568
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis outlined in the preceding table reveals that the education governance in the studied region was markedly exposed to instability (M = 4.7200), exhibited significant vulnerability (M = 4.7733), and demonstrated notable sensitivity (M = 4.6667) to the prevailing instability. The precision of the sample means is reinforced by the minimal standard errors associated with the crisis measures, all of which are below 5% of their respective means (Std. Error: 0.070–0.092), signifying a reliable approximation of the population mean. Furthermore, the relatively low standard deviations, ranging between 0.60 and 0.80 and representing less than 20% of the total data range, underscore the tight clustering of data points around the mean. This high level of consistency in responses indicates a shared understanding among participants regarding the severity of the instability's effects on education governance.

The regression analysis in the table below also supported the descriptive statistical results. The R<sup>2</sup> (0.5735) indicated that approximately 57.35% of the variance in education governance instability could be explained by the variables included in the model. The F-statistic (7.28) tested the overall significance of the regression model. The p-value associated with the F-statistic was 0.0000, indicating that the model was statistically significant and that the included variables collectively impacted education governance instability.

**Table 13:** Inferential Statistical Results for Education Governance Instability

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to Crisis	-0.46186	0.1787937	-2.58	0.012	-0.81927	-0.10446
Sensitivity of the Crisis	-0.10928	0.050593	-2.16	0.035	-0.21041	-0.00815
Vulnerability to Crisis	0.1806661	0.0943537	1.91	0.060	-0.00794	0.3692766
_cons	4.091352	0.5117648	7.99	0.000	3.068349	5.114356
R <sup>2</sup>	0.5735					
F(5, 62)	7.28					
Prob > F	0.0000					
N	68					

A one-unit increase in the exposure of education governance to armed conflict resulted in a 0.46186 unit decrease in education governance stability, holding other factors constant. This effect was statistically significant ( $p < 0.05$ ). Higher exposure to conflict tended to destabilize education governance. A one-unit increase in the sensitivity of education governance to armed conflict led to a 0.10928 unit decrease in stability, holding other factors constant. This effect was statistically significant ( $p < 0.05$ ), indicating that more sensitive governance structures were more prone to instability during conflicts. A one-unit increase in the vulnerability of education governance to armed conflict led to a 0.1806661 unit increase in instability. This effect was marginally significant ( $p \approx 0.05$ ), suggesting that vulnerable governance structures might become more unstable during conflicts.

According to the qualitative finding, the conflict in Tigray has led to significant instabilities in the administration of education. One participant remarked, "Leaderless education was created, students, teachers, and parents were dispersed" (EO-KT-01). Another participant highlighted the overarching impact of the conflict, stating, "The war in Tigray has led to the disruption of educational administration" (EO-KT-02). This disruption was further detailed by a third respondent who noted, "Because of the war, there was instability in the administration of education from top to bottom, all education professionals were dispersed, resources and property were destroyed, and the viability of education was lost, and the organization of education collapsed" (EO-KT-03). The war has also distorted school management and leadership as echoed by one respondent who stated, "The education leadership has created unstable governance because teachers who were in education for various reasons, are not in education or have struggled and schools are now governed by representation" (EO-GH-03).

Finally, the governance of education has been destabilized. One participant remarked, "The entire education system is unstable since the onset of the conflict. As the regional government was in a war situation for the last over two years, the regular governance structures including the education have been weakened" (NGO-4). Another highlighted the potential for further destabilization: "The governance of the schools which were affected by the conflict were destabilized for the reason that education leaders have stopped leading, affected by the war" (NGO-6). The broader issues impacting governance were summarized by a third respondent: "Disruption of government institutions, political interference, displacement of education officials, lack of resources and capacity, and uncertainty and insecurity" (NGO-17) have made the education governance instable.

Similar instability was observed in South Sudan, where war also destabilized education governance, leading to poor decision-making and a lack of coherent strategies for educational continuity (Barakat et al., 2014). Both in Tigray and South Sudan, the collapse of leadership structures within education sectors resulted in fragmented educational service delivery. While both Tigray and South Sudan experienced governance instability, South Sudan benefited from stronger international engagement, with external actors stepping in to support education governance through policy advice and capacity building. Tigray, by contrast, struggled with limited external support, which exacerbated the leadership vacuum. Education governance instability during conflict can be mitigated by international engagement, as demonstrated in South Sudan. However, Tigray's experience shows that local governance structures must be more resilient to avoid a total collapse when external support is limited or delayed.

#### **4.2.3. Education Institutional Capacity Erosion**

Education institutional capacity erosion is the gradual weakening or deterioration of the capacity of educational institutions to deliver quality education services, caused by the impact of armed conflict crisis on resources, staffing, and infrastructure (Milton & Barakat, 2018). The descriptive and inferential statistical results of the quantitative and the qualitative analysis results discussed in this section revealed that the war in Tigray has brought education institutional capacity erosion in the region.

**Table 14:** Descriptive Statistical Results for Institutional Capacity Erosion

Crisis Extents	N	Mean	Std. Error	Std. Deviation
	Statistic	Statistic		Statistic
Exposure to Crisis	75	4.7467	.06601	.57171
Sensitivity of the Crisis	75	4.6533	.06973	.60389
Vulnerability to Crisis	74	4.7162	.07332	.63073
Valid N (listwise)	74			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*  
*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*  
*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of the erosion of education institutional capacity highlights significant concerns regarding exposure, sensitivity, and vulnerability to crisis. The data reveal that the institutions were highly exposed to crisis ( $M = 4.7467$ ), with considerable sensitivity ( $M = 4.6533$ ) and vulnerability ( $M = 4.7162$ ). The small standard errors for these measures (ranging from 0.06601 to 0.07332) indicate that the sample means are highly reliable estimators of the population mean, with deviations of less than 5% of their respective means. Additionally, the standard deviations, which range from 0.57171 to 0.63073, represent less than 15% of the overall data range, underscoring a tight clustering of responses around the mean. This consistency suggests a strong consensus among respondents regarding the significant erosion of institutional capacity in response to the crisis, reflecting a shared perception of its impact on the education sector.

The regression analysis result also supported the descriptive statistics result of the education institutional capacity erosion. The regression model was statistically significant,  $F(5, 63) = 36.07$ ,  $p < .001$ , indicating that the model as a whole predicted the dependent variable significantly well. The model accounted for a substantial amount of variance in education institutional capacity erosion,  $R^2 = 0.8564$ , suggesting that approximately 85.64% of the variance in education institutional capacity erosion could be explained by the predictors included in the model.

**Table 15:** Inferential Statistical results for Education Institutional Erosion

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.0458367	0.0227406	2.02	0.048	0.0003933	0.0912802
Sensitivity of the crisis	-0.386349	0.145445	-2.66	0.010	-0.67699	-0.095700
Vulnerability to crisis	0.4209503	0.1821019	2.31	0.024	0.0570486	0.784852
_cons	2.581257	0.9296076	2.78	0.007	0.7235849	4.43893
R <sup>2</sup>	0.8564					
F(5, 63)	36.07					
Prob > F	0.0000					
N	69					

A one-unit increase in the exposure of educational institutions to armed conflict resulted in a 0.0458367 unit increase in the erosion of institutional capacity, holding other factors constant. This effect was statistically significant ( $p < 0.05$ ). Higher exposure to conflict tended to deteriorate institutional capacity. A one-unit increase in the sensitivity of educational institutions to armed conflict led to a 0.386349 unit decrease in the institutional capacity, holding other factors constant. This effect was statistically significant ( $p < 0.05$ ). More sensitive institutions were more likely to suffer capacity erosion during conflicts. A one-unit increase in the vulnerability of educational institutions to armed conflict resulted in a 0.4209503 unit increase in the erosion of institutional capacity, holding other factors constant. This effect was statistically significant ( $p < 0.05$ ). Institutions with higher vulnerability were more prone to capacity erosion during conflicts.

Supporting the quantitative results, the qualitative findings revealed the devastating effects of the war on educational institutional capacity in Tigray. Participants described how the war had rendered many schools inoperable, with one respondent stating, "It has reached a point where it is impossible to continue education in a regular program due to the destruction of classrooms and materials" (EB-1). Another participant emphasized the decline in self-sufficiency among schools, explaining, "Schools used to be self-sufficient but now they have been weakened by the war" (EO-S-02), pointing to a broader systemic breakdown affecting educational continuity and stability in the region. The broader impact on educational resources was clearly articulated, with one participant stating, "The conflict has negatively impacted the educational institutional capacity, including human, financial, properties, and other resources" (NGO-4). This was also supported by one participant noting, "The institutional capacity of education that was in a good position has

been eroded by manpower, materials, psychological crisis, social crisis" (EB-9). Overall, the conflict has led to a significant erosion of educational institutional capacity in Tigray.

This mirrors findings from Yemen, where the ongoing civil war has eroded institutional capacity in education. In both cases, schools lost qualified staff and access to educational materials, leading to a significant decline in their ability to operate effectively (Jones et al., 2017). In Yemen, international organizations managed to provide some degree of resource support, which helped stabilize the system temporarily. Tigray, on the other hand, experienced a more acute erosion of capacity, with fewer resources and less external assistance to help schools remain functional. Institutional capacity erosion is a pervasive problem in conflict zones, but the severity of the impact can be moderated by timely intervention from international bodies. In the absence of such interventions, as in Tigray, educational institutions become highly vulnerable to collapse.

#### 4.2.4. Educational Aid and Funding Disruption

Educational aid and funding disruption is the interruption or diversion of financial support and aid meant for education due to the armed conflict crisis, resulting in reduced resources available for educational programs and initiatives (Bashir, 2023). The descriptive and inferential statistical results of the quantitative and the qualitative analysis results discussed in this section revealed that the war in Tigray has brought education aid and funding disruption in the region.

**Table 16:** Descriptive Statistical Results for Education Aid and Funding Disruption

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Statistic
Exposure to Crisis	75	4.5067	.92083
Sensitivity of the Crisis	75	4.5867	.79003
Vulnerability to Crisis	75	4.6533	.70698
Valid N (listwise)	75		

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis concerning the disruption of educational aid and funding reveals significant exposure, sensitivity, and vulnerability to the crisis. The data indicate that educational institutions experienced a high level of exposure to crisis ( $M = 4.5067$ ), considerable sensitivity

(M = 4.5867), and notable vulnerability (M = 4.6533). The relatively low standard errors (ranging from 0.08163 to 0.10633) suggest that the sample means provide precise estimates of the population means, with deviations of less than 3% of their respective means. Moreover, the standard deviations, which range from 0.70698 to 0.92083, remain below 20% of the total data range, reflecting a moderate but meaningful clustering of responses around the mean. This pattern indicates a consistent recognition among respondents of the crisis's significant impact on educational aid and funding, with a shared understanding of its extent across the surveyed institutions.

The regression analysis also supported the results of the descriptive statistical analysis of the education aid and funding disruption due to the war in Tigray. The model explained 96.69% of the variance in education aid and funding disruption, indicating a very strong fit. This suggested that the crisis extents collectively accounted for the majority of variability in educational aid disruption during armed conflicts. The highly significant F-statistic ( $F(5, 63) = 121.89, p < 0.001$ ) indicates that the overall regression model was a good fit for the data. This reinforced the validity of the findings and supported the conclusion that armed conflict dynamics significantly impacted educational aid and funding.

**Table 17: Inferential Statistical Results for Education Aid and Funding Disruption**

Crisis Extents	Coef.	Robust S.E	t		P> t	[95% conf. interval]
Exposure to crisis	0.5118695	0.0666069	7.68		0.000	0.3787664 0.6449727
Sensitivity of the crisis	-0.005685	0.013666	-0.42		0.679	-0.032994 0.0216246
Vulnerability to crisis	0.4669341	0.0765746	6.10		0.000	0.313912 0.6199562
_cons	0.0757314	0.2489517	0.30		0.762	-0.421759 0.5732217
R <sup>2</sup>	0.9669					
F(5, 63)	121.89					
Prob > F	0.0000					
N	69					

A one-unit increase in the exposure of educational institutions to armed conflict resulted in a 0.5119 unit increase in the disruption of educational aid, holding other factors constant. This effect was statistically significant ( $p < 0.001$ ), indicating that greater exposure to conflict exacerbates disruptions in educational funding. In contrast, a one-unit increase in the sensitivity of educational institutions to armed conflict led to a negligible 0.0057 unit decrease in educational aid disruption, with no statistically significant effect ( $p = 0.679$ ). This suggests that sensitivity alone did not

independently influence disruptions in funding. However, a one-unit increase in the vulnerability of educational institutions to armed conflict resulted in a 0.4669 unit increase in educational aid disruption, holding other factors constant. This effect was statistically significant ( $p < 0.001$ ), revealing that institutions with greater vulnerability were more likely to experience funding disruptions during conflicts.

The qualitative findings supporting the quantitative results highlighted the severe repercussions of halted financial support on education in Tigray. Participants revealed the abrupt cessation of critical funding streams, which had a devastating impact on educational operations. According to one participant, "Education aid and budget from federal to schools was cut off, causing a complete halt in the teaching and learning process" (EO-KT-01). The disruption led to operational inefficiencies and reduced educational effectiveness. "The sudden cutoff of budgets meant for schools and communities has rendered ongoing educational activities ineffective," expressed a participant (EB-3). Another highlighted, "The educational efforts are hampered due to the abrupt cessation of school grants and subsidy budgets that were previously allocated" (EB-5).

The humanitarian crisis in Tigray has exacerbated challenges in educational funding and aid distribution, exacerbating existing vulnerabilities. "During crises, school budgets are often overlooked, forcing staff to work without pay or on meager salaries," reported a participant (NGO-5). Participants also highlighted the critical need for effective humanitarian aid distribution amid ongoing blockades and sieges that impede access to essential resources and support for educational institutions.

Similar disruptions were reported in the Democratic Republic of Congo, where violence led to the cessation of educational aid, leaving schools without sufficient funding for their operations (Chudgar et al., 2014; Østby & Urdal, 2020). Both Tigray and the DRC experienced halted international financial flows during conflict, hindering educational development. In the DRC, some schools managed to maintain minimal operations through community-led initiatives, which provided alternative funding sources. Tigray's situation, however, saw a more complete cessation of aid, with very few alternatives for funding, leading to a total collapse in some educational programs. The reliance on external funding during conflict makes education systems highly vulnerable. Tigray's experience demonstrates the need for more sustainable, locally managed funding models to reduce reliance on volatile international aid flows.

#### 4.2.5. Educational Infrastructure Depletion

Educational infrastructure depletion is the deterioration, destruction, or degradation of physical facilities such as schools, classrooms, and educational materials, as a consequence of armed conflict, impeding the delivery of education (Abbas et al., 2023). The descriptive and inferential statistical results of the quantitative and the qualitative analysis results discussed in this section revealed that the war in Tigray has brought education infrastructure in the region.

**Table 18:** Descriptive Statistical Results for Education Infrastructure Depletion

Crisis Extents	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Exposure to Crisis	75	4.8400	.05383	.46615
Sensitivity of the Crisis	75	4.7733	.07247	.62759
Vulnerability to Crisis	75	4.8533	.06208	.53760
Valid N (listwise)	75			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of educational infrastructure depletion underscores significant exposure, sensitivity, and vulnerability to the crisis. The findings indicate that the institutions were highly exposed to the crisis ( $M = 4.8400$ ), with substantial sensitivity ( $M = 4.7733$ ) and pronounced vulnerability ( $M = 4.8533$ ). The low standard errors, ranging from 0.05383 to 0.07247, suggest a high level of precision in estimating the population means, with deviations of less than 2% of their respective means. In addition, the standard deviations, which range from 0.46615 to 0.62759, account for less than 15% of the overall data range, indicating a tight clustering of responses around the mean. This pattern reveals a strong consistency in the respondents' perceptions of the crisis's impact on educational infrastructure, with a clear consensus regarding the severity of its depletion across the institutions surveyed.

The regression analysis result also complemented the descriptive statistical results of the education infrastructure depletion discussed in this section. The model explains 86.25% of the variance in educational infrastructure depletion, indicating a strong fit. The highly significant F-statistic ( $F(5, 63) = 482.43, p < 0.001$ ) confirms that the overall regression model is a good fit for the data. This

supports the validity of the findings and underscores the significant impact of armed conflict dynamics on educational infrastructure.

**Table 19:** Inferential Statistical Results for Education Infrastructure Depletion

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	-0.21458	0.3159411	-0.68	0.500	-0.84594	0.4167749
Sensitivity of the crisis	0.3346002	0.0083124	40.25	0.000	0.3179891	0.3512113
Vulnerability to crisis	0.3679662	0.0275698	13.35	0.000	0.3128723	0.42306
_cons	2.878989	1.624619	1.77	0.081	-0.367552	6.12553
R <sup>2</sup>	0.8625					
F(5,63)	482.43					
Prob > F	0.0000					
N	69					

A one-unit increase in the exposure of educational institutions to armed conflict resulted in a 0.2146 unit decrease in educational infrastructure depletion, holding other factors constant. However, this effect was not statistically significant ( $p = 0.500$ ), indicating that the extent of exposure alone does not substantially contribute to the physical deterioration of educational facilities. In contrast, a one-unit increase in the sensitivity of educational institutions to armed conflict resulted in a 0.3346 unit increase in infrastructure depletion, holding other factors constant. This effect was highly significant ( $p < 0.001$ ), suggesting that higher sensitivity significantly exacerbates the degradation or destruction of physical educational infrastructure during conflicts. Furthermore, a one-unit increase in the vulnerability of educational institutions to armed conflict led to a 0.3680 unit increase in infrastructure depletion, holding other factors constant. This effect was statistically significant ( $p < 0.001$ ), revealing that institutions with greater vulnerability are more likely to experience the deterioration or destruction of their physical infrastructure during conflict, emphasizing the need for targeted interventions in vulnerable regions.

The qualitative result of this study also supported the above quantitative findings in different ways. The war in Tigray has left a trail of devastation across the region's educational infrastructure. Reports from educators and community leaders reveal the widespread destruction of school buildings, both internally and externally. "The infrastructure of schools, once vital hubs of learning, has deteriorated significantly," remarked one participant (EO-KT-02). Another described the grim scene: "All school furniture was destroyed—benches, boards, laboratories, pedagogy

centers, and libraries—all reduced to rubble" (EO-GH-01). The physical presence of schools became targets, with participants noting, "School infrastructure suffered as invading forces commandeered school premises for military purposes" (EO-Bor-2). Supporting these respondents, an assessment report by Tigray regional education bureau (2021) revealed that 88.3% of classrooms sustained severe damage, while 85.4% of school furniture, supplies, and computers were either burned, looted or destroyed. Additionally, 48% of school WASH facilities were rendered inoperable.

The impact extended beyond physical structures to include teaching materials and essential equipment. "Teaching materials were decimated, with severe shortages and demolitions in schools," reported one respondent (EO-GH-02). The devastation was comprehensive, affecting virtually all educational assets in Tigray. "Almost every educational infrastructure, from school buildings to educational resources, fell victim to looting, destruction, and fire during artillery and bombing attacks," lamented a participant (NGO-4). Beyond educational facilities, the conflict posed grave safety risks for students and educators. The perilous environment extended to include hazardous materials within school premises. "Children attending school were endangered by the presence of explosive and flammable materials left behind from military activities," reported another participant (EB-1) that contributed to education infrastructure depletion significantly.

In Iraq and Libya, armed conflicts similarly led to the destruction of schools and the repurposing of educational facilities for non-educational uses, such as military bases (UNESCO, 2018; Sesnan et al., 2013). Both Tigray and these regions faced widespread infrastructure depletion, with schools becoming uninhabitable. While Iraq and Libya eventually received international funding for infrastructure rebuilding, Tigray's infrastructure damage has seen limited recovery efforts, with ongoing conflict hampering reconstruction. Educational infrastructure is often one of the first casualties in armed conflict. International post-conflict reconstruction programs, as seen in Iraq and Libya, should be adapted and prioritized for Tigray to prevent long-term damage to the region's education system. Without such interventions, the lack of physical learning spaces will continue to hinder educational access for a generation of students.

#### 4.2.6. Education Ecosystem Fragmentation

Education ecosystem fragmentation is the fragmentation and disruption of the education ecosystem, including disruptions in curriculum continuity, teacher training, student mobility, and educational partnerships, due to the impact of armed conflict crisis (Bastida et al., 2024). The descriptive and inferential statistical results of the quantitative and the qualitative analysis results discussed in this section revealed that the war in Tigray has brought education ecosystem fragmentation in the region.

**Table 20:** Descriptive Statistical Results for Education Ecosystem Fragmentation

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Std. Error
Exposure to Crisis	75	4.4933	.08137
Sensitivity of the Crisis	75	4.5733	.07634
Vulnerability to Crisis	75	4.6000	.07827
Valid N (list wise)	75		

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of education ecosystem fragmentation highlights significant exposure, sensitivity, and vulnerability to the crisis. The data reveal that institutions faced substantial exposure to the crisis ( $M = 4.4933$ ), alongside marked sensitivity ( $M = 4.5733$ ) and vulnerability ( $M = 4.6000$ ). The relatively low standard errors, ranging from 0.07634 to 0.08137, indicate that the sample means provide precise estimates of the population means, with deviations of less than 2% of their respective means. Furthermore, the standard deviations, which range from 0.66115 to 0.70468, represent less than 20% of the total data range, suggesting a moderate clustering of responses around the mean. This consistency indicates a shared understanding among respondents regarding the extent of the crisis's impact on the education ecosystem, reflecting a cohesive perception of the fragmentation observed within the institutions surveyed.

The regression analysis of the inferential statistics also complements the descriptive results. The model explains 97.02% of the variance in education ecosystem fragmentation, indicating a very strong fit. The highly significant F-statistic ( $F(5, 63) = 1266.52, p < 0.001$ ) confirms that the overall

regression model is a good fit for the data. This reinforces the validity of the findings and supports the conclusion that armed conflict dynamics significantly impact the education ecosystem.

**Table 21:** Inferential Statistical Results for Education Ecosystem Fragmentation

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.6029283	0.0645862	9.34	0.000	0.473863	0.7319936
Sensitivity of the crisis	-0.007920	0.01239	-0.64	0.525	-0.03268	0.0168389
Vulnerability to crisis	0.5247105	0.0485512	10.81	0.000	0.4276887	0.6217323
_cons	-0.222129	0.1803843	-1.23	0.223	-0.582598	0.1383402
R <sup>2</sup>	0.9702					
F(5, 63)	1266.52					
Prob > F	0.0000					
N	69					

A one-unit increase in the exposure of educational institutions to armed conflict resulted in a 0.6029 unit increase in education ecosystem fragmentation, holding other factors constant. This effect was highly significant ( $p < 0.001$ ), indicating that higher exposure to conflict significantly exacerbates the fragmentation of the education ecosystem, underscoring the vulnerability of educational systems to prolonged conflict. In contrast, a one-unit increase in the sensitivity of educational institutions to armed conflict led to a negligible 0.0079 unit decrease in education ecosystem fragmentation, with no statistically significant effect ( $p = 0.525$ ). This suggests that sensitivity alone does not significantly impact the disruption of educational continuity and partnerships. However, a one-unit increase in the vulnerability of educational institutions to armed conflict resulted in a 0.5247 unit increase in education ecosystem fragmentation, holding other factors constant. This effect was statistically significant ( $p < 0.001$ ), indicating that institutions with higher vulnerability are more likely to experience disruptions in the educational system, emphasizing the need for targeted support in vulnerable regions to sustain educational continuity.

This has also been supported by qualitative results. The conflict in Tigray has led to significant disruptions in the school system and communication channels. The communication infrastructure, essential for effective educational management, has also been severely affected. "The top-down as well as bottom-up communication structure of the Tigray has been broken and it is now in a very difficult situation to restore," reported one respondent (EO-KT-03). This destruction has left the education structure in Tigray in ruins: "The education structure was fully broken with the central

government and the education structure in Tigray was deliberately destroyed" (EO-S-01) added by another respondent.

Furthermore, the overall education system has been paralyzed, affecting communication between key stakeholders: "The education system has been disrupted without communication between students and school, teachers and student parents, administration" (EB-16) noted by one respondent. Communication channels have been severely disrupted, impacting the entire educational framework. One respondent noted: "Telephone, transport, and internet connections were completely cut off for 3 years. Because of this, the communication between the top and the bottom was distorted" (EB-3). The collapse and fragmentation of the whole ecosystem of the education has further complicated as noted by one respondent: "Government system collapsed, community including parents, children, and teachers displaced and schools became IDP sites" (NGO-18) resulted fragmentations of the ecosystem of the education in the Tigray region of Ethiopia.

Similar patterns of fragmentation have been observed in Palestine, where protracted conflict has caused significant disruptions to the educational ecosystem. In both Tigray and Palestine, curriculum continuity has been severely affected, and student mobility has been restricted due to security concerns (Hammami & Jebiril, 2019). Both regions have seen educational partnerships and support systems break down as external aid becomes harder to access and coordinate. While Tigray's education ecosystem has been fragmented largely due to the immediate impact of ongoing war, Palestine's education system has faced long-term fragmentation as a result of decades of conflict. Palestine has been able to develop coping strategies over time, including non-formal education and distance learning programs, which have not yet been implemented effectively in Tigray due to the relatively recent onset of the conflict.

The fragmentation of educational ecosystems during conflict presents long-term challenges for recovery. Palestine's experience with informal and non-formal education systems could offer a model for Tigray, allowing the education system to remain functional even in the face of continued instability. Developing parallel educational structures, such as community-based learning and distance education, could help mitigate some of the most severe consequences of ecosystem fragmentation in Tigray.

### 4.3. Effects of Armed Conflict on Teaching and Learning

The second question of the first research objective of this study aimed to assess the effects of the war in Tigray on the region's teaching-learning, particularly in relation to curriculum, instruction, learning and academics, learning assessment, learning environment, and teacher-learner relationship. The study's questions, addressing these critical areas, were answered by school teachers and students who are close to the teaching and learning process. Respondents assessed the severity of the war's effects on these teaching-learning factors using a 5-point rating scale, where 1 indicated minimal impact and 5 represented the highest level of crisis. Three key dimensions discussed in the first question were used to measure the extent of the crisis: exposure, sensitivity, and vulnerability, and supported by qualitative data analysis.

A comprehensive statistical analysis was performed, beginning with descriptive statistics, focusing on means and standard deviations, and progressing to inferential techniques, notably multiple linear regression analysis, to assess the crisis factors across various dimensions. All assumption tests confirmed the robustness of the model, facilitating a rigorous and reliable examination of the crisis factors affecting the teaching-learning system discussed in this section below.

#### 4.3.1. Curriculum Disruption

Curriculum disruption is the interruption or modification of educational curricula caused by armed conflict crisis, leading to gaps or deviations from the planned learning content and outcomes (Justino et al, 2014). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

**Table 22:** Descriptive Statistical Results for Curriculum Disruption

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Std. Error
Exposure to Crisis	157	4.5860	.06765
Sensitivity of the Crisis	156	4.5064	.06268
Vulnerability to Crisis	156	4.6667	.06257
Valid N (listwise)	156		

*Mean scales: low [1–2], medium (2–3), high (3–4), and very high (4–5)*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of curriculum disruption illustrates significant exposure, sensitivity, and vulnerability to the crisis. The data show that the curriculum in Tigray experienced high exposure to the crisis ( $M = 4.5860$ ), alongside notable sensitivity ( $M = 4.5064$ ) and vulnerability ( $M = 4.6667$ ) to the crisis. The low standard errors, ranging from 0.06257 to 0.06765, suggest that the sample means offer precise estimates of the population means, with deviations of less than 2% of their respective means. Moreover, the standard deviations, which range from 0.78151 to 0.84766, represent less than 20% of the overall data range, indicating a moderate clustering of responses around the mean. This consistency across responses points to a shared understanding among participants regarding the severe impact of the crisis on curriculum continuity, reflecting a common recognition of the disruption experienced within the teaching-learning framework.

Multiple regression analysis model was also used to complement the descriptive results. The model explains 95.38% of the variance in curriculum disruption, indicating a very strong fit. The highly significant F-statistic ( $F(5, 148) = 1512.98, p < 0.001$ ) confirms that the overall regression model is a good fit for the data. This supports the validity of the findings and underscores the significant impact of armed conflict dynamics on curriculum disruption.

**Table 23: Inferential Statistical Results for Curriculum Disruption**

Crisis Extents	Coef.	Robust S.E	t		P> t	[95% conf. interval]
Exposure to crisis	0.413995	0.056652	7.31		0.000	3020441 0.525945
Sensitivity of the crisis	0.403519	0.048142	8.38		0.000	0.308384 0.498654
Vulnerability to crisis	0.324632	0.024384	13.31		0.000	0.276447 0.372817
_cons	-644226	0.199473	-1.33		0.187	-586062 0.129761
R <sup>2</sup>	0.9538					
F(5, 148)	1512.98					
Prob > F	0.000					
N	154					

A one-unit increase in the exposure of educational institutions to armed conflict resulted in a 0.414 unit increase in curriculum disruption, holding other factors constant. This effect was highly significant ( $p < 0.001$ ), indicating that higher exposure to conflict significantly amplifies disruptions in curriculum delivery. Similarly, a one-unit increase in the sensitivity of educational institutions to armed conflict led to a 0.404 unit increase in curriculum disruption, holding other factors constant. This effect was also highly significant ( $p < 0.001$ ), suggesting that institutions

more sensitive to conflict are significantly more likely to experience interruptions in curriculum delivery. Finally, a one-unit increase in the vulnerability of educational institutions to armed conflict resulted in a 0.325 unit increase in curriculum disruption, holding other factors constant. This effect was highly significant ( $p < 0.001$ ), suggesting that institutions with higher vulnerability face a substantially greater risk of curriculum disruptions.

The qualitative findings revealed significant disruptions to the educational curriculum caused by the war in Tigray, leaving students and teachers deeply concerned about the impact on their learning experiences. Students reported that the imposition of an accelerated curriculum due to the conflict has compressed instructional timeframes, making it difficult to cover the required material adequately. One student remarked, "The time we learn is very short. We had to learn a lot of topics in a short period of time" (S-KT-01), while another stated, "Because of the war, we were forced to study 2 grades in one year instead of one grade in one year" (S-KT-02). These statements highlight the pressure students face in coping with an accelerated pace, which has compromised their ability to fully comprehend and master the curriculum. Many students expressed concerns about advancing through grade levels without adequate proficiency. As one student noted, "Students moving from class to class without adequate proficiency, no student-centered teaching methods" (S-KT-04), reflecting the lack of depth in learning as a result of the hurried curriculum.

Similar findings were observed in Syria, where accelerated programs also failed to deliver adequate learning outcomes due to compressed instructional periods. Justino et al. (2014) reported that conflict-induced curriculum disruptions in Syria resulted in significant gaps in students' learning outcomes, much like in Tigray, where students struggled to keep up with the fast-paced learning. In South Sudan, while there was also severe curriculum disruption, there was more external intervention, with international organizations helping to mitigate the impact through flexible learning models and distance education programs. In Tigray, the lack of external support further exacerbated the situation, with fewer resources available to aid in recovery. Curriculum disruption during conflict has a direct negative impact on students' learning outcomes, as seen in both Tigray and Syria. However, more robust external intervention, as seen in South Sudan, can help mitigate the extent of disruption by providing alternative learning models, such as distance learning and remedial programs.

### 4.3.2. Instructional Challenges:

Instructional challenges are the difficulties faced by teachers and educators in delivering effective instruction and learning experiences to students due to armed conflict-related disruptions and limitations (Dryden-Peterson, 2020). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

**Table 24:** Descriptive Statistical Results for Instructional Challenges

Crisis Extents	N	Mean	Std. Error	Std. Deviation
	Statistic	Statistic		Statistic
Exposure to Crisis	157	4.1720	.08242	1.03266
Sensitivity of the Crisis	156	4.2372	.07561	.94434
Vulnerability to Crisis	156	4.3205	.07275	.90865
Valid N (listwise)	156			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of instructional challenges reveals significant exposure, sensitivity, and vulnerability to the crisis. The results indicate that institutions encountered notable exposure to the crisis ( $M = 4.1720$ ), along with substantial sensitivity ( $M = 4.2372$ ) and vulnerability ( $M = 4.3205$ ). The relatively low standard errors, ranging from 0.07275 to 0.08242, suggest that the sample means are reliable estimators of the population means, with deviations of less than 2% of their respective means. Furthermore, the standard deviations, which range from 0.90865 to 1.03266, represent around 20% of the overall data range, indicating a moderate spread of responses around the mean. This dispersion reflects a diverse but converging set of perspectives among respondents, highlighting the widespread recognition of the instructional challenges posed by the crisis across the teaching-learning system.

In the regression analysis supporting the descriptive results above, the R-squared ( $R^2 = 0.8909$ ) indicates that the model explains approximately 89.09% of the variance in instructional challenges, suggesting a very good fit. The F-statistic ( $F(5, 148) = 250.85, p < 0.001$ ) indicates that the model is statistically significant, indicating that at least one of the predictors significantly predicts instructional challenges.

**Table 25: Inferential Statistical Results for Instructional Challenges**

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.3703039	0.0532263	6.96	0.000	0.2651222	0.4754855
Sensitivity of the crisis	0.3465157	0.0582127	5.95	0.000	0.2314802	0.4615511
Vulnerability to crisis	0.3980319	0.0538812	7.39	0.000	0.291556	0.5045078
_cons	-0.1420365	0.274722	-0.52	0.606	-0.6849208	0.4008478
R <sup>2</sup>	0.8909					
F(5, 148)	250.85					
Prob > F	0.0000					
N	154					

The regression results reveal a statistically significant relationship between exposure to crisis, sensitivity, vulnerability, and instructional challenges. Specifically, the coefficient of 0.3703 for exposure to crisis suggests that, holding other variables constant, a one-unit increase in crisis exposure corresponds to an estimated 0.3703 unit increase in instructional challenges. This effect is highly statistically significant ( $p < 0.001$ ), implying that increased crisis exposure is strongly associated with worsening instructional challenges. Similarly, sensitivity exhibits a positive and statistically significant impact on instructional challenges, with a coefficient of 0.3465. This suggests that each additional unit of sensitivity is associated with a 0.3465 unit increase in instructional challenges ( $p < 0.001$ ), underscoring the exacerbating role of heightened sensitivity in this context. Furthermore, the coefficient for vulnerability, 0.3980, indicates a substantial and statistically significant relationship ( $p < 0.001$ ) between increased vulnerability and instructional challenges. A one-unit increase in vulnerability is predicted to lead to a 0.3980 unit increase in instructional challenges, confirming that higher vulnerability levels intensify the challenges faced in instructional settings.

The qualitative findings supporting the quantitative results highlight the numerous instructional challenges faced by teachers in Tigray following the war. One of the major concerns was the decline in educational quality, with respondents attributing it to teacher shortages, ineffective teaching methods, and disrupted class schedules. One respondent noted, "There is no quality of education like in the past. There is a shortage of teachers and there is no effective teaching and learning process as teachers are forced to teach overlapping subjects" (S-KT-02). Additionally, overcrowded classrooms, scarcity of teaching materials such as textbooks and chairs, and lack of

proper supervision further hindered the instructional process. These issues disrupted the continuity of learning, with students and teachers struggling to adapt to the constrained and compromised educational environment. The shift from student-centered to teacher-centered methodologies, driven by time constraints, also negatively affected the engagement and effectiveness of instruction.

The psychological and economic hardships experienced by both teachers and students significantly contributed to the instructional challenges. Teachers, demoralized by the conflict, struggled with a lack of support, inadequate resources, and the need for additional employment to cope with economic strain. As one teacher remarked, "Teachers were injured by the war and forced to work without pay. Accordingly, the learning process suffered" (T-KT-03). Psychological trauma also played a role in diminishing student motivation and engagement, with students unable to achieve expected learning outcomes. One respondent emphasized, "It results in invisible learning outcomes; it leads active learning not to be practical" (S-Seh-1). These combined challenges have deeply affected the ability of teachers to implement diverse and effective instructional methods, contributing to the overall decline in educational standards in the region.

Similar instructional challenges were reported in South Sudan, where teacher shortages and a lack of educational resources were key barriers to effective instruction (UNESCO, 2017). Both contexts suffered from insufficient materials and overcrowded classrooms, hindering the ability of teachers to provide quality instruction. In South Sudan, international organizations provided some relief by offering teacher training programs and financial support, whereas in Tigray, the lack of such external interventions left teachers with little assistance, worsening the instructional challenges. The instructional challenges in conflict zones are often compounded by teacher shortages and a lack of resources, as seen in both Tigray and South Sudan. However, Tigray's situation could be improved through stronger international support, similar to the interventions provided in South Sudan, which offered teacher training and resource distribution.

### 4.3.3. Learning and Academic Regression:

Learning and academic regression is the setback in students' learning progress and academic achievements resulting from interrupted learning environments and inadequate educational support during armed conflict crisis (Mendenhall et al, 2021). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

**Table 26:** Descriptive Statistical Results for Learning and Academic Regression

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Std. Error
Exposure to Crisis	157	4.7389	.05654
Sensitivity of the Crisis	156	4.6667	.05091
Vulnerability to Crisis	156	4.7949	.04140
Valid N (listwise)	156		

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*  
*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*  
*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of learning and academic regression reveals substantial exposure, sensitivity, and vulnerability to the crisis. The data indicate that institutions experienced high exposure to the crisis (M = 4.7389), accompanied by significant sensitivity (M = 4.6667) and pronounced vulnerability (M = 4.7949). The low standard errors, ranging from 0.04140 to 0.05654, suggest that the sample means provide precise estimates of the population means, with deviations of less than 2% of their respective means. Additionally, the standard deviations, which range from 0.51704 to 0.70843, are below 20% of the overall data range, indicating a moderate clustering of responses around the mean. This pattern reflects a moderate consensus among respondents, indicating a shared understanding of the severe impact of the crisis on learning outcomes and academic progression across the institutions surveyed.

In the multiple regression analysis below complementing the descriptive statistical results above, the R-squared ( $R^2 = 0.6659$ ) indicates that approximately 66.59% of the variance in learning and academic regression is explained by the independent variables included in the model. This suggests a moderate to strong model fit. The F-statistic ( $F(5, 148) = 62.00, p < 0.001$ ) indicates that the

model is statistically significant, indicating that the predictors collectively have a significant effect on learning and academic regression.

Table 27: Inferential Statistical Results for Learning and Academic Regression

Crisis Extents	Coef.	Robust S. E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.2841307	0.0898783	3.16	0.002	0.1065201	0.4617412
Sensitivity of the crisis	0.3534585	0.1045231	3.38	0.001	0.1469081	0.5600089
Vulnerability to crisis	0.4701878	0.1083608	4.34	0.000	0.2560536	0.684322
_cons	0.017625	0.6831215	0.03	0.979	-1.332307	1.367557
R <sup>2</sup>	0.6659					
F(5, 148)	62.00					
Prob > F	0.0000					
N	154					

The regression analysis result in the table above indicated that a one-unit increase in exposure of the learning and academics to crisis is associated with a 0.2841 unit increase in learning and academic regression. This coefficient is statistically significant ( $p = 0.002$ ), indicating a positive relationship between exposure to armed conflict and the degree of learning regression. Similarly, a one-unit increase in sensitivity of the crisis is associated with a 0.3535 unit increase in learning and academic regression. This relationship is statistically significant ( $p = 0.001$ ), suggesting that higher sensitivity to conflict exacerbates academic setbacks. Additionally, a one-unit increase in vulnerability of the learning to crisis leads to a 0.4702 unit increase in learning and academic regression. This coefficient is statistically significant ( $p < 0.001$ ), highlighting that increased vulnerability to armed conflict significantly intensifies academic regression.

Qualitatively supporting the quantitative results, respondents provided insights into the significant academic regression and learning setbacks experienced by students in Tigray as a consequence of the war. Students expressed profound frustration and disappointment over the regression in their academic progression. Many reported being at least a year behind the expected level and class, attributing the setback directly to the disruptions caused by the conflict. For instance, one respondent lamented, "We have now gone backwards from the level and class we should have reached and the knowledge we should have held. We are at least a year behind now" (S-KT-01). Participants expressed deep regret over the wasted years of education due to the suspension of schooling during the conflict. They highlighted the inability to acquire the necessary knowledge

and reach the appropriate grade level. One respondent noted, "The knowledge and grade level we should have acquired during these three years has been wasted as education has been suspended for about three years" (S-KT-06).

The war-induced disruptions resulted in a misalignment between students' age and the grade level they should have reached. This discrepancy hindered their academic progression and contributed to a decline in educational outcomes. For instance, one respondent noted, "There is a mismatch between the grade levels created by the war and the education that students should have reached" (T-KT-02). Students' academic performance suffered due to the prolonged absence from school and the psychological trauma inflicted by the conflict. Many students experienced setbacks in their learning journey, with some failing to meet the expected grade levels. As expressed by one respondent, "Students were excluded from school for about 3 years and the level of education was reversed" (T-KT-06), and all these crises resulted learning and academic regression for students in Tigray.

Similar findings were reported in conflict zones like Afghanistan and Iraq, where students also fell behind by one to two years due to disruptions in their education (World Bank, 2020). In both regions, academic progress was hindered by long-term school closures and psychological trauma caused by the conflict. In Afghanistan, efforts were made to reintroduce remedial programs to help students catch up, whereas Tigray lacked such structured programs, making it harder for students to recover from the academic regression caused by the conflict. Learning regression is a significant issue in conflict zones, but regions like Afghanistan that implemented remedial education programs were more successful in helping students recover. Tigray would benefit from similar interventions to help students regain lost learning time and close the academic gap.

#### **4.3.4. Disrupted Learning Assessment:**

Disrupted learning assessment is the disruption or modification of methods and processes for evaluating student learning and progress due to armed conflict crisis, affecting the accurate measurement of educational outcomes (Nicolai et al, 2020). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

Table 28: Descriptive Statistical Results for Disrupted Learning Assessment

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Std. Error
Exposure to Crisis	157	4.3694	.06471
Sensitivity of the Crisis	156	4.3654	.06689
Vulnerability to Crisis	156	4.5064	.05998
Valid N (listwise)	156		

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]  
**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range  
**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of disrupted learning assessment highlights significant exposure, sensitivity, and vulnerability to the crisis. The data indicate that institutions faced considerable exposure to the crisis (M = 4.3694), along with marked sensitivity (M = 4.3654) and notable vulnerability (M = 4.5064). The relatively low standard errors, ranging from 0.05998 to 0.06689, suggest that the sample means provide precise estimates of the population means, with deviations of less than 2% of their respective means. Furthermore, the standard deviations, ranging from 0.74917 to 0.83540, remain below 20% of the total data range, indicating a moderate clustering of responses around the mean. This consistency in responses reflects a common understanding among participants regarding the extent of the crisis's disruption on learning assessments across the surveyed institutions.

In the multiple regression analysis below contributing to the descriptive results above, the R-squared ( $R^2 = 0.8398$ ) indicates that approximately 83.98% of the variance in disrupted learning assessment is explained by the independent variables included in the model. This suggests a very good model fit. The F-statistic ( $F(5, 150) = 163.47, p < 0.001$ ) indicates that the model is statistically significant, indicating that the predictors collectively have a significant effect on disrupted learning assessment.

Table 29: Inferential Statistical Results for Disrupted Learning Assessment

Variables	Coef.	Robust S. E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.4685699	0.0863646	5.43	0.000	0.2979216	0.6392182
Sensitivity of the crisis	0.5011086	0.0723607	6.93	0.000	0.3581308	0.6440864
Vulnerability to crisis	0.3993296	0.0601006	6.64	0.000	0.2805765	0.5180827
_cons	-0.8241717	0.4718024	-1.75	0.083	-1.756409	0.1080653
R <sup>2</sup>	0.8398					
F(5, 150)	163.47					
Prob > F	0.0000					
N	154					

The regression analysis indicated that a one-unit increase in exposure to crisis is associated with a 0.4686 unit increase in disrupted learning assessment. This coefficient is statistically significant ( $p < 0.001$ ), indicating a strong positive relationship between exposure to armed conflict and the disruption of learning assessment. Similarly, a one-unit increase in Sensitivity of the crisis is associated with a 0.5011 unit increase in disrupted learning assessment. This relationship is statistically significant ( $p < 0.001$ ), suggesting that higher sensitivity to conflict greatly exacerbates the disruption of learning assessments. Furthermore, a one-unit increase in vulnerability to crisis leads to a 0.3993 unit increase in disrupted learning assessment. This coefficient is statistically significant ( $p < 0.001$ ), highlighting that increased vulnerability to armed conflict significantly intensifies the disruption of learning assessments.

The qualitative data result also supported the above quantitative results where respondents consistently expressed concerns about the rushed nature of both lessons and assessments that led to disruption, with many feeling that the limited time for learning and preparation hindered their academic success. One student noted, "The lesson itself is a rush and the test is a rush" (S-KT-01), while another emphasized, "We don't have enough time for exams. You learn and you get tested and now it's all running around" (S-KT-05). Several respondents linked this to an increase in cheating, with one stating, "We are not getting enough preparation time. So, it has opened the door for students to get into cheating in order to pass" (S-KT-02). Additionally, there were concerns about passing students without ensuring they had the necessary knowledge, as expressed by one respondent: "Passing students from class to class but not checking whether they have knowledge or not" (S-KT-09). Poor planning of assessments, such as doubling tests or clustering them near the end, was also mentioned as problematic: "Now, there are few tests that are reinforced by

planning but by doubling the tests we have tested once to fill out of 100 points" (S-KT-04) observed by one respondent.

The disruption in educational assessments, particularly during periods of crisis such as war, has led to significant inconsistencies and dissatisfaction among students and teachers. According to one respondent, "Due to the interruption of education for about three years, assessment was stopped completely" (T-RC-01). This disruption has impacted the overall quality of education, with respondents noting that the "Disruption of educational examinations has occurred as general education has fallen. The scales we are given are not up to date either" (S-KT-10). The lack of learning resources and incomplete assessment coverage has further hindered students' ability to demonstrate their knowledge, as highlighted by one respondent: "Not covering the book completely and not learning" (T-H-02). Variations in assessment practices across areas have also been observed, underscoring the need for more standardized and equitable approaches to ensure consistency in education delivery. One respondent remarked, "Variations in assessment practices and delivery were observed across different areas or schools" (T-RC-05), highlighting the disparities that exacerbate educational inequalities.

Similar challenges were reported in Syria, where ongoing conflict heavily disrupted the structure and quality of learning assessments. Save the Children (2018) found that poorly planned exams, combined with a lack of proper resources, led to inconsistent and unreliable evaluations of students' academic performance. In both Tigray and Syria, the crisis led to an erosion of standardized assessment procedures, further exacerbating learning inequalities. In Syria, some regions implemented alternative, flexible assessment models to accommodate the disrupted academic calendar, allowing students more time to complete exams and mitigate the stress of compressed learning. Tigray, however, lacked the infrastructure and resources to implement alternative assessment models, leaving students underprepared and contributing to widespread academic regression.

Disrupted learning assessments are a common consequence of conflict, as seen in both Tigray and Syria. However, alternative assessment models, such as those used in Syria, could help reduce the pressure on students and ensure more reliable evaluations of academic performance. In Tigray,

adopting flexible assessment strategies would allow students more time to recover from compressed learning periods and improve the accuracy of their academic evaluations.

#### 4.3.5. Adverse Learning Environment:

Adverse learning environment is the negative and often unsafe physical, psychological, and social conditions in which teaching and learning take place as a result of armed conflict crisis, hindering effective education (Winthrop et al, 2021). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

Table 30: Descriptive Statistical Results for Adverse Learning Environment

Crisis Extents	N	Mean	Std. Deviation
	Statistic	Statistic	Statistic
Exposure to Crisis	157	4.4713	.85904
Sensitivity of the Crisis	156	4.4615	.84536
Vulnerability to Crisis	156	4.5513	.77289
Valid N (listwise)	156		

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the adverse learning environment reveals significant exposure, sensitivity, and vulnerability to the crisis. The findings show that institutions were substantially exposed to the crisis ( $M = 4.4713$ ), exhibited considerable sensitivity ( $M = 4.4615$ ), and displayed notable vulnerability ( $M = 4.5513$ ). The relatively low standard errors, ranging from 0.06188 to 0.06856, suggest that the sample means provide precise estimates of the population means, with deviations of less than 2% of their respective means. Additionally, the standard deviations, ranging from 0.77289 to 0.85904, account for less than 20% of the overall data range, indicating a moderate clustering of responses around the mean. This reflects a shared understanding among respondents regarding the significant impact of the adverse learning environment across the surveyed institutions, suggesting consistent perceptions of the crisis's effects.

In the multiple regression analysis below, the R-squared ( $R^2$ ) value of 0.8328 indicates that approximately 83.28% of the variance in the adverse learning environment is explained by the independent variables included in the model. This suggests a very good model fit, showing that the predictors effectively account for the variability in adverse learning conditions. The F-statistic ( $F(5, 148) = 153.38, p < 0.001$ ) indicates that the model is statistically significant, meaning that the predictors- exposure, sensitivity, and vulnerability collectively have a significant effect on the adverse learning environment.

Table 31: Inferential Statistical Results for Adverse Learning Environment

Crisis Extents	Coef.	Robust S. E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.4005698	0.0667533	6.00	0.000	0.2686571	0.5324825
Sensitivity of the crisis	0.3798178	0.0647364	5.87	0.000	0.2518908	0.5077448
Vulnerability to crisis	0.3904714	0.0620482	6.29	0.000	0.2678565	0.5130863
_cons	-0.2687859	0.3510119	-0.77	0.445	-.9624285	0.4248567
$R^2$	0.8328					
F(5, 148)	153.38					
Prob > F	0.0000					
N	154					

The regression analysis above indicated that the coefficient for exposure to crisis 0.4006 with a p-value of less than 0.001 indicates a strong positive relationship between exposure to armed conflict and the adversity of the learning environment. Specifically, a one-unit increase in exposure to crisis is associated with a 0.4006 unit increase in adverse learning environment. The p-value indicates that this relationship is statistically significant, underscoring the critical impact of conflict exposure on worsening learning environments.

Similarly, the coefficient for sensitivity of the crisis 0.3798 with a p-value of less than 0.001 indicates that as the sensitivity of the learning environment to conflict disruptions increases, the adversity of the learning conditions also increases. The statistical significance of this relationship suggests that environments more sensitive to conflict experience significantly worse conditions. For each unit increase in sensitivity to conflict, the adverse learning environment increases by approximately 0.38 units.

Furthermore, the coefficient for vulnerability to crisis 0.3905 with a p-value of less than 0.001 indicates a positive relationship between vulnerability to armed conflict and the adversity of the

learning environment. The statistical significance highlights that increased vulnerability to conflict significantly worsens the learning conditions. For every unit increase in vulnerability, the adverse learning environment increases by approximately 0.39 units.

The qualitative result supporting the quantitative findings revealed that educational institutions have endured severe damage, creating deeply challenging learning environments for both students and educators. Respondents vividly described the physical destruction of schools, recounting scenes of broken chairs, torn classrooms, shattered windows, and collapsed structures. One respondent stated, "The chairs we sit on are destroyed and broken, our classrooms are ripped off, the walls of the classrooms are torn, the windows of the classrooms are broken." (S-KT-01) Another added, "The school, once a place of comfort for students, has now deteriorated into dilapidation due to the war. There are no chairs, equipped library, or laboratories left." (T-KT-04) The loss of essential academic resources, such as libraries and laboratories, further compromises the quality of education and diminishes students' motivation. "Teaching aids like computers, laboratories, and libraries have been completely destroyed, significantly dampening the desire for learning." (S-KT-13) Another respondent emphasized, "The destruction has extended to libraries, laboratories, chairs, classrooms, and computer tables." (T-GH-04)

Beyond the physical damage, the conflict has created an environment far from conducive to learning. Classrooms have become unattractive, noisy, and unsafe, hindering student engagement. "The broken windows make the classroom uninviting for study. Overall, the teaching conditions have significantly worsened compared to the past." (S-KT-06) The pervasive fear of ongoing conflict and potential hazards further intensifies students' insecurity, as noted by one respondent: "Students' enthusiasm for attending school has decreased due to the persisting dangers." (S-Seh-01) These adverse conditions have led to widespread psychological trauma, stress, and negative coping mechanisms, with respondents reporting behaviors like gambling and delinquency. "Students are experiencing trauma, stress, and fear, compounded by economic and political crises." (S-RC-01) Moreover, the destruction of schools has broader implications for the community, contributing to social unrest and declining educational participation. "The destruction of schools has led to social unrest within the community and a decline in educational engagement." (T-Bor-4).

Similar findings were reported in Yemen, where schools were physically destroyed during the conflict, creating unsafe environments for students. Oxfam (2019) documented how schools in Yemen were rendered unusable, with broken furniture, destroyed classrooms, and a lack of essential educational resources. Both Tigray and Yemen experienced significant physical damage to their learning spaces, making it difficult for students to focus on their education. In Yemen, international aid organizations played a role in rebuilding and restoring some of the damaged schools. In Tigray, due to the ongoing nature of the conflict and political isolation, there has been limited international involvement in rebuilding educational infrastructure. Adverse learning environments are a common consequence of conflicts, as seen in Tigray and Yemen. However, while Yemen received some international assistance for reconstruction, Tigray’s recovery efforts remain stalled due to limited external support. Tigray could benefit from enhanced international collaboration and post-conflict reconstruction efforts to rebuild schools and restore a conducive learning environment for students.

#### 4.3.6. Strained Teacher-Learner Relationship:

Strained teacher-learner relationship is the strain and challenges in the relationship between teachers and students caused by armed conflict crisis, impacting the quality of teaching, learning, and communication within the educational context (Novelli et al, 2021). Quantitative and qualitative results of this study discussed in this section below revealed that the war in Tigray resulted disruption of the primary school curriculum in the region.

Table 32: Descriptive Statistical Results for Strained Teacher-Learner Relationship

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	157	3.9745	.09169	1.14885
Sensitivity of the Crisis	156	3.9744	.08815	1.10102
Vulnerability to Crisis	156	4.0321	.09293	1.16076
Valid N (listwise)	156			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the strained teacher-learner relationship revealed substantial exposure, sensitivity, and vulnerability to the crisis. The results indicate that institutions

experienced significant exposure to the crisis ( $M = 3.9745$ ), alongside similar levels of sensitivity ( $M = 3.9744$ ) and vulnerability ( $M = 4.0321$ ). The relatively low standard errors, ranging from 0.08815 to 0.09293, suggest that the sample means provide reliable estimates of the population means, with deviations of less than 3% of their respective means. Moreover, the standard deviations, which range from 1.10102 to 1.16076, represent just over 20% of the overall data range, indicating a wider spread of responses around the mean. This variation suggests a diverse set of perspectives among respondents regarding the extent of the strained teacher-learner relationship, reflecting varied experiences of the crisis's impact on this critical educational dynamic across the institutions surveyed.

The regression analysis below complementing the descriptive result above underscored the severe impact of armed conflict crisis on teacher-learner relationships within educational settings. The findings highlight that increased exposure, sensitivity, and vulnerability to armed conflict significantly escalate strain between teachers and students. The high R-squared value indicates that approximately 95.03% of the variance in strained teacher-learner relationship can be explained by the predictors included in the model. This suggests that the model provides a robust explanation of the relationship between armed conflict dimensions and student-learner relationship. The significant F-statistic ( $p < 0.0001$ ) indicates that the overall model is highly significant. This implies that the included predictors collectively have a substantial impact on strained teacher-learner relationship, reinforcing the validity of the regression model.

**Table 33:** Inferential Statistical Results for Strained Teacher-Learner Relationship

Crisis Extents	Coef.	Robust S. E	t	P>t	[95% conf. interval]	
Exposure to crisis	0.3665913	0.0415484	8.82	0.000	0.2844866	0.448696
Sensitivity of the crisis	0.3572766	0.0423746	8.43	0.000	0.2735392	0.441014
Vulnerability to crisis	0.4077842	0.0369286	11.04	0.000	0.3348087	0.4807597
_cons	-0.1026083	0.156904	-0.65	0.514	-0.4126698	0.2074532
R <sup>2</sup>	0.9503					
F(5, 148)	586.34					
Prob > F	0.0000					
N	154					

The coefficient for exposure to crisis (0.3665913,  $p < 0.001$ ) in the regression analysis above indicated a significant positive relationship between exposure to armed conflict crisis and the strain in teacher-learner relationships. This means that as exposure to armed conflict increases, the strain

experienced in teacher-learner relationships also increases. The high statistical significance ( $p < 0.001$ ) suggests strong evidence for this relationship. Similarly, the coefficient for sensitivity of the crisis (0.3572766,  $p < 0.001$ ) highlights that higher sensitivity to armed conflict crisis exacerbates the strain in teacher-learner relationships. Each unit increase in sensitivity is associated with a 0.36 unit increase in teacher-learner relationship strain. Furthermore, the coefficient for vulnerability to crisis (0.4077842,  $p < 0.001$ ) indicates that the vulnerability of educational institutions to armed conflict significantly amplifies the strain in teacher-learner relationships. A one-unit increase in vulnerability corresponds to a 0.41 unit increase in strained relationships.

The qualitative analysis supporting the quantitative results above revealed that the war in Tigray significantly strained the relationship between teachers and learners. Teachers and students alike report a significant decline in classroom behavior, attributed to the trauma and stress induced by the conflict. One student (S-KT-01), explained, "The war caused the behavior of the students to deteriorate. There is disagreement with the teachers. There is a situation where the teachers complain because we have up to 98 students in a class." Overcrowded classrooms and emotional distress contribute to the strained teacher-student relationship, leading to open disrespect and frequent disagreements. Another respondent (S-KT-02), added, "There are disagreements between students and students and between students and teachers. There are also students who bully teachers." These strained dynamics reflect the broader challenges exacerbated by the conflict, with disrupted communication and eroded respect for authority.

The war's devastation has profoundly damaged the relationships between students and teachers, with respondents emphasizing how the conflict has disrupted the educational system and deeply affected classroom dynamics. As one respondent (T-RC-04) noted, "After the war, the relationship between the students and the teachers has been very damaged." Communication breakdowns are common, worsened by factors such as mismatched age and grade levels and extended absences. This psychological toll affects not just students but teachers as well, with respondent (T-RC-05) stating, "Our students, who were morally strong, are now easily irritated by the adverse conditions created by the war, and their relationship with their teachers is severely strained." The emotional instability and demotivation among both groups underline how the conflict has fundamentally altered the teaching and learning environment, making it difficult to foster the supportive relationships necessary for education to thrive.

Similar dynamics were found in Nigeria, where Human Rights Watch (2017) documented that conflict and overcrowded classrooms strained teacher-student relationships. The trauma caused by conflict-related violence, coupled with the overcrowded classrooms, led to a breakdown in communication and increasing behavioral issues in both Tigray and Nigeria. In Nigeria, some schools implemented trauma-informed teaching and peer counseling programs to help rebuild teacher-learner relationships and address the emotional needs of students. These programs helped alleviate some of the strain between teachers and students, while Tigray, lacking in psychological support programs, saw more pronounced relational deterioration.

Strained teacher-learner relationships are a significant issue in conflict zones. Tigray's experience mirrors that of Nigeria, where emotional distress and overcrowding created tensions between students and teachers. Implementing trauma-informed teaching and counseling programs could help improve these relationships in Tigray, offering both teachers and students the support they need to rebuild trust and communication.

#### **4.4. Effects of Armed Conflict on Education Agents**

The third question of the first research objective of this study aimed to assess the effects of the war in Tigray on the region's education agents, particularly in relation to education government bodies, education NGOs, school teachers, students, and parents. The study's questions, addressing these critical areas, were answered by these respective education agents. Respondents assessed the severity of the war's effects on these education agents using a 5-point rating scale, where 1 indicated minimal impact and 5 represented the highest level of crisis. Three key dimensions discussed in the first question were used to measure the extent of the crisis: exposure, sensitivity, and vulnerability, and supported by qualitative data analysis.

A comprehensive statistical analysis was performed, beginning with descriptive statistics, focusing on means and standard deviations, and progressing to inferential techniques, notably multiple linear regression analysis, to assess the crisis factors across various dimensions. All assumption tests confirmed the robustness of the model, facilitating a rigorous and reliable examination of the crisis factors affecting the education agents discussed in this section below.

#### 4.4.1. Weaponizing Education (Government)

Weaponizing Education (Government) is the use of education as a tool for political or military purposes by government bodies during armed conflict, often leading to the manipulation of educational content and structures (Adonteng-Kissi et al., 2019; Milton & Barakat, 2018). Descriptive and inferential statistical results of the quantitative data supported by qualitative results discussed in this section below revealed that the war in Tigray impacted the education government body significantly where the education sector was weaponized with high exposure, sensitivity, and vulnerability to crisis.

**Table 34:** Descriptive Statistical Results for Weaponizing Education

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	57	4.5614	.10916	.82413
Sensitivity of the Crisis	57	4.4912	.12546	.94723
Vulnerability to Crisis	57	4.5088	.12294	.92819
Valid N (listwise)	57			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*  
*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*  
*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of the weaponization of education revealed significant exposure, sensitivity, and vulnerability to the crisis. The findings indicate that institutions experienced considerable exposure to the crisis (M = 4.5614), accompanied by notable sensitivity (M = 4.4912) and vulnerability (M = 4.5088). The relatively low standard errors, ranging from 0.10916 to 0.12546, suggest that the sample means provide precise estimates of the population means, with deviations of less than 3% of their respective means. Additionally, the standard deviations, which range from 0.82413 to 0.94723, indicate a moderate spread of responses around the mean. This dispersion reflects a range of perspectives among respondents regarding the extent of the weaponization of education, underscoring a shared recognition of the crisis's impact on educational integrity across the surveyed institutions.

The multiple regression statistical results complementing the descriptive statistical results indicated a very strong model fit and significant relationships between the crisis extents of armed conflict and weaponizing education. The high R-squared value (0.9998) shows that the model

explains nearly all the variability in weaponizing education, demonstrating its effectiveness. The extremely high F-statistic (99999.00) and the associated p-value (0.0000) further confirm that the model is highly significant, and the variables included are critical determinants of the weaponization of education. These results underscored the robustness of the analysis and the importance of addressing the factors of exposure, sensitivity, and vulnerability in educational systems during armed conflicts to mitigate the risk of weaponization.

Table 35: Inferential Statistical Results for Weaponizing Education

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.3197255	0.0048694	65.66	0.000	0.3099498	0.3295013
Sensitivity of the crisis	0.3245169	0.0114256	28.40	0.000	0.301579	0.3474549
Vulnerability to crisis	0.3417325	0.0075356	45.35	0.000	0.3266042	0.3568609
_cons	0.0287902	0.0211807	1.36	0.180	-0.013732	0.0713122
R <sup>2</sup>	0.9998					
F(5,51)	99999.00					
Prob > F	0.0000					
N	57					

The coefficient for exposure is 0.3197, indicating that for every one-unit increase in exposure to armed conflict, the weaponization of education increases by 0.3197 units. The t-value of 65.66 and the p-value of 0.000 suggest a highly significant relationship between exposure and weaponizing education. The coefficient for sensitivity is 0.3245, which means that a one-unit increase in sensitivity results in a 0.3245 unit increase in weaponizing education. The t-value of 28.40 and the p-value of 0.000 demonstrate a strong and statistically significant relationship between sensitivity and weaponizing education. The coefficient for vulnerability is 0.3417, meaning that a one-unit increase in vulnerability leads to a 0.3417 unit increase in weaponizing education. The t-value of 45.35 and the p-value of 0.000 highlight a strong and statistically significant relationship between vulnerability and weaponizing education.

Supporting the quantitative results, the qualitative result indicated that education in Tigray has become a deliberate casualty of war, systematically targeted to undermine community stability and control. Schools, once safe havens for learning, have been transformed into battlegrounds and military strongholds. "Education has been used as a weapon of war," lamented one respondent (EO-KT-03), reflecting the shared experience of many. "Schools became army camps. School equipment was used as a weapon and became a base," described another respondent (EO-GH-01).

The destruction of school infrastructure has been devastating, exacerbating the educational crisis. "Through the destruction of schools' infrastructure and supplies by the war, the psycho-social set up of the school community is highly damaged," explained one observer (EO-AH-01). Deliberately destroyed, schools left behind scars beyond physical damage. "School infrastructure was destroyed and burnt down, leaving more scars than the spear killing them," recounted another (EB-15).

The war restricted access to education as a deliberate war tactic. "Schools were closed, education aid and staff salaries were cut," highlighted a respondent (EO-S-01), while external forces looted and burned school supplies (EB-23). "Knowing that schools are a public organization, they were deliberately destroyed to kill and injure citizens," observed another (EB-4), with schools housing weapons and displaced people (EB-14). The psychological toll on students has been profound. "Children were kept from learning and were made ignorant from schooling," expressed a respondent (EB-20), while another emphasized, "Schools were targeted, infrastructures were destroyed, books were torn and burned" (EB-26). Education professionals were not spared, as "Education professionals, including teachers and support staff, suffered casualties due to the conflict," noted multiple respondents, with many facing trauma, economic hardship, and displacement, further destabilizing the educational system.

Similar findings were observed in conflict zones like Syria, where schools were frequently targeted by government forces and rebel groups. The Global Coalition to Protect Education from Attack (GCPEA, 2018) reported the use of educational facilities for military purposes, leading to significant long-term damage to education systems. In some regions, like Iraq and Afghanistan, there have been concerted international efforts to demilitarize educational spaces, with organizations like UNESCO advocating for the protection of schools. In Tigray, the ongoing conflict and lack of international intervention have worsened the weaponization of education. The weaponization of educational spaces in conflict zones like Tigray and Syria demonstrates the devastating impact of war on educational infrastructure. However, international pressure and protocols like the Safe Schools Declaration, which Iraq and Afghanistan adopted, show that global mechanisms can mitigate such weaponization. Similar interventions are urgently needed in Tigray to protect educational spaces and rebuild the learning infrastructure.

#### 4.4.2. Constrained Education Aid (NGOs)

Constrained Education Aid (NGOs) is the limitations and challenges faced by non-governmental organizations (NGOs) in providing educational aid and support to affected regions during armed conflict crisis, impeding their capacity to deliver assistance (Khan et al., 2018; Brophy, 2020). Descriptive and inferential statistical results of the quantitative data supported by qualitative results discussed in this section below revealed that the war in Tigray impacted the education NGOs significantly where they faced constrained education aid with high exposure, sensitivity, and vulnerability to crisis.

Table 36: Descriptive Statistical Results for Constrained Education Aid

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	18	3.8889	.34194	1.45072
Sensitivity of the Crisis	18	4.0556	.26162	1.10997
Vulnerability to Crisis	18	4.3889	.18327	.77754
Valid N (listwise)	18			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of constrained education aid to NGOs reveals notable exposure, sensitivity, and vulnerability to the crisis. The data indicate that NGOs experienced moderate exposure to the crisis ( $M = 3.8889$ ), alongside considerable sensitivity ( $M = 4.0556$ ) and heightened vulnerability ( $M = 4.3889$ ). The relatively higher standard errors, ranging from 0.18327 to 0.34194, suggest that while the sample means provide a reasonable estimate of the population means, the deviations are larger, reflecting more variability in the data. Additionally, the standard deviations, which range from 0.77754 to 1.45072, indicate a wider spread of responses around the mean, particularly regarding exposure. This variability suggests diverse experiences among respondents concerning the extent to which constrained education aid impacted NGOs, highlighting differing perceptions of the crisis's impact within the surveyed group.

The regression analysis aimed to quantify how various dimensions of armed conflict impact the ability of NGOs to provide educational aid also supported the descriptive results. The regression model exhibits an exceptionally high R-squared value of 0.9998, indicating that nearly 100% of the variance in constrained education aid can be explained by the predictors included in the model.

The F-test also confirms the model's overall significance ( $F(4, 12) = 51108.47, p < 0.001$ ), suggesting that the combined influence of exposure, sensitivity, and vulnerability on constrained education aid is highly significant.

Table 37: Inferential Statistical Results for Constrained education Aid

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.3369761	0.0108027	31.19	0.000	0.313439	0.3605132
Sensitivity of the crisis	0.3231301	0.0181674	17.79	0.000	0.2835468	0.3627134
Vulnerability to crisis	0.3253927	0.01149	28.32	0.000	0.3003581	0.3504273
_cons	0.0601383	0.0513804	1.17	0.265	-0.051809	0.1720866
R <sup>2</sup>	0.9998					
F(4,12)	51108.47					
Prob > F	0.0000					
N	17					

The regression results show a highly significant positive coefficient (0.3369761,  $p < 0.001$ ). This suggests that as the exposure of educational aid to armed conflict increases, the capacity of NGOs to deliver aid diminishes significantly. Similarly, the coefficient (0.3231301,  $p < 0.001$ ) indicates that NGOs operating in highly sensitive environments, where educational aid is easily disrupted or its impact is diminished due to conflict dynamics, face substantial challenges in maintaining consistent aid delivery. Additionally, the regression shows a significant positive coefficient (0.3253927,  $p < 0.001$ ), indicating that NGOs face increased difficulty in delivering aid when their efforts are vulnerable to the effects of conflict.

The qualitative analysis result in support of the quantitative findings indicated that NGOs have significantly faced constrained education aid due to the war in Tigray in different ways. It exacted a heavy toll as noted by one respondent "Significant security risks made it increasingly difficult for NGOs to operate in conflict-affected areas" (NGO-2), while destruction of infrastructure compounded the situation. "School buildings and learning supplies were destroyed, severely hindering our ability to provide educational services," shared a different respondent (NGO-14). Displacement disrupted educational continuity, and logistical obstacles, such as blockades, limited access to resources also hindered NGOs. "Displacement of communities disrupted our operations, resulting in gaps and disruptions in our educational initiatives" (NGO-2). "Blockades disrupted supply chains, limiting our access to essential resources like textbooks and teaching materials"

(NGO-2). Persistent safety concerns also hampered NGO efforts. "NGOs faced ongoing safety concerns for our staff and beneficiaries, which restricted our ability to deliver consistent and effective educational services," added another respondent (NGO-5).

Similar logistical barriers were documented in Yemen, where Oxfam (2019) reported severe difficulties in delivering educational aid due to conflict. Both in Tigray and Yemen, the destruction of infrastructure and security concerns posed significant challenges to providing educational support. Unlike Yemen, where humanitarian organizations found limited ways to maintain educational programs through remote or alternative methods, Tigray's complete isolation and lack of connectivity further limited NGOs' ability to deliver aid effectively. Constraints on educational aid are a common issue in conflict zones, but Yemen's ability to continue some educational initiatives through alternative delivery methods could offer lessons for Tigray. Establishing remote education or community-based learning centers might help alleviate the disruptions caused by aid blockages, though logistical and security challenges would still need to be addressed.

#### 4.4.3. Teachers' Professional Regression (Teachers)

Teachers' Professional Regression (Teachers) is the decline or regression in teachers' professional development, well-being, and capacities caused by armed conflict crisis, affecting their ability to provide quality education (Pherali et al., 2020; Bdaiwi et al., 2023). Descriptive and inferential statistical results of the quantitative data supported by qualitative results discussed in this section below revealed that the war in Tigray impacted the teachers significantly where they professional regression with high exposure, sensitivity, and vulnerability to crisis.

Table 38: Descriptive Statistical Results for Teachers' Professional regression

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	48	4.5208	.12975	.89893
Sensitivity of the Crisis	47	4.4894	.11328	.77662
Vulnerability to Crisis	47	4.6170	.09401	.64448
Valid N (listwise)	47			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]  
**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range  
**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of teachers' professional regression highlights significant exposure, sensitivity, and vulnerability to the crisis. The findings indicate that teachers faced considerable exposure to the crisis ( $M = 4.5208$ ), along with marked sensitivity ( $M = 4.4894$ ) and pronounced vulnerability ( $M = 4.6170$ ). The relatively low standard errors, ranging from 0.09401 to 0.12975, suggest that the sample means provide precise estimates of the population means, with deviations of less than 3% of their respective means. Furthermore, the standard deviations, which range from 0.64448 to 0.89893, indicate a moderate clustering of responses around the mean. This pattern reflects a consistent understanding among respondents regarding the professional regression experienced by teachers during the crisis, with shared insights into the significant impact it had on their professional development across the surveyed group.

The regression analysis aimed to assess how the extent of armed conflict (CE) impacts Teachers' Professional Regression, measured by various dimensions also supported the descriptive results. The model exhibits a very high R-squared value of 0.9995, indicating that the predictors collectively explain 99.95% of the variance in teachers' professional regression. The F-test is highly significant ( $F(5,39) = 23161.68$ ,  $p < 0.001$ ), suggesting that the overall model is a good fit and the predictors jointly have a significant effect on the professional regression of teachers.

Table 39: Inferential Statistical Results for Teachers' Professional Regression

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]
Exposure to crisis	0.314788	0.0121975	25.81	0.000	0.2901163 0.3394598
Sensitivity of the crisis	0.3274426	0.015528	21.09	0.000	0.2960342 0.358851
Vulnerability to crisis	0.3404959	0.0133545	25.50	0.000	0.3134839 0.367508
_cons	0.017544	0.0902561	0.19	0.847	-0.165016 0.2001042
R <sup>2</sup>	0.9995				
F(5,39)	23161.68				
Prob > F	0.0000				
N	45				

The regression analysis shows a highly significant positive coefficient (0.314788,  $p < 0.001$ ) between the relationship of exposure to crisis and teachers' professional regression. This indicates that as exposure of teachers to armed conflict increases, their professional regression worsens, impacting their ability to effectively educate students. Similarly, the coefficient (0.3274426,  $p < 0.001$ ) signifies a significant positive relationship between sensitivity and professional regression

of teachers. This suggests that teachers in highly sensitive environments, where their professional development is easily disrupted or their well-being is compromised due to conflict dynamics, face substantial challenges in maintaining their educational roles effectively. Furthermore, the regression results show a significant positive coefficient (0.3404959,  $p < 0.001$ ) for the exposure to crisis and professional regression. This implies that teachers are more likely to experience regression in their professional capacities when their work is vulnerable to the war.

The teaching profession in Tigray, once held in high regard, has experienced a profound decline due to the war as indicated by the results of the qualitative data of this study. Educators, once respected pillars of society, now express deep frustration and disillusionment with their profession. One respondent (T-KT-04) lamented, "We teachers ourselves hate it so much that we have no choice but to blame our families as an extension," reflecting the drastic shift in societal perception and the internal struggles teachers face. The erosion of professional dignity is further compounded by economic hardships, with many educators enduring salary delays for up to 17 months. "Teaching is not considered a profession," emphasized another respondent (T-GH-01), highlighting how prolonged salary delays and lack of financial support have contributed to a diminished sense of value and purpose within the profession.

The impact of the war extends beyond financial struggles to deeply affect the mental well-being of teachers and their relationships with students. Strained teacher-student dynamics and a pervasive sense of job dissatisfaction are common, with educators feeling unable to effectively deliver lessons amidst the turmoil. One respondent (T-KT-11) noted how the war has led to "strained relations between students and teachers," while others spoke of the psychological toll, including displacement and trauma. The lack of capacity-building opportunities and disrupted professional development further exacerbate the challenges, leaving educators with limited resources to adapt to evolving needs. The societal devaluation of the profession, as described by several respondents, has left many educators feeling marginalized and contemplating alternative careers.

Similar challenges were observed in South Sudan, where teachers faced salary delays, displacement, and psychological trauma caused by the ongoing conflict. According to UNICEF (2020), many South Sudanese teachers reported a decline in their professional skills and a struggle

to maintain classroom management due to lack of training and support. In South Sudan, some teachers benefited from internationally funded capacity-building programs, which helped mitigate the effects of the conflict on their professional development. However, in Tigray, the conflict limited access to such programs, exacerbating the degradation of teachers' professional capacities. The professional degradation of teachers during armed conflict is a recurring issue in conflict-affected regions like Tigray and South Sudan. However, providing targeted international support and capacity-building initiatives can help alleviate the decline in teaching quality. In Tigray, introducing similar programs could help restore teachers' professional skills and morale, which are critical to the recovery of the education system.

#### 4.4.4. Out-of-School Children (Students)

Out-of-School Children (Students) are children who are unable to access or continue formal education due to armed conflict crisis, leading to an increase in the number of students who are not enrolled or attending school (Jones et al., 2022; Rai, 2020). Descriptive and inferential statistical results of the quantitative data supported by qualitative results discussed in this section below revealed that the war in Tigray affected the students to be out of school significantly with high exposure, sensitivity, and vulnerability to crisis.

Table 40: Descriptive Statistical Results for Out-of-School Children

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	109	4.4495	.09443	.98588
Sensitivity of the Crisis	109	4.3945	.08746	.91306
Vulnerability to Crisis	109	4.3945	.09756	1.01852
Valid N (listwise)	109			

**Mean scales:** low [1–2], medium (2–3), high (3–4), and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of out-of-school children reveals significant exposure, sensitivity, and vulnerability to the crisis. The data show that the crisis led to considerable exposure (M = 4.4495), with notable sensitivity (M = 4.3945) and vulnerability (M = 4.3945) regarding the issue of out-of-school children. The low standard errors, ranging from 0.08746 to 0.09756, indicate

that the sample means provide precise estimates of the population means, with deviations of less than 3% of their respective means. Additionally, the standard deviations, ranging from 0.91306 to 1.01852, represent less than 20% of the data range, suggesting a moderate clustering of responses around the mean. This consistency in responses reflects a shared understanding among participants of the crisis's impact on the increasing number of out-of-school children, underlining the significant educational disruption across the surveyed institutions.

The multiple regression analysis focuses on understanding the factors contributing to the number of out-of-school children also complemented the results from the descriptive statistical analysis. The exceptionally high R-squared value of 0.9997 indicates that 99.97% of the variability in the number of Out-of-School Children is explained by the variables included in the model. The low p-value associated with the F-statistic ( $p = 0.0000$ ) indicates that the overall model is statistically significant. This means that the combined effect of crisis extent factors provides a strong prediction of the number of Out-of-School Children in conflict-affected regions.

Table 41: Inferential Statistical Results for Out-of-School Children

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.332547	0.006674	49.83	0.000	0.3193107	0.3457832
Sensitivity of the crisis	0.3287784	0.0061877	53.13	0.000	0.3165066	0.3410502
Vulnerability to crisis	0.3392521	0.0059574	56.95	0.000	0.3274369	0.3510673
_cons	0.0079271	0.0169751	0.47	0.641	-0.025739	0.0415932
R <sup>2</sup>	0.9997					
F(5,103)	46133.05					
Prob > F	0.0000					
N	109					

The coefficient of 0.332547 ( $p < 0.001$ ) in the regression analysis above indicates that for every unit increase in exposure of out-of-school children to armed conflict, we expect approximately 0.332547 more children to be out of school. This suggests that children who are more exposed to the direct effects of armed conflict are more likely to be deprived of educational opportunities. Similarly, a coefficient of 0.3287784 ( $p < 0.001$ ) means that each unit increase in sensitivity of the crisis leads to an expected increase of about 0.3287784 units in the number of out of school children (OSC). With the highest coefficient and statistically significant among the crisis extents at 0.3392521 ( $p < 0.001$ ), vulnerability highlights that vulnerable children are significantly more likely to be out of school during armed conflict.

The war in Tigray has caused a sharp rise in the number of children out of school due to displacement and economic hardship. As one respondent [S-KT-01] explained, “There are children who have been displaced from their homes and exposed to various problems,” highlighting the challenges faced by many families. Another respondent [S-KT-02] underscored the tragic impact of the war, noting that “there were students who are now in the military, there are those who have been injured, and those who have lost their lives. Children out of school are in unwanted places and gambling.” These testimonies illustrate how displacement and involvement in conflict-related activities have not only uprooted children from their communities but also disrupted their education. Economic instability has compounded this issue, as respondent [S-KT-07] pointed out, “There are still students who have not attended school due to economic hardship and fear.” Similarly, respondent [S-Bor-05] noted, “Because of the war, children have been out of school due to poverty,” showing how families, burdened by financial pressures, are forced to prioritize survival over education.

The psychological and social effects of the conflict further exacerbate the situation for out-of-school children. According to respondent [S-KT-29], “Students were displaced, lost their parents, and became desperate,” underscoring the emotional toll the war has taken on children. Another respondent [S-RC-03] added, “Psychological problems, the current high cost of living, and inflation have caused a lot of problems,” leading to school avoidance or disengagement. The destruction of educational infrastructure has only worsened the situation, as children have been driven into alternative activities. Respondent [S-Bor-03] explained, “Due to the closure of schools, many children are away from school and in cattle herding, in an unprofitable place.” Moreover, the absence of schooling has forced some children into early marriage or the workforce, with one respondent [S-KT-03] noting, “Because we were away from school many times, many students became discouraged, some went to other jobs, and some got married.” These combined factors leave children vulnerable to social problems, with respondent [S-RC-06] observing that “students were forced to join unnecessary activities like gambling, addiction, etc., leading to low academic achievement.” Without intervention, the cycle of educational disruption, poverty, and social disintegration will continue to harm children in Tigray.

A similar dynamic was reported in Nigeria during the Boko Haram insurgency, where conflict led to a sharp increase in out-of-school children. According to UNESCO (2017), security concerns,

displacement, and recruitment of children by armed groups contributed to high dropout rates, especially for girls. In Nigeria, efforts by international organizations and the government to provide safe learning environments—such as mobile schools and community learning centers—helped reduce the number of out-of-school children. In contrast, Tigray saw limited implementation of such initiatives due to the ongoing conflict and lack of infrastructure.

Conflict-induced increases in out-of-school children are a global issue, as seen in both Tigray and Nigeria. Establishing safe educational spaces and offering psychological support can help mitigate these effects. Tigray could benefit from implementing mobile schools or community-based learning centers to provide educational opportunities for displaced or vulnerable children, similar to the interventions used in Nigeria.

#### 4.4.5. Education-Averse Parents (Parents)

Education-Averse Parents (Parents) are parents and caregivers who are hesitant or unwilling to send their children to school due to armed conflict crisis, often due to safety concerns, thereby affecting students' access to education (Akar, 2023). Descriptive and inferential statistical results of the quantitative data supported by qualitative results discussed in this section below revealed that the war in Tigray affected the parents to be education averse parents with high exposure, sensitivity, and vulnerability to crisis.

**Table 42:** Descriptive Statistical Results for Education Averse Parents

Crisis Extents	N	Mean	Std. Error	Std. Deviation
Exposure to Crisis	58	4.1897	.12410	.94511
Sensitivity of the Crisis	58	4.2586	.11421	.86977
Vulnerability to Crisis	58	4.3966	.10704	.81520
Valid N (listwise)	58			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of education-averse parents reveals notable exposure, sensitivity, and vulnerability to the crisis. The data show that there was significant exposure to the crisis (M = 4.1897), along with considerable sensitivity (M = 4.2586) and heightened vulnerability (M = 4.3966). The relatively low standard errors, ranging from 0.10704 to 0.12410, suggest that

the sample means provide reliable estimates of the population means, with deviations of less than 3% of their respective means. Additionally, the standard deviations, which range from 0.81520 to 0.94511, indicate a moderate spread of responses around the mean. This variability suggests a range of perspectives among respondents regarding the extent of parental aversion to education during the crisis, reflecting differing levels of educational engagement and impact across the surveyed group.

The results from the regression analysis also supported the descriptive results where the high R-squared value of 0.9995 indicates that 99.95% of the variability in the number of education-averse parents is explained by the variables included in the model. The significant F-statistic ( $F(5, 52) = 40441.06, p < 0.001$ ) indicates that the overall model is highly significant. This means that the combined effect of crisis extent factors effectively predicts the number of education-averse parents in regions affected by armed conflict.

Table 43: Regression Analysis for Education-Averse Parents

Crisis Extents	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Exposure to crisis	0.3189538	0.0104904	30.40	0.000	0.2979033	0.3400043
Sensitivity of the crisis	0.3312337	0.0077523	42.73	0.000	0.3156775	0.3467899
Vulnerability to the crisis	0.3439434	0.0074063	46.44	0.000	0.3290814	0.3588053
_cons	0.0119852	0.0385775	0.31	0.757	-0.065426	0.0893967
R <sup>2</sup>	0.9995					
F(5,52)	40441.06					
Prob > F	0.0000					
N	58					

The exposure coefficient in the regression analysis above suggests that for every unit increase in exposure of parents to armed conflict, there is an expected increase of approximately 0.3189538 units in the number of education-averse parents. Higher exposure to armed conflict significantly heightens parental reluctance to send children to school due to safety concerns, as indicated by the highly significant p-value ( $p < 0.001$ ). Similarly, each unit increase in sensitivity of the crisis leads to an expected increase of about 0.3312337 units in the number of education-averse parents. The highly significant p-value ( $p < 0.001$ ) underscores the robustness of this relationship. Furthermore, an increase in vulnerability by one unit corresponds to an expected increase of approximately

0.3439434 units in the number of education-averse parents. The highly significant p-value ( $p < 0.001$ ) confirms the significant impact of vulnerability on parental decisions.

The war in Tigray has significantly altered parents' attitudes towards education, largely due to economic hardship and exploitation as indicated by the qualitative result of this study. Respondent [P-KT-01] expressed concern over the "decline in parents' awareness and initiation for education," noting that parents increasingly prioritize immediate survival needs, which has led to a decrease in educational follow-up and an increase in child labor exploitation. This shift is further emphasized by [P-KT-04], who stated that the conflict has "created high dread, economic poverty, and decreased parents' thought on the value of education," reflecting a diminished belief in the importance of education amid escalating economic instability. Respondent [P-KT-06] added that "parents degrade the value of education, needing their children's labor," illustrating how dire economic circumstances force families to make painful choices that compromise their children's future.

The psychological impact of the war has compounded these challenges, leading to disillusionment among parents in Tigray. As [P-KT-11] pointed out, "parents still feel the explosions of the weapons and have mental distress and dread," which underscores the lasting trauma inflicted by the violence. This sentiment resonates with [P-Seh-5], who indicated that "parents lose hope towards education, having observed children hurt due to the war." Furthermore, [P-RC-01] lamented, "Their hopes for education were diminished," revealing how the psychological toll of war has forced parents into agonizing decisions, such as sending children into exile rather than to school. The testimonies from focus group participants depict a bleak reality where educational aspirations are stifled by trauma and economic hardship, with [P-RC-05] noting that "schools have been used as camps for armies, resulting in damage." Ultimately, the conflict has created an environment where the hope for a better future through education has been overshadowed by despair and insecurity of parents.

Similar patterns were observed in Nigeria during the Boko Haram insurgency, where parents withdrew their children from schools due to security concerns and financial struggles. UNESCO (2017) reported that parents in conflict-affected areas were particularly reluctant to send their daughters to school, fearing abduction or violence. In both Tigray and Nigeria, fear for children's safety was a common factor leading to education aversion. In Nigeria, local and international

organizations implemented community engagement initiatives to help parents understand the importance of education, even during conflict. In contrast, Tigray lacked significant community-level interventions to address parents' concerns and promote the importance of continuing education during the conflict.

The aversion of parents to education during conflicts, seen in both Tigray and Nigeria, highlights the importance of addressing safety concerns and providing reassurance to communities. Implementing community outreach and education awareness programs—similar to those used in Nigeria—could help mitigate parental reluctance in Tigray, encouraging more parents to support their children's return to school. Providing parents with resources and assurances regarding their children's safety is crucial for rebuilding trust in the education system during and after conflict.

#### **4.5. Response Approaches to Education System Crisis**

The first question of the second objective of this study was aimed at exploring innovative response approaches to education system crises revealed in the first objective of this study particularly responses to education policy disruption, governance instability, institutional capacity erosion, education aid and funding disruption, infrastructure depletion, and education ecosystem fragmentation. Respondents from education offices, education bureau, and education NGOs have responded to the proposed respective response approaches quantitatively and qualitatively discussed in this section. The respective proposed response approaches discussed in this section were conflict-sensitive education policy, education cluster coordination, cross-institutional partnerships, smart aid distribution network, temporary learning spaces, and community-led learning networks.

These response approaches have been measured in terms of the features of education (4A's): availability, accessibility, acceptability, and adaptability in 1-5 rating scales where 1 is the lowest and 5 is the highest. Availability emphasizes the need for education facilities and services to be physically and economically accessible where schools, teachers, and learning materials should be readily available to all individuals, ensuring that they are not deprived of education due to distance or economic constraints (World Bank, 2020). Accessibility focuses on removing barriers that may prevent certain groups from accessing education where economic, cultural, social, and physical barriers should be eliminated to ensure that marginalized groups, such as girls, children with

disabilities, and minority populations, have equal opportunities to access education (UNESCO, 2015). Acceptability underscores the importance of respecting individuals' cultural identity, values, and languages within the educational context where education should be sensitive to the diverse needs and backgrounds of learners, ensuring that it is inclusive and culturally relevant, and adaptability is emphasizing the need for education systems to be flexible and responsive to the changing needs of individuals and society (UNESCO, 2017).

A comprehensive statistical analysis was conducted, starting with descriptive statistics, including means and standard deviations, and advancing to inferential techniques, notably multiple linear regression, to evaluate the response approaches across various dimensions of the features of education.

#### 4.5.1. Conflict-Sensitive Education Policy

Respondents, in their quantitative and qualitative responses discussed in this section, assured that conflict-sensitive education policy could be a response approach to education policy disruption. Conflict-sensitive education policy is the development and implementation of education policies that take into consideration the impact of conflict, aiming to minimize negative effects and promote sustainable education in crisis-affected areas (Hewison, 2013; Janke & Reisman, 2015).

Table 44: Descriptive Statistical Results for Conflict-Sensitive Education Policy

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	3.2267	.15720	1.36137
Accessibility	75	2.8667	.14248	1.23391
Acceptability	75	2.9467	.13137	1.13772
Adaptability	75	2.9600	.14758	1.27809
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the conflict-sensitive education policy indicates that it serves as a moderate response mechanism to mitigate the disruptions caused by the war in Tigray, evaluated across four critical educational dimensions: availability, accessibility, acceptability, and

adaptability. Using a 5-point scale, the analysis reveals nuanced outcomes. The policy demonstrates a high level of availability for implementation ( $M = 3.2267$ ), while its accessibility is moderate ( $M = 2.8667$ ), acceptability among stakeholders is similarly moderate ( $M = 2.9467$ ), and it shows moderate adaptability to changing contexts ( $M = 2.9600$ ).

The standard errors, ranging between 0.13137 and 0.15720, suggest a reliable degree of precision in these estimates, ensuring they represent the broader population effectively. However, the relatively elevated standard deviations (from 1.13772 to 1.36137) reveal significant variability in respondents' perceptions, highlighting divergent views regarding the efficacy of conflict-sensitive policy implementation. This variation underscores the complex and multifaceted nature of education policy responses in conflict-affected regions.

The multiple regression analysis further substantiates the findings from the descriptive statistical analysis, confirming a strong model fit. The R-squared ( $R^2$ ) value of 0.9760 indicates that 97.60% of the variance in the dependent variable—conflict-sensitive education policy—is explained by the independent variables, representing various educational features. Moreover, the F-statistic of 449.08, coupled with a p-value of 0.0000, underscores the statistical significance of the model as a whole.

Table 45: Inferential Statistical Results for Conflict-Sensitive Education Policy

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2323972	0.0232831	9.98	0.000	0.1858549	0.2789396
Accessibility	0.2929883	0.0394117	7.43	0.000	0.2142054	0.3717712
Acceptability	0.3567268	0.0301791	11.82	0.000	0.2963996	0.4170539
Adaptability	0.0339682	0.0221274	1.54	0.130	-0.010264	0.0782002
_cons	0.1324854	0.122973	1.08	0.285	-0.113334	0.3783048
$R^2$	0.9760					
F(6, 62)	449.08					
Prob > F	0.0000					
N	69					

The regression analysis revealed that a 1-unit increase in availability is associated with a 0.2324 increase in the conflict-sensitive education policy. The strong statistical significance indicates that availability is a critical factor in shaping policy in conflict-sensitive education contexts. Accessibility is another major contributor to the conflict-sensitive education policy, with a 1-unit

increase in accessibility leading to a 0.2930 increase in the outcome. This shows accessibility's importance, likely reflecting the need to ensure education is within reach for those in conflict-affected areas. Acceptability has the highest coefficient, indicating that it is the most influential factor. A 1-unit increase in acceptability leads to a 0.3567 increase in conflict-sensitive education policy outcomes. Though adaptability is not statistically significant at the conventional 0.05 level, the conflict-sensitive education policy increases by 0.0339682 at a 1-unit increase of its adaptability to changing situations.

Several respondents emphasized the need for conflict-sensitive education policies that address the unique challenges faced in conflict-affected areas. Respondent [EO-KT-03] highlighted the importance of “developing and implementing education policy in affected areas, taking into account the damage and finding sustainable solutions for the future.” Respondent [EO-Bor-2] echoed this sentiment, stressing that “education policy based on the past conflict should be adopted and implemented.” Stakeholder engagement was also a focal point, with Respondent [EO-AH-01] advocating for “awareness creation on Conflict-Sensitive Education Policy” and Respondent [NGO 9] calling for the development of guidelines by the bureau of education to guide Education in Emergencies (EiE).

Respondents also underscored the potential for education policies to promote reconciliation and peacebuilding, with Respondent [EO-RC-01] stating that the goal is to “make peace by understanding and negotiating problems.” Regional specificity was highlighted, with Respondent [NGO-8] noting that Tigray’s current context is distinct from other regions, a sentiment reinforced by Respondent [NGO-5], who suggested that national-level politics undermine conflict-sensitive education efforts in Tigray. The role of international organizations and NGOs was also recognized, as Respondent [NGO-14] emphasized the lack of a conflict-sensitive education policy, except for those informed by international experience and NGO initiatives. These insights reflect the complexity of developing and implementing conflict-sensitive education policies in crisis-affected regions like Tigray, stressing the importance of local context and stakeholder collaboration.

When compared to other studies, the findings reveal that respondents perceive the conflict-sensitive education policy strategy in Tigray as moderately effective in terms of availability, accessibility, and acceptability. However, its adaptability in addressing the complex and evolving

disruptions to education caused by conflict remains a significant shortcoming. This limitation is particularly concerning given the fluid and unpredictable nature of conflict environments, where educational policies must be flexible enough to respond to shifting circumstances. Research by Hewison (2013) and Janke & Reisman (2015) highlights adaptability and stakeholder collaboration as critical components for the long-term success of conflict-sensitive policies in other conflict-affected regions. Their studies emphasize that without these elements, even well-intentioned policies risk becoming obsolete or ineffective in the face of dynamic challenges.

To improve the efficacy of the conflict-sensitive education policy strategy in Tigray, a more adaptable approach is necessary, one that prioritizes continuous stakeholder engagement at multiple levels—local, regional, and international. Enhanced collaboration between governmental bodies, non-governmental organizations, and community groups can help ensure that policies remain responsive to the on-the-ground realities and evolving needs of affected populations. Additionally, integrating mechanisms for real-time feedback and flexible policy adjustments could allow for more immediate and effective responses to emerging disruptions, thereby safeguarding the continuity and quality of education during periods of instability. Drawing from the successful implementation of conflict-sensitive policies in other regions, Tigray’s strategy would greatly benefit from embedding adaptability as a core principle, alongside robust coordination with key stakeholders to ensure its long-term sustainability and impact.

#### **4.5.2. Education Cluster Coordination**

Respondents, in their quantitative and qualitative responses discussed in this section, assured that education cluster coordination could be a response approach to education governance instability during armed-conflict of war like in Tigray. Education cluster coordination is the collaborative efforts among various stakeholders, including governments, NGOs, and international organizations, to coordinate and deliver education services and support in crisis situations (Smith, 2009).

Table 46: descriptive Statistical Results for Education Cluster Coordination

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	2.8000	.15654	1.35567
Accessibility	75	3.0000	.14947	1.29448
Acceptability	75	3.1600	.14586	1.26320
Adaptability	75	2.9733	.15419	1.33531
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the education cluster coordination indicates that it serves as a moderate response mechanism to mitigate the education governance instability caused by the war in Tigray, evaluated across four critical educational dimensions: availability, accessibility, acceptability, and adaptability. Using a 5-point scale, with categories defined as low [1–2], medium (2–3], high (3–4], and very high (4–5], the analysis reveals nuanced outcomes. The approach demonstrates a moderate level of availability for implementation (M = 2.8000), while its accessibility is high (M = 3.0000), acceptability among stakeholders is similarly high (M = 3.1600), and it shows moderate adaptability to changing contexts (M = 2.9733).

The standard errors, ranging from 0.14586 to 0.15654, suggest the estimates are precise and representative of the broader population. However, the notable standard deviations (ranging from 1.26320 to 1.35567) reflect variability in respondents’ experiences, underscoring diverse perceptions regarding the effectiveness and adaptability of educational services in a conflict-affected environment. This diversity highlights the complexity of coordinating education in conflict zones, where needs and conditions can vary widely across different communities.

The multiple regression analysis further substantiates the findings from the descriptive statistical analysis, confirming a strong model fit. The R-squared (R<sup>2</sup>) value of 0.9880 indicates that 98.80% of the variance in the dependent variable—education cluster coordination—is explained by the independent variables, representing various educational features. Moreover, the F-statistic of 1342.45, coupled with a p-value of 0.0000, underscores the statistical significance of the model as a whole.

Table 47: Regression Analysis for Education Cluster Coordination

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2838962	0.0342728	8.28	0.000	0.2153858	0.3524066
Accessibility	0.210503	0.0291571	7.22	0.000	0.1522188	0.2687873
Acceptability	0.377554	0.0296507	12.73	0.000	0.3182832	0.4368248
Adaptability	-0.031967	0.0140681	-2.27	0.027	-0.060089	-0.003845
_cons	0.1905104	0.0832135	2.29	0.025	0.0241689	0.356000
R <sup>2</sup>	0.9880					
F(6,62)	1342.45					
Prob > F	0.0000					
N	69					

The regression analysis revealed that a 1-unit increase in availability is associated with a 0.2839 increase in the education cluster coordination approach. The strong statistical significance indicates that availability is a critical factor in establishing cluster coordination in conflict contexts. Accessibility is another major contributor to the education cluster coordination, with a 1-unit increase in accessibility leading to a 0.2105 increase in the outcome. This shows accessibility's importance, likely reflecting the need to ensure education governance is within reach for those in conflict-affected areas. Acceptability has the highest coefficient, indicating that it is the most influential factor. A 1-unit increase in acceptability leads to a 0.3776 increase in education cluster coordination outcomes. Though adaptability is statistically significant ( $P = 0.025$ ), it shows a negative coefficient (-0.0320), indicating that the education cluster coordination adaptability decreases during war due to some factors.

Qualitative findings from respondents witnessed that education cluster coordination in crisis-affected areas like Tigray is a solution for education governance instability. Respondents highlighted the importance of joint efforts with stakeholders to provide essential equipment, support, and monitoring. For instance, EO-KT-03 stated, "In collaboration with stakeholders, provide equipment/s and support and monitor affected communities." Respondents suggested mobilizing existing resources to bridge gaps, and NGOs played a crucial role in supporting government capacity. As one NGO respondent (NGO-17) explained, "Education Cluster coordination in Tigray plays a vital role in ensuring that children affected by conflict have access to quality education and can continue their learning in a safe and supportive environment." These

insights highlight the complexity of cluster coordination and the need for comprehensive approaches to ensure access to quality education in crisis-affected regions like Tigray.

In comparison with other studies, the education cluster coordination in Tigray has shown moderate success in addressing governance instability caused by ongoing conflict. While the coordination efforts have demonstrated commendable strengths in ensuring the availability, accessibility, and acceptability of education services, the critical issue of adaptability remains a significant challenge. In volatile conflict environments, the ability to quickly adjust strategies and operations is paramount for maintaining educational continuity. Smith (2009) highlights that effective cluster coordination in conflict zones depends heavily on increased flexibility and responsiveness to the rapidly shifting dynamics of such crises—traits that are currently underrepresented in Tigray’s coordination mechanisms.

To enhance the adaptability of education cluster coordination in Tigray, a more agile and responsive framework is needed. This would involve establishing real-time data collection and analysis systems that can inform decision-making and enable swift adjustments to emerging challenges. Additionally, fostering stronger collaboration between local authorities, international partners, and non-governmental organizations can ensure that resources are deployed more efficiently and in alignment with the immediate needs of the affected populations. By integrating adaptive management practices, such as scenario planning and contingency strategies, the coordination efforts in Tigray could become more resilient and better equipped to manage the disruptions caused by conflict. This enhanced adaptability would not only improve the immediate response to crises but also contribute to a more sustainable and robust education system capable of weathering future challenges.

#### **4.5.3. Cross-Institutional Partnerships**

Respondents, in their quantitative and qualitative responses discussed in this section, indicated cross-institutional partnership as a response approach education institutional capacity erosion during armed-conflict of war like in Tigray. Cross-institutional partnerships is collaborative partnerships between different educational institutions, organizations, and agencies to pool resources, expertise, and efforts in responding to education system crises caused by armed conflict (Renders & Knezevic, 2017).

Table 48: Descriptive Statistical Results for Cross-Institutional Partnership

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	3.0933	.14726	1.27527
Accessibility	75	2.7600	.15286	1.32379
Acceptability	75	3.2267	.14024	1.21448
Adaptability	72	3.1528	.15278	1.29636
Valid N (listwise)	72			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of cross-institutional partnerships underscores their moderate effectiveness in addressing educational challenges across four critical dimensions: availability, accessibility, acceptability, and adaptability. Utilizing a 5-point scale, the findings exhibit varied performance: the partnerships demonstrate moderate availability (M = 3.0933) and accessibility (M = 2.7600), while scoring high in acceptability (M = 3.2267) and adaptability (M = 3.1528) in response to evolving circumstances. The standard errors, between 0.14024 and 0.15286, reflect the reliability and representativeness of the estimates within the broader educational landscape. Nevertheless, the standard deviations, ranging from 1.21448 to 1.32379, indicate notable variability in responses, suggesting differing perspectives on the effectiveness of these partnerships. This variability highlights the inherent complexity in managing cross-institutional collaborations, where diverse educational needs and institutional capabilities vary significantly across different contexts.

The regression analysis, corroborating the descriptive findings, demonstrates a robust model fit with an R-squared (R<sup>2</sup>) value of 0.9845, indicating that 98.45% of the variance in cross-institutional partnerships is accounted for by educational attributes. The F-statistic of 1215.64, coupled with a p-value of 0.000, affirms the model's overall statistical significance. These outcomes provide a comprehensive insight into the determinants influencing partnerships in armed conflict environments, emphasizing the pivotal role of well-structured cross-institutional collaborations and their key features in advancing sustainable education amidst crises.

Table 49: Regression Analysis for Cross-Institutional Partnership

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.3354539	0.0420281	7.98	0.000	0.2514409	0.4194669
Accessibility	0.2306661	0.039885	5.78	0.000	0.1509372	0.3103951
Acceptability	0.3994055	0.034448	11.59	0.000	0.330545	0.468266
Adaptability	-0.040469	0.0174549	-2.32	0.024	-0.07536	-.0055771
_cons	0.038916	0.0853371	0.46	0.650	-0.13167	0.2095025
R <sup>2</sup>	0.9845					
F(6, 62)	1215.64					
Prob > F	0.0000					
N	69					

The regression analysis revealed that a 1-unit increase in availability is associated with a 0.3355 increase in cross-institutional partnership outcomes. The strong statistical significance ( $p < 0.001$ ) indicates that availability is a crucial factor in fostering partnerships between institutions, especially in educational contexts. Similarly, accessibility plays a significant role in enhancing these partnerships, with a 1-unit increase in accessibility leading to a 0.2307 increase in the outcome. This highlights the importance of ensuring that educational resources and opportunities are easily accessible to institutions, which helps strengthen collaborative efforts.

Acceptability emerges as the most influential factor, having the highest coefficient. A 1-unit increase in acceptability results in a 0.3994 increase in cross-institutional partnerships. This suggests that when education systems are perceived as more acceptable—whether in terms of quality, relevance, or cultural fit—the partnerships are more likely to thrive. While adaptability is statistically significant ( $p = 0.024$ ), it has a negative coefficient (-0.0405). This indicates that as adaptability increases, cross-institutional partnerships tend to decrease slightly. This could reflect potential challenges or conflicts arising from excessive flexibility or changes within the institutions involved, which may disrupt collaboration.

Participants from the qualitative findings emphasized the critical role of cross-institutional partnerships in addressing educational challenges, particularly in crisis-affected regions. A robust policy framework was seen as essential for fostering collaboration between public and non-governmental organizations, with one respondent stressing the importance of institutional arrangements that create a sense of ownership among different entities: "Linking public and non-governmental organizations through a policy framework of education by linking them through a

sense of ownership (system) or institutional arrangement" (EO-KT-01). Collaboration with various charities was also highlighted as a practical approach to solving school-related issues, as noted by another respondent: "Solve school problems in collaboration with various charities" (EO-KT-02). The sharing of resources and practices among institutions was viewed as a critical element, with one respondent pointing out the benefits of ensuring the national availability of educational materials through collective efforts: "Among various educational institutions, charities collaborate to have a system of national availability of educational materials to meet the benefits of sharing practices with others" (EO-KT-03).

However, respondents also acknowledged the challenges inherent in sustaining strong cross-institutional partnerships. While one respondent emphasized that pooling resources among like-minded institutions could strengthen educational responses: "The partnership of all like-minded institutions will strengthen the response to education as they will bring resources together" (NGO-4), others noted that such efforts often faltered over time, lacking long-term sustainability: "The cross-institutional partnership was not very strong. Efforts were made to bring different partners to one but not sustainable" (NGO-9). Additionally, despite the recognized importance of collaboration in crisis contexts, partnerships were often seen as superficial and lacking in substantive engagement: "Even though the intervention of education needs a high involvement of other sectors, the partnership is not beyond words" (NGO-6). Nevertheless, the findings underscore that when effectively managed, these partnerships can play a vital role in addressing the complex challenges faced by the education sector, especially in regions like Tigray, where collective efforts are essential: "Cross-institutional partnerships in Tigray crises are essential for maximizing the impact of the response and addressing the complex challenges faced by the region" (NGO-17), emphasized by one respondent.

In comparison to other studies, cross-institutional partnerships in Tigray have demonstrated moderate effectiveness in mitigating the erosion of educational institutional capacities. These partnerships have performed well in terms of availability, acceptability, and accessibility, ensuring that educational services remain operational in challenging circumstances. However, they have shown lower levels of adaptability, a critical factor in conflict-affected regions where conditions can change rapidly. Renders and Knezevic (2017) emphasize the importance of adaptability in cross-institutional partnerships, noting that in other conflict situations, institutions that are able to

effectively pool resources and respond dynamically to shifting needs tend to achieve more sustainable outcomes.

To improve the efficacy of cross-institutional partnerships in Tigray, greater emphasis must be placed on enhancing adaptability. This could be achieved by fostering more flexible and resilient resource-sharing arrangements, particularly with international stakeholders who can provide critical support in times of crisis. By learning from successful practices in other regions, where institutions have developed adaptive frameworks that allow for the efficient allocation of resources and rapid response to educational disruptions, Tigray's partnerships could become more robust. Strengthening these relationships with international organizations and donors would not only improve resource mobilization but also enhance the capacity of local institutions to withstand future challenges. In doing so, Tigray's educational system could better navigate the uncertainties of conflict and ensure continuity in learning for its most vulnerable populations.

#### 4.5.4. Smart-Aid Distribution Network

In both their quantitative and qualitative responses, the respondents highlighted smart-aid distribution network as a strategic response to the disruption of education aid and funding during armed conflicts, such as the war in Tigray. Smart aid distribution network is an efficient and targeted distribution network for educational aid and resources, ensuring that assistance reaches the most affected and vulnerable populations during armed conflict crisis (Haider, 2014).

Table 50: Descriptive Statistical Results for Smart-Aid Distribution Network

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	2.6800	.13970	1.20987
Accessibility	75	2.5733	.14603	1.26463
Acceptability	75	2.9867	.15480	1.34057
Adaptability	75	2.8133	.14167	1.22688
Valid N (listwise)	75			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis of the smart aid distribution Network reveals its moderate effectiveness in addressing the education aid and funding disruptions across four critical dimensions: availability, accessibility, acceptability, and adaptability. Utilizing a 5-point scale, the findings exhibit varied performance: the network demonstrates moderate availability (M = 2.6800)

and accessibility (M = 2.5733), while scoring higher in acceptability (M = 2.9867) and adaptability (M = 2.8133). The standard errors, ranging from 0.13970 to 0.15480, indicate the reliability of the estimates within the educational landscape. Additionally, the standard deviations, ranging from 1.20987 to 1.34057, reveal notable variability in responses, suggesting differing perspectives on the effectiveness of the smart aid distribution network. This variability underscores the complexity in addressing educational needs, as institutional capacities and contexts differ significantly across the spectrum.

The regression model that underpinned the descriptive statistical findings exhibited an exceptional fit, evidenced by an R-squared (R<sup>2</sup>) value of 0.9870. This signifies that an impressive 98.70% of the variance in smart aid distribution is accounted for by educational features. Furthermore, the F-statistic of 2238.31, accompanied by a p-value of 0.000, affirms the model's overall statistical significance. These results illuminate the model's comprehensive insight into the factors that drive smart aid distribution in contexts of armed conflict. They emphasize the pivotal importance of a well-structured smart aid distribution network and its inherent attributes in fostering sustainable educational support and funding in times of crisis.

Table 51: Regression Analysis for Smart-Aid Distribution Network

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2821316	0.0289317	9.75	0.000	0.224298	0.3399652
Accessibility	0.2304015	0.0238374	9.67	0.000	0.1827512	0.2780517
Acceptability	0.4162691	0.0237106	17.56	0.000	0.368872	0.4636658
Adaptability	-0.014963	0.009959	-1.50	0.138	-0.034871	0.0049445
_cons	0.1537437	0.0657523	2.34	0.023	0.0223069	0.2851806
R <sup>2</sup>	0.9870					
F(6, 62)	2238.31					
Prob > F	0.0000					
N	69					

The regression analysis of the smart aid distribution network revealed that a 1-unit increase in availability is associated with a 0.2821 increase in aid distribution effectiveness. This strong statistical significance (p < 0.001) highlights the critical role of availability in ensuring that aid reaches its intended recipients efficiently. Similarly, accessibility is significant in enhancing aid distribution outcomes, with a 1-unit increase leading to a 0.2304 increase in effectiveness. This finding emphasizes the necessity of making aid resources and services easily accessible to

beneficiaries, facilitating smoother distribution processes. Acceptability stands out as the most influential factor in the network, with a coefficient of 0.4163. A 1-unit increase in acceptability correlates with a 0.4163 increase in aid distribution success. This suggests that when aid programs are perceived as acceptable—considering factors like cultural relevance and quality—the likelihood of effective distribution increases significantly. In contrast, adaptability shows a slight negative relationship with aid distribution effectiveness, with a coefficient of -0.01496 that shows decline.

Participants in the qualitative findings emphasized the critical role of sustainable relief mechanisms in the context of smart-aid distribution within conflict zones. One respondent highlighted the necessity of expanding access to these mechanisms through engagement with international NGOs, stating, "Expand access to sustainable relief mechanisms by engaging with international NGOs when and where conflict occurs" (EO-KT-01). Equitable implementation of aid emerged as a recurring theme among respondents, reflecting core principles of smart-aid distribution. One participant remarked on the need for equity and quality in aid implementation to achieve successful outcomes: "Ensuring successful implementations of aid with equity and quality" (EO-Seh-1). Another stressed the importance of meeting resource needs through smart-aid distribution: "Resources would be fulfilled" (EO-Seh-2). NGO insights underscored the adaptability and accessibility of smart-aid distribution, with one respondent noting, "This response is highly adaptable and acceptable but rarely accessible and highly challenging to reach or utilize, with significant barriers deterring its effective implementation" (NGO-2).

Another highlighted the potential benefits of a smart aid distribution network in Tigray, including enhanced effectiveness and efficiency of humanitarian assistance: "A smart aid distribution network in Tigray can help improve the effectiveness and efficiency of humanitarian assistance, enhance coordination among stakeholders, and ensure that aid reaches those who need it most in a timely and transparent manner" (NGO-17). Community engagement and coordination were also deemed vital, with one respondent stressing the importance of involving local stakeholders in resource mobilization: "Involving communities and local stakeholders in resource mobilization and management to ensure sustainable funding for education initiatives in crisis-affected regions" (NGO-11). Another pointed out the necessity of a targeted distribution network to ensure aid reaches the most vulnerable populations during crises: "An efficient and targeted distribution

network for educational aid and resources, ensuring that assistance reaches the most affected and vulnerable populations during armed conflict crisis" (NGO-12).

In comparison to other studies, the smart-aid distribution network in Tigray has achieved moderate success, particularly in terms of acceptability among local populations. However, the network faces significant shortcomings in availability, accessibility, and adaptability—critical dimensions for effective humanitarian response in conflict-affected regions. Haider (2014) underscores that aid distribution models in other conflict zones have been most successful when driven by strong international collaboration and the equitable allocation of resources. These essential elements are currently lacking in Tigray, where fragmented coordination and resource disparities hinder the full potential of smart-aid initiatives.

To enhance the effectiveness of aid distribution in Tigray, a more structured and cohesive approach is necessary. This would involve fostering stronger partnerships among international aid organizations, local stakeholders, and government entities to ensure that resources are allocated equitably and efficiently. By prioritizing coordination mechanisms, aid distribution could become more adaptable to the rapidly changing needs on the ground, ensuring that the most vulnerable populations—often displaced or marginalized—receive timely and appropriate support. Additionally, integrating technology and data-driven strategies into the distribution framework could further optimize resource management and enable more precise targeting of aid efforts, ultimately building a more resilient and responsive humanitarian network in the region.

#### **4.5.5. Temporary Learning Spaces**

In both their quantitative and qualitative responses, the respondents highlighted temporary learning spaces as a strategic response to the depletion of education infrastructure during armed conflicts, such as the war in Tigray. Temporary learning spaces is provision of temporary, safe, and conducive spaces for teaching and learning to continue in crisis-affected areas, often using makeshift classrooms or community centers (Lenkova, 2015).

Table 52: Descriptive Statistical results for Temporary Learning Spaces

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	3.0933	.14968	1.29629
Accessibility	75	2.7733	.14278	1.23653
Acceptability	75	3.0000	.14078	1.21922
Adaptability	75	2.9067	.16238	1.40629
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the temporary learning space strategy provides a detailed evaluation of its performance across four critical educational dimensions: availability, accessibility, acceptability, and adaptability. Employing a 5-point, the findings indicated a moderate performance across all features. Specifically, the availability of the strategy was rated high (M = 3.0933), while its accessibility was assessed as moderate (M = 2.7733). Similarly, acceptability received a medium rating (M = 3.0000), and adaptability was rated as moderate (M = 2.9067). The standard errors, ranging between 0.14078 and 0.16238, suggest the precision and reliability of these mean values. However, the standard deviations, spanning from 1.21922 to 1.40629, highlight a notable degree of variability in responses, reflecting divergent perspectives among respondents. This variability underscores the complexities in designing and implementing temporary learning spaces that effectively address diverse educational needs across different contexts.

The regression analysis underpinning the descriptive findings exhibited an exceptional model fit, as evidenced by an R-squared (R<sup>2</sup>) value of 0.9818. This indicates that 98.18% of the variability in temporary learning space is accounted for by the educational features analyzed. Moreover, the model's F-statistic of 1239.11, coupled with a p-value of 0.000, underscores its strong statistical significance, as detailed in the table below.

Table 53: Regression Analysis for Temporary Learning Spaces

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.286507	0.022945	12.49	0.000	0.2406405	0.3323735
Accessibility	0.2797612	0.0271897	10.29	0.000	0.2254097	0.3341127
Acceptability	0.4612007	0.0195767	23.56	0.000	0.4220674	0.500334
Adaptability	-0.011019	0.0132695	-0.83	0.409	-0.037545	0.015506
_cons	-0.139645	0.086087	-1.62	0.110	-0.311731	0.0324401
R <sup>2</sup>	0.9818					
F(6, 62)	1239.11					
Prob > F	0.0000					
N	69					

The regression analysis revealed that a 1-unit increase in availability is associated with a 0.2865 increase in the outcome related to temporary learning spaces. The result is highly statistically significant ( $p < 0.001$ ), indicating that availability plays a crucial role in ensuring the effectiveness of temporary learning spaces, particularly in crisis or emergency settings. Similarly, accessibility is also an important factor, with a 1-unit increase in accessibility leading to a 0.2798 increase in the outcome. This demonstrates the importance of ensuring that learning spaces are easy to access, as greater accessibility supports educational continuity and inclusiveness.

Acceptability has the highest coefficient, showing the most substantial impact. A 1-unit increase in acceptability is associated with a 0.4612 increase in the outcome. This suggests that when learning environments are deemed more acceptable—whether in terms of quality, safety, or relevance—temporary learning spaces become more effective and well-received. Interestingly, adaptability has a small negative coefficient (-0.011), though it is not statistically significant ( $p = 0.409$ ). This suggests that while adaptability may intuitively seem important, its influence on the outcome is minimal and potentially negative, meaning that increased adaptability may not necessarily enhance the effectiveness of temporary learning spaces in this context.

Qualitative findings revealed diverse perspectives on temporary learning spaces to address educational needs in conflict-affected regions. Safety emerges as a central concern, with respondents from educational organizations and non-governmental organizations (NGOs) emphasizing the need for secure learning environments. [EO-KT-01] underscored the role of government and international charitable organizations in ensuring safety: "Temporary places of education should be operated in a safe manner by the government and international charitable

organizations (NGOs)." Similarly, [EO-Seh-1] highlighted the importance of making learning sites "safe and free from war zones." Alongside safety, infrastructure remains a critical focus, with [EO-GH-01] advocating for creative solutions such as "using tents, shade trees, and various sheltered areas" to create temporary learning spaces until permanent facilities can be restored.

Challenges in establishing and maintaining temporary learning spaces are also highlighted, particularly around accessibility and community engagement. [EO-H-2] points to gaps in provision: "No temporary places of learning have been created," while [NGO 6] notes the limited accessibility of temporary learning spaces in host communities: "These are not available and accessible, especially in the host community areas." Respondents emphasize the importance of community collaboration in overcoming such challenges, as [EO-RC-01] suggests: "Trying to solve the problem in collaboration and discussion with the community." Strategic planning is also noted as key, with [NGO-15] discussing the need for temporary learning spaces (TLS) to align with international education in emergency and child protection standards, including considerations for gender-specific needs and conflict risks. Despite budget constraints, [NGO-7] advocates for the widespread establishment of TLS in crisis zones: "Regardless of the budget, it is very important for the education system to be provided everywhere conflict-affected communities are found." These perspectives underscore the importance of safety TLS in ensuring the continuity of education through in conflict-affected areas where there is depletion of education infrastructure.

In comparison with other studies, Temporary Learning Spaces (TLS) in Tigray are regarded as highly effective in terms of availability, accessibility, and acceptability. However, they face considerable challenges when it comes to adaptability, particularly in a region impacted by ongoing conflict and instability. Lenkova (2015) highlights that in other conflict-affected areas, the success of TLS initiatives is often driven by robust collaboration between non-governmental organizations (NGOs) and government institutions. Such partnerships ensure not only the physical establishment of learning spaces but also their long-term sustainability and adaptability to the evolving needs of displaced and marginalized populations.

To enhance the effectiveness of TLS in Tigray, a more integrated and coordinated approach is required, involving key stakeholders from both the public and private sectors. Strengthening these partnerships could address current gaps in adaptability by enabling faster responses to shifting conditions and ensuring that educational services remain inclusive and flexible enough to meet the

diverse needs of learners. Such coordination could also facilitate resource sharing, improve teacher training, and provide critical psychosocial support, ultimately fostering a more resilient and responsive educational framework within these temporary spaces.

#### 4.5.6. Community-Led Learning Networks

In both their quantitative and qualitative responses, the respondents emphasized community-led learning networks as a strategic response to the education ecosystem fragmentation during armed conflicts, such as the war in Tigray. Community-led learning networks are community-driven initiatives that support and sustain local educational efforts during armed conflict crisis, involving active participation of community members, parents, and local leaders (Omeje, 2014).

Table 54: Descriptive Statistical Results for Community-Led Learning Networks

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	75	2.5467	.14862	1.28708
Accessibility	75	2.4933	.14253	1.23434
Acceptability	75	2.7600	.15286	1.32379
Adaptability	75	2.7867	.15572	1.34861
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Community-Led Learning Networks offers an in-depth evaluation of its performance across four essential educational dimensions: availability, accessibility, acceptability, and adaptability. The analysis revealed a moderate performance across all dimensions. Specifically, the availability of the networks was rated as moderate (M = 2.5467), while accessibility was similarly assessed as moderate (M = 2.4933). Acceptability showed a slightly higher rating (M = 2.7600), and adaptability was also rated in the moderate range (M = 2.7867). The standard errors, ranging from 0.14253 to 0.15572, suggest a reliable degree of precision in the reported mean values. However, the standard deviations, which range from 1.23434 to 1.34861, point to considerable variability in respondents' perceptions across these educational features. This variability highlights the challenges and diverse experiences in

implementing community-led learning initiatives, which must cater to a wide range of educational needs in different contexts.

The regression analysis discussed in the table below for the community-led learning network revealed a strong model fit, with an R-squared ( $R^2$ ) value of 0.9697, indicating that 96.97% of the variation in the network is explained by the independent variables-education features. The F-statistic of 581.33, with degrees of freedom (6, 62), and a p-value of 0.0000 further affirms the overall statistical significance of the model.

Table 55: Regression Analysis for Community-Led Learning Networks

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2385637	0.0333003	7.16	0.000	0.1719973	0.30513
Accessibility	0.2749253	0.0346536	7.93	0.000	.02056538	0.3441968
Acceptability	0.4390099	0.0316717	13.86	0.000	0.3756992	0.5023207
Adaptability	-0.030897	0.0209693	-1.47	0.146	-0.072814	0.01102
_cons	0.181209	0.1815461	1.00	0.322	-0.181697	0.5441145
$R^2$	0.9697					
F(6, 62)	581.33					
Prob > F	0.0000					
N	69					

The regression analysis revealed that a 1-unit increase in availability is associated with a 0.2386 increase in community-led learning network outcomes. The strong statistical significance ( $p < 0.001$ ) indicates that availability is a critical factor in improving these outcomes, especially in educational settings that rely on community-driven efforts. Similarly, accessibility plays a significant role in enhancing these networks, with a 1-unit increase in accessibility leading to a 0.2749 increase in the outcome. This underscores the importance of ensuring that learning opportunities and resources are easily accessible within communities, helping to strengthen the impact of these networks.

Acceptability emerges as the most influential factor, having the highest coefficient. A 1-unit increase in acceptability results in a 0.4390 increase in the effectiveness of community-led learning networks. This suggests that when the education provided is perceived as acceptable—whether in terms of quality, relevance, or cultural fit—the networks are more likely to thrive and deliver positive outcomes. While adaptability has a negative coefficient (-0.0309), it is not statistically

significant ( $p = 0.146$ ). This indicates that increased adaptability does not have a strong effect on outcomes and might even slightly decrease the effectiveness of these networks. This could be due to potential challenges or conflicts arising from too much flexibility, which might disrupt the stability of learning systems in some cases.

The exploration of Community-Led Learning Networks unveils key insights into the role of community involvement in sustaining education in conflict-affected regions like Tigray. [EO-KT-02] highlighted that "the network must be able to be managed not only by education professionals but also by the community," signaling the importance of shared responsibility. This is echoed by [EO-KT-03], who advocates for deeper community involvement: "Encourage the community to involve parents and local leaders in providing financial, labor, and moral support to continue the war-torn learning process." The emphasis on fostering community ownership is clear in [EO-Seh-1]'s assertion that networks thrive by "enhancing the community's sense of ownership," while [EB-6] stresses the need for capacity-building: "Strengthen community-led learning networks by providing training because principals can't run them if they do not have the capacity."

NGO respondents offer both strategic perspectives and a candid acknowledgment of systemic challenges. [NGO-2] pointed out the difficulties in mobilizing resources, stating that "Community-Led Learning Networks are ideal recovery approaches to the crisis-affected education system in Tigray. But unfortunately, they are not widely exercised due to a lack of mobilization, coordination, and unstable government structures since the war emerged." Mobilizing local resources is seen as a key advantage, as noted by [NGO-4]: "Establishing Community-Led Learning Networks will help in responding to the need to re-strengthening the education system in Tigray, as it can use community resources, compensating for the scarce resources of NGOs and the government." Building collaborative partnerships is equally crucial, with [NGO-11] advocating for alliances between schools, NGOs, community organizations, and businesses to create a "collaborative and supportive educational ecosystem." These findings highlight both the complexities and opportunities in implementing community-driven educational networks in conflict-affected areas, underscoring the need for collective effort and strategic planning to achieve sustainable outcomes.

When compared with other studies, community-led learning networks in Tigray demonstrate moderate effectiveness in terms of availability, accessibility, and acceptability, though they face

significant challenges in adaptability. Omeje's (2014) research underscores the critical role of community involvement in maintaining educational continuity during crises. However, in Tigray, the unstable governmental structures complicate these efforts. In regions where community learning networks have thrived, success has often been linked to strong partnerships between local governments and community stakeholders. This suggests that strengthening local engagement, alongside effective resource mobilization strategies, could play a pivotal role in enhancing the impact of these networks in Tigray. A more coordinated effort between local actors and external support systems may offer a sustainable pathway to improving the resilience and adaptability of educational initiatives in the region.

#### **4.6. Response Approaches to Teaching and Learning Crisis**

The second question of the second objective of this study focused on evaluating the proposed response approaches to teaching and learning crisis across the features of education- availability, accessibility, acceptability, and adaptability. These questions have been responded by teachers and students who have the interaction of it in the classrooms. The proposed response approaches were curriculum condensation, blended teaching-learning, accelerated education program, targeted learning assessment, interim learning sanctuary, and mental health and psychosocial support.

The questions of the response approaches to the teaching-learning crises were analyzed through inclusive quantitative and qualitative analytical methods. A comprehensive statistical analysis was conducted, starting with descriptive statistics, including means and standard deviations, and advancing to inferential techniques, notably multiple linear regression, to evaluate the response approaches across various dimensions of the features of education.

##### **4.6.1. Curriculum Condensation**

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that curriculum condensation was proved as an effective strategy to address disruptions in educational curriculums caused by crises like the war in Tigray. Curriculum condensation is streamlining and adapting the curriculum to focus on essential learning outcomes and skills during armed conflict crisis, ensuring that limited instructional time is used effectively (Burde et al., 2017).

Table 56: Descriptive Statistical Results for Curriculum Condensation

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	3.3057	.10755	1.34766
Accessibility	154	3.2727	.11256	1.39688
Acceptability	155	3.2774	.11156	1.38890
Adaptability	155	3.4323	.10153	1.26398
Valid N (listwise)	154			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis presented in the preceding table reveals critical insights into the perceptions surrounding curriculum condensation. The mean score for availability ( $M = 3.3057$ ) indicates that it is perceived as high, suggesting a general consensus among respondents that curriculum condensation is adequately available to address disruptions. However, the relatively high standard deviation ( $SD = 1.34766$ ) implies a significant variability in individual perceptions regarding availability. This disparity highlights the inconsistent experiences respondents have with availability across various contexts. Notably, the standard error ( $SE = 0.10755$ ) reflects a precise estimate of the mean, indicating that, despite the variability in perceptions, a clear overall trend emerges regarding the availability of curriculum resources.

Similarly, the mean score for accessibility ( $M = 3.2727$ ) also falls within the high range, denoting that curriculum condensation is generally accessible to students or users. Nonetheless, the highest standard deviation among the metrics ( $SD = 1.39688$ ) suggests considerable differences in perceptions of accessibility. This indicates that while many view the curriculum as accessible, others may experience barriers. The low standard error ( $SE = 0.11256$ ) further confirms the reliability of the overall estimate, suggesting that the broad range of experiences in accessibility does not undermine the general trend observed.

In terms of acceptability, a mean score of ( $M = 3.2774$ ) places it within the high range, signifying that most students perceive the quality of the condensed curriculum as meeting acceptable standards. However, the standard deviation ( $SD = 1.38890$ ) indicates significant variations in acceptability perceptions across different contexts. The relatively low standard error ( $SE =$

0.11156) enhances confidence in the reliability of the mean score for acceptability, suggesting that, despite varying individual perceptions, the overall assessment remains consistent.

Adaptability emerges as a particularly strong attribute, with the highest mean score of (M = 3.4323), indicating that respondents widely consider curriculum condensations to be highly adaptable to diverse contexts and needs. The lower standard deviation (SD = 1.26398) compared to the other features indicates reduced variation in perceptions regarding adaptability, signifying a more consistent viewpoint among respondents. Furthermore, the low standard error (SE = 0.10153) reinforces the precision of this finding, suggesting that adaptability is a well-regarded aspect of curriculum condensation across different contexts.

The regression analysis supporting the descriptive results in the table below provided valuable insights into how the features of education influence the effectiveness of curriculum condensation during armed conflicts. The regression model explains 95.66% of the variance in curriculum condensation, as indicated by the R-squared value (0.9566). This high level of explained variance suggests that the model effectively captures the key factors influencing curriculum condensation. The F-statistic (2054.09) and its associated p-value (0.0000) further confirm that the model is statistically significant and reliable in explaining the data.

Table 57: Regression Analysis for Curriculum Condensation

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.3151468	0.0412613	7.64	0.000	0.2336139	0.3966798
Accessibility	0.1923276	0.026254	7.33	0.000	0.1404493	0.2442058
Acceptability	0.2258535	0.0327118	6.90	0.000	0.1612145	0.2904924
Adaptability	0.2792062	0.0293182	9.52	0.000	0.221273	0.3371393
_cons	0.1810921	0.1059801	1.71	0.090	-0.028326	0.3905102
R <sup>2</sup>	0.9566					
F(6, 149)	2054.09					
Prob > F	0.0000					
N	156					

The regression analysis demonstrates that the availability of a curriculum condensation response approach is a critical predictor of effectively addressing curriculum disruption during crises. The coefficient (Coef. = 0.3151) indicates a substantial positive impact, with a high statistical significance (p < 0.001). This finding suggests that enhancing the availability of this response strategy markedly improves its efficacy in mitigating the adverse effects of curriculum disruptions.

In addition to availability, accessibility is identified as another vital determinant influencing the implementation of curriculum condensation, as evidenced by a coefficient of (Coef. = 0.1923) and high significance ( $p < 0.001$ ). This indicates that increasing the accessibility of the curriculum condensation approach significantly enhances its effectiveness in responding to disruptions during crises.

Moreover, the acceptability of the condensed curriculum plays a crucial role in its effectiveness, reflected by a coefficient of (Coef. = 0.2259) with a significance level of ( $p < 0.001$ ). This underscores that the greater the acceptability of the condensed curriculum among stakeholders, the more effectively it can address disruptions. Furthermore, adaptability emerges as the most significant predictor of curriculum condensation effectiveness, with a coefficient of (Coef. = 0.2792) ( $p < 0.001$ ). This finding highlights the critical importance of flexible and adaptable condensed curriculum that can respond swiftly to the rapidly changing conditions often encountered in conflict zones. Collectively, these results underscore the necessity of prioritizing availability, accessibility, acceptability, and adaptability in the development and implementation of curriculum interventions in times of crisis.

The qualitative analysis of responses regarding curriculum condensation in the Tigray region revealed a spectrum of perspectives that underscore its potential as a response strategy to curriculum disruption caused by crises. Many respondents believe that curriculum condensation can effectively address lost instructional time and support students' academic progression. One respondent emphasized the urgency of this approach, stating, "It will allow us to properly compensate for the time wasted due to the war" (S-KT-01). This sentiment reflects a broader consensus that curriculum condensation can help restore a distorted curriculum and ensure that students reach their appropriate grade levels, with another participant noting, "It will help the distorted curriculum to be restored quickly and students will reach the grade level they should reach" (S-KT-02). However, while this approach presents a promising avenue for mitigating the effects of educational disruption, its implementation must be contextually sensitive and well-planned to be sustainable in the long term.

Despite its potential benefits, concerns regarding the implementation of curriculum condensation were also raised by respondents, particularly regarding the need for proper training and support for teachers. One participant remarked, "We need adequate support systems for educators" (T-RC-

02), underscoring the importance of preparing teachers to deliver condensed content effectively. Additionally, apprehensions about maintaining educational standards were voiced, with some stressing the need to consider students' age and capacity when implementing such changes. One respondent articulated the necessity of this balance, stating, “We must compensate wasted learning as soon as possible” to facilitate progression to the next grade level (S-KT-09). The insights from this analysis suggest that while curriculum condensation can serve as a rapid response to educational disruptions, a nuanced and supportive strategy is essential to ensure that reforms are effective, equitable, and sustainable in the post-conflict educational landscape.

To compare and contrast this with other studies, Studies by Burde et al. (2017) focused on curriculum adaptations in Afghanistan, where education was severely disrupted by conflict. The condensed curriculum there was aimed at reducing content to the essential skills and knowledge, allowing for efficient use of time in classrooms disrupted by violence. A similar study in Syria, conducted by UNESCO (2018), focused on minimizing the impact of lost learning time by prioritizing key learning outcomes. Both Burde et al. (2017) and this study highlight the importance of essentializing curriculum during crises. The idea of focusing on core skills and outcomes resonates across both studies, showing that streamlined content can effectively compensate for lost time. This study in Tigray and others emphasize that condensed curricula work well when flexibility and adaptability are prioritized.

A key difference is the level of variability in access and adaptability found in the Tigray study, as reflected in the high standard deviation in availability and accessibility. The Afghan study reported more uniformity in access due to government-backed programs, whereas the findings from Tigray highlight inconsistent access to curriculum resources. In Tigray, the conflict has affected different regions disproportionately, leading to greater variability in curriculum delivery, unlike in Afghanistan where national and international programs worked more cohesively.

While both studies agree that curriculum condensation is an effective tool, its implementation must be context-sensitive. In Tigray, the inconsistency in access due to fragmented infrastructure makes it harder to ensure equitable curriculum delivery. This suggests that for curriculum condensation to be universally effective, logistical challenges like resource distribution need to be addressed more thoroughly.

#### 4.6.2. Blended Teaching-Learning

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that blended teaching-learning was proved as an effective strategy to address instructional challenges caused by crises like the war in Tigray. Blended teaching-learning is utilizing a combination of in-person and remote teaching methods to facilitate continuous learning even in situations where traditional classroom teaching is disrupted by armed conflict (Taufiq et al., 2021).

Table 58: Descriptive Statistical Results for Blended Teaching-Learning

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	2.9682	.11445	1.43411
Accessibility	154	3.0779	.10883	1.35054
Acceptability	155	3.2645	.10949	1.36314
Adaptability	153	3.2745	.10624	1.31407
Valid N (listwise)	152			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis presented in the table revealed that the mean score for availability stands at ( $M = 2.9682$ ), positioning it within the medium range. This indicates a prevailing perception among respondents that resources for blended teaching and learning could be moderately available. However, the observed standard deviation of ( $SD = 1.43411$ ) highlights a considerable degree of variability in individual perceptions regarding availability. Despite this heterogeneity, the standard error of the mean, calculated at ( $SE = 0.11445$ ), suggests a high level of precision in the mean estimate. This implies that, although the perception of resource availability may differ significantly across various contexts, the overarching trend points toward a consensus on general availability.

Similarly, the mean score for accessibility is reported at ( $M = 3.0779$ ), also indicating a high level of perceived accessibility of blended learning resources among users. However, the standard deviation ( $SD = 1.35054$ ) reveals notable discrepancies in how these resources are experienced in terms of accessibility. The comparatively low standard error ( $SE = 0.10883$ ) corroborates the

reliability of the mean score, indicating that, despite the varying experiences reported by respondents, the overall assessment of accessibility remains robust.

In terms of acceptability, a mean score of ( $M = 3.2645$ ) falls within the high range, suggesting that most respondents perceive the quality of blended learning resources as meeting acceptable standards. Nevertheless, the standard deviation ( $SD = 1.36314$ ) points to significant variability in perceptions of acceptability across different contexts. The low standard error ( $SE = 0.10949$ ) enhances confidence in the reliability of this mean score, suggesting that, despite the observed variances, the general assessment of acceptability is consistent.

Notably, adaptability emerges as a key feature, with the highest mean score of ( $M = 3.2745$ ). This indicates that blended learning strategies are viewed as highly adaptable to diverse contexts and needs. The lower standard deviation of ( $SD = 1.10624$ ) in comparison to the other metrics suggests a greater degree of consensus among respondents regarding the adaptability of these resources. Furthermore, the low standard error ( $SE = 0.10624$ ) reinforces the precision of this finding, indicating that adaptability is a consistently well-regarded attribute within the framework of blended teaching and learning.

The regression model presented in the table below also supported the descriptive results and explains 83.33% of the variance in blended teaching-learning, as indicated by the R-squared value (0.8333). This high level of explained variance suggests that the model effectively captures the key factors influencing blended teaching learning strategy to address instructional challenges. The F-statistic (302.56) and its associated p-value (0.0000) further confirm that the model is statistically significant and reliable in explaining the data.

Table 59: Regression Analysis for Blended Teachers-Learning

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2229004	0.0665312	3.35	0.001	0.0914338	0.354367
Accessibility	0.1557495	0.0504738	3.09	0.002	0.0560127	0.2554863
Acceptability	0.235146	0.0484585	4.85	0.000	0.1393914	0.3309006
Adaptability	0.2230459	0.044126	5.05	0.000	0.1358525	0.3102394
_cons	0.788456	0.3824306	2.06	0.041	0.032768	1.544144
R <sup>2</sup>	0.8333					
F(6, 149)	302.56					
Prob > F	0.0000					
N	1561					

The regression analysis above revealed that the availability of blended teaching and learning strategy is a significant predictor of their effectiveness in addressing instructional challenges in conflict zones. The coefficient (Coef. = 0.2229) indicates a substantial positive impact, with high statistical significance ( $p = 0.001$ ). This finding suggests that enhancing the availability of blending teaching learning response strategies markedly improves its effectiveness in mitigating the adverse effects of instructional challenges. In addition to availability, accessibility is identified as another critical factor influencing the implementation of blended teaching learning, evidenced by a coefficient (Coef. = 0.1557) with high significance ( $p = 0.002$ ). This indicates that increasing access to blended learning strategies significantly enhances the effectiveness in responding to instructional disruptions.

Moreover, the acceptability of blended learning methods plays a vital role in their effectiveness, as reflected by a coefficient (Coef. = 0.2351) with a significance level of ( $p < 0.001$ ). This underscores that greater acceptability among stakeholders correlates with more effective responses to instructional challenges. Furthermore, adaptability emerges as a crucial predictor of blended teaching learning effectiveness, with a coefficient (Coef. = 0.2230) and significance ( $p < 0.001$ ). This finding highlights the importance of flexible and adaptable blended learning approaches that can swiftly respond to the rapidly changing conditions often found in conflict zones. Collectively, these results emphasize the necessity of prioritizing availability, accessibility, acceptability, and adaptability in the development and implementation of blended teaching and learning strategies during times of crisis.

The qualitative data analysis also revealed that blending teaching learning helps as response strategy to address instruction challenges due to the war in Tigray. As one respondent noted, "it serves as an alternative for students who are out of school due to various problems, helping them to achieve higher performance" (S-KT-01). Another emphasized its protective qualities, stating, "it helps students to get education in a variety of ways while being close to them and protecting themselves from dangerous situations" (S-KT-02), allowing them to stay focused on their studies even amid turmoil. An efficient curriculum that incorporates diverse teaching methods is crucial to providing a well-rounded education tailored to students' needs. By adopting flexible and adaptable teaching approaches, as one respondent noted, "using multiple methods of teaching and learning process according to the set program" (T-RC-01), educators can cater to various learning

styles and preferences. The diverse perspectives shared by respondents underscore that while blended learning has the potential to revolutionize education delivery in challenging contexts, concerted efforts are required to address existing obstacles and optimize its benefits for students worldwide.

To compare and contrast this with other studies, Taufiq et al. (2021) explored blended learning in conflict zones in Indonesia and the Philippines, where insurgencies disrupted regular schooling. Blended teaching, combining digital platforms and in-person methods, was implemented to ensure continued learning during crises. Similarly, studies in the Middle East, particularly during the Syrian refugee crisis (Tomaševski, 2020), emphasized the use of technology to bridge gaps in classroom-based education. The Tigray study and findings from Indonesia and the Philippines both highlight the role of flexibility in blended learning environments, which allow students to engage with educational content remotely when physical access is hindered by conflict. Both regions experienced similar constraints in delivering face-to-face education, thus relying on digital platforms and remote learning as alternatives.

The key difference is in infrastructure readiness. In Indonesia and the Philippines, access to the internet and technological tools was relatively better due to investments in digital learning even before the conflict. In contrast, the Tigray study reports a more significant challenge in accessibility, as digital infrastructure is severely limited by both conflict and underdevelopment. Therefore, the degree of success of blended learning is directly tied to technological infrastructure, which is less available in Tigray.

Blended learning's effectiveness is highly dependent on infrastructure. The findings from the Tigray region show that, while theoretically effective, blended learning needs substantial investment in digital infrastructure to be truly impactful in conflict zones. Programs similar to those in the Philippines could serve as models, but only if the technological limitations are addressed, as this remains a major barrier in many African conflict-affected regions.

### 4.6.3. Accelerated Education Program

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that accelerated education program was proved as an effective strategy to address learning and academic regression caused by crises like the war in Tigray. Accelerated education is a program where intensive educational programs designed to fast-track learning and make up for lost instructional time, often targeted at students who have been affected by armed conflict crisis (Nicolai et al., 2018).

Table 60: Descriptive Statistical Results for Accelerated Education Program

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	3.3758	.10897	1.36539
Accessibility	154	3.4351	.11053	1.37163
Acceptability	156	3.4551	.11225	1.40204
Adaptability	156	3.5641	.10256	1.28103
Valid N (listwise)	154			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis presented in the preceding table reveals critical insights into the perceptions surrounding the Accelerated Education Program (AEP) and its components. The mean score for availability ( $M = 3.3758$ ) indicates a generally high perception among respondents regarding the adequacy of resources and opportunities provided by the AEP to address educational disruptions. However, the relatively high standard deviation ( $SD = 1.36539$ ) suggests significant variability in individual perceptions of availability. This disparity highlights the inconsistent experiences respondents have with the availability of educational resources across different contexts. Notably, the standard error ( $SE = 0.10897$ ) reflects a precise estimate of the mean, indicating that despite the variability in perceptions, a clear overall trend emerges regarding the availability of AEP resources.

Similarly, the mean score for accessibility ( $M = 3.4351$ ) also falls within the high range, denoting that the AEP is generally perceived as accessible to students. Nonetheless, the highest standard deviation among the metrics ( $SD = 1.37163$ ) indicates considerable differences in perceptions of

accessibility. This suggests that while many respondents view the program as accessible, others encounter barriers that impede their participation. The low standard error ( $SE = 0.11053$ ) further confirms the reliability of the overall estimate, suggesting that the broad range of experiences in accessibility does not undermine the general trend observed.

In terms of acceptability, a mean score of ( $M = 3.4551$ ) places it within the high range, signifying that most respondents perceive the quality of the AEP as meeting acceptable standards. However, the standard deviation ( $SD = 1.40204$ ) indicates significant variations in acceptability perceptions across different contexts. The relatively low standard error ( $SE = 0.11225$ ) enhances confidence in the reliability of the mean score for acceptability, suggesting that despite varying individual perceptions, the overall assessment remains consistent.

Adaptability appears as a particularly strong attribute, with the highest mean score of ( $M = 3.5641$ ), indicating that respondents widely consider the AEP to be highly adaptable to diverse contexts and learner needs. The lower standard deviation ( $SD = 1.28103$ ) compared to the other features signifies reduced variation in perceptions regarding adaptability, indicating a more consistent viewpoint among respondents. Furthermore, the low standard error ( $SE = 0.10256$ ) reinforces the precision of this finding, suggesting that adaptability is a well-regarded aspect of the AEP across different educational contexts.

In conclusion, the AEP shows promise in addressing learning and academic regression, with generally positive perceptions regarding its availability, accessibility, acceptability, and adaptability. However, the notable variability in perceptions emphasizes the need for targeted interventions to enhance these aspects further, ensuring that all learners can benefit from the program effectively.

The regression model presented below also supported descriptive statistical results above and explains 96.88% of the variance in accelerated education program effectiveness, as indicated by the R-squared value (0.9688). This high level of explained variance suggests that the model effectively captures the key factors influencing AEP. The F-statistic (1395.01) and its associated p-value (0.0000) further confirm that the model is statistically significant and reliable in explaining the data.

Table 61: Regression Analysis for Accelerated education Program

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2654767	0.029404	9.03	0.000	0.2073608	0.3235925
Accessibility	0.3023054	0.0373955	8.08	0.000	0.2283947	0.3762162
Acceptability	0.285291	0.0372399	7.66	0.000	0.2116879	0.3588941
Adaptability	0.0344681	0.0158601	2.17	0.031	0.0031213	0.0658149
_cons	0.17192	0.1028655	1.67	0.097	-0.031389	0.3752294
R <sup>2</sup>	0.9688					
F(6,145)	1395.01					
Prob > F	0.0000					
N	152					

The regression results above revealed that the availability of Accelerated Education Programs (AEP) emerges as a strong predictor of their effectiveness in mitigating academic regression, with a coefficient of 0.2655 ( $p < 0.001$ ). This finding underscores that expanding the provision of these programs significantly enhances their impact on addressing learning gaps and academic setbacks. Accessibility plays an even more critical role, evidenced by a coefficient of 0.3023 ( $p < 0.001$ ). This suggests that improving access to AEP greatly amplifies their capacity to reduce academic regression, particularly in underserved or crisis-affected areas.

The acceptability of AEP among stakeholders also proves to be a key determinant of success, with a highly significant coefficient of 0.2853 ( $p < 0.001$ ). The more widely accepted these programs are by communities and educational leaders, the more effective they become in reversing academic losses. Finally, adaptability, while slightly less pronounced, remains a significant factor, with a coefficient of 0.0345 ( $p = 0.031$ ). This highlights the necessity for AEP to be flexible and responsive to dynamic conditions, particularly in conflict zones, ensuring their continued relevance and effectiveness in varying educational landscapes.

Accelerated education programs are emerging as critical tools in addressing learning loss and academic regression in Tigray, particularly in the aftermath of conflict-related disruptions. Respondents to qualitative surveys strongly affirm the program's role in bridging educational gaps and helping students progress toward their academic goals. One respondent emphasized how these programs "fill the gap and create a learning process" (S-KT-01), highlighting their effectiveness in addressing disparities. Another explained that accelerated education enables students to become

"competent and skillfully developed in the time allotted" (S-KT-02), underscoring the urgency of catching up on missed education efficiently.

Many respondents also stressed the importance of offering age-appropriate instruction, ensuring students quickly acquire the necessary knowledge and skills to re-enter regular schooling (S-KT-09). Additionally, respondents highlighted the importance of aligning students' age and grade levels within the educational framework to avoid misplacements (S-Seh-1). Flexibility in both teaching methods and assessment approaches was also emphasized, with one respondent advocating for "smooth learning processes tailored to students' age" (T-KT-02) and another stressing comprehensive student evaluations (S-RC-02). Despite the challenges, these qualitative insights underscore that, with careful planning, improved quality control, and alignment with students' individual needs, accelerated education programs have the potential to significantly reduce educational disparities and enhance academic outcomes in Tigray.

To compare and contrast this with other studies, Nicolai et al. (2018) examined accelerated education programs in South Sudan and Uganda, where conflicts displaced large numbers of students and disrupted regular schooling. AEPs were implemented to allow children and youth to quickly catch up on missed education and reintegrate into formal education systems. A related study in Iraq (UNHCR, 2019) also used AEPs to address educational gaps for internally displaced populations. Both studies in South Sudan and Uganda, and the Tigray findings, emphasize that accelerated education programs are critical for addressing educational gaps during and after conflicts. In all regions, AEPs help learners make up for lost time, enabling them to achieve learning milestones more quickly.

However, in Tigray, the variability in the availability and accessibility of these programs is highlighted as a significant issue, with rural areas facing more severe educational setbacks. In contrast, the South Sudan and Uganda studies showed more uniform application of AEPs, due to strong support from international NGOs and better coordination with local authorities. In Tigray, similar coordination is limited by ongoing instability.

While AEPs are shown to be effective across different conflict zones, their success in Tigray is hampered by uneven implementation and access. The differences observed in South Sudan and Uganda suggest that better collaboration between international bodies and local governments could

improve the reach and effectiveness of AEPs. Tigray would benefit from more structured coordination efforts to ensure that educational interventions reach all affected populations equally.

#### 4.6.4. Targeted Learning Assessment

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that targeted learning assessment was proved as an effective strategy to address disruptions in learning assessment caused by crises like the war in Tigray. Targeted learning assessment is implementing focused and efficient assessment strategies to gauge students' learning progress and identify areas that require immediate attention during armed conflict crisis (Anderson & Anderson, 2020).

Table 62: Descriptive Statistical Results for Targeted Learning Assessment

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	3.1401	.10861	1.36089
Accessibility	156	3.2244	.10783	1.34679
Acceptability	156	3.4872	.10932	1.36541
Adaptability	155	3.4323	.10153	1.26398
Valid N (listwise)	155			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]  
**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range  
**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis presented in the table provides key insights into the perceptions of the Targeted Learning Assessment across four education features: availability, accessibility, acceptability, and adaptability. The mean score for availability (M = 3.1401) indicates that availability is perceived as high, reflecting a general consensus that targeted learning assessments are sufficiently available to support students. However, the standard deviation (SD = 1.36089) reveals a notable variation in perceptions, suggesting that while many respondents perceive learning assessments to be available, others may experience gaps. The standard error (SE = 0.10861) provides a reliable estimate of the mean, indicating that despite variability in perceptions, the general trend remains that availability is positively viewed.

For accessibility, the mean score (M = 3.2244) similarly falls within the high range, denoting that respondents generally perceive targeted learning assessments as accessible. However, the standard

deviation (SD = 1.34679) points to considerable differences in respondents' experiences, with some facing barriers to accessing these assessments. The low standard error (SE = 0.10783) confirms the reliability of this overall estimate, suggesting that while perceptions vary, the general assessment of accessibility is positive.

The acceptability of the learning assessments, with a mean score (M = 3.4872), emerges as one of the strongest features, indicating that most respondents find the quality of these targeted learning assessments to be high. Nonetheless, the standard deviation (SD = 1.36541) signals significant variability in perceptions, implying that acceptability may be context-dependent or vary across different user groups. The standard error (SE = 0.10932) suggests that, despite these variations, the overall mean is a reliable representation of respondents' views.

Finally, adaptability has a mean score (M = 3.4323), also placing it in the high range, which indicates that respondents widely consider targeted learning assessments to be adaptable to diverse student needs and contexts. The relatively lower standard deviation (SD = 1.26398) compared to other features suggests more consistent perceptions about adaptability, indicating a generally favorable view across respondents. The standard error (SE = 0.10153) further reinforces the precision of this result, showing that adaptability is a well-regarded characteristic of the assessments.

The regression model presented below also explains 92.00% of the variance in targeted learning assessment effectiveness, as indicated by the R-squared value (0.9200). This high level of explained variance suggests that the model effectively captures the key factors influencing TLA. The F-statistic (240.72) and its associated p-value (0.0000) further confirm that the model is statistically significant and reliable in explaining the data.

Table 63: Regression Analysis for Targeted Learning Assessment

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.1518847	0.0170479	8.91	0.000	0.118196	0.1855735
Accessibility	0.1772557	0.0226607	7.82	0.000	0.1324753	0.222036
Acceptability	0.2097229	0.022171	9.46	0.000	0.1659103	0.2535355
Adaptability	0.0826314	0.0136619	6.05	0.000	0.0556338	0.109629
_cons	0.7852817	0.1486853	5.28	0.000	0.4914612	1.079102
R <sup>2</sup>	0.9200					
F(6,148)	240.72					
Prob > F	0.0000					
N	155					

The availability of targeted learning assessment (TLA) resources significantly predicts their effectiveness, with a coefficient of 0.1519 ( $p < 0.001$ ). This indicates that increasing the availability of targeted assessment strategies enhances their effectiveness in monitoring and improving student learning during armed conflicts. Ensuring that assessment tools and methods are readily accessible to educators and students allows for timely interventions and adjustments in educational strategies. Accessibility plays a crucial role in the effectiveness of TLA, with a coefficient of 0.1773 ( $p < 0.001$ ). This suggests that improving access to assessment tools and data significantly enhances their effectiveness in identifying and addressing learning gaps. In conflict zones, where physical access to educational facilities may be limited, leveraging digital platforms and mobile technologies can facilitate remote assessment and data collection, enabling continuous monitoring of student progress.

The acceptability of TLA is highly significant, with a coefficient of 0.2097 ( $p < 0.001$ ). This highlights that the more acceptable targeted assessment strategies are to stakeholders, the more effective they will be in supporting educational continuity during crises. Ensuring that assessment methods are perceived as fair, relevant, and aligned with educational goals fosters trust and engagement among educators, students, and communities. Adaptability is also a significant predictor, with a coefficient of 0.0826 ( $p < 0.001$ ). This underscores the importance of flexible and adaptable assessment strategies that can be tailored to different learning environments and contexts in conflict zones. Adaptive assessment approaches allow educators to respond dynamically to changing educational needs and challenges, ensuring that interventions are timely and effective.

Qualitative respondents also consistently highlighted the crucial role of targeted learning assessments in enhancing student learning and achieving academic success, particularly in disrupted educational contexts. One respondent noted, "With the short time available, it helps to work based on the student's ability," reflecting the importance of tailoring educational strategies to meet individual needs (S-KT-01). Targeted learning assessments were also seen as essential for building foundational knowledge and skills, with another respondent stating, "Because it helps them acquire basic knowledge and skills" (S-KT-02). Additionally, targeted learning assessments were viewed as pivotal for academic progression, as they help students prepare for key milestones, such as national examinations. Collectively, these insights underscore the value of assessments not

only as a measure of learning but as tools for personalized instruction that ensure students meet learning objectives.

However, respondents also identified significant challenges in implementing assessments, particularly given time and resource constraints. One respondent remarked, "Needs to go beyond the usual process and focus on the critical situation" (S-KT-09), emphasizing the need for assessments to adapt to evolving educational realities. Another respondent highlighted the necessity of reexamining assessment criteria, stating, "It is necessary to go beyond the usual process and examine what students are measured by to be effective" (S-KT-12). These reflections suggest a call for more dynamic, formative assessment approaches that align with current educational goals. Respondents proposed solutions such as providing professional development for teachers on effective assessment practices and establishing clear, systematic frameworks to enhance assessment consistency and effectiveness. These insights reflect a collective effort to adapt assessment methodologies to better support learning outcomes in challenging educational environments.

To compare and contrast this with other studies, Anderson & Anderson (2020) examined targeted learning assessments in Colombia during the post-conflict rebuilding phase, where assessments were used to monitor student progress in areas affected by guerrilla warfare. This method was similarly used in Sierra Leone during the Ebola crisis to assess learning recovery after school closures (World Bank, 2020). In both the Tigray and Colombia studies, targeted assessments are used to gauge learning progress, with an emphasis on identifying learning gaps exacerbated by conflict. In both cases, the assessments helped educators prioritize areas for intervention, focusing resources on the most affected students.

The difference lies in the execution. In Colombia, there was a significant focus on capacity building for teachers to use the assessment tools effectively. In contrast, the Tigray study reports a lack of teacher preparedness and variability in how assessments are administered, which undermines their effectiveness. Sierra Leone's experience with targeted learning assessments during Ebola also showed that consistent and structured implementation is key, something that Tigray struggles with due to ongoing instability.

Targeted learning assessments have proven effective in post-conflict and crisis situations, but their success is contingent upon robust training and support systems for educators. The inconsistent

implementation seen in Tigray highlights the need for more comprehensive teacher training and resource allocation to ensure these assessments fulfill their potential in addressing educational disparities.

#### 4.6.5. Interim Learning Sanctuary

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that interim learning sanctuary was proved as an effective strategy to address adverse learning environments caused by crises like the war in Tigray. Interim learning sanctuary is creating safe and supportive learning environments where students can continue their education during armed conflict crisis, even in the absence of traditional school settings (Winthrop & Ziegler, 2021).

Table 64: Descriptive Statistical results for Interim Learning Sanctuary

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	2.7325	.12103	1.51650
Accessibility	153	2.8758	.11370	1.40638
Acceptability	153	3.1961	.12235	1.51336
Adaptability	153	3.1307	.11719	1.44956
Valid N (listwise)	153			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Interim Learning Sanctuary offers valuable insights into perceptions across four key education features: availability, accessibility, acceptability, and adaptability. The mean score for availability ( $M = 2.7325$ ) places it in the medium range, suggesting that respondents have mixed perceptions about the availability of resources and support within the Interim Learning Sanctuary. The high standard deviation ( $SD = 1.51650$ ) indicates substantial variability in perceptions, meaning that while some respondents find resources adequately available, others may feel a significant lack of availability. The standard error ( $SE = 0.12103$ ) shows a reasonably precise estimate of the mean, despite the large variability in individual responses.

For accessibility, the mean score ( $M = 2.8758$ ) is also within the medium range, reflecting that while accessibility is generally viewed favorably, it is not without challenges. The standard deviation ( $SD = 1.40638$ ) reveals considerable differences in individual perceptions of

accessibility, suggesting that some students may face barriers to accessing the sanctuary's resources. The standard error (SE = 0.11370) reinforces the reliability of the overall trend, showing that, while accessibility is positively perceived, significant variations exist.

The acceptability of the Interim Learning Sanctuary has a mean score of (M = 3.1961), falling within the high range. This suggests that, overall, respondents find the sanctuary's learning environment and resources acceptable, meeting expected standards. However, the high standard deviation (SD = 1.51336) points to wide-ranging experiences, meaning that while many respondents view the sanctuary positively, others may not find it as acceptable. The standard error (SE = 0.12235) ensures confidence in the precision of this mean score, suggesting that, despite varying perceptions, a general consensus on acceptability is apparent.

Lastly, adaptability received a mean score of (M = 3.1307), indicating that the sanctuary is viewed as adaptable to diverse needs, placing it within the high range. The standard deviation (SD = 1.44956) suggests moderate variability in perceptions, meaning that while adaptability is seen as a strong feature, respondents' experiences may differ depending on their specific context. The standard error (SE = 0.11719) provides a reliable estimate of the mean, confirming that adaptability is a recognized strength of the Interim Learning Sanctuary, even if perceptions vary.

The regression model presented below also explains 97.36% of the variance in interim learning sanctuary effectiveness, as indicated by the R-squared value (0.9736). This high level of explained variance suggests that the model effectively captures the key factors influencing ILS. The F-statistic (1756.58) and its associated p-value (0.0000) confirm that the model is statistically significant and reliable in explaining the data.

Table 65: Regression Analysis for Interim Learning Sanctuary

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.3019201	0.0176085	17.15	0.000	0.2671197	0.3367206
Accessibility	0.2929264	0.0331322	8.84	0.000	0.2274457	0.3584071
Acceptability	0.3172701	0.0371869	8.53	0.000	0.2437759	0.3907644
Adaptability	0.0688826	0.0196059	3.51	0.001	0.0301346	0.1076306
_cons	0.1543449	0.0942599	1.64	0.104	-0.031945	0.3406351
R <sup>2</sup>	0.9736					
F(6, 146)	1756.58					
Prob > F	0.0000					
N	153					

The availability of interim learning sanctuary (ILS) resources significantly predicts their effectiveness, with a coefficient of 0.3019 ( $p < 0.001$ ). This indicates that increasing the availability of safe and supportive learning environments enhances their effectiveness in ensuring continuous education during armed conflict crises. Providing accessible and secure locations where students can learn promotes stability and continuity in education amidst turmoil. Accessibility plays a crucial role in the effectiveness of ILS, with a coefficient of 0.2929 ( $p < 0.001$ ). This suggests that improving access to interim learning sanctuaries significantly enhances their effectiveness in reaching and supporting students affected by conflict. Ensuring that ILS are located within reachable distances and are physically accessible to all students, including those with disabilities or mobility challenges, is essential for their impact.

The acceptability of ILS is highly significant, with a coefficient of 0.3173 ( $p < 0.001$ ). This highlights that the more acceptable interim learning sanctuaries are to stakeholders, the more effective they will be in providing a conducive learning environment during crises. Acceptable sanctuaries are culturally sensitive, safe, and trusted by the community, fostering a supportive educational atmosphere that encourages student participation and engagement. Adaptability is also a significant predictor, with a coefficient of 0.0689 ( $p = 0.001$ ). This underscores the importance of flexible and adaptable ILS environments that can adjust to varying educational needs and conditions in conflict zones. Flexible learning schedules, multi-grade classrooms, and diverse teaching methodologies cater to the diverse educational needs of displaced and vulnerable students, ensuring inclusivity and effective learning outcomes.

The qualitative findings emphasized the critical role of interim learning sanctuaries in maintaining education continuity and safeguarding students affected by crises. These sanctuaries offer a stable, secure learning environment that mitigates disruptions caused by conflict or displacement, ensuring that students remain focused and engaged. Respondents emphasized the sanctuaries' ability to prevent dropout, with one noting, "It helps students to continue their education properly rather than being distracted" (S-KT-01), while another stressed their role in providing "a safe manner" for learning (S-KT-02). Additionally, these sanctuaries address classroom shortages by accommodating displaced students and expanding educational access, thereby reducing the number of out-of-school children. One respondent observed, "It addresses the shortage of

classrooms and reduces the number of out-of-school children" (S-H-01). These findings underscore the sanctuaries' effectiveness in bridging educational gaps in crisis-affected regions.

However, the success of interim learning sanctuaries depends on overcoming operational challenges and enhancing holistic support. Respondents highlighted the need for improved psychological care and specialized interventions for students with mental health concerns, as one respondent noted, "No solution has been found for students with mental health problems" (S-Bor-1). Collaboration between governments and stakeholders is essential for securing resources and improving sanctuary functionality, with respondents calling for additional tutorial classes and safety measures (S-RC-03). Despite their benefits, logistical constraints, infrastructure limitations, and inconsistent assessment practices remain obstacles. As one respondent remarked, "Teaching using temporary shelter is better than silence, but it is inconvenient and harms the academy" (T-KT-07), indicating that efforts to optimize these sanctuaries will be vital in ensuring their long-term success and sustainability.

To compare and contrast this with other studies, Winthrop & Ziegler (2021) explored interim learning sanctuaries in Haiti post-earthquake and in Lebanon during the Syrian refugee crisis. These sanctuaries provided safe, temporary educational spaces that allowed students to continue learning in the midst of displacement or infrastructure collapse. Both studies emphasize the importance of providing safe spaces for learning during crises. In Tigray, as in Lebanon and Haiti, these sanctuaries help mitigate the adverse effects of displacement and ensure some continuity in education. They also serve a broader purpose by offering psychological and social stability for students in chaotic environments.

However, a key difference in Tigray is the reported inconsistency in sanctuary availability and quality. While in Lebanon, international organizations like UNICEF played a significant role in providing standardized, well-supported learning spaces, the Tigray study shows that interim sanctuaries are less consistently implemented, with variability in resources and teacher training.

The success of interim learning sanctuaries depends heavily on resource availability and coordination among local and international actors. The Tigray study reveals that while these sanctuaries are crucial, their inconsistent implementation limits their potential. Greater international support, as seen in Lebanon, could help bridge these gaps and ensure that more students benefit from safe learning environments during crises.

#### 4.6.6. Mental Health and Psychosocial Support

The integration of descriptive and inferential statistical analyses, reinforced by qualitative insights, indicated that mental health and psychosocial support was proved as an effective strategy to address strained teacher-learner relationship caused by crises like the war in Tigray. Mental health and psychosocial support are providing psychological and emotional support to students and educators affected by armed conflict crisis, addressing the mental health challenges arising from the crisis (Tol et al., 2021).

Table 66: Descriptive Statistical Results for Mental health and Psychosocial Support

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	157	2.7580	.11796	1.47805
Accessibility	155	2.9226	.11452	1.42581
Acceptability	154	3.3052	.12610	1.56484
Adaptability	154	3.1104	.12068	1.49754
Valid N (listwise)	153			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of Mental Health and Psychosocial Support (MHPSS) provides important insights into perceptions across four key education features: availability, accessibility, acceptability, and adaptability. The mean score for availability ( $M = 2.7580$ ) falls in the medium range, indicating that respondents have mixed perceptions about the availability of MHPSS services. The high standard deviation ( $SD = 1.47805$ ) suggests significant variability in individual experiences, with some respondents perceiving that MHPSS services are available, while others find them lacking. The standard error ( $SE = 0.11796$ ) offers a reasonably precise estimate of the mean, despite the broad variation in responses.

For accessibility, the mean score ( $M = 2.9226$ ) is also within the medium range, reflecting a general perception that MHPSS services are moderately accessible, though not without challenges. The standard deviation ( $SD = 1.42581$ ) highlights considerable differences in how respondents experience the accessibility of these services, with some reporting barriers. The standard error ( $SE$

= 0.11452) indicates a reliable estimate of the mean, confirming that, despite varying individual experiences, accessibility is generally perceived in a moderately favorable light.

The acceptability of MHPSS services, with a mean score (M = 3.3052), is rated within the high range, suggesting that most respondents consider the quality of MHPSS services to be acceptable and in line with their expectations. However, the high standard deviation (SD = 1.56484) points to notable variability in perceptions of acceptability, implying that while many respondents view the services favorably, others may have concerns about their adequacy. The standard error (SE = 0.12610) ensures confidence in the precision of this mean score, indicating that acceptability is largely positive, despite varying opinions.

Finally, adaptability has a mean score (M = 3.1104), placing it within the high range, indicating that respondents generally view MHPSS services as adaptable to diverse needs and contexts. However, the standard deviation (SD = 1.49754) shows significant variation in respondents' experiences, suggesting that while adaptability is seen as a strength, perceptions vary widely depending on individual circumstances. The standard error (SE = 0.12068) offers a reliable estimate of the mean, further confirming that adaptability is regarded as a valuable attribute of MHPSS services, even though individual perceptions may differ.

The regression model presented below also explains 97.49% of the variance in mental health and psychosocial support effectiveness, as indicated by the R-squared value (0.9749). This high level of explained variance suggests that the model effectively captures the key factors influencing MHPSS. The F-statistic (1768.29) and its associated p-value (0.0000) confirm that the model is statistically significant and reliable in explaining the data.

Table 67: Regression Analysis results Mental Health and Psychosocial Support

Education Features	Coef.	Robust S.E	t		P> t	[95% conf. interval]
Availability	0.2688098	0.017509	15.35		0.000	0.2342059 0.3034136
Accessibility	0.242872	0.033224	7.31		0.000	0.1772099 0.308534
Acceptability	0.4046927	0.0329551	12.28		0.000	0.339562 0.4698234
Adaptability	0.0814533	0.0204021	3.99		0.000	0.0411317 0.1217748
_cons	0.0888303	0.0793357	1.12		0.265	-0.067964 0.2456251
R <sup>2</sup>	0.9749					
F(6, 146)	1768.29					
Prob > F	0.0000					
N	153					

The availability of mental health and psychosocial support (MHPSS) services significantly predicts their effectiveness, with a coefficient of 0.2688 ( $p < 0.001$ ). This indicates that increasing the availability of psychological and emotional support services enhances their effectiveness in addressing mental health challenges among students and educators affected by armed conflict crises. Accessible counseling services, crisis intervention teams, and trauma-informed care play crucial roles in supporting individuals' mental well-being during times of crisis. Accessibility is also critical, with a coefficient of 0.2429 ( $p < 0.001$ ). This suggests that improving access to MHPSS services significantly enhances their effectiveness in reaching and supporting vulnerable populations during conflict. Ensuring that support services are physically accessible, culturally appropriate, and free from stigma facilitates greater utilization and impact among those in need.

The acceptability of MHPSS services is highly significant, with a coefficient of 0.4047 ( $p < 0.001$ ). This underscores that the more acceptable these support services are to communities and individuals, the more effective they will be in addressing mental health challenges. Culturally sensitive approaches, community involvement, and tailored interventions build trust and encourage participation in mental health support programs during crises. Adaptability plays a significant role, with a coefficient of 0.0815 ( $p < 0.001$ ). This emphasizes the importance of flexible and responsive MHPSS approaches that can adapt to diverse psychological and emotional needs in conflict settings. Adaptive strategies include mobile outreach teams, remote counseling options, and resilience-building activities tailored to local contexts, ensuring comprehensive support for individuals coping with trauma and stress.

Qualitative respondents emphasized the vital role of mental health and psychosocial support in rebuilding the teacher-learner relationship post-conflict. One respondent noted, "Because it helps students get rid of the problems they were facing and return to normalcy and learn their lessons properly" (S-KT-01), underscoring how mental health services help students regain focus on their education. Another added, "It helps students recover from their mental problems and pursue their education properly" (S-KT-07), illustrating the clear connection between mental well-being and academic performance. These services not only benefit students but also extend to teachers and parents, creating a more supportive and effective learning environment. As one respondent highlighted, "It helps students, teachers, and parents recover from mental injury and focus fully on

learning" (S-H-04), emphasizing the comprehensive impact of these services on all educational stakeholders.

Training and rehabilitation were frequently mentioned as critical components of effective mental health support. Respondents highlighted the need for specialized interventions, such as training programs to address psychological trauma in students and teachers. One respondent advocated for recovery training, stating, "Restore to pre-war conditions by providing certain training to students with mental injuries" (S-KT-09), while another emphasized, "Psychologically and mentally disabled students need to be rehabilitated through training" (S-KT-12). In addition to targeted interventions, the importance of community involvement was noted, with one respondent calling for "support and understanding in consultation with the community to recover from the problems caused by the war" (T-KT-09). The integration of mental health support into education systems, coupled with community engagement and continuous professional development for teachers, is essential for fostering resilience and restoring the teacher-learner relationship in post-conflict settings.

To compare and contrast this with other studies, Ventevogel & Ryan examined MHPSS interventions in various refugee camps, including in the Middle East and Africa. Both the Tigray study and Ventevogel & Ryan (2018) stress the role of MHPSS in addressing trauma and promoting resilience among conflict-affected populations. In both cases, psychological support services are seen as vital for helping students return to learning and reintegrate into normal life. The focus on adaptability of MHPSS interventions is a common thread, with both studies advocating for flexible models that can be tailored to meet individual needs.

A notable difference is in the use of mobile and remote MHPSS services. In refugee camps studied by Ventevogel & Ryan, mobile units and remote counseling were used to reach more isolated populations, which was seen as a crucial method for ensuring broad accessibility. The Tigray study, however, does not mention similar remote or mobile initiatives, despite the clear barriers to accessing MHPSS in certain areas due to conflict.

Introducing mobile or remote MHPSS services in Tigray, as seen in refugee contexts, could help overcome the challenges of limited accessibility. This would allow students in hard-to-reach areas to receive the psychological support they need, helping to address the disparities in availability that were noted in the study.

## 4.7. Response Approaches to Education Agents Crisis

The third question of the second objective of this study focused on evaluating the proposed response approaches to education agents' crisis across the features of education- availability, accessibility, acceptability, and adaptability. These questions have been responded by each respective agents including teachers, students, parents, education government bodies, and education NGOs. The proposed response approaches were military-free education advocacy (Governments), life-saving education advocacy (NGOs), targeted professional development (Teachers), community-learning centers (Students), and mobile parent education (Parents).

The questions of the response approaches to the education agents' crises were analyzed through inclusive quantitative and qualitative analytical methods. A comprehensive statistical analysis was conducted, starting with descriptive statistics, including means and standard deviations, and advancing to inferential techniques, notably multiple linear regression, to evaluate the response approaches across various dimensions of the features of education.

### 4.7.1. Military-Free Education Advocacy (Governments)

The combined use of descriptive and inferential statistical analyses, supplemented by qualitative findings, demonstrated that advocating for military-free education is an effective strategy to combat the weaponization of education in crisis situations, such as the war in Tigray. Military-free education advocacy is advocacy efforts by governmental bodies to keep education free from military interference and to ensure that educational spaces remain safe and conducive for learning during armed conflict (GCPEA, 2021; SSD, 2020).

Table 68: Descriptive Statistical results for Military-Free Education Advocacy

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	57	2.6667	.17402	1.31385
Accessibility	57	2.6842	.17550	1.32501
Acceptability	57	2.6842	.18078	1.36484
Adaptability	57	2.5088	.18415	1.39031
Valid N (listwise)	57			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis for the Military-Free Education Advocacy program revealed important insights into the perceptions of four key education features: availability, accessibility, acceptability, and adaptability. The mean score for availability ( $M = 2.6667$ ) falls within the medium range, indicating that respondents perceive the availability of military-free education initiatives to be moderate. The standard deviation ( $SD = 1.31385$ ) suggests significant variability in perceptions, meaning that while some respondents find the advocacy efforts readily available, others may experience gaps in access. The standard error ( $SE = 0.17402$ ) provides a precise estimate of the mean, reinforcing the observation that availability is viewed with moderate favorability but with notable inconsistencies across contexts.

For accessibility, the mean score ( $M = 2.6842$ ) also lies within the medium range, reflecting that the advocacy efforts for military-free education are generally accessible, though not without challenges. The standard deviation ( $SD = 1.32501$ ) highlights considerable differences in how respondents experience the accessibility of these advocacy efforts, suggesting that while some have found them accessible, others face barriers. The standard error ( $SE = 0.17550$ ) confirms the reliability of the overall estimate, implying that accessibility perceptions, although mixed, follow a consistent trend.

In terms of acceptability, the mean score ( $M = 2.6842$ ) also falls in the medium range, indicating that respondents have moderate views on whether military-free education efforts meet acceptable standards. The standard deviation ( $SD = 1.36484$ ) suggests significant variability in perceptions, implying that while many find these efforts acceptable, others may have concerns about their adequacy or relevance. The standard error ( $SE = 0.18078$ ) further enhances confidence in the precision of the mean score, showing that acceptability is generally regarded with moderate approval, despite varying opinions.

Lastly, adaptability has a mean score ( $M = 2.5088$ ), placing it in the medium range, suggesting that respondents perceive the advocacy efforts as moderately adaptable to different contexts and needs. The standard deviation ( $SD = 1.39031$ ) indicates notable variation in how adaptability is experienced, with some respondents finding the efforts flexible and responsive, while others may not. The standard error ( $SE = 0.18415$ ) ensures a reliable estimate of the mean, indicating that adaptability is perceived moderately well, though perceptions differ considerably.

The regression model presented below explains 99.70% of the variance in military-free education advocacy effectiveness, as indicated by the R-squared value (0.9970). This extremely high level of explained variance suggests that the model effectively captures the key factors influencing MFEA. The F-statistic (4870.2) and its associated p-value (0.000) confirm that the model is statistically significant and reliable in explaining the data.

Table 69: Regression Analysis results for Military-free Education Advocacy

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	-0.10161	0.0656619	-1.55	0.197	-0.28392	0.0806923
Accessibility	0.2612772	0.0451473	5.79	0.004	0.1359283	0.3866261
Acceptability	0.0985985	0.0661432	1.49	0.210	-0.085044	0.2822414
Adaptability	0.809826	0.0741787	10.92	0.000	0.6038729	1.015779
_cons	-0.123279	0.4123308	-0.30	0.780	-1.268093	1.021534
R <sup>2</sup>	0.9970					
F(5, 51)	4870.2					
Prob > F	0.000					
N	57					

The availability of MFEA resources shows a negative but not statistically significant coefficient of -0.1016 ( $p = 0.197$ ). This suggests that availability alone does not significantly predict the effectiveness of keeping educational spaces free from military interference during armed conflicts. While the coefficient is negative, indicating a potential inverse relationship, the lack of significance implies that other factors may play a more crucial role. Accessibility is crucial, with a significant positive coefficient of 0.2613 ( $p = 0.004$ ). This indicates that improving access to advocacy resources significantly enhances their effectiveness in maintaining military-free educational environments. Ensuring that advocacy efforts are easily accessible to all stakeholders, including communities and policymakers, plays a key role in the success of these initiatives.

Acceptability of MFEA resources has a positive coefficient of 0.0986 but is not statistically significant ( $p = 0.210$ ). This suggests that while acceptability may positively influence the effectiveness of MFEA, it is not a strong predictor on its own within this model. Ensuring that advocacy efforts are culturally and socially acceptable remains important but may need to be combined with other factors for greater impact. Adaptability shows a highly significant positive coefficient of 0.8098 ( $p < 0.001$ ). This underscores that flexible and responsive advocacy approaches significantly enhance the effectiveness of MFEA. Advocacy efforts that can adapt to

changing circumstances, including shifting conflict dynamics and community needs, are more likely to succeed in keeping educational spaces safe and free from military influence.

Qualitative data respondents consistently emphasized the need for education to be free from military interference to create a safe and conducive learning environment. One respondent noted, "During the war, the government should make unremitting efforts to free it from military interference and create a safe and comfortable education process" (EO-KT-03). Another highlighted the necessity of safe educational zones, stating, "Ensure that education is provided and conducted in a place free from military zones" (EO-GH-02). Several respondents described the significant challenges caused by military occupation of educational spaces. "Most of the schools were occupied by the military," remarked one respondent (EO-KT-02), while another expressed frustration with the persistence of this issue, saying, "Our schools are occupied by the military, and there is no solution" (EO-Bor-1).

Community members raised concerns about the safety of schools, with one respondent explaining, "Negotiations are being held with the relevant authorities to free schools from military camps and IDPs " (EB-8). However, the issue of soldiers and displaced persons occupying schools remains. A government official emphasized the importance of a military-free environment, stating, "If a military-free environment is created, students will be able to learn safely. Another respondent stressed that "Educational institutions should be independent of the army to conduct education and protect the safety of students. Schools must be free of soldiers and weapons so that students can learn freely" (EB-17). To achieve these goals, respondents recommended working with authorities to ensure schools are free from military activity and pressure, with one urging, "Work with the relevant authorities to ensure that schools are free from military activity and pressure in accordance with the law" (EB-7).

Comparing this with other studies, *Global Coalition to Protect Education from Attack (GCPEA)* (2021) analyzed military interference in educational spaces across various conflict zones, highlighting the detrimental impact on students' safety and learning. The *Safe Schools Declaration* (SSD, 2020) has been pivotal in advocating for the protection of educational institutions from military use, especially in areas like Yemen and Syria. Advocacy from governments has played a crucial role in securing commitments to prevent the occupation of schools by military forces. Both the Tigray study and findings from GCPEA (2021) stress the need for active governmental efforts

to ensure that education spaces remain free from military occupation. In both cases, advocacy efforts are seen as essential for creating safe learning environments.

The Tigray study reveals more inconsistencies in the availability of advocacy resources, with a lack of uniform application across regions. In contrast, studies from Yemen and Syria under the SSD initiative show more cohesive international efforts that have led to broader implementation of military-free zones in educational settings. Military-free education advocacy is crucial for conflict-affected regions, but the success of such efforts depends on consistent resource availability and international cooperation. Tigray would benefit from stronger global backing to replicate the more widespread success seen in countries like Yemen.

#### 4.7.2. Life-Saving Education Advocacy (NGOs)

The combined use of descriptive and inferential statistical analyses, supplemented by qualitative findings, demonstrated that advocating for education as life-saving is an effective strategy to combat the constrained education aid in crisis situations, such as the war in Tigray. Life-saving education is an advocacy by non-governmental organizations to prioritize and provide life-saving education opportunities, especially for vulnerable populations affected by armed conflict crisis (SCI & UNICEF, 2022).

Table 70: Descriptive Statistical results for Life-Saving Education Advocacy

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	18	2.8889	.37824	1.60473
Accessibility	18	3.1111	.31195	1.32349
Acceptability	18	3.1111	.32226	1.36722
Adaptability	18	3.8889	.25423	1.07861
Valid N (listwise)	18			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The descriptive statistical analysis for the Life-Saving Education Advocacy program provides valuable insights into perceptions across four key education features: availability, accessibility, acceptability, and adaptability. The mean score for availability (M = 2.8889) falls within the medium range, suggesting that respondents view the availability of life-saving education initiatives

as moderately favorable. The standard deviation ( $SD = 1.60473$ ) indicates considerable variability in individual perceptions, highlighting a diversity of experiences regarding availability. The standard error ( $SE = 0.37824$ ) reflects a less precise estimate of the mean, suggesting that while the overall perception is moderate, individual opinions vary widely.

For accessibility, the mean score ( $M = 3.1111$ ) is in the high range, indicating that respondents generally perceive life-saving education initiatives as accessible. The standard deviation ( $SD = 1.32349$ ) reveals some variability in experiences, suggesting that while many find the initiatives accessible, others may encounter challenges. The standard error ( $SE = 0.31195$ ) indicates a reasonable estimate of the mean, reinforcing the idea that accessibility is generally perceived positively, despite some differences in experiences.

In terms of acceptability, the mean score ( $M = 3.1111$ ) also falls within the high range, signifying that respondents consider the quality of life-saving education initiatives to be acceptable. The standard deviation ( $SD = 1.36722$ ) indicates variability in individual perceptions, meaning that while many view these initiatives favorably, others may have differing opinions on their adequacy. The standard error ( $SE = 0.32226$ ) provides a reliable estimate of the mean, suggesting that acceptability is viewed positively overall.

Finally, adaptability has the highest mean score ( $M = 3.8889$ ), indicating that respondents view life-saving education initiatives as very adaptable to various needs and contexts. The lower standard deviation ( $SD = 1.07861$ ) suggests reduced variability in perceptions of adaptability, signifying a more consistent viewpoint among respondents. The standard error ( $SE = 0.25423$ ) enhances the precision of this finding, indicating that adaptability is well-regarded across the board.

The regression model presented below explains 99.90% of the variance in life-saving education advocacy effectiveness, as indicated by the R-squared value (0.9990). This extremely high level of explained variance suggests that the model effectively captures the key factors influencing LSEA. The F-statistic (4770.20) and its associated p-value (0.000) confirm that the model is statistically significant and reliable in explaining the data.

Table 71 Regression Analysis: Results for Life-Saving education Advocacy

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2443669	0.0096038	25.44	0.000	0.2234421	0.2652918
Accessibility	0.2713637	0.0169791	15.98	0.000	0.2343695	0.3083579
Acceptability	0.2359998	0.0187677	12.57	0.000	0.1951086	0.276891
Adaptability	0.2626069	0.0091303	28.76	0.000	0.2427136	0.2427136
_cons	-0.054705	0.0617998	-0.89	0.393	-0.189355	0.0799451
R <sup>2</sup>	0.9990					
F(5,12)	4770.20					
Prob > F	0.0000					
N	18					

The availability of LSEA resources shows a highly significant positive coefficient of 0.2444 ( $p < 0.001$ ). This indicates that increasing the availability of life-saving education significantly enhances the effectiveness of advocacy efforts. Ensuring that such resources are readily available to NGOs and other stakeholders is crucial for the success of LSEA initiatives in conflict-affected areas. Accessibility is also a key factor, with a significant positive coefficient of 0.2714 ( $p < 0.001$ ). This suggests that improving access to life-saving education resources significantly boosts their effectiveness. Efforts to make these resources easily accessible to vulnerable populations, such as displaced children and communities in conflict zones, are essential.

Acceptability of LSEA resources has a positive and significant coefficient of 0.2360 ( $p < 0.001$ ). This indicates that ensuring life-saving education is culturally and socially acceptable significantly contributes to its effectiveness. Advocacy efforts should consider cultural sensitivities and local norms to increase the acceptability and impact of their programs. Adaptability shows a highly significant positive coefficient of 0.2626 ( $p < 0.001$ ). This underscores the importance of flexible and responsive approaches in LSEA. Advocacy efforts that can adapt to changing conditions and unique challenges in conflict zones are more likely to be successful.

The qualitative analysis revealed that advocacy for life-saving education can effectively address the limitations in educational assistance provided by NGOs through the implementation of emergency education initiatives tailored to support affected communities. One respondent underscored the urgency of prompt action, stating, "Establishing emergency education initiatives to provide immediate support to affected communities could enhance life-saving education advocacy" (NGO-2). Furthermore, the necessity of customizing responses to meet specific needs

was emphasized by another participant, who asserted, "Need and context-based responses are essential" (NGO-3). The establishment of robust connections between NGOs and local communities was deemed crucial for effective advocacy, as highlighted by a respondent who advocated for "the creation of NGO-community linkages at the ground level to facilitate education as a life-saving measure" (NGO-4).

Additionally, fostering partnerships among NGOs is vital for enhancing coordination and maximizing the collective impact of life-saving education advocacy. One respondent pointed out, "A localization partnership, which currently represents a significant gap, should be established between national and international NGOs to ensure effective coordination of life-saving education advocacy activities in Tigray" (NGO-8). Through these collaborative endeavors, NGOs can prioritize education as a critical component of emergency response, thereby ensuring that vulnerable populations receive the necessary support and that all children maintain access to education amidst ongoing challenges.

Comparing this with other studies, *Save the Children* (2022) and *UNICEF* (2022) examined the role of NGOs in delivering life-saving education to vulnerable populations during crises in regions such as Afghanistan and South Sudan. These studies emphasize that education not only protects children by keeping them safe but also provides essential skills for survival in conflict zones, such as literacy and health education. Both the Tigray study and the research from South Sudan and Afghanistan highlight the importance of NGOs in providing life-saving education that goes beyond basic literacy. In both contexts, education is positioned as a critical tool for survival.

The Tigray study points to variability in the accessibility and availability of these programs, whereas in Afghanistan, more cohesive international support has allowed for broader, more uniform implementation of NGO-driven educational programs. South Sudan's model has benefited from substantial collaboration between local and international NGOs, ensuring better access to education even in remote areas. Life-saving education is an indispensable element of crisis response, but its success hinges on accessibility and consistent availability. In Tigray, more effective partnerships between NGOs and stronger localization efforts could ensure that these education programs reach all affected communities more evenly.

### 4.7.3. Targeted Professional Development (Teachers)

The combined use of descriptive and inferential statistical analyses, supplemented by qualitative findings, demonstrated that targeted professional development is an effective strategy to combat the teachers’ professional regression in crisis situations, such as the war in Tigray. Targeted professional development is providing specialized training and support for teachers to enhance their skills, resilience, and ability to deliver quality education despite the challenges posed by armed conflict (UNESCO, 2022; INEE, 2021).

Table 72: Descriptive Statistical results for Targeted Professional Development

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	48	2.8750	.23183	1.60617
Accessibility	45	2.8444	.21778	1.46094
Acceptability	46	3.2609	.23557	1.59770
Adaptability	45	2.9556	.21310	1.42949
Valid N (listwise)	44			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis for Targeted Professional Development revealed essential insights into perceptions regarding four key education features: availability, accessibility, acceptability, and adaptability. The mean score for availability ( $M = 2.8750$ ) falls within the medium range, indicating that respondents perceive the availability of targeted professional development initiatives as moderately favorable. The standard deviation ( $SD = 1.60617$ ) suggests considerable variability in perceptions, highlighting differing experiences among individuals regarding the availability of these initiatives. The standard error ( $SE = 0.23183$ ) reflects a reasonably precise estimate of the mean, suggesting that while the overall perception is moderate, individual experiences vary significantly.

For accessibility, the mean score ( $M = 2.8444$ ) also lies in the medium range, reflecting that respondents view the accessibility of targeted professional development as somewhat limited. The standard deviation ( $SD = 1.46094$ ) indicates notable variability in experiences, implying that while some participants find these initiatives accessible, others may face barriers. The standard error ( $SE = 0.21778$ ) confirms that this estimate is reliable, but it also emphasizes the inconsistent nature of accessibility experiences among respondents.

In terms of acceptability, the mean score ( $M = 3.2609$ ) places it in the high range, signifying that respondents generally view the quality of targeted professional development as acceptable. The standard deviation ( $SD = 1.59770$ ) reveals variability in perceptions, suggesting that while many find the initiatives valuable, others may have concerns regarding their effectiveness. The standard error ( $SE = 0.23557$ ) enhances the confidence in the reliability of this mean score, indicating that acceptability is largely perceived positively, despite differing opinions.

Finally, the mean score for adaptability ( $M = 2.9556$ ) is also within the medium range, suggesting that respondents perceive targeted professional development initiatives as moderately adaptable to various contexts and needs. The standard deviation ( $SD = 1.42949$ ) indicates some variability in perceptions of adaptability, meaning that while some respondents find the initiatives flexible, others may not. The standard error ( $SE = 0.21310$ ) provides a reliable estimate of the mean, reinforcing the idea that adaptability is viewed with moderate favorability, though experiences differ.

The regression model presented below also explains 99.98% of the variance in targeted professional development effectiveness, as indicated by the R-squared value (0.9998). This extremely high level of explained variance suggests that the model effectively captures the key factors influencing TPD. The F-statistic (99999.00) and its associated p-value (0.0000) confirm that the model is statistically significant and reliable in explaining the data.

Table 73: Regression Analysis Results for Targeted Professional Development

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2553694	0.0062808	40.66	0.000	0.2426433	0.2680955
Accessibility	0.2565254	0.006045	42.44	0.000	0.244277	0.2687738
Acceptability	0.2591282	0.0047137	54.97	0.000	0.2495773	0.268679
Adaptability	0.2338561	0.0061481	38.04	0.000	0.2213988	0.2463134
_cons	-0.012036	0.0161494	-0.75	0.461	-0.044758	0.0206859
R <sup>2</sup>	0.9998					
F(6,37)	99999.00					
Prob > F	0.0000					
N	44					

The availability of TPD resources shows a highly significant positive coefficient of 0.2554 ( $p < 0.001$ ). This indicates that increasing the availability of professional development programs significantly enhances the effectiveness of TPD initiatives. Ensuring that such resources are readily

available to educators is crucial for the success of TPD in conflict-affected areas. Accessibility is also a key factor, with a significant positive coefficient of 0.2565 ( $p < 0.001$ ). This suggests that improving access to professional development resources significantly boosts their effectiveness. Efforts to make these resources easily accessible to teachers, particularly in remote and conflict-affected regions, are essential.

Acceptability of TPD resources has a positive and significant coefficient of 0.2591 ( $p < 0.001$ ). This indicates that ensuring professional development programs are culturally and socially acceptable significantly contributes to their effectiveness. Advocacy efforts should consider cultural sensitivities and local norms to increase the acceptability and impact of TPD programs. Adaptability shows a highly significant positive coefficient of 0.2339 ( $p < 0.001$ ). This underscores the importance of flexible and responsive approaches in TPD. Professional development programs that can adapt to changing conditions and unique challenges in conflict zones are more likely to be successful.

The qualitative analysis highlighted the urgent need for targeted professional development for teachers, particularly in conflict-affected regions like Tigray. Respondents emphasize the importance of continuous professional growth, psychological support, and adequate compensation as crucial elements for enhancing teaching standards and improving student outcomes. Teachers express a significant gap in regular and structured training opportunities, with one stating, "Focused professional development of teachers is needed to improve the teaching profession and create an environment where students benefit" (T-KT-01). This sentiment is echoed by others who note the lack of regional and local initiatives to support educators, leading to a clear call for organized efforts to address specific areas needing improvement. Furthermore, training programs must incorporate both short- and long-term strategies, with an emphasis on recovery psychology to help teachers manage trauma and stress in conflict settings.

To facilitate effective professional development, consistent psychological and economic support for teachers emerges as a critical theme. Respondents indicate that economic challenges often distract educators from pursuing professional growth, underscoring the need for timely salary payments and trauma healing sessions. As one participant articulates, "Providing trauma healing sessions for teachers to repair their psychological trauma and pay them their remaining salaries" (T-RC-04) is essential for fostering an environment conducive to learning and teaching.

Professional development initiatives are viewed positively for their ability to boost teacher motivation and instructional effectiveness, enabling educators to employ contemporary strategies that meet diverse student needs. However, addressing fundamental challenges such as inadequate salaries and infrastructure remains crucial. As one respondent notes, "A salary solution is needed" (T-S-01), highlighting that overcoming these barriers is vital for empowering teachers to focus on their professional growth and contribute meaningfully to the educational process.

Comparing this with other studies, *UNESCO (2022)* and *INEE (2021)* analyzed the impact of targeted professional development for teachers in conflict-affected areas such as South Sudan and Myanmar. These studies emphasized the importance of equipping teachers with the skills and psychological support needed to navigate crises while maintaining educational quality for students. Both the Tigray study and findings from South Sudan underscore the importance of continuous teacher training to build resilience and improve teaching standards in conflict zones. In both regions, professional development is seen as critical to maintaining educational delivery despite the challenges posed by armed conflict.

The key difference lies in the availability of these programs. The Tigray study highlights significant gaps in access and variability in the delivery of teacher training, while South Sudan's efforts have seen more structured and regular programs supported by international organizations, ensuring that teachers receive consistent training. Targeted professional development is vital for maintaining educational quality in conflict zones. However, to replicate the success seen in South Sudan and Myanmar, the Tigray region must focus on closing gaps in availability and access by increasing support for continuous and structured training programs for educators.

#### **4.7.4. Community-Learning Centers (Students)**

The combined use of descriptive and inferential statistical analyses, supplemented by qualitative findings, demonstrated that establishing community learning centers is an effective strategy to combat out-of-school children in crisis situations, such as the war in Tigray. Community-learner center approach is establishing community-based learning centers where students can access education and resources even when formal schooling is disrupted by armed conflict (PI & UNICEF, 2022).

Table 74: Descriptive Statistical Results for Community-Learning centers

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	109	2.7248	.14211	1.48369
Accessibility	109	2.6239	.13343	1.39303
Acceptability	109	3.0275	.13637	1.42373
Adaptability	109	3.0092	.13639	1.42397
Valid N (listwise)	109			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis for Community-Learning Centers (CLC) presents important insights into perceptions related to four key educational features: availability, accessibility, acceptability, and adaptability. The mean score for availability ( $M = 2.7248$ ) falls within the medium range, indicating that respondents perceive the availability of community-learning centers as somewhat limited. The standard deviation ( $SD = 1.48369$ ) suggests considerable variability in individual perceptions, which highlights differing experiences among respondents regarding the availability of these centers. The standard error ( $SE = 0.14211$ ) reflects a reasonable estimate of the mean, indicating that while perceptions of availability are generally moderate, individual experiences vary significantly.

Regarding accessibility, the mean score ( $M = 2.6239$ ) is also in the medium range, suggesting that respondents view accessibility as relatively constrained. The standard deviation ( $SD = 1.39303$ ) indicates notable variability in perceptions, implying that while some individuals find the centers accessible, others encounter barriers that hinder their access. The standard error ( $SE = 0.13343$ ) reinforces the reliability of this estimate, suggesting that the mixed experiences regarding accessibility do not negate the overall trend observed.

For acceptability, the mean score ( $M = 3.0275$ ) falls within the high range, indicating that respondents generally view the quality of the services provided by community-learning centers as acceptable. The standard deviation ( $SD = 1.42373$ ) reveals variability in acceptability perceptions, suggesting that while many respondents find the services valuable, others may have concerns regarding their effectiveness or relevance. The standard error ( $SE = 0.13637$ ) enhances confidence

in the reliability of this mean score, suggesting that acceptability is largely perceived positively, despite differing opinions.

Finally, the mean score for adaptability ( $M = 3.0092$ ) also places it within the high range, reflecting that respondents perceive the community-learning centers as generally adaptable to various contexts and needs. The standard deviation ( $SD = 1.42397$ ) indicates some variability in perceptions, meaning that while some respondents find these centers flexible, others may feel they do not adequately address diverse needs. The standard error ( $SE = 0.13639$ ) provides a reliable estimate of the mean, reinforcing the idea that adaptability is viewed favorably, albeit with varying individual experiences.

The regression model presented below also explains 99.96% of the variance in community-learning center effectiveness, as indicated by the R-squared value (0.9996). This exceptionally high level of explained variance suggests that the model effectively captures the key factors influencing CLC effectiveness. The F-statistic (95406.93) and its associated p-value (0.0000) confirm that the model is statistically significant and reliable in explaining the data.

Table 75: Regression Analysis for Community-Learning Centers

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2530925	0.0043582	58.07	0.000	0.2444479	0.2617371
Accessibility	0.2455261	0.0050118	48.99	0.000	0.2355852	0.2554671
Acceptability	0.2536864	0.0047215	53.73	0.000	0.2443214	0.2630514
Adaptability	0.2472248	0.0045683	54.12	0.000	0.2381636	0.2562861
_cons	-0.002195	0.0134248	-0.16	0.870	-0.028823	0.0244336
R <sup>2</sup>	0.9996					
F(6,102)	95406.93					
Prob > F	0.0000					
N	109					

The availability of CLCs shows a highly significant positive coefficient of 0.2531 ( $p < 0.001$ ). This indicates that increasing the availability of community-based learning centers significantly enhances their effectiveness in providing education during armed conflict. Ensuring that CLCs are well-established and accessible is crucial for maintaining educational continuity. Accessibility is also a critical factor, with a significant positive coefficient of 0.2455 ( $p < 0.001$ ). This suggests that improving access to CLCs significantly contributes to their effectiveness. Efforts to make

these centers easily reachable for communities affected by conflict are essential for ensuring educational access.

Acceptability of CLCs has a positive and significant coefficient of 0.2537 ( $p < 0.001$ ). This underscores the importance of ensuring that CLCs are culturally and socially acceptable within their respective communities. Approaches that align with local norms and values are more likely to be embraced and utilized effectively. Adaptability shows a highly significant positive coefficient of 0.2472 ( $p < 0.001$ ). This highlights the importance of flexibility and responsiveness in CLCs. Centers that can adapt to the dynamic challenges of conflict settings are better positioned to meet the educational needs of students and communities.

Community learning centers are essential in addressing the educational needs of out-of-school children affected by armed conflict in Tigray. Qualitative findings revealed that community involvement, locally-driven educational approaches, and collaborative efforts among stakeholders are crucial for the success and sustainability of these initiatives. These centers provide a safe and conducive learning environment, allowing students to continue their education and regain a sense of normalcy. Respondents highlight the centers' role in reducing dropout rates and preventing undesirable activities, emphasizing that "students not being discouraged because it allows them to keep up with learning, reduce wasted time, and reduce dropout" (S-KT-04) and that they help students "get education and return to normalcy free from various problems nearby" (S-KT-01).

The success of community learning centers relies on community-centered education, which actively involves local members and tailor educational programs to fit local contexts. Respondents advocate for community ownership and support, with one noting, "work needs to be centered on the local community, as the lives of students are determined by the community" (S-KT-12). Engaging community members in the educational process enhances learning outcomes, as highlighted by a respondent who emphasized the importance of "encouraging community participation during classes" (S-Bor-2). Raising awareness and fostering a sense of ownership among community members are also essential for the sustainability of these centers. As one respondent stated, "to raise awareness of the learning process for the community or parents" (S-H-01) is crucial for garnering local support keep students in school.

Comparing this with other studies, *Plan International* (2022) and *UNICEF* (2022) explored the establishment of community-learning centers in conflict zones, particularly in Syria and Lebanon,

where formal schooling was disrupted. These centers provided students with access to education and resources in safe, community-based environments. The studies found that these centers helped reduce dropout rates and kept students engaged in learning during crises. Both the Tigray study and the research from Syria and Lebanon emphasize the importance of community-learning centers in providing continuous access to education when formal schools are inaccessible. In both contexts, these centers serve as critical hubs for learning, offering students a safe environment to continue their education during conflict.

The Tigray study points to greater variability in the accessibility and availability of these centers, with some regions facing significant barriers to access. In contrast, the implementation in Syria and Lebanon was more uniform, supported by strong collaborations between local communities and international organizations, which ensured broader coverage and consistency in the availability of learning centers. Community-learning centers are vital for ensuring educational continuity during armed conflict. However, the success of these centers in Tigray is hindered by inconsistent access and availability. Stronger collaboration between local communities and international bodies, as seen in Syria and Lebanon, could help improve the reach and effectiveness of these centers in providing education to conflict-affected students.

#### **4.7.5. Mobile Parent Education (Parents)**

The combined use of descriptive and inferential statistical analyses, supplemented by qualitative findings, demonstrated that deploying mobile parent education is an effective strategy to combat the education averse parents in crisis situations, such as the war in Tigray. Providing parents and caregivers with educational resources, training, and information to support their children's learning and well-being during armed conflict crisis (INEE, 2021).

Table 76: Descriptive Statistical Results for Mobile Parents Education

Education Features	N	Mean	Std. Error	Std. Deviation
Availability	58	2.6034	.15150	1.15378
Accessibility	58	2.6379	.14488	1.10340
Acceptability	58	3.3448	.18821	1.43333
Adaptability	57	3.0877	.16468	1.24328
Valid N (listwise)	57			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The regression model presented also explains 99.91% of the variance in parental support for children's learning through MPE, as indicated by the R-squared value (0.9991). This exceptionally high level of explained variance suggests that the model effectively captures the key factors influencing MPE effectiveness. The F-statistic (13181.54) and its associated p-value (0.0000) confirm that the model is statistically significant and reliable in explaining the data.

Table 77: Regression Analysis for Mobile Parents Education

Education Features	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Availability	0.2408333	0.0075421	31.93	0.000	0.2256846	0.255982
Accessibility	0.2531094	0.0071219	35.54	0.000	0.2388047	0.2674141
Acceptability	0.2589399	0.0061562	42.06	0.000	0.2465748	0.271305
Adaptability	0.2462541	0.0071786	34.30	0.000	0.2318354	0.2606728
_cons	-0.035257	0.0210076	-1.68	0.100	-0.077452	0.0069382
R <sup>2</sup>	0.9991					
F(6,50)	13181.54					
Prob > F	0.0000					
N	57					

The availability of MPE shows a highly significant positive coefficient of 0.2408 ( $p < 0.001$ ). This suggests that increasing the availability of educational resources and training for parents significantly enhances their ability to support children's learning during armed conflict. Accessible resources empower parents to play an active role in their children's education despite challenges. Accessibility is crucial, with a significant positive coefficient of 0.2531 ( $p < 0.001$ ). This indicates that improving access to MPE resources and information further strengthens parental support for

children's learning. Efforts to ensure that educational support is easily accessible to parents are essential for effective implementation.

Acceptability has a highly significant positive coefficient of 0.2589 ( $p < 0.001$ ). This underscores the importance of culturally and socially acceptable approaches in MPE programs. Strategies that align with local values and norms are more likely to be embraced by parents, fostering effective support for children's education. Adaptability shows a significant positive coefficient of 0.2463 ( $p < 0.001$ ). This highlights the importance of flexible and responsive MPE programs that can adjust to varying needs and contexts during armed conflict. Programs that can adapt their resources and strategies effectively empower parents to navigate challenges and support children's learning.

Qualitative findings of this study also revealed that Mobile Parent Education (MPE) has become a vital strategy for engaging education-averse parents in conflict-affected regions. This approach seeks to enhance parental awareness and empower families by fostering collaboration among stakeholders to improve children's educational outcomes. By implementing targeted interventions, these initiatives bridge the gap between parental understanding of education's importance and actionable support for their children's learning. Respondents emphasize the significance of awareness-raising activities, with one participant stating, “[Awareness raising] to follow up and support their children's learning” (P-KT-01). Another highlighted the positive shift in parental attitudes toward education, noting the need to “enhance parents' attitude towards education to help their children attend their learning regularly” (P-KT-04). This underscores the crucial role of Mobile Parent Education in cultivating a supportive environment where parents are not only informed about educational needs but also actively engaged in their children's academic journeys.

Central to Mobile Parent Education strategies are themes of empowerment, resilience-building, and collaboration. In conflict-affected settings, where families often face numerous challenges, these initiatives aim to deepen parents' understanding of education's significance while fostering resilience amidst adversity. Respondents report transformative outcomes, with one stating that these programs help “shift parents' minds to positive thinking” (P-Seh-6). Collaborative efforts among government agencies, non-governmental organizations, and community structures are essential, as highlighted by a respondent who emphasized the need to “prepare joint plans, connect interfaces, [and] communicate with government and non-governmental organizations” (P-RC-02). By leveraging peer-to-peer learning and community engagement, Mobile Parent Education

initiatives ensure a coordinated and sustainable approach, effectively addressing the evolving challenges faced by families affected by armed conflict.

Comparing this with other studies, *War Child* (2021) and *INEE* (2021) studied mobile parent education programs in conflict zones, such as in Lebanon and Jordan, where parents were provided with resources and training to support their children's education. These programs, delivered through mobile devices and in-person workshops, helped parents play an active role in their children's learning, even during displacement and limited access to schools. Both the Tigray study and the findings from Lebanon and Jordan emphasize the importance of engaging parents through mobile education initiatives. In both cases, providing parents with educational tools and training helps them support their children's education, even when formal schooling is disrupted.

The Tigray study indicates significant gaps in the availability and accessibility of mobile parent education programs, with certain regions struggling to implement these initiatives effectively. In Lebanon and Jordan, however, stronger infrastructure and broader partnerships with NGOs allowed for more widespread and effective use of mobile education programs, ensuring that more parents had access to the resources needed to support their children. Mobile parent education plays a critical role in supporting children's learning during crises. To improve the effectiveness of these programs in Tigray, efforts must be made to increase the availability and accessibility of mobile education tools and resources, mirroring the success of similar initiatives in Lebanon and Jordan through stronger partnerships and infrastructure development.

#### **4.8. Resilient Approaches to Education System Crisis**

The initial inquiry under the third objective of this study aimed to investigate innovative, crisis-resilient approaches to the education system in Tigray. This exploration specifically examined proposed resilience strategies such as agile education policy, decentralized governance, empowered local capacity, community-driven financing, future-proof infrastructure, and a networked local ecosystem. Responses were gathered from participants representing education offices, bureaus, and NGOs. These participants assessed the proposed approaches in relation to the three key dimensions of resilience capacities: absorptive, adaptive, and transformative capacities.

Absorptive Capacity is the ability of education systems, institutions, and agents to absorb and manage the shocks and challenges of armed conflict crisis while minimizing negative impacts on

learning and well-being (UNESCO, 2015; Dryden-Peterson, 2011). Adaptive Capacity is the capability to adapt and adjust educational strategies, policies, and practices to changing circumstances and effectively address the challenges posed by armed conflict (GPE, 2018; Mendenhall et al, 2017). Transformative Capacity is the potential to bring about positive and lasting changes in education systems, teaching-learning approaches, and education agents in the aftermath of armed conflict crisis, aiming for improved resilience and sustainability (Novelli & Sayed, 2016; Davies, 2011).

The responses for these questions have been analyzed using quantitative analysis supported by qualitative results. A comprehensive statistical analysis was performed, beginning with descriptive statistics, focusing on means and standard deviations, and progressing to inferential techniques, notably multiple linear regression analysis, to explore the resilient approaches across resilient capacity dimensions.

#### 4.8.1. Agile Education Policy

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicate that the agile education policy possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient education policy. Agile Education Policy is flexible and adaptable education policies that can respond to changing circumstances during and after armed conflict crisis, ensuring continued access to quality education (World Bank, 2023).

Table 78: Descriptive Statistical Results for Agile Education Policy

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
	Statistic	Statistic		Statistic
Absorptive Capacity	75	3.4267	.13972	1.21002
Adaptive Capacity	75	3.2800	.15015	1.30031
Transformative Capacity	75	3.3467	.14394	1.24654
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Agile Education Policy data yielded significant insights into its absorptive, adaptive, and transformative resilient capacities as perceived by respondents, emphasizing the importance of creating a crisis-resilient educational framework.

The Absorptive Capacity of the Agile Education Policy received a mean score of 3.43, positioning it within the "high" range of perceptions. This score reflects respondents' general belief that the policy possesses a robust capacity to absorb and leverage information effectively during times of crisis. The low standard deviation of 1.21 indicates minimal variability among responses, highlighting a strong consensus that the Agile Education Policy can withstand policy disruptions effectively. Furthermore, the standard error of 0.14, which falls below 5% of the mean, underscores the reliability of this estimate, suggesting that the mean score is a stable representation of the population's perception of the policy's absorptive capacity.

In a similar vein, the Adaptive Capacity of the Agile Education Policy attained a mean score of 3.28, also categorizing it as "high." This result suggests that respondents perceive the policy as having a significant capacity to adapt to disruptions. However, the standard deviation of 1.30 indicates a slightly greater variability in responses compared to absorptive capacity, suggesting that opinions may differ more widely regarding the effectiveness of the policy's adaptive measures. Nevertheless, the standard error of 0.15, remaining below 5% of the mean, implies that the mean score is a reliable estimate despite the observed variability in responses.

Lastly, the Transformative Capacity of the Agile Education Policy scored a mean of 3.35, also categorizing it as "high." This finding indicates a generally positive perception among respondents regarding the policy's capacity for transformative change within the educational landscape. The standard deviation of 1.25 reflects a moderate level of agreement among respondents, although it shows slightly more variability than the absorptive capacity. The standard error of 0.14 further confirms the reliability of the mean score, emphasizing that the perception of the transformative capacity of the Agile Education Policy remains consistent among respondents.

The multiple regression analysis model outlined below further corroborates the findings of the preceding descriptive statistical analysis. The model's fit for the Agile Education Policy (AEP) is remarkably robust, evidenced by an R-squared value of 0.9617. This indicates that approximately 96.17% of the variance in the resilient capacities of AEP can be accounted for by the model.

Furthermore, the F-statistic of 612.02, accompanied by a p-value of 0.0000, underscores the model's overall statistical significance.

Table 79: Regression Analysis for Agile Education Policy

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3994975	0.0433601	9.21	0.000	0.3128759	0.4861192
Adaptive Capacity	0.5651657	0.042824	13.20	0.000	0.479615	0.6507165
Transformative Capacity	-0.056511	0.0204653	-2.76	0.008	-0.097395	-0.015627
_cons	0.3050243	0.145456	2.10	0.040	0.0144426	0.595606
R <sup>2</sup>	0.9617					
F(4, 64)	612.02					
Prob > F	0.0000					
N	69					

The analysis highlighted a strong absorptive capacity within the Agile Education Policy (AEP), demonstrated by the positive coefficient of 0.3995. This suggests that for every one-unit increase in Absorptive Capacity, the effectiveness of the Agile Education Policy increases by approximately 0.3995 units. This significant result indicates that the policy is highly effective in absorbing and withstanding the impacts of armed conflict, maintaining its functionality despite external disruptions. The high t-value (9.21) and very low p-value (0.000) provide robust statistical support for this finding, confirming that the AEP's ability to absorb disturbances and continue operating is a key strength. Policymakers can therefore rely on this capacity to mitigate the immediate negative effects of conflicts on education systems.

Even more notable is the AEP's adaptive capacity, as reflected by the substantial coefficient of 0.5652. This suggests that for every one-unit increase in Adaptive Capacity, the effectiveness of the Agile Education Policy increases by approximately 0.5652 units. This indicates that the policy excels in adjusting and evolving in response to the changing circumstances of armed conflict, significantly enhancing its overall effectiveness. The extremely high t-value (13.20) and p-value (0.000) further reinforce the importance of this capacity. The AEP's ability to rapidly adapt to new challenges and modify strategies as conditions shift is a critical strength, and policymakers should prioritize adaptive strategies to maintain educational quality and access during times of conflict.

In contrast, the AEP's transformative capacity presents a challenge, indicated by the negative coefficient of -0.0565. This suggests that for every one-unit increase in Transformative Capacity, the effectiveness of the Agile Education Policy decreases by approximately 0.0565 units. This

finding implies that the policy is less effective in driving transformative change during conflict situations. The significant t-value (-2.76) and p-value (0.008) confirm this negative impact, suggesting that transformative initiatives, while potentially beneficial in the long term, may not be effective or could even be counterproductive in the short term. Policymakers should, therefore, approach transformative changes cautiously, ensuring that they are carefully designed and implemented to avoid destabilizing the existing educational framework.

An Agile Education Policy can offer a robust solution to the challenges faced by conflict-affected regions like Tigray. Such a policy ensures that education remains accessible, even during crises, by integrating global best practices with local realities. One respondent highlighted that the policy "meets international standards and is easy to implement on the ground" (EO-KT-01), making it suitable for addressing the fragility education system. Furthermore, by focusing on technological advancements and creating diverse learning opportunities, the policy aims "to produce a technologically advanced workforce and to provide students with various opportunities to learn" (EO-GH-03). A key strength of an Agile Education Policy lies in its flexibility and responsiveness to both stable and crisis situations. Unlike traditional policies, which "are not flexible and agile" (NGO-4).

An Agile approach is designed to ensure the continuation of the teaching-learning process, even during armed conflicts (NGO-10). One respondent stressed that when education policy is "closer to the community, it can easily be absorbed, adapted, and transformed by the community" (NGO-12), which enhances its resilience and sustainability. Collaboration with stakeholders is also vital, as an Agile policy "values people and their interactions" and "creates meaning by collaborating with stakeholders, and adapting to change" (NGO-14). This adaptability allows the education system to absorb changes and promote meaningful transformations. By incorporating equity and inclusivity, the policy helps conflict-affected communities "promote resilience and recovery in the education system, and create sustainable and inclusive learning opportunities" (NGO-17), ensuring that education remains relevant and accessible in the long term.

Other studies, such as those conducted in Afghanistan and South Sudan (*World Bank, 2020*), also emphasize the need for adaptable education policies in conflict settings. In these studies, policies that adjust to local contexts while integrating global standards have been shown to be effective in keeping education accessible during crises. A unique aspect of the Tigray study is its focus on the

community's role in absorbing and transforming these policies. Unlike other conflict zones where education is often handled by international NGOs, the Tigray study stresses the importance of community involvement in policy implementation, suggesting that local ownership improves the resilience of the education system. An Agile Education Policy is crucial for maintaining education in conflict zones, but its success depends heavily on the local context. The Tigray study suggests that, in addition to flexibility and international support, community involvement is key to making such policies work effectively in practice. Other regions should consider this element when designing their own education policies for resilience during crises.

#### 4.8.2. Decentralized Education Governance

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicated that the decentralized education governance approach possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient and stable education governance. Decentralized Education Governance is delegating decision-making authority to local and community levels to ensure that education is responsive to the needs and context of the crisis-affected areas (Asrori, 2023).

Table 80: Descriptive Statistical Results for Decentralized Education Governance

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	75	3.3200	.14846	1.28568
Adaptive Capacity	74	3.4054	.14769	1.27052
Transformative Capacity	74	3.2568	.14912	1.28277
Valid N (listwise)	74			

**Mean scales:** low [1–2], medium (2–3), high (3–4), and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Decentralized Education Governance data provided valuable insights into the system's absorptive, adaptive, and transformative resilient capacities as evaluated by respondents. These metrics shed light on how decentralized governance in education is perceived in terms of its resilience to disruptions and ability to adapt to evolving educational demands.

The Absorptive Capacity of the decentralized education governance framework achieved a mean score of 3.32, placing it within the "high" range of perceptions. This score suggests that respondents generally perceive the system as effective in absorbing external shocks and maintaining functionality during disruptions. The standard deviation of 1.29 indicates a relatively low variability in responses, reflecting a solid consensus regarding the system's absorptive capacity. Additionally, the standard error of 0.15, which is less than 5% of the mean, reinforces the reliability of this estimate, suggesting that the population's perception of the absorptive capacity is consistently reflected in the data.

For Adaptive Capacity, the decentralized education governance framework received a mean score of 3.41, also categorized as "high." This result implies that respondents perceive the system's ability to adjust and respond to changing circumstances as strong. The standard deviation of 1.27 suggests minimal variation in respondents' views, indicating a broad agreement on the system's adaptive capacity. The standard error of 0.15, remaining under 5% of the mean, supports the precision of the estimate, ensuring that the mean score is a reliable reflection of the population's assessment of adaptive capacity.

In terms of Transformative Capacity, the framework scored a mean of 3.26, again within the "high" range. This suggests that respondents view the system as capable of undergoing meaningful transformation to improve and innovate in response to challenges. The standard deviation of 1.28 points to a moderate agreement among respondents, while the standard error of 0.15 affirms the stability of the estimate, indicating that the transformative capacity is consistently recognized by respondents.

The multiple regression analysis model outlined below further substantiates the findings from the preceding descriptive statistical analysis. The model's fit for Decentralized Education Governance (DEG) is exceptionally strong, as reflected by an R-squared value of 0.9767, indicating that approximately 97.67% of the variance in DEG's effectiveness can be explained by the model. Additionally, the F-statistic of 917.62, paired with a p-value of 0.0000, confirms the model's overall statistical significance.

Table 81: Regression Analysis for Decentralized education Governance

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4414598	0.0512264	8.62	0.000	0.3390597	0.5438599
Adaptive Capacity	0.5499197	0.0505702	10.87	0.000	0.4488313	0.6510082
Transformative Capacity	-0.031878	0.0297155	-1.07	0.288	-0.091278	0.0275227
_cons	0.0623741	0.1420828	0.44	0.662	-0.221645	0.3463935
R <sup>2</sup>	0.9767					
F(5, 62)	917.62					
Prob > F	0.0000					
N	68					

The decentralized education governance (DEG) exhibited a strong absorptive capacity, with a positive coefficient of 0.4415. This suggests that for every one-unit increase in Absorptive Capacity, the effectiveness of the DEG increases by approximately 0.4415 units. This significant result indicates that DEG's ability to absorb and withstand the impacts of armed conflict enhances its effectiveness. The high t-value (8.62) and very low p-value (0.000) strongly support this finding, suggesting that DEG's absorptive capacity is a critical strength, allowing education systems to maintain stability and functionality during crises. Policymakers can leverage this strength to ensure that educational services continue uninterrupted in conflict zones.

The DEG's adaptive capacity is also robust, with a positive coefficient of 0.5499. This suggests that for every one-unit increase in Adaptive Capacity, the effectiveness of the DEG increases by approximately 0.5499 units. This substantial coefficient implies that DEG's ability to adjust and adapt to the changing circumstances of armed conflict significantly boosts its effectiveness. The extremely high t-value (10.87) and p-value (0.000) underscore the importance of adaptability in maintaining educational quality and responsiveness. This indicates that DEG's strength lies in its flexibility and capacity to evolve in response to new challenges, making it a key area for policymakers to focus on to enhance educational resilience in conflict-affected areas.

In contrast, the DEG's transformative capacity appears to be a weakness, with a negative coefficient of -0.0319. This suggests that for every one-unit increase in Transformative Capacity, the effectiveness of the DEG decreases by approximately 0.0319 units. Although this coefficient is not statistically significant (t-value of -1.07 and p-value of 0.288), it suggests that transformative changes within DEG might not significantly impact its effectiveness. This indicates that while transformation can be beneficial in some contexts, it does not play a crucial role in enhancing DEG

during armed conflicts. Policymakers should approach transformative initiatives with caution, ensuring they are well-planned and do not disrupt existing structures.

Decentralized education governance shifts control from a centralized system to local communities, empowering them to take an active role in shaping policy and strategy. As one respondent observed, "While education is from government-owned to public-owned approach, the role of government in policy and strategy leadership is ensured" (EO-KT-01). This ensures that while government leadership remains a guiding force, local communities gain the flexibility needed to address their specific educational challenges. Decentralization allows for policies to be tailored to the unique contexts of each community, fostering more effective and responsive educational outcomes. This shift, according to another respondent, enables local administrators and educators to make informed decisions based on their local realities, enhancing both accountability and innovation in addressing educational challenges (EO-KT-02).

The expansion of decentralized management goes hand-in-hand with empowering communities to effectively manage educational resources. One perspective emphasized the need to "expand decentralized education management to better manage education structures and organize educational resources and materials locally" (EO-KT-03), ensuring that resources are allocated according to local priorities. Furthermore, ensuring uniform yet context-sensitive implementation across different regions is essential for equity, as noted by another respondent: "Decentralized management but making its implementation uniform" (EO-GH-01). This balance between standardization and local adaptation enhances the quality of education while fostering ownership and responsibility among local stakeholders. Local decision-making authority, such as assigning teachers to schools, further promotes operational efficiency and responsiveness, while building capacity within communities to sustain effective decentralized governance ensures long-term success, even in times of crisis (EO-Seh-3, NGO-1).

Similar findings are reported in countries like South Sudan and Colombia, where decentralized education governance has been used to empower local communities to respond quickly to educational challenges during conflict (*INEE, 2020*). In these settings, decentralization has allowed for greater flexibility and responsiveness in addressing local needs, much like in Tigray. The Tigray study emphasizes that transformative capacity—the ability to make long-lasting changes to the education system—is less effective in a decentralized governance model. In

contrast, studies from Colombia suggest that decentralization can lead to more transformative changes when combined with strong central oversight, helping to rebuild educational structures post-conflict. Decentralized governance is effective in absorbing shocks and adapting to crises, but the Tigray study suggests that achieving long-term transformation through decentralization alone is challenging. A balance between decentralization and central oversight may be necessary to ensure that these governance structures not only manage immediate crises but also contribute to the long-term transformation of the education system.

### 4.8.3. Empowered Local Capacity

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicated that the empowering local capacity approach possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient education institutional capacity. Empowered Local Capacity is strengthening the capacities and skills of local educators, administrators, and communities to effectively manage and sustain education services despite armed conflict challenges (El Assaad, 2022).

Table 82: Descriptive Statistical Results for Empowered Local Capacity

Resilient Capacities	N	Mean	Std. Error	Std. Deviation	Variance
Absorptive Capacity	75	3.3067	.14944	1.29420	1.675
Adaptive Capacity	75	3.3600	.15262	1.32175	1.747
Transformative Capacity	74	3.3378	.14939	1.28508	1.651
Valid N (listwise)	74				

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Empowered Local Capacity data provided valuable insights into the absorptive, adaptive, and transformative capacities as perceived by respondents. These findings are crucial for understanding how empowered local governance can enhance educational resilience in the face of challenges. The Absorptive Capacity achieved a mean score of 3.31, placing it within the "high" range of perceptions. This indicates that respondents generally believe that empowered local capacities effectively absorb and utilize external information to enhance educational practices. The standard deviation of 1.29 suggests a relatively low level of

variability among respondents' assessments, signaling a strong consensus that empowered local capacities are well-equipped to manage policy disruptions. Furthermore, the variance of 1.68 corroborates the stability of the data, reflecting consistent perceptions across the sample.

In terms of Adaptive Capacity, the mean score was 3.36, also categorizing it as "high." This score suggests that respondents perceive empowered local capacities as capable of adjusting and responding effectively to changing educational demands and challenges. The standard deviation of 1.32 indicates a slight increase in variability compared to absorptive capacity, suggesting that opinions may diverge more significantly regarding the effectiveness of adaptive measures. The variance of 1.75 further supports this finding, indicating a broader range of perceptions among respondents. The Transformative Capacity scored a mean of 3.34, placing it firmly within the "high" range as well. This result indicates a favorable perception among respondents regarding the capacity for transformative change within empowered local governance frameworks. The standard deviation of 1.29 indicates a moderate level of agreement among respondents, similar to absorptive capacity, while the variance of 1.65 underscores the consistency in perceptions regarding transformative capacity.

The multiple regression analysis below performed to assess the impact of various resilient capacities on Empowered Local Capacity (ELC) within the context of armed conflict yields several noteworthy findings also supported the descriptive results above. The overall model fit is exceptional, evidenced by an R-squared value of 0.9743, which indicates that approximately 97.43% of the variance in empowered local capacity can be accounted for by the model. Moreover, the F-statistic of 576.04, accompanied by a p-value of 0.0000, affirms the model's statistical significance as a whole.

Table 83: Regression Analysis for Empowered Local Capacity

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3759571	0.0625386	6.01	0.000	0.2509837	0.5009305
Adaptive Capacity	0.5922677	0.0651565	9.09	0.000	0.4620628	0.7224725
Transformative Capacity	-0.004260	0.0325584	-0.13	0.896	-0.069323	0.0608024
_cons	0.2047111	0.1702908	1.20	0.234	-0.135588	0.5450101
R <sup>2</sup>	0.9743					
F(5,63)	576.04					
Prob > F	0.0000					
N	69					

Firstly, the absorptive capacity of ELC has a positive and significant relationship with empowered local capacity, as indicated by a coefficient of 0.376 and a p-value of 0.000. This suggests that for each one-unit increase in absorptive capacity, the empowered local capacity increases by approximately 0.376 units, holding other variables constant. This strong positive correlation indicates that enhancing absorptive capacity is crucial for improving local capacity to manage and sustain education services amidst the challenges posed by armed conflict.

Similarly, the adaptive capacity of ELC also shows a strong positive and significant relationship with empowered local capacity. The coefficient for adaptive capacity is 0.592, with a p-value of 0.000, indicating that an increase of one unit in adaptive capacity is associated with an increase of about 0.592 units in empowered local capacity, controlling for other factors. This underscores the importance of adaptive capacity, which involves the ability to adjust and adapt to changing circumstances, in enabling local educators, administrators, and communities to effectively respond to and manage the dynamic challenges of conflict situations.

In contrast, the transformative capacity of ELC does not exhibit a significant relationship with empowered local capacity, as indicated by a coefficient of -0.004 and a p-value of 0.896. This suggests that changes in transformative capacity do not significantly predict changes in empowered local capacity in this context. This non-significance indicates that transformative capacity may not be a primary driver of local capacity in conflict settings, or that its impact is not well captured in this model. Further research could explore under what conditions transformative capacity becomes relevant and how it can be effectively developed.

The empowered local capacity strategy significantly enhances the absorptive, adaptive, and transformative resilience capacities of communities, particularly in educational contexts. This strategy prepares local communities to handle crises, adapt to changing conditions, and fundamentally transform their systems for long-term sustainability and growth. By aligning educational policies and curricula with local contexts and resources, the strategy bolsters absorptive resilience. As one respondent noted, “When the policy, curriculum of education is prepared in a manner that reflects the resources, history, of the area, citizens know the history and identity of their area and pass it on to the next generation” (EO-KT-01). This alignment fosters a sense of identity and continuity, stabilizing the system during crises, while effective communication within the community strengthens social bonds. Another respondent emphasized

the importance of engaging the community: “By communicating with the community” (EO-KT-02).

Utilizing local expertise further enhances absorptive resilience by integrating indigenous solutions and practical insights into the educational environment. One interviewee highlighted this approach, stating, “Link background knowledge in the community to the educational environment \_ Make appropriate use of local professionals” (EO-GH-01). Encouraging local communities to support education creates a buffer of resources crucial during disruptions. Efforts to enable local communities to become educationally supportive were noted by another respondent: “Efforts to enable the local community to become educationally supportive in a different way” (EO-GH-02). The strategy also promotes adaptive resilience by focusing on skills development and crisis response. Strengthening the capacity of local professionals and leaders ensures effective management of new challenges, as emphasized by one respondent: “Strengthening the capacity and skills of local professionals, leaders, and community members who took into account the crisis” (EO-KT-03). Localized training and resource allocation further enable rapid adaptation to changing needs, illustrated by the comment, “Any budget is pushed to the woreda, and the manpower is trained in short trainings” (EO-GH-03).

Transformative resilience is supported through sustainability and self-reliance initiatives. By linking local capacity efforts to government leadership and monitoring systems, long-term sustainability is ensured, reducing dependency on external aid. One respondent remarked, “Ensure that this is sustainable and improved by linking it to government leadership and monitoring and evaluation” (EO-Bor-1). Encouraging community ownership of local resources fosters proactive problem-solving. As stated by one respondent, “The community needs to be able to own local resources (manpower, property, and money) and use them for the benefit of education” (EB-17). Empowering local capacity during crises also ensures the education system continues to function and innovate, with a respondent noting, “Empowering local capacity during a crisis helps education to continue” (EB-23). Ultimately, investing in local actors' skills and capabilities lays a foundation for long-term development and well-being, as highlighted by an interviewee: “Investing in the skills and capabilities of local actors is key to building a strong foundation for long-term development and well-being in Tigray” (NGO-17). Together, these elements foster resilience, sustainability, and inclusivity, driving transformative change in the education system.

Studies from conflict-affected areas like Yemen and Myanmar (UNESCO, 2020) echo similar findings, where empowering local teachers and administrators has proven essential in maintaining educational services. These studies show that building local capacity allows for faster, more flexible responses to crises. The Tigray study places greater emphasis on long-term development, noting that empowered local capacity is not only critical for immediate crisis response but also for ensuring the sustainability of the education system. In comparison, other studies focus more on the short-term benefits of empowering local actors, with less attention paid to long-term system transformation. Empowering local capacity is critical for maintaining education during crises, but the Tigray study suggests that it is also essential for ensuring the long-term sustainability of the education system. Future studies in other conflict-affected regions could benefit from investigating how local capacity-building can contribute to both short-term resilience and long-term transformation.

#### 4.8.4. Community-Driven Financing

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicated that the community-driven financing strategy possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient education aid and funding. Community-Driven Financing is involving communities and local stakeholders in resource mobilization and management to ensure sustainable funding for education initiatives in crisis-affected regions (Typeset, 2023).

Table 84: Descriptive Statistical Results for Community-Driven Financing

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	75	3.3467	.15480	1.34057
Adaptive Capacity	74	3.1892	.14864	1.27865
Transformative Capacity	75	3.2267	.15489	1.34137
Valid N (listwise)	74			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of Community-Driven Financing data offers critical insights into the absorptive, adaptive, and transformative capacities as perceived by respondents. These

metrics are essential for understanding the effectiveness of community-driven financing initiatives in promoting educational resilience and sustainability.

The Absorptive Capacity received a mean score of 3.35, categorizing it within the "high" range of perceptions. This indicates that respondents generally believe community-driven financing initiatives effectively absorb and utilize resources and information to support educational needs. The standard deviation of 1.34 suggests a moderate level of variability in responses, reflecting a reasonable consensus among respondents regarding the absorptive capacity of these initiatives. The standard error of 0.15, which is below 5% of the mean, further reinforces the reliability of this estimate, indicating that the mean score reliably represents the population's perception.

In terms of Adaptive Capacity, the mean score was 3.19, placing it in the "medium" range. This suggests that while respondents recognize some ability of community-driven financing initiatives to adapt to changing educational contexts, there is significant room for improvement. The standard deviation of 1.28 indicates a higher variability in responses compared to absorptive capacity, implying that opinions may differ more widely regarding the effectiveness of adaptive measures. However, the standard error of 0.15, remaining below 5% of the mean, implies that the mean score is a reliable estimate despite this variability.

Lastly, the Transformative Capacity scored a mean of 3.23, also categorizing it as "medium." This result suggests that respondents perceive community-driven financing initiatives as possessing some capacity for transformative change within the educational landscape, but there is still significant potential for growth and enhancement. The standard deviation of 1.34 indicates a moderate level of agreement among respondents, while the standard error of 0.15 confirms the stability of the mean score, emphasizing that perceptions of transformative capacity are consistently recognized among respondents.

The multiple regression analysis of Community-Driven Financing (CDF), offered critical insights into the impact of various resilient capacities. The overall model fit is exceptional, as indicated by an R-squared value of 0.9731, signifying that approximately 97.31% of the variance in community-driven financing can be explained by the model. Additionally, the F-statistic of 1483.81, coupled with a p-value of 0.0000, confirms the model's statistical significance as a whole. This high goodness-of-fit demonstrates the model's effectiveness in capturing the relationship between the independent variables and community-driven financing.

Table 85: Regression Analysis for Community-Driven Financing

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4385915	0.0636358	6.89	0.000	0.3114254	0.5657575
Adaptive Capacity	0.6048663	0.0620758	9.74	0.000	0.4808176	0.7289149
Transformative Capacity	0.0263011	0.0256187	1.03	0.309	-0.024894	0.077496
_cons	-0.172634	0.1165068	-1.48	0.143	-0.405454	0.0601862
R <sup>2</sup>	0.9731					
F(5,63)	1483.81					
Prob > F	0.0000					
N	69					

The analysis revealed a positive and statistically significant relationship between the absorptive capacity of community-driven financing (CDF) and its effectiveness, as evidenced by a coefficient of 0.439 and a robust standard error of 0.0636. The calculated t-value stands at 6.89, with a p-value of 0.000, thereby confirming the statistical significance of this association. This finding suggests that for every one-unit increase in absorptive capacity, community-driven financing is likely to increase by approximately 0.439 units, assuming other variables remain constant. This highlights the critical importance of absorptive capacity, defined as the ability to absorb and recover from shocks, in enhancing community-driven financing initiatives. Strengthening this capacity can markedly enhance communities' capabilities to manage and sustain educational funding in the face of crises.

In a similar vein, the adaptive capacity of CDF also demonstrates a positive and significant correlation with community-driven financing. The coefficient is measured at 0.605, accompanied by a robust standard error of 0.0621. The t-value for this relationship is 9.74, with a p-value of 0.000. This indicates that an increase of one unit in adaptive capacity corresponds to an increase of approximately 0.605 units in community-driven financing while controlling for other influencing factors. Adaptive capacity—defined as the ability to adjust and respond to changing circumstances—plays a pivotal role in enabling communities to effectively mobilize and manage resources during crisis situations.

Conversely, the transformative capacity of CDF does not demonstrate a significant relationship with community-driven financing. The coefficient is recorded at 0.0263, with a robust standard error of 0.0256. The t-value is 1.03, and the p-value is 0.309, which indicates a lack of statistical significance. This finding suggests that variations in transformative capacity, characterized by

fundamental changes to systems and structures, do not reliably predict changes in community-driven financing within this context. The absence of significance calls for further investigation to elucidate the role of transformative capacity under varying conditions or contexts.

Community-driven financing enhances absorptive capacity by fostering a sense of ownership and responsibility among community members. As one respondent noted, "Introduce awareness work as a policy that education belongs to the community" (EO-KT-01). This policy advocacy emphasizes the importance of education as a community asset, ensuring that it remains a priority even during crises. Moreover, community-led resource management promotes transparency and accountability, enhancing the system's ability to recover from shocks, as noted by another respondent: "Community-led resource management ensures transparency, accountability, and fair distribution and hence short-term school rehabilitation" (EB-23).

Community-driven financing bolsters adaptive capacity by encouraging community involvement in resource mobilization and educational reforms. One respondent illustrated this role by stating, "Community involvement in resource mobilization for educational reforms" (EO-GH-01). Creating capacity awareness through strong relationships with the public, government, charities, and teachers fosters a collaborative environment for implementing adaptive strategies. As one participant noted, "Create capacity awareness by establishing close relationships with the public, government, charities, and teachers" (EO-Bor-1). Involving various stakeholders ensures a broad base of support and resources, enhancing the system's flexibility and responsiveness. A respondent noted "Conduct discussions with the community, non-governmental organizations, and entrepreneurial individuals to protect community-led resources in schools" (EB-8) further emphasize the importance of stakeholder involvement in adaptive resilience.

Community-driven financing supports transformative capacity by promoting long-term planning and sustainable development. The commitment to future-oriented planning is evident in the assertion, "Prepare long, medium, and short-term plans for each school in Tigray to have educational infrastructure suitable for the future" (EO-S-02, EO-S-03). Ensuring sustainability and continuity in education during emergencies is vital for transformative resilience. As one NGO representative emphasized, "Promoting community-driven financing in education during emergencies in Tigray, education stakeholders can empower local communities, enhance resource

mobilization, promote sustainability, and ensure the continuity of education services in times of crisis" (NGO-17).

Overall, community-driven financing enhances absorptive, adaptive, and transformative resilience capacities by fostering community ownership, engaging stakeholders, promoting transparency, and focusing on long-term sustainability. This strategy empowers local communities to actively manage educational resources, helping them withstand immediate shocks while promoting systemic transformation and resilience in the face of ongoing challenges.

Similar findings are reported in Lebanon and Sierra Leone, where community involvement in financing education has been critical in sustaining schools during crises (*UNICEF, 2021*). Both contexts underscore that empowering local stakeholders to manage financial resources increases transparency and ensures funds are allocated to priority areas. The Tigray study highlights greater challenges with the transformative capacity of community-driven financing, noting that while absorptive and adaptive capacities are strong, long-term transformation of the education system is more difficult to achieve. In contrast, in Sierra Leone, community-driven initiatives successfully contributed to long-term education system rebuilding after the Ebola crisis. While community-driven financing is effective in absorbing immediate shocks and adapting to ongoing crises, the Tigray study shows that achieving long-term transformative change requires more than local financing. A robust, centralized system for monitoring and supporting these initiatives may be necessary to ensure they have lasting impacts on the education system.

#### **4.8.5. Future-Proof Infrastructure**

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicated that the future-proof infrastructure approach possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient education infrastructure and prevent from depletion. Future-Proof Infrastructure is designing and constructing educational infrastructure that is resilient to armed conflict and other crises, ensuring that learning spaces can withstand disruptions (Kippin, 2023).

Table 86: Descriptive Statistical Results for Future-Proof Infrastructure

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	75	3.2000	.16979	1.47043
Adaptive Capacity	74	3.2027	.16661	1.43326
Transformative Capacity	74	3.2838	.16721	1.43842
Valid N (listwise)	74			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of Future-Proof Infrastructure data reveals significant insights into the absorptive, adaptive, and transformative capacities as perceived by respondents. These insights are crucial for understanding how well infrastructure investments can support resilience in the educational sector.

The Absorptive Capacity for future-proof infrastructure attained a mean score of 3.20, placing it within the "medium" range of perceptions. This indicates that respondents perceive the infrastructure's ability to absorb and effectively utilize external resources and information as moderate. The standard deviation of 1.47 suggests a considerable level of variability in responses, indicating that opinions on absorptive capacity vary widely among respondents. Additionally, the standard error of 0.17, which is greater than 5% of the mean, points to some uncertainty surrounding this estimate, suggesting that while the mean score represents the overall perception, it may not be as stable as desired.

For Adaptive Capacity, the mean score was 3.20, also categorized within the "medium" range. This result suggests that respondents acknowledge some capacity for future-proof infrastructure to adapt to changing educational needs and challenges, but again, there is significant potential for enhancement. The standard deviation of 1.43 indicates similar variability in opinions as observed with absorptive capacity. The standard error of 0.17, which remains above 5% of the mean, reinforces the notion that while the mean is a useful estimate, perceptions may be quite diverse, reflecting differing views on how well the infrastructure can adapt.

In terms of Transformative Capacity, the infrastructure scored a mean of 3.28, positioning it within the "medium" range. This suggests that respondents believe there is a potential for transformative change driven by future-proof infrastructure within the educational landscape. The standard deviation of 1.44 shows a moderate level of variability, indicating that while there is some

agreement among respondents, perceptions vary significantly. The standard error of 0.17 further confirms that the mean score, while indicative of general sentiment, may mask underlying diversity in opinions regarding transformative potential.

The multiple regression analysis below on Future-Proof Infrastructure (FPI) yielded valuable insights into the impact of various resilient capacities. The overall model fit is exceptional, evidenced by an R-squared value of 0.9857, indicating that approximately 98.57% of the variance in future-proof infrastructure can be explained by the model. Furthermore, the F-statistic of 2267.42, coupled with a p-value of 0.0000, confirms the model's statistical significance as a whole. This high goodness-of-fit illustrates the model's effectiveness in capturing the relationship between the independent variables and future-proof infrastructure.

Table 87: Regression Analysis for Future-Proof Infrastructure

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4782224	0.0542419	8.82	0.000	0.3698286	0.5866162
Adaptive Capacity	0.5489584	0.0587653	9.34	0.000	0.4315253	0.6663915
Transformative Capacity	0.0378425	0.0215767	1.75	0.084	-0.005275	0.0809601
_cons	-0.047046	0.0734791	-0.64	0.524	-0.193882	0.0997902
R <sup>2</sup>	0.9857					
F(5,63)	2267.42					
Prob > F	0.0000					
N	69					

The analysis indicates that the absorptive capacity of future-proof infrastructure (FPI) exhibits a positive and statistically significant relationship. The coefficient is recorded at 0.478, accompanied by a robust standard error of 0.0542. The t-value for this association is 8.82, with a p-value of 0.000, confirming the statistical significance of this relationship. This suggests that for every unit increase in absorptive capacity, future-proof infrastructure increases by approximately 0.478 units, assuming other variables remain constant. This strong positive correlation emphasizes the critical role of enhancing absorptive capacity—which encompasses the ability to absorb and recover from shocks—in the development of infrastructure capable of withstanding disruptions. Investments aimed at improving absorptive capacity can substantially bolster the resilience of educational infrastructure.

Similarly, the adaptive capacity of FPI demonstrates a positive and significant correlation with future-proof infrastructure. The coefficient is measured at 0.549, with a robust standard error of 0.0588. The t-value associated with this relationship is 9.34, and the p-value is 0.000. This indicates that an increase of one unit in adaptive capacity correlates with an increase of approximately 0.549 units in future-proof infrastructure while controlling for other factors. Adaptive capacity, defined as the ability to adjust and respond to changing circumstances, is pivotal in designing infrastructure that can effectively counter and withstand evolving threats and crises.

In contrast, the transformative capacity of FPI displays a positive, albeit not statistically significant, relationship with future-proof infrastructure. The coefficient is reported at 0.038, with a robust standard error of 0.0216. The t-value stands at 1.75, and the p-value is 0.084, indicating that the relationship does not reach statistical significance at the conventional 0.05 level. However, the proximity to significance suggests a potential positive effect that merits further investigation. Transformative capacity, which involves enacting fundamental changes to systems and structures, may play a role in enhancing infrastructure resilience under specific conditions or contexts.

The qualitative analysis of responses regarding future-proof infrastructure highlights a multifaceted approach that emphasized resilience capacities essential for educational development in Tigray. Stakeholders, such as [EO-KT-01], emphasize the need for future-proof educational infrastructure grounded in robust policies that integrate both immediate responses and long-term strategies. As [EO-KT-01] notes, “Formulate a continuous robust short- and long-term education policy that examines the existing current situation and reaches the peak of development the world has reached.” This forward-thinking approach ensures that education systems not only recover from current challenges but are resilient and adaptable to future disruptions. The government's role is central, as highlighted by [EO-GH-01], who calls for coordinated infrastructure support: “Infrastructure to be provided by charities, natives by the government.” In addition, [EO-GH-02] underscores the importance of community-driven efforts, stating, “Rebuild and repair the destroyed educational development infrastructure in collaboration with the local community.” Together, these insights advocate for building educational infrastructure that is sustainable, inclusive, and equipped to meet future demands.

Furthermore, NGOs, such as [NGO 17], underscore the transformative potential of resilient school facilities and community engagement strategies, noting, "Future-proofing infrastructure for education in Tigray through resilient school facilities, digital connectivity, WASH facilities, renewable energy solutions, community engagement, and maintenance strategies." Additionally, technological integration and strategic planning, articulated by [EO-RC-01] and [EO-RC-03], contribute significantly to adaptive resilience, with EO-RC-01 stating, "Preparing quality strategic plan for the education sector," and EO-RC-03 advocating to "Make schools centers of science and technology." Ultimately, the qualitative findings outline a comprehensive resilience framework that integrates absorptive, adaptive, and transformative capacities, underscoring the imperative for a resilient educational future in Tigray.

Similar strategies have been employed in conflict zones like Syria and Afghanistan (*UNICEF, 2021*), where future-proof infrastructure—including durable school buildings and flexible learning environments—has been shown to play a crucial role in maintaining access to education during crises. Both the Tigray study and these other studies emphasize the importance of integrating resilient infrastructure into education systems. While the Tigray study indicates a strong focus on adaptive capacity, such as using mobile classrooms or temporary shelters, it highlights challenges in achieving transformative capacity in infrastructure development. In contrast, in Afghanistan, future-proof infrastructure efforts have led to more transformative impacts, as infrastructure investments have facilitated broader systemic changes in the education sector. Future-proof infrastructure is essential for ensuring the continuity of education during crises, but the Tigray study suggests that achieving transformative, long-term impacts requires more than just building durable structures. Other regions, like Afghanistan, have demonstrated that infrastructure development can lead to systemic improvements when combined with broader educational reforms.

#### **4.8.6. Networked Local Ecosystem**

The descriptive and inferential statistical findings from the quantitative analysis, complemented by the qualitative insights discussed in this section, indicated that the networked local ecosystem strategy possesses robust adaptive, adoptive, and transformative resilience capacities to create crisis resilient education ecosystem and prevent from fragmentation. Networked Local Ecosystem is building strong networks and partnerships among various local actors, such as schools, NGOs,

community organizations, and businesses, to create a collaborative and supportive educational ecosystem (EPDC, 2021).

Table 88: Descriptive Statistical Results for Networked Local Ecosystem

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	75	3.2800	.15134	1.31066
Adaptive Capacity	75	3.3067	.15064	1.30460
Transformative Capacity	75	3.3467	.15711	1.36058
Valid N (listwise)	75			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The descriptive statistical analysis of the Networked Local Ecosystem data provides important insights into the absorptive, adaptive, and transformative capacities as perceived by respondents. These findings are critical for understanding how well a networked local ecosystem can foster resilience in educational settings.

The Absorptive Capacity achieved a mean score of 3.28, categorizing it within the "high" range of perceptions. This indicates that respondents generally believe the networked local ecosystem effectively absorbs and utilizes information and resources to support educational initiatives. The standard deviation of 1.31 reflects a moderate level of variability in responses, suggesting that while there is a general consensus on the ecosystem's absorptive capacity, individual opinions do diverge to some extent. Additionally, the standard error of 0.15, which is less than 5% of the mean, reinforces the reliability of this estimate, indicating that the mean score is a stable representation of the respondents' perceptions.

Regarding Adaptive Capacity, the mean score was 3.31, placing it in the "high" range as well. This result suggests that respondents perceive the networked local ecosystem as capable of effectively adapting to changing educational contexts and challenges. The standard deviation of 1.30 indicates slightly lower variability compared to absorptive capacity, implying a stronger agreement among respondents on the ecosystem's adaptive abilities. The standard error of 0.15, also below 5% of the mean, further supports the reliability of this estimate, suggesting that the mean score accurately reflects the population's perception of adaptive capacity.

Finally, the Transformative Capacity scored a mean of 3.35, categorizing it as "high." This indicates that respondents view the networked local ecosystem favorably regarding its potential for transformative change within the educational framework. The standard deviation of 1.36 suggests a moderate level of variability in perceptions, indicating that while respondents generally agree on the transformative potential, there are still differences in individual opinions. The standard error of 0.16, remaining below 5% of the mean, confirms the stability of the mean score, emphasizing that the perception of transformative capacity is consistently recognized among respondents.

The multiple regression analysis on Networked Local Ecosystem (NLE) presented below provided significant insights into the impact of resilient capacities. The overall model fit is outstanding, as demonstrated by an R-squared value of 0.9867, indicating that approximately 98.67% of the variance in networked local ecosystem development can be accounted for by the model. Additionally, the F-statistic of 2328.08, along with a p-value of 0.0000, confirms the model's statistical significance as a whole. This high goodness-of-fit illustrates the model's effectiveness in capturing the relationship between the independent variables and networked local ecosystem development.

Table 89: Regression Analysis for Networked Local Ecosystem

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.5086662	0.0520911	9.76	0.000	0.4045703	0.612762
Adaptive Capacity	0.4917189	0.0471658	10.43	0.000	0.3974657	0.5859721
Transformative Capacity	0.0036832	0.022314	0.17	0.869	-0.040908	0.0482741
_cons	-0.045476	0.0907135	-0.50	0.618	-0.226752	.1358008
R <sup>2</sup>	0.9867					
F(5,63)	2328.08					
Prob > F	0.0000					
N	69					

The Networked Local Ecosystem (NLE) analysis demonstrated a robust positive relationship between absorptive capacity and community effectiveness, as indicated by a coefficient of 0.5087 and a robust standard error of 0.0521. The t-value is 9.76, with a p-value of 0.000, confirming the statistical significance of this relationship. This suggests that for each one-unit increase in absorptive capacity, community effectiveness increases by approximately 0.5087 units, holding other variables constant. This result emphasizes the critical role of absorptive capacity, which

includes the ability to absorb and recover from external shocks, in enhancing the effectiveness of the networked local ecosystem.

In addition, the adaptive capacity of NLE also exhibits a positive and significant relationship with community effectiveness. The coefficient for adaptive capacity is 0.4917, with a robust standard error of 0.0472. The t-value is 10.43, and the p-value is 0.000, indicating that an increase of one unit in adaptive capacity is associated with an increase of about 0.4917 units in community effectiveness, controlling for other factors. This highlights the importance of adaptive capacity in enabling communities to adjust and respond effectively to changing circumstances, thereby enhancing their overall resilience and functionality.

In contrast, the transformative capacity of NLE does not show a significant relationship with community effectiveness. The coefficient is 0.0037, with a robust standard error of 0.0223. The t-value is 0.17, and the p-value is 0.869, indicating no statistical significance. This suggests that changes in transformative capacity, which involve fundamental shifts in systems and structures, do not significantly predict changes in community effectiveness in this context. This non-significance underscores the necessity for further research to explore the conditions under which transformative capacity may become relevant and its potential impact on community dynamics.

The qualitative analysis of responses regarding the networked local ecosystem for education in Tigray highlighted a strategic emphasis on communication, collaboration, and community engagement to foster resilience and continuity. [EO-KT-01] underscores the importance of having a clear vision and purpose, stating, "Working to have a vision of purpose by putting the education structure into a bow through the network and let everyone enter the same." This vision-setting approach aligns stakeholders toward a unified goal, which is crucial for building a cohesive educational ecosystem. Strengthening networks and partnerships emerges as a fundamental strategy, as articulated by [EO-KT-03], who emphasizes, "Strengthen school governance by creating strengthened networks and partnerships with schools and spreading a culture of supportive cooperation." This initiative aims to enhance governance structures and promote collaborative efforts among educational institutions, laying the groundwork for sustainable development and adaptive resilience.

Communication plays a pivotal role in enhancing the effectiveness of the local ecosystem. According to [EO-GH-01], "Processes are extended to strengthen the columnar communication

system," highlighting efforts to improve communication channels within the educational framework. Similarly, [EO-GH-03] advocates for collaboration within clusters and sub-clusters, stating, "Collaborate experiences in clusters, stations, and sub-clusters," emphasizing the importance of shared experiences and knowledge exchange. Community engagement is another crucial component, as noted by [EO-Seh-3], who asserts, "It motivates the linkage of the community with other stakeholders." This approach integrates community perspectives and resources into the educational network, fostering local ownership and resilience. Additionally, [EB-1] suggests organizing schools in clusters to support one another, while [EB-6] promotes district-level cluster meetings for sharing experiences, enhancing collaboration at the grassroots level. This holistic approach underscores the transformative potential of a well-connected educational ecosystem in fostering resilience and sustainability.

Other studies, such as those from Myanmar and the Central African Republic (*UNESCO, 2022*), show similar outcomes where building the capacity of local educators and communities has proven critical in maintaining education during conflict. Both the Tigray study and these other studies highlight that empowering local actors enables the education system to remain functional despite disruptions. While the Tigray study notes strong absorptive and adaptive capacities, it finds that transformative capacity—the ability to drive long-term systemic changes—remains limited. In contrast, in Myanmar, local capacity-building initiatives have led to more transformative outcomes, as empowered local actors have driven broader reforms in education policy and curriculum development. Empowering local capacity is essential for maintaining education during crises, but the Tigray study suggests that achieving long-term transformation requires more sustained support and resources. Other regions, such as Myanmar, show that local capacity-building can lead to systemic change when combined with efforts to reform educational policies and curricula.

## 4.9. Resilient Approaches to Teaching and Learning Crisis

The second question of the third objective of this study focused on exploring crisis resilient approaches for teaching-learning crises measuring them in terms of resilient capacities namely absorptive, adaptive, and transformative capacities by teachers and students quantitatively and supporting qualitatively. The proposed resilient approaches discussed in this section were agile curriculum development, hybrid pedagogical instruction, targeted mastery-based learning, learner-Based assessment, protective learning environment, life skills and well-being education.

The responses for these questions have been analyzed using quantitative analysis supported by qualitative results. A comprehensive statistical analysis was performed, beginning with descriptive statistics, focusing on means and standard deviations, and progressing to inferential techniques, notably multiple linear regression analysis, to explore the resilient approaches for teaching learning crisis across resilient capacity dimensions.

### 4.9.1. Agile Curriculum Development

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the agile curriculum development strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient curricula and safeguard them against potential disruptions. Agile curriculum development is developing curricula that can be adapted and adjusted quickly to suit the changing needs and challenges posed by armed conflict crisis while maintaining learning quality (Buheji & Mushimiyimana, 2023).

Table 90: Descriptive Statistical Results for Agile Curriculum Development

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.4395	.10857	1.36032
Adaptive Capacity	155	3.5290	.10165	1.26547
Transformative Capacity	155	3.4581	.10993	1.36866
Valid N (listwise)	155			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity of the agile curriculum development process reflects how well the curriculum can handle immediate disruptions and maintain its core functions under stress. With a mean score of 3.4395, the absorptive capacity falls within the high range (3–4), indicating that the curriculum design is generally effective at managing sudden changes or shocks. This could be in response to external factors like changing educational policies, technological advancements, or unexpected shifts in learner needs. The low standard error (0.10857), which is only about 3.16% of the mean, highlights the reliability of this estimate. In other words, the precision of the mean score is high, suggesting that the result is not significantly impacted by sampling variability. However, the standard deviation (1.36032), being relatively large compared to the range, points to considerable variability in how different respondents perceive the absorptive capacity. This discrepancy could imply that certain groups or contexts find the curriculum more adaptable to immediate changes than others, possibly due to differing levels of access to resources or technological infrastructure.

The curriculum's adaptive capacity—its ability to evolve and adjust to long-term changes and emerging demands—also scores in the high range, with a mean of 3.5290. This indicates that the curriculum is seen as highly capable of adjusting to shifts in educational trends, student needs, or external conditions. The low standard error (0.10165), which represents about 2.88% of the mean, further supports the reliability of this estimate, demonstrating that the measurement of the adaptive capacity is precise and trustworthy. While the curriculum appears to be adaptable overall, the high standard deviation (1.26547) signals that perceptions of its adaptability vary among respondents. This variability might suggest that some components of the curriculum or certain implementation environments are more adaptable than others. For example, schools or programs with more access to technology or innovative teaching methods might experience higher adaptive capacity, while those with fewer resources might struggle more to adjust.

The transformative capacity of the curriculum—the ability to innovate and make fundamental changes in response to long-term challenges—also scores high, with a mean of 3.4581. This suggests that the curriculum is not only adaptable but can undergo deep transformations when necessary, allowing it to innovate and thrive in the face of evolving educational demands. The low standard error (0.10993), representing 3.18% of the mean, implies that the mean estimate is quite precise, meaning that the transformative capacity is consistently perceived across the sample.

However, the high standard deviation (1.36866) points to considerable variability in these perceptions. This variation could stem from differences in how transformative the curriculum is perceived to be across different contexts or stakeholders. Some parts of the system may be seen as more capable of significant transformation, while others may lag due to constraints like limited resources, insufficient training, or resistance to change.

The multiple regression analysis of Agile Curriculum Development (ACD) presented below, designed to create curricula that adapt to the evolving demands and challenges of armed conflict while ensuring the quality of education, offers key insights into the role of resilience. The model demonstrates an exceptional fit, with an R-squared value of 0.9674, indicating that approximately 96.74% of the variation in agile curriculum development can be accounted for by the predictors. The F-statistic of 1172.38, accompanied by a p-value of 0.0000, confirms the overall statistical significance of the model. This underscores its effectiveness in capturing the relationship between the independent variables and agile curriculum development.

Table 91: Regression Analysis for Agile Curriculum Development

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.2779245	0.0308776	9.00	0.000	0.2169066	0.2169066
Adaptive Capacity	0.520451	0.0288021	18.07	0.000	0.4635344	0.5773675
Transformative Capacity	0.0476009	0.0203241	2.34	0.021	0.0074379	0.0877639
_cons	0.3098804	0.1039847	2.98	0.003	0.104394	0.5153669
R <sup>2</sup>	0.9674					
F(5,148)	1172.38					
Prob > F	0.0000					
N	154					

The absorptive capacity of Agile Curriculum Development (ACD) demonstrates a significantly positive relationship with agile curriculum development, evidenced by a coefficient of 0.278, a robust standard error of 0.0309, a t-value of 9.00, and a p-value of 0.000. This indicates that for each one-unit increase in absorptive capacity, agile curriculum development improves by approximately 0.278 units, holding all other factors constant. Strengthening absorptive capacity—defined as the ability to assimilate and recover from external shocks—is essential for fostering curricula that are agile and responsive to crises without compromising the quality of education.

Similarly, the adaptive capacity of ACD shows a strong positive correlation with agile curriculum development. With a coefficient of 0.520, a robust standard error of 0.0288, a t-value of 18.07, and a p-value of 0.000, this result implies that a one-unit increase in adaptive capacity corresponds to an increase of approximately 0.520 units in agile curriculum development, controlling for other variables. Adaptive capacity, which allows systems to adjust and flexibly respond to evolving circumstances, is critical in ensuring that curricula remain relevant and effective amid the dynamic challenges posed by armed conflict.

Moreover, transformative capacity of ACD also exhibits a positive and statistically significant association with agile curriculum development, as reflected in a coefficient of 0.048, a robust standard error of 0.0203, a t-value of 2.34, and a p-value of 0.021. This suggests that a one-unit increase in transformative capacity results in an approximate 0.048-unit increase in agile curriculum development, with other variables held constant. Transformative capacity, which drives fundamental changes in curriculum structures and methodologies, contributes positively to the agility and adaptability of educational frameworks during times of crisis.

The qualitative exploration of agile curriculum development for crisis recovery in Tigray reveals a strategic approach aimed at mitigating the educational disruptions caused by emergencies. Central to this strategy is the rapid acquisition of essential knowledge and skills, as highlighted by respondents. For instance, [S-KT-02] emphasizes, "It allows to create students with the required qualifications and skills in the shortest possible time," a sentiment echoed by [S-KT-13], who states, "Because we learn the required lessons in the shortest time." These responses underscore the urgency of swift educational interventions to equip students with critical competencies, even in challenging circumstances. Compensating for lost learning time also emerges as a key objective, with [S-KT-04] explaining, "To compensate for wasted learning time appropriately, so that students move from class to class with sufficient knowledge and skills." [S-KT-06] similarly affirms the approach, noting, "It helps us to make up for the wasted time quickly and get back into the regular." These perspectives underscore the adaptive nature of agile curriculum development in ensuring continuous educational progress.

Flexibility and coordination are pivotal in agile curriculum planning, as reflected in the comments of [S-KT-10], who highlights the importance of "Top-down coordination to improve student outcomes." This is supported by [S-KT-12], who advocates for "Implementing the curriculum

properly, making it inclusive for all students." Teacher training and support also play a crucial role, with [S-KT-17] stressing, "To implement this approach, teachers must be trained," and [S-KT-25] reinforcing the need for preparation, stating, "Teachers must also be properly prepared to teach and ensure the curriculum is learned properly." A student-centered approach remains at the core of this strategy, as described by [S-Seh-1], who notes, "It helps to compensate for major contents of learning programs, encouraging learners to continue." Moreover, the importance of resource allocation and infrastructure is highlighted by [S-S-01], emphasizing the need for "teaching materials" and systemic support like adequate teacher salaries, as noted by [S-S-03]. Finally, evaluation and continuous improvement are integral to the process, with [S-Bor-3] and [S-RC-02] advocating for regular monitoring and adjustments to ensure that evolving educational needs are met effectively.

Similar studies, such as those conducted in Afghanistan and Iraq (*UNESCO, 2020*), emphasize the importance of flexible curriculum development in conflict zones. In both Tigray and these regions, adaptable curricula help mitigate the impact of disruptions caused by conflict, ensuring that students can continue learning despite the circumstances. A key difference is the implementation level. The Tigray study indicates variability in how different schools or districts can implement agile curriculum strategies, influenced by factors such as resource availability and teacher training. In contrast, studies in Iraq highlight more uniform implementation, supported by significant international funding and training for teachers, which ensures that agile curricula are more consistently applied across the region. Agile curriculum development is crucial for maintaining education in conflict zones. However, to maximize its effectiveness, regions like Tigray may need greater resource investment and teacher training programs, as seen in Iraq, to reduce the variability in implementation and ensure all students benefit equally from the adaptive curriculum.

#### **4.9.2. Hybrid Pedagogical Instruction**

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrated that the hybrid pedagogical instructions strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient pedagogical instruction and safeguard them against potential crises. Hybrid pedagogical instruction is blending different

teaching methods and approaches to accommodate various learning environments and situations during armed conflict, ensuring effective instruction (López-Alcarria et al, 2019).

Table 92: Descriptive Statistical Results for Hybrid Pedagogical Instruction

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.1401	.11482	1.43874
Adaptive Capacity	155	3.2710	.11407	1.42021
Transformative Capacity	155	3.2839	.11533	1.43588
Valid N (listwise)	155			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity of hybrid pedagogical instruction is reflected in its ability to handle sudden disruptions and maintain educational continuity. With a mean score of 3.1401, this capacity is categorized as high within the [3–4] range, suggesting that the hybrid instructional model is generally effective at absorbing short-term shocks, such as transitioning between in-person and online learning environments. The low standard error (0.11482), which constitutes about 3.65% of the mean, indicates a high level of precision in the estimation of the mean. This precision shows that the observed mean value reliably represents the larger population's views on the curriculum's absorptive capacity. However, the standard deviation (1.43874) is relatively high, revealing significant variability in perceptions. While some respondents may find the hybrid model highly resilient to disruptions, others may experience challenges in maintaining stability, potentially due to differences in access to technology, the digital literacy of educators and students, or variations in institutional support.

The adaptive capacity of hybrid pedagogical instruction, which reflects its ability to adjust to evolving circumstances, scored a mean of 3.2710, also falling within the high range (3–4). This indicates that the hybrid model is perceived as being flexible and capable of responding effectively to long-term changes in the educational landscape, such as adapting to new technologies, changing student needs, or evolving pedagogical trends. The standard error (0.11407) is low, approximately 3.49% of the mean, underscoring that this estimate is reliable and that the sampling variability is minimal. However, the high standard deviation (1.42021) points to considerable variation in how

different stakeholders perceive the model's adaptability. This could suggest that while some institutions or individuals can easily adjust their hybrid teaching methods, others face challenges due to factors like insufficient technological infrastructure, varying levels of teacher training, or inconsistent student engagement in the hybrid setting. These differences contribute to an uneven experience in terms of how adaptable the curriculum feels to different participants.

The transformative capacity of hybrid pedagogical instruction, which measures the curriculum's ability to innovate and evolve fundamentally, recorded a mean score of 3.2839, placing it within the high range as well. This score indicates that the hybrid model is not only reactive but can also drive significant and innovative changes in teaching and learning methods. For example, the model is likely to promote new strategies for integrating technology with traditional education, resulting in a more flexible and future-oriented approach. The low standard error (0.11533), about 3.51% of the mean, signals that the estimate is accurate and reliable, reinforcing the idea that the perception of transformative capacity is well-represented in the data. However, the high standard deviation (1.43588) reveals substantial variability in perceptions of transformative capacity. This suggests that while some schools or educators view hybrid instruction as highly innovative, others may struggle to implement transformative practices, likely due to varying levels of institutional support, resources, or willingness to embrace change. These differences reflect the challenges faced by different educational environments in adopting and sustaining transformative changes.

The multiple regression analysis of Hybrid Pedagogical Instruction (HPI) presented below, which synthesizes various teaching methods and approaches to adapt to diverse learning environments and circumstances amid armed conflict, yields significant insights into the impact of resilience. The model demonstrates an excellent fit, with an R-squared value of 0.9721, indicating that approximately 97.21% of the variance in hybrid pedagogical instruction is accounted for by the predictors. The F-statistic of 1651.02, coupled with a p-value of 0.0000, confirms the overall statistical significance of the model. This high goodness-of-fit underscores the model's efficacy in elucidating the relationship between the independent variables and hybrid pedagogical instruction.

Table 93: Regression Analysis for Hybrid Pedagogical Instruction

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4482491	0.0200696	22.33	0.000	0.4085913	0.487907
Adaptive Capacity	0.5626201	0.0229698	24.49	0.000	0.5172314	0.6080088
Transformative Capacity	0.039973	0.0197529	2.02	0.045	0.000941	0.079005
_cons	-0.075875	0.0866487	-0.88	0.383	-0.247094	0.0953439
R <sup>2</sup>	0.9721					
F(5,149)	1651.02					
Prob > F	0.0000					
N	155					

The absorptive capacity of hybrid pedagogical instruction (HPI) exhibits a highly significant positive correlation with hybrid pedagogical instruction, as evidenced by a coefficient of 0.448, a robust standard error of 0.0201, a t-value of 22.33, and a p-value of 0.000. This indicates that for every unit increase in absorptive capacity, hybrid pedagogical instruction increases by approximately 0.448 units, assuming other variables remain constant. The enhancement of absorptive capacity—defined as the ability to assimilate and recover from shocks and disruptions—is vital for adapting and sustaining effective instructional methods during crisis situations.

Similarly, the adaptive capacity of HPI reveals a strong positive association with hybrid pedagogical instruction, demonstrated by a coefficient of 0.563, a robust standard error of 0.0230, a t-value of 24.49, and a p-value of 0.000. This implies that a one-unit increase in adaptive capacity correlates with an approximate increase of 0.563 units in hybrid pedagogical instruction, while controlling for other factors. Adaptive capacity, which enables flexibility and adjustment in teaching strategies, is essential for delivering effective instruction that addresses the diverse needs of learners amidst the challenges posed by armed conflict.

Furthermore, the transformative capacity of HPI also indicates a positive and statistically significant relationship with hybrid pedagogical instruction, with a coefficient of 0.040, a robust standard error of 0.0198, a t-value of 2.02, and a p-value of 0.045. This finding suggests that a one-unit increase in transformative capacity is associated with an increase of approximately 0.040 units in hybrid pedagogical instruction, while holding other variables constant. Transformative capacity, characterized by innovative changes and enhancements in instructional approaches, plays

a crucial role in fostering the adaptability and effectiveness of pedagogical strategies during times of crisis.

The qualitative findings on hybrid pedagogical instruction highlight a multifaceted approach aimed at enhancing educational resilience and adaptability in the face of challenges. Central to this strategy is the commitment to providing diverse learning options tailored to meet varying student needs and preferences. As noted by [S-KT-01], "It helps students to learn and retain sufficient knowledge using a variety of methods," emphasizing the importance of employing multiple instructional strategies. Furthermore, [T-KT-01] points out that "The learning process can be conducted using various options (by TV, radio, etc.)," highlighting the flexibility required to ensure continuous learning opportunities across different platforms. The advocacy for a student-centered approach also emerges as a pivotal theme, with [S-KT-12] suggesting, "There should be a shift from the existing teacher-centered to student-centered approach by implementing teaching in a way that students understand."

Flexibility and adaptability are identified as essential components of effective hybrid instruction, especially during crises. [S-H-03] asserts, "Technology-enabled learning is useful for teaching in times of crisis," highlighting the vital role technology plays in facilitating remote learning opportunities. The necessity for teachers to diversify their methodologies is reinforced by [S-KT-29], who states, "So as to the students' learning outcomes can increase, teachers shall use different types of teaching methodologies," indicating that varying approaches can significantly enhance student engagement and outcomes. Additionally, resource utilization is crucial; [T-KT-02] emphasizes that "The learning process can be conducted using various options (by TV, radio, etc.)," pointing to the importance of leveraging diverse resources to support effective teaching practices. Moreover, [T-RC-08] advocates for "Teaching using environmental material," underscoring the value of local resources in enriching the educational experience.

Similar approaches have been documented in Syria and Lebanon, where hybrid instructional models have been adopted to ensure continuous learning during periods of displacement (*Save the Children, 2021*). In both contexts, hybrid teaching methods have proven effective in providing educational access even when physical classrooms are unavailable. In contrast to Syria and Lebanon, where digital infrastructure and access to technology are more developed, the Tigray study highlights significant variability in technological access, which affects the success of hybrid

pedagogical approaches. While the hybrid model is effective in principle, the lack of consistent access to digital resources in Tigray limits its full potential. Hybrid pedagogical instruction offers a resilient solution for education in crisis-affected areas, but its effectiveness in Tigray is constrained by unequal access to technology. Investments in digital infrastructure and training, as seen in Syria, could improve the reach and efficacy of hybrid teaching methods in Tigray.

### 4.9.3. Targeted-Mastery-Based Learning

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrated that the targeted-mastery-based learning strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient learning and safeguard them against potential learning and academic regression. Targeted mastery-based learning is focusing on students' mastery of essential skills and competencies rather than strictly following a set timeline, allowing flexibility in learning progression during armed conflict (Parsons & MacCallum, 2019).

Table 94: Descriptive Statistical Results for Targeted-Mastery-Based Learning

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.3503	.10687	1.33909
Adaptive Capacity	155	3.3161	.11276	1.40387
Transformative Capacity	155	3.4065	.10741	1.33726
Valid N (listwise)	155			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The absorptive capacity for targeted mastery-based learning achieved a mean score of 3.3503, categorizing it within the high range (3–4). This indicates that the model is generally effective in absorbing and managing short-term disruptions to the learning process. The high mean suggests that educators and students are capable of maintaining continuity even when faced with unexpected challenges. The standard error of 0.10687, approximately 3.19% of the mean, is considered low, indicating that the estimate of the mean is precise and reliable. This means stakeholders can have confidence in the representativeness of the mean value. However, the standard deviation of 1.33909 indicates a moderate level of variability in perceptions. While many respondents view the

absorptive capacity as robust, the differences in responses may reflect varying experiences in different educational contexts, including access to resources and institutional support.

The adaptive capacity of targeted mastery-based learning scored a mean of 3.3161, which also falls within the high range. This indicates a strong perception of the model's ability to adjust to ongoing changes in the educational landscape. The high score reflects confidence among educators and learners that they can effectively modify their approaches in response to evolving needs, technologies, or circumstances. The standard error of 0.11276, representing about 3.39% of the mean, is again low, reinforcing the reliability of the mean estimate. However, the standard deviation of 1.40387 suggests a notable variability in how different stakeholders view the adaptive capacity. This variability may indicate differences in institutional resources, training, and overall willingness to embrace change, suggesting that while the model is perceived as adaptive, the actual experiences may differ widely across contexts.

The transformative capacity of targeted mastery-based learning received a mean score of 3.4065, placing it firmly in the high range. This score indicates that the model is viewed as capable of fostering significant and innovative changes in educational practice, which is essential for long-term success. The high mean suggests that many stakeholders feel empowered to implement new strategies and approaches within their learning environments. The standard error of 0.10741, which is approximately 3.15% of the mean, is low, indicating a reliable estimate. However, similar to the other capacities, the standard deviation of 1.33726 reveals some variability in perceptions of transformative capacity. This variability could reflect differences in the degree of institutional support for innovation, professional development opportunities, and the readiness of educators and learners to embrace transformative practices.

The multiple regression analysis of Targeted Mastery-Based Learning (TMBL), which emphasizes students' mastery of essential skills and competencies while allowing for flexibility in learning progression during armed conflict, reveals valuable insights into the impact of resilience. The model exhibits an exceptional fit, with an R-squared value of 0.9684, indicating that approximately 96.84% of the variance in targeted mastery-based learning can be attributed to the predictors. The F-statistic of 2177.40, along with a p-value of 0.0000, confirms the overall statistical significance

of the model. This high goodness-of-fit suggests that the model effectively delineates the relationship between the independent variables and targeted mastery-based learning.

Table 95: Regression Analysis for Targeted-Mastery-Based Learning

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4045451	0.0262552	15.41	0.000	0.3526645	0.4564256
Adaptive Capacity	0.5858903	0.022061	26.56	0.000	0.5422975	0.6294832
Transformative Capacity	-0.019206	0.0184208	-1.04	0.299	-0.055606	0.0171933
_cons	0.0982656	0.0868164	1.13	0.260	-0.073285	0.269816
R <sup>2</sup>	0.9684					
F(5, 149)	2177.40					
Prob > F	0.0000					
N	155					

The analysis of the absorptive capacity of TMBL reveals a significant positive correlation with targeted mastery-based learning, evidenced by a coefficient of 0.405, a robust standard error of 0.0263, a t-value of 15.41, and a p-value of 0.000. This finding indicates that for each unit increase in absorptive capacity, targeted mastery-based learning increases by approximately 0.405 units, while controlling for other variables. This underscores the importance of enhancing absorptive capacity—defined as the ability to absorb and recover from disruptions—as a critical factor in implementing flexible learning strategies that prioritize skill mastery over rigid timelines, particularly during periods of armed conflict.

In a similar vein, the adaptive capacity of TMBL demonstrates a robust positive relationship with targeted mastery-based learning, with a coefficient of 0.586, a standard error of 0.0221, a t-value of 26.56, and a p-value of 0.000. This suggests that an increase of one unit in adaptive capacity is associated with an increase of approximately 0.586 units in targeted mastery-based learning, again controlling for other factors. Adaptive capacity, characterized by flexibility and responsiveness in educational practices, facilitates personalized learning pathways that can be tailored to meet the evolving needs and challenges faced by students in crisis situations.

Conversely, the transformative capacity of TMBL does not exhibit a statistically significant relationship with targeted mastery-based learning. The coefficient is -0.019, with a robust standard error of 0.0184, a t-value of -1.04, and a p-value of 0.299. This indicates that transformative capacity, which involves fundamental changes in educational methodologies, does not

significantly influence the implementation of targeted mastery-based learning within this specific context.

The qualitative findings on targeted mastery-based learning reveal a holistic framework aimed at developing students' skills and competencies through action-oriented educational strategies. Central to this approach is a strong emphasis on skill development, with educators noting its transformative potential. For instance, as [S-KT-01] states, "Because it helps students to have different skills and abilities and become competent," mastery-based learning equips students with diverse abilities, promoting competence. Similarly, [T-KT-05] highlights that "As a student's skills develop, the student becomes a problem solver," emphasizing how skill enhancement fosters critical thinking and problem-solving capabilities. Furthermore, action-based learning experiences are pivotal for deepening understanding and facilitating skill acquisition. As noted by [S-KT-08], "Because it helps the student to receive action-based learning," this method allows for practical application in the learning process. These insights advocate for educational strategies that prioritize practical engagement, equipping students to tackle real-world challenges.

Advocates for targeted mastery-based learning also underscore a student-centered approach that encourages active participation and practical knowledge application. [S-KT-21] emphasizes that "Because it helps you learn by doing," highlighting the significance of experiential learning in enhancing student engagement and comprehension, while [T-KT-12] calls for "Provide a learning-oriented teaching and learning process," stressing the need for educational practices tailored to individual learning styles. Continuous improvement and assessment are also essential elements of mastery-based learning, as noted by [S-Seh-1], who states, "Help learners identify their focus area and develop their skills continuously," emphasizing personalized learning pathways. Meanwhile, [T-RC-01] underscores the importance of "Providing professional training for teachers," indicating the crucial role of educator development in effectively implementing mastery-based approaches.

Studies from conflict-affected regions like South Sudan and Somalia show similar success with mastery-based learning approaches (*World Bank, 2021*). In these contexts, allowing students to progress at their own pace has helped mitigate learning losses caused by conflict-related disruptions. A key difference is in the level of institutional support. In South Sudan, mastery-based learning is supported by government-backed teacher training programs that help educators implement this strategy effectively. The Tigray study notes variability in teacher preparedness,

suggesting that without adequate training, the transformative potential of mastery-based learning is limited. While mastery-based learning is a powerful tool for mitigating learning losses during crises, its success in Tigray would be enhanced by more robust teacher training programs and institutional support, similar to those in South Sudan. Ensuring that educators are equipped to implement this approach is essential for maximizing its benefits.

#### 4.9.4. Learner-Based Assessment

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the learner-based assessment strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient learning assessment and safeguard them against potential disruptions. Learner-based assessment is shifting towards assessment methods that consider individual student strengths, needs, and circumstances, recognizing the diversity of learners affected by armed conflict crisis (Fischer et al, 2021).

Table 96: Descriptive Statistical Results for Learner-Based Assessment

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.2675	.11045	1.38389
Adaptive Capacity	155	3.3484	.10135	1.26179
Transformative Capacity	155	3.4129	.10861	1.35218
Valid N (listwise)	155			

*Mean scales: low [1–2], medium (2–3), high (3–4), and very high (4–5)*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The absorptive capacity for learner-based assessment received a mean score of 3.2675, which categorizes it within the high range (3–4). This indicates that the model is generally perceived as effective in absorbing disruptions and maintaining continuity in the learning process. The mean suggests that educators and learners feel confident in their ability to navigate short-term challenges, such as shifts in assessment methods or unexpected interruptions to the educational environment. The standard error of 0.11045, which constitutes about 3.38% of the mean, is considered low, providing a reliable estimate of the mean. This precision enhances confidence in the data's representation of stakeholder perspectives. However, the standard deviation of 1.38389

reflects a considerable level of variability in how different respondents perceive the absorptive capacity. This variation may indicate differing experiences based on institutional support, technological access, and individual preparedness to adapt to new assessment approaches.

The adaptive capacity of learner-based assessment scored a mean of 3.3484, also placing it within the high range. This score reflects a strong perception of the model's ability to adjust to ongoing changes and evolving educational needs. Respondents generally feel that the assessment model can effectively respond to the dynamics of learning environments, whether through integrating new assessment tools or modifying existing practices. The standard error of 0.10135, representing approximately 3.02% of the mean, is low, indicating a reliable estimate of the adaptive capacity perception. The standard deviation of 1.26179 suggests some variability in responses, pointing to differences in how stakeholders experience the adaptability of learner-based assessments. Variations may arise from differences in institutional resources, levels of educator training, and willingness to embrace changes in assessment practices, which can influence perceptions of adaptive capacity.

The transformative capacity for learner-based assessment achieved a mean score of 3.4129, placing it firmly in the high range. This high mean suggests that the model is seen as capable of driving significant changes in teaching and learning practices. Stakeholders feel empowered to implement innovative assessment strategies that can enhance learning outcomes and foster student engagement. The standard error of 0.10861, approximately 3.18% of the mean, is low, reinforcing the reliability of this estimate. However, the standard deviation of 1.35218 indicates a notable variability in how different individuals perceive the transformative capacity. This variability may reflect differences in institutional support for innovative assessment methods, educators' readiness to adopt new practices, and varying student responses to assessment changes. Understanding these differences is essential for maximizing the transformative potential of learner-based assessments across diverse educational contexts.

The multiple regression analysis of Learner-Based Assessment (LBA) presented below, which prioritizes assessment methods customized to individual student strengths, needs, and circumstances during armed conflict, offers significant insights into the role of resilience. The model demonstrates a robust fit, with an R-squared value of 0.9736, indicating that approximately 97.36% of the variance in learner-based assessment can be accounted for by the predictors. The F-

statistic of 1779.28, accompanied by a p-value of 0.0000, confirms the overall statistical significance of the model. This high goodness-of-fit suggests that the model effectively elucidates the relationship between the independent variables and learner-based assessment.

Table 97: Regression Analysis for Learner-Based Assessment

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4366554	0.0218223	20.01	0.000	0.3935342	0.4797766
Adaptive Capacity	0.5204511	0.0277534	18.75	0.000	0.4656101	0.5752921
Transformative Capacity	0.0505872	0.0177544	2.85	0.005	0.0155043	0.0856702
_cons	0.1588631	0.0764048	2.08	0.039	0.0078862	0.30984
R <sup>2</sup>	0.9736					
F(5,149)	1779.28					
Prob > F	0.0000					
N	155					

The analysis reveals a substantial positive correlation between the absorptive capacity of learner-based assessment (LBA) and the effectiveness of these assessments. The regression coefficient for absorptive capacity is 0.437, accompanied by a robust standard error of 0.0218, yielding a t-value of 20.01 and a p-value of 0.000. This statistical evidence suggests that for each one-unit increase in absorptive capacity, there is an approximate increase of 0.437 units in learner-based assessment, with all other variables held constant. This finding underscores the importance of enhancing absorptive capacity—the ability to assimilate and recover from disruptions—as it plays a pivotal role in implementing assessment strategies that are responsive to individual student needs, especially in crisis contexts.

Furthermore, the adaptive capacity of LBA exhibits a strong positive relationship with learner-based assessment. The corresponding regression coefficient is 0.520, with a robust standard error of 0.0278, a t-value of 18.75, and a p-value of 0.000. This indicates that an increase of one unit in adaptive capacity correlates with a rise of approximately 0.520 units in learner-based assessment while controlling for other influencing factors. This relationship highlights the significance of adaptive capacity in fostering flexibility and responsiveness in educational practices, thereby supporting personalized assessment methods that cater to the diverse circumstances of learners during periods of armed conflict.

Moreover, the transformative capacity of LBA also reveals a positive and statistically significant association with learner-based assessment. The regression coefficient stands at 0.051, with a robust standard error of 0.0178, a t-value of 2.85, and a p-value of 0.005. This implies that a one-unit increase in transformative capacity is linked to an increase of approximately 0.051 units in learner-based assessment, with other variables controlled. The findings accentuate the role of transformative capacity—characterized by innovative changes in assessment strategies—in positively influencing the adoption of learner-centered approaches that prioritize individual student growth and development.

Qualitative findings on learner-based assessment underscored its pivotal role in tailoring education to meet individual student needs and fostering a supportive learning environment. The emphasis on identifying strengths and weaknesses is crucial, as noted by [S-KT-01], who states, "Because it helps to examine the student's weaknesses and strengths and help and qualify," highlighting how such assessments enable personalized guidance and targeted support. [S-KT-04] adds, "Because it allows you to identify students' strengths and weaknesses," further emphasizing the importance of assessments in informing instructional strategies to enhance learning outcomes based on individual profiles. Another significant theme emerging from the responses is the promotion of independent learning. [S-KT-03] remarks, "Because it helps students to fill in the gaps and explore knowledge in different ways on their own," illustrating how learner-based assessments empower students to take ownership of their learning journey.

Similarly, [S-KT-16] emphasizes, "Because it helps students to learn independently and develop the necessary skills," reinforcing the developmental aspect of assessments in fostering critical thinking and self-directed learning abilities. Advocates for learner-based assessment stress the importance of a student-centered approach in evaluation practices. [S-KT-09] suggests, "Conduct student-centered assessment and inspection systems," promoting assessments that respond to individual student needs and learning progress. [T-KT-06] notes, "A student-centered assessment system would be based on a topic that needs attention, but it is not often implemented," pointing to the potential benefits of aligning assessment strategies with the diverse needs and interests of students. Additionally, [T-KT-13] states, "Ensuring that students learn on time and providing continuous assessments," highlighting how regular feedback supports continuous improvement in learning outcomes.

Studies in Yemen and Nigeria (INEE, 2020) report similar findings, where individualized assessments have been key to maintaining educational progress during conflict. Both the Tigray study and these reports highlight the importance of assessments that account for the diverse needs of students in crisis contexts. The Tigray study points to challenges in standardization, with variability in how learner-based assessments are implemented across different schools. In contrast, Yemen’s experience suggests that centralized guidelines for learner-based assessments, supported by international organizations, have led to more consistent and equitable application. Learner-based assessment is crucial for maintaining personalized education during crises, but in Tigray, standardization and central support are needed to ensure that all students benefit equally. Centralized guidelines, as seen in Yemen, could help reduce variability and improve the overall effectiveness of these assessments.

#### 4.9.5. Protective Learning Environment

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the protective learning environment strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient learning environment and safeguard them against potential adversities. Protective learning environment is creating learning environments that prioritize students' safety, well-being, and emotional health, especially in contexts where armed conflict poses threats to these aspects (Ndassimba et al, 2022).

Table 98: Descriptive Statistical Results for Protective Learning Environment

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.3631	.10660	1.33567
Adaptive Capacity	155	3.4710	.10648	1.32562
Transformative Capacity	155	3.4452	.10680	1.32969
Valid N (listwise)	155			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity for a protective learning environment received a mean score of 3.3631, categorizing it within the high range (3–4). This indicates that the model is perceived as effective

in absorbing challenges and maintaining a stable learning experience. Educators and students alike feel confident in their ability to navigate disruptions, such as changes in teaching methods or unforeseen challenges. The standard error of 0.10660, which constitutes about 3.17% of the mean, is considered low, suggesting that the estimate of the mean is precise and representative of stakeholder views. However, the standard deviation of 1.33567 indicates a moderate level of variability in perceptions of absorptive capacity. This variability may reflect differences in institutional support, access to resources, and individual readiness to adapt to new educational challenges, highlighting the need for tailored approaches to enhance the absorptive capacity across various contexts.

The adaptive capacity of the protective learning environment achieved a mean of 3.4710, placing it firmly in the high range. This score indicates a strong perception among respondents of the model's ability to respond effectively to ongoing changes and emerging challenges in education. Stakeholders generally believe that the protective environment fosters a culture of adaptability, allowing educators and students to embrace new methodologies and adapt their practices accordingly. The standard error of 0.10648, approximately 3.06% of the mean, is low, enhancing the reliability of this mean estimate. The standard deviation of 1.32562 suggests some variability in experiences, indicating that while many find the environment supportive of adaptability, others may face challenges based on differing levels of institutional resources, training, and individual readiness to embrace change. Addressing these differences could enhance the overall adaptive capacity of the learning environment.

The transformative capacity for a protective learning environment received a mean score of 3.4452, also falling within the high range. This indicates that the model is viewed as effectively fostering significant changes and innovations in educational practice. Respondents feel empowered to implement new strategies and approaches that enhance learning outcomes and promote student engagement. The standard error of 0.10680, representing approximately 3.10% of the mean, is low, reinforcing confidence in the reliability of this estimate. However, the standard deviation of 1.32969 reveals notable variability in how different stakeholders perceive the transformative capacity. This variability may arise from differing levels of support for innovation, professional development opportunities, and educators' willingness to implement transformative

practices. Understanding these differences is crucial for maximizing the transformative potential of protective learning environments.

The multiple regression analysis of Protective Learning Environment (PLE), which focuses on fostering safe and supportive learning environments in the context of armed conflict, provides valuable insights into the impact of resilience. The model exhibits a strong fit, with an R-squared value of 0.9694, indicating that approximately 96.94% of the variance in protective learning environments can be attributed to the predictors. The F-statistic of 1168.58, along with a p-value of 0.0000, confirms the overall statistical significance of the model. This high goodness-of-fit suggests that the model effectively captures the relationship between the independent variables and protective learning environments.

Table 99: Regression Analysis for Protective Learning Environment

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.4092891	0.0261002	15.68	0.000	0.3577149	0.4608634
Adaptive Capacity	0.6061375	0.0227407	26.65	0.000	0.5612015	0.6510735
Transformative Capacity	0.039197	0.020366	1.92	0.056	-0.001046	0.0794405
_cons	0.0258077	0.093264	0.28	0.782	-0.158483	0.2100985
R <sup>2</sup>	0.9694					
F(5, 149)	1168.58					
Prob > F	0.0000					
N	155					

The analysis of the relationship between the absorptive capacity of Protective Learning Environments (PLE) and protective learning environments reveals a statistically significant positive association. The regression coefficient is 0.409, accompanied by a robust standard error of 0.0261, a t-value of 15.68, and a p-value of 0.000. This robust statistical evidence indicates that for every one-unit increase in absorptive capacity, protective learning environments are expected to increase by approximately 0.409 units, all else being equal. The enhancement of absorptive capacity—defined as the ability to absorb and recover from disruptions—is essential for establishing and maintaining educational settings that prioritize the safety and well-being of students, particularly in contexts of armed conflict.

In parallel, the adaptive capacity of PLE also exhibits a strong positive correlation with protective learning environments. The regression coefficient for adaptive capacity is 0.606, with a robust

standard error of 0.0227, a t-value of 26.65, and a p-value of 0.000. This indicates that a one-unit increase in adaptive capacity is associated with an increase of approximately 0.606 units in protective learning environments when controlling for other variables. This highlights that adaptive capacity, which fosters flexibility and responsiveness within educational practices, plays a crucial role in creating nurturing environments that protect students' emotional health and well-being during crises.

Conversely, the transformative capacity of PLE reveals a positive yet marginally significant relationship with protective learning environments. The coefficient for transformative capacity stands at 0.039, with a robust standard error of 0.0204, a t-value of 1.92, and a p-value of 0.056. This suggests that an increase of one unit in transformative capacity is correlated with a rise of approximately 0.039 units in protective learning environments, while controlling for other factors. Transformative capacity, which involves innovative alterations in educational policies and practices, may contribute positively to the establishment of safer and more supportive learning environments; however, further research is warranted to elucidate this relationship more comprehensively.

Qualitative findings highlighted the critical importance of protective learning environments in fostering student well-being and academic engagement. For instance, [S-KT-01] notes that such environments "increase the desire to learn" among both students and teachers, suggesting that safety and support can significantly enhance motivation. Furthermore, [S-KT-07] emphasizes that a positive atmosphere encourages students to "love their school" and boosts their desire to learn, illustrating the profound impact that a protective setting has on student attitudes towards education. Creating comfortable and safe spaces in schools is essential for optimal learning conditions, as noted by [S-KT-04], which states that a supportive environment makes students "comfortable and willing to focus on learning." The significance of physical safety is reinforced by [S-KT-10], which underscores the necessity of measures that promote a distraction-free and secure learning environment.

The role of protective learning environments also extends to promoting school attendance and fostering a sense of belonging. As [S-KT-06] points out, such environments encourage students to "attend school without any problems," highlighting the relationship between a positive school climate and regular attendance. [S-KT-30] reinforces this idea by stating that a safe environment

enables students to "spend more time" at school, enhancing their engagement. Additionally, the insights suggest that community involvement is pivotal for maintaining a protective learning environment, as noted by [S-KT-24], which advocates for "dialogue with the community" to create supportive educational settings. Infrastructure development is also vital; [S-GH-1] emphasizes the need for a "clean school compound," while [T-GH-04] stresses that renovations are essential for student comfort and success. However, challenges such as security threats and community disruptions, highlighted by [T-RC-01] and [T-AH-01], pose significant risks to maintaining a protective environment.

Similar strategies have been employed in Jordan and Iraq (*UNICEF, 2021*), where creating safe learning spaces has proven essential for maintaining education in refugee camps and conflict zones. In both Tigray and these regions, protective environments are crucial for ensuring students' emotional and psychological well-being. The Tigray study indicates variability in the consistency of protective environments, with some areas facing more challenges in maintaining safe schools due to ongoing conflict. In Jordan, protective learning environments benefit from strong international support and collaboration, which ensures more consistent implementation across different regions. Protective learning environments are essential for maintaining student well-being during crises, but Tigray could benefit from stronger international collaboration to ensure consistency across regions. The success seen in Jordan, where protective environments are more uniformly maintained, suggests that additional external support could enhance the effectiveness of these efforts in Tigray.

#### **4.9.6. Life Skills and Well-Being Education**

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the life skills and well-being education strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient teacher-learner relationship and safeguard them against potential strains. This approach is integrating life skills and well-being education into the curriculum to equip students with essential skills for coping with the challenges of armed conflict and promoting resilience (Ossiannilsson, 2022).

Table 100: Descriptive Statistical Results for Life Skills and Well-Being Education

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	157	3.4204	.11182	1.40113
Adaptive Capacity	154	3.4156	.10653	1.32202
Transformative Capacity	154	3.4481	.11096	1.37694
Valid N (listwise)	154			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity for life skills and well-being education attained a mean score of 3.4204, categorizing it within the high range (3–4). This result indicates that participants generally perceive this educational approach as effective in absorbing challenges and maintaining a supportive learning environment. Individuals feel equipped to handle disruptions and engage actively in their educational processes. The standard error of 0.11182, approximately 3.27% of the mean, is low, which signifies a reliable estimate of the mean score. However, the standard deviation of 1.40113 indicates a moderate level of variability in perceptions regarding absorptive capacity. This variability may arise from differing experiences in applying life skills education, highlighting the necessity for tailored support to enhance absorptive capacity across diverse contexts.

The adaptive capacity of life skills and well-being education received a mean score of 3.4156, placing it within the high range. This score reflects a strong perception of the program's ability to help individuals respond to ongoing changes and challenges. Participants feel confident in their capacity to adapt their skills and approaches to meet new educational demands. The standard error of 0.10653, which accounts for approximately 3.12% of the mean, is low, enhancing the reliability of this estimate. The standard deviation of 1.32202 suggests some variability in responses, indicating that while many participants find the program adaptive, others may experience challenges based on varying levels of personal circumstances and institutional support. Addressing these disparities could further improve the adaptive capacity of the educational framework.

The transformative capacity for life skills and well-being education achieved a mean score of 3.4481, categorizing it within the high range. This score indicates that the program is perceived as effective in fostering significant changes in participants' attitudes and practices. Stakeholders feel empowered to implement new strategies and behaviors that enhance their well-being and overall life skills. The standard error of 0.11096, approximately 3.21% of the mean, is low, suggesting

confidence in the mean estimate. The standard deviation of 1.37694 shows a moderate level of variability in perceptions regarding transformative capacity. This variability may reflect differences in individual experiences with the educational framework, influenced by factors such as personal commitment to change and available resources. Understanding these differences is essential for maximizing the transformative potential of life skills and well-being education.

The multiple regression analysis of Life Skills and Well-Being Education (LSWE) presented below, which incorporates life skills and well-being education into the curriculum to foster resilience in the face of armed conflict, reveals significant insights into the impact of resilient capacities. The model demonstrates a strong fit, with an R-squared value of 0.9721, indicating that approximately 97.21% of the variance in life skills and well-being education can be attributed to the predictors. The F-statistic of 1873.32, along with a p-value of 0.0000, confirms the overall statistical significance of the model. This high goodness-of-fit suggests that the model effectively elucidates the relationship between the independent variables and life skills and well-being education.

Table 101: Regression Analysis for Life Skills and Well-Being Education

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.493082	0.0444831	11.08	0.000	0.405178	0.580986
Adaptive Capacity	0.5539536	0.0449015	12.34	0.000	0.4652227	0.6426845
Transformative Capacity	0.039728	0.0156981	2.53	0.012	0.0087066	0.0707493
_cons	-0.074318	0.0800763	-0.93	0.355	-0.232559	0.0839223
R <sup>2</sup>	0.9721					
F(5,148)	1873.32					
Prob > F	0.0000					
N	154					

The analysis of the absorptive capacity of Life Skills and Well-Being Education (LSWE) revealed a significant positive correlation with the provision of life skills and well-being education. The regression coefficient is 0.493, accompanied by a robust standard error of 0.0445, yielding a t-value of 11.08 and a p-value of 0.000. This statistical significance indicates that a one-unit increase in absorptive capacity is associated with an approximate increase of 0.493 units in life skills and well-being education, assuming all other variables remain constant. Therefore, enhancing absorptive capacity—defined as the ability to assimilate and adapt to disruptions—plays a vital

role in embedding effective life skills education, which equips students with essential coping strategies amid the challenges posed by armed conflict.

In a similar vein, the adaptive capacity of LSWE exhibits a robust positive relationship, with a coefficient of 0.554, a robust standard error of 0.0449, a t-value of 12.34, and a p-value of 0.000. This suggests that an increase of one unit in adaptive capacity correlates with an enhancement of approximately 0.554 units in life skills and well-being education, controlling for other influencing factors. The significance of adaptive capacity lies in its ability to foster flexibility and responsiveness in educational content and delivery, thereby facilitating the effective integration of well-being education that bolsters students' resilience during crises.

Furthermore, the transformative capacity of LSWE presents a positive relationship, although marginally significant, with a coefficient of 0.040, a robust standard error of 0.0157, a t-value of 2.53, and a p-value of 0.012. This outcome indicates that a one-unit increase in transformative capacity is linked to an increase of approximately 0.040 units in life skills and well-being education, with other variables held constant. Transformative capacity encompasses innovative alterations in educational methodologies and curriculum design, suggesting that such changes may positively impact the incorporation of life skills education aimed at fostering resilience among students affected by armed conflict.

Qualitative results of this research underscored the profound impact of life skills and well-being education on students' holistic development. [S-KT-01] asserts, "Because it helps students to find solutions to problems in their future lives and become stronger," highlighting the significance of this education in fostering essential problem-solving abilities for navigating life's challenges. Similarly, [S-KT-13] adds, "Because you will be insightful and it will help you to find quick solutions to problems," emphasizing how these skills enhance adaptability and resilience among students. Ethical and moral development also emerges as a key theme. [S-KT-02] mentions, "Because it helps to produce a student who is ethically built and has a high ability to solve problems," illustrating the integration of ethical values with practical skills. Furthermore, [S-KT-08] emphasizes, "Because it helps students to be free from the psychological problems caused by the war and to become morally blessed," demonstrating how such education can alleviate emotional challenges and foster moral integrity.

Communication skills and relationship-building are crucial components of life skills education. [S-KT-05] states, "It helps us to become young in our learning as it improves the relationship between student and student as well as between student and teacher," underlining the role of effective communication in facilitating positive interactions. Additionally, [T-KT-07] adds, "Provide skills-based training to teachers and provide psychological healing to the community," reflecting the broader societal impact of enhanced communication through education. Emotional well-being is also addressed, with [S-KT-16] noting, "Because it helps you to be free from your anxiety and solve problems properly," while [S-KT-19] emphasizes, "Because it helps students to plan their activities to solve problems easily in the course of their lives." Goal setting and planning are foundational outcomes of life skills education, as [S-KT-21] states, "Because it helps you to have a goal and your staff to go by plan." Respondents stress the necessity of community engagement for holistic development. [S-KT-29] suggests, "Making the students part of the solutions for problems rather than taking as problems," which highlights the active involvement of students in addressing community issues.

Similar programs in conflict-affected areas such as Yemen and Lebanon have also emphasized the importance of integrating life skills and well-being education into the curriculum (*UNICEF, 2020*). In both Tigray and these regions, life skills programs are seen as essential for helping students build the emotional and social resilience needed to cope with the stresses of conflict. These programs typically focus on areas like conflict resolution, communication, self-awareness, and stress management. One significant difference lies in the reach and uniformity of these programs. In Lebanon, life skills and well-being education has been widely supported by international organizations like UNICEF, which has allowed for more consistent implementation across different regions. In Tigray, however, the study notes variability in how life skills education is delivered, with some areas receiving less support due to ongoing conflict and resource limitations. Life skills and well-being education is critical for building emotional resilience in students during times of conflict, but the Tigray study suggests that its effectiveness is limited by uneven access and implementation. By drawing on the experience in Lebanon, where international collaboration has led to more widespread and consistent application of these programs, Tigray could enhance its life skills education by increasing support and resources, ensuring that all students benefit equally from these essential programs.

#### 4.10. Resilient Approaches to Education Agents’ Crisis

The third question of the third objective of this study centered on examining crisis-resilient strategies for educational stakeholders, assessing their resilience capacities: absorptive, adaptive, and transformative capacities among teachers, students, parents, educational offices, education bureaus, and educational NGOs, who are essential partners in the education sector. This assessment was conducted through a combination of quantitative data and supporting qualitative insights. The identified resilient strategies include: peace and ethical education (Governments), family endowments for education (NGOs), a comprehensive teacher support system (Teachers), the right to education for children (Students), and educational skills for parents (Parents).

Responses to these inquiries were analyzed utilizing quantitative methods, supplemented by qualitative findings. A thorough statistical analysis was undertaken, commencing with descriptive statistics—focusing on means and standard deviations—and advancing to inferential techniques, particularly multiple linear regression analysis, to investigate the resilient strategies for educational stakeholders across the dimensions of resilience capacity.

##### 4.10.1. Peace and Ethical Education (Governments)

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the peace and ethical education strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient education sector and safeguard them against weaponizing education. This approach refers to integrating peace education and ethical values into the curriculum to promote conflict resolution, empathy, and understanding, especially in areas affected by armed conflict ( Kapuwa, 2021; Yazdani, 2022).

Table 102: Descriptive Statistical results for Peace and Ethical Education

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	57	3.1930	.17240	1.30163
Adaptive Capacity	57	3.1053	.17285	1.30499
Transformative Capacity	57	3.0877	.18611	1.40510
Valid N (listwise)	57			

*Mean scales: low [1–2], medium (2–3], high (3–4], and very high (4–5]*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The absorptive capacity for peace and ethical education recorded a mean score of 3.1930, placing it in the high range (3–4). This result indicates that respondents perceive this educational framework as relatively effective in enabling individuals to absorb challenges and maintain a conducive learning environment. Participants generally feel equipped to handle disruptions and complexities associated with peace and ethical issues. The standard error of 0.17240, which is approximately 5.39% of the mean, is considered high, suggesting a less precise estimate of the mean score. This may indicate variability in experiences and perceptions among respondents. Furthermore, the standard deviation of 1.30163 reflects a moderate level of variability in the responses, highlighting differing levels of support and effectiveness experienced by participants. This variability suggests the need for tailored strategies to enhance absorptive capacity across various educational contexts.

The adaptive capacity for peace and ethical education achieved a mean score of 3.1053, also within the high range. This indicates that participants generally view the educational approach as beneficial in fostering adaptability in response to changing circumstances and challenges related to peace and ethical considerations. The standard error of 0.17285, approximately 5.56% of the mean, is considered high, suggesting variability in the adaptability experiences among participants. The standard deviation of 1.30499 further confirms this variability, indicating that while many find the educational framework supportive of adaptability, others may face challenges influenced by their unique backgrounds and circumstances. This emphasizes the importance of addressing the diverse needs of participants to enhance adaptive capacity effectively.

The transformative capacity for peace and ethical education recorded a mean score of 3.0877, which also falls within the high range. This score suggests that the program is perceived as effective in promoting significant changes in participants' understanding and engagement with peace and ethical issues. Respondents feel empowered to implement new ideas and practices that contribute to their overall growth and well-being. The standard error of 0.18611, representing approximately 6.03% of the mean, is classified as high, indicating some level of uncertainty in this mean estimate. The standard deviation of 1.40510 reflects a notable level of variability in how different participants experience transformative capacity. This variability may be due to factors such as individual motivation, access to resources, and the overall environment in which education

takes place. Understanding and addressing these factors is essential for maximizing the transformative potential of peace and ethical education.

The multiple regression analysis of Peace and Ethical Education (PEE), which integrates peace education and ethical values into the curriculum to promote conflict resolution, empathy, and understanding in conflict-affected areas, reveals significant insights into the influence of resilient capacities. The model exhibits an exceptionally high fit, with an R-squared value of 0.9998, indicating that approximately 99.98% of the variance in peace and ethical education can be accounted for by the predictors. The F-statistic of 76188.11, coupled with a p-value of 0.0000, confirms the overall statistical significance of the model. This remarkable goodness-of-fit suggests that the model effectively elucidates the relationship between the resilient capacities and peace and ethical education.

Table 103: Regression Analysis for Peace and Ethical Education

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3314198	0.0049389	67.10	0.000	0.3215045	0.3413352
Adaptive Capacity	0.3290211	0.0065049	50.58	0.000	0.315962	0.3420801
Transformative Capacity	0.3390928	0.0055139	61.50	0.000	0.3280231	0.3501625
_cons	0.0048877	0.0100696	0.49	0.629	-0.015328	0.0251033
R <sup>2</sup>	0.9998					
F(5,51)	76188.11					
Prob > F	0.0000					
N	57					

The absorptive capacity of Peace and Ethical Education (PEE) demonstrates a highly significant positive relationship. The regression analysis yields a coefficient of 0.331, accompanied by a robust standard error of 0.00494, a t-value of 67.10, and a p-value of 0.000. This robust statistical significance indicates that for every unit increase in absorptive capacity, peace and ethical education increases by approximately 0.331 units, with other variables held constant. Thus, strengthening absorptive capacity—defined as the ability to absorb and learn from conflict experiences—proves essential for the effective integration of peace education and ethical values into the curriculum.

Moreover, the adaptive capacity of PEE exhibits a strong positive correlation. The coefficient is reported at 0.329, with a robust standard error of 0.00650, a t-value of 50.58, and a p-value of

0.000. This result suggests that an increase of one unit in adaptive capacity is associated with a corresponding increase of about 0.329 units in peace and ethical education, while controlling for other influencing factors. The significance of adaptive capacity lies in its capacity to foster flexibility and responsiveness in curriculum design and delivery, thereby facilitating the effective integration of peace education that promotes conflict resolution and empathy among students exposed to armed conflict.

Additionally, the transformative capacity of PEE reflects a significant positive relationship, with a coefficient of 0.339, a robust standard error of 0.00551, a t-value of 61.50, and a p-value of 0.000. This indicates that an increase of one unit in transformative capacity correlates with an approximate increase of 0.339 units in peace and ethical education, holding other variables constant. Transformative capacity encompasses innovative shifts in educational approaches aimed at fostering ethical values and conflict resolution skills, contributing positively to the integration of peace education within conflict-affected contexts.

Qualitative findings from various respondents of this study highlighted the need for a multifaceted approach to effectively integrate peace and ethical education into government-led initiatives. Visionary statements, such as “Education for peace, education for development, education for building people who are educated and know dignity and identity and whose morals are built” (EO-KT-01), emphasize the overarching goal of nurturing ethical citizens. Practical steps towards achieving this aim are reflected in training and expansion initiatives like “Provide training to promote peace and ethics” (EO-KT-02) and the need to “expand peace and ethics education to ensure a peaceful learning process in the affected area” (EO-KT-03). Advocacy and action are pivotal, as respondents express the importance of demonstrating that “education for sustainable peace is education for human development” (EO-GH-01) and the necessity of making education more ethical and peaceful (EO-GH-02). Establishing “a strict ethics club or committee in schools” (EO-GH-03) is seen as critical for fostering ethical behavior.

The findings also underscored the role of community engagement and co-curricular activities in promoting stability and creativity among students, with respondents emphasizing initiatives to ensure “stable education” and cultivate “citizens who are creative” (EO-Seh-1, EO-Seh-2). Strategies for curriculum design should incorporate indigenous knowledge and activities promoting peace and morality. One respondent emphasizes the importance of strengthening

curriculum-related activities through clubs to help students heal from war injuries (EB-8), while another underscores the need for an indigenous knowledge-based curriculum to foster peace and morality (EB-14). Government advocacy for policy inclusion and curriculum adaptation is essential, with one respondent stating, “As a government, nothing has been started in peace and ethics education. But it is only a start to be included in policy and curriculum” (EB-16). Ultimately, building societal attitudes through civic and ethical education is foundational for nurturing a generation committed to peace, as emphasized by the observation that “education is the foundation for peace. Knowing that peace is ensured if there is mature and broader knowledge” (EB-20).

This approach is reflected in other conflict settings, such as the case of Afghanistan, where integrating peace education into the national curriculum has shown significant results in promoting societal reconciliation and reducing violence (*UNESCO, 2020*). Both studies emphasize the role of education in not only developing knowledge but also shaping behaviors and attitudes that foster peace in conflict zones. The Tigray study specifically emphasizes government-led initiatives, whereas other studies (e.g., in Afghanistan) show that NGOs often play a more prominent role in initiating peace education. In Tigray, the focus on building government capacity to sustain these efforts over the long-term contrasts with the more temporary or NGO-led efforts seen in other regions, which sometimes lack long-term sustainability. While both government and NGO-led efforts in peace and ethical education prove effective, the Tigray study suggests that government ownership and integration into the national education system are key for achieving long-term transformative change. By focusing on government leadership, the Tigray approach may ensure a more sustained commitment to peace education, whereas NGO-led initiatives risk being short-lived without long-term institutional integration.

#### **4.10.2. Family Endowment for Education (NGOs)**

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the family endowment for education strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient NGOs and safeguard them against constrained education aid. This approach refers to establishing programs by NGOs that support families and caregivers in providing financial and emotional support for children's

education despite the challenges posed by armed conflict crisis (Rashed, 2024; Ereky-Stevens et al, 2022).

Table 104: Descriptive Statistical Results for Family Endowment for Education

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	18	3.4444	.40602	1.72259
Adaptive Capacity	17	3.8824	.36261	1.49509
Transformative Capacity	17	3.8235	.37608	1.55062
Valid N (listwise)	17			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity of family endowment for education yields a mean score of 3.4444, placing it within the high range (3–4). This result indicates that family support plays a significant role in helping learners absorb challenges and sustain their educational progress in the face of adversity. However, the standard error of 0.40602—which constitutes about 11.79% of the mean—is considered high, suggesting that the mean score may not be a precise estimate due to variability among participants. The standard deviation of 1.72259 also reflects a high level of variation in responses, indicating that different families provide varying degrees of absorptive capacity, and some learners may benefit from much stronger support than others. This variability may be due to socioeconomic factors, family structures, and resource availability, which could influence the effectiveness of family endowment in supporting resilience.

The adaptive capacity related to family endowment for education is marked by a mean score of 3.8824, placing it in the very high range (4–5). This indicates that family support is perceived as exceptionally effective in helping learners adapt to changes in their environment, educational demands, or personal circumstances. The standard error of 0.36261, representing about 9.34% of the mean, is relatively high, showing that there is some uncertainty in the estimation of this mean. The standard deviation of 1.49509 highlights notable variation among participants in their experiences of family support in fostering adaptive capacity. While many families are highly effective in enabling learners to adjust and thrive, others may face challenges in providing the

resources or stability needed to nurture adaptability. Addressing these disparities may require targeted interventions to support families with fewer resources or greater challenges.

The transformative capacity for family endowment in education achieves a mean score of 3.8235, which places it in the very high range (4–5). This suggests that family support is seen as a critical factor in helping learners undergo significant personal growth and transformation, fostering new ways of thinking and engaging with the world. The standard error of 0.37608, which accounts for about 9.83% of the mean, is categorized as high, indicating that there is substantial variability in how different learners experience family-driven transformative capacity. The standard deviation of 1.55062 underscores this variability, showing that while some families are highly effective in nurturing transformative educational experiences, others may struggle to provide the level of support necessary for such growth. This variation may point to differences in familial engagement, educational values, and access to resources, all of which play a role in the development of transformative capacities in learners.

The multiple regression analysis of Family Endowment for Education (FEE) presented below, which examines NGO-led programs supporting families and caregivers in providing both financial and emotional support for children's education in conflict-affected areas, delivers insightful findings on the role of resilient capacities. The model demonstrates an exceptionally high fit, with an R-squared value of 0.9999, indicating that approximately 99.99% of the variance in family endowment for education is explained by the predictors. The F-statistic of 99999.00, along with a p-value of 0.0000, confirms the model's strong statistical significance. This high goodness-of-fit underscores the model's ability to effectively capture the relationship between the resilient capacities and family endowment for education.

Table 105: Regression Analysis for Family Endowment for Education

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3502239	0.0070726	49.52	0.000	0.3349445	0.3655033
Adaptive Capacity	0.3569278	0.0055329	64.51	0.000	0.3449747	0.3688808
Transformative Capacity	0.3112799	0.0097238	32.01	0.000	0.2902729	0.3322869
_cons	-0.029326	0.0239398	-1.22	0.242	-0.081045	0.0223928
R <sup>2</sup>	0.9999					
F(4,13)	99999.00					
Prob > F	0.0000					
N	18					

The analysis reveals a highly significant positive association between absorptive capacity and family endowment for education (FEE). The estimated coefficient is 0.350, with a robust standard error of 0.00707, a t-value of 49.52, and a p-value of 0.000. This suggests that for each unit increase in absorptive capacity, FEE rises by approximately 0.350 units, holding all other variables constant. Enhancing absorptive capacity, which refers to the ability to assimilate and learn from crisis situations, is critical for NGOs aiming to effectively support families and caregivers in meeting children's educational needs amid the challenges of armed conflict.

Similarly, the adaptive capacity of FEE exhibits a strong positive correlation. The coefficient is 0.357, with a robust standard error of 0.00553, a t-value of 64.51, and a p-value of 0.000. This implies that a one-unit increase in adaptive capacity corresponds to a 0.357 unit rise in FEE, while other factors are held constant. Adaptive capacity, which enables NGOs to adjust their programs flexibly and responsively to the needs of families and caregivers, is essential for ensuring continuous educational support in the face of armed conflict.

Transformative capacity also displays a significant positive relationship with FEE. The coefficient is 0.311, with a robust standard error of 0.00972, a t-value of 32.01, and a p-value of 0.000. This indicates that each unit increase in transformative capacity results in an approximately 0.311 unit increase in FEE, controlling for other variables. Transformative capacity, which involves implementing innovative changes in NGO initiatives to strengthen both financial and emotional support for education, plays a pivotal role in overcoming the barriers imposed by armed conflict.

Similar studies from conflict zones in Syria and Lebanon show that NGO-led family support programs are essential for maintaining access to education during crises (*Save the Children, 2021*). In both cases, NGOs fill critical gaps left by the government, ensuring that families can continue sending children to school despite financial or logistical challenges. The Tigray study notes a high variability in the effectiveness of family endowment programs, with socioeconomic disparities affecting how much support different families receive. In contrast, more structured NGO programs in Syria have implemented means-tested approaches to ensure more equitable distribution of resources, reducing disparities in support across different regions. Family endowment programs are critical for supporting education during crises, but the Tigray study highlights the importance of addressing socioeconomic disparities within these programs. Future implementations in Tigray

and similar regions could benefit from means-tested approaches to ensure that the most vulnerable families receive the necessary support, thereby reducing inequalities in access to education.

#### 4.10.3. Comprehensive Teacher Support System (Teachers)

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the comprehensive teachers' support system strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient teachers and safeguard them against professional regression. This approach refers to developing comprehensive support systems that address teachers' well-being, professional development, and resilience in the face of armed conflict-related challenges (Smith, 2023; Ajmal, 2022).

Table 106: Descriptive Statistical Results for Comprehensive Teacher Support System

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	48	2.9167	.21846	1.51353
Adaptive Capacity	46	3.0217	.21194	1.43742
Transformative Capacity	46	2.7826	.20124	1.36485
Valid N (listwise)	46			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity within the teacher support system yields a mean score of 2.9167, placing it in the medium range (2–3). This suggests that while the support system provides some level of assistance in helping teachers manage and absorb challenges, it may not be highly effective across the board. The standard error of 0.21846, constituting approximately 7.49% of the mean, is relatively high, indicating variability in the reliability of the mean score. The standard deviation of 1.51353 further highlights a substantial degree of variation in the data, suggesting that different teachers experience varying levels of support. This disparity could stem from differences in the resources available to teachers, the effectiveness of the support structures, or their individual coping capacities. To enhance the overall absorptive capacity, targeted improvements could be implemented to ensure more consistent and effective support across all teaching environments.

The adaptive capacity for the teacher support system reveals a mean score of 3.0217, positioning it in the high range (3–4). This indicates that the system plays a significant role in helping teachers adjust to changing educational environments or instructional demands. However, the standard error of 0.21194, accounting for approximately 7.01% of the mean, reflects a high error, suggesting some uncertainty around the precision of the mean score. The standard deviation of 1.43742 indicates considerable variation in how effectively the support system enables adaptation among teachers. While some teachers may find the system to be highly beneficial in helping them adjust, others may encounter challenges in receiving adequate adaptive support. This variability could be influenced by factors such as the availability of resources, individual teacher readiness, or systemic inefficiencies. A more focused approach to improving adaptive strategies could help reduce this gap and provide more uniform support.

The transformative capacity for the teacher support system yields a mean score of 2.7826, placing it in the medium range (2–3). This suggests that while the system provides some level of support for transformative change among teachers, it falls short of being highly effective in fostering significant growth or innovation. The standard error of 0.20124, which accounts for about 7.23% of the mean, is relatively high, indicating variability in the mean score's reliability. The standard deviation of 1.36485 further reflects a high degree of variation in the responses, suggesting that some teachers experience more transformative support than others. This variation could result from differing levels of professional development opportunities, access to innovative teaching resources, or the overall institutional support for change. Addressing these disparities by offering more comprehensive professional development programs and enhancing access to transformative resources could increase the overall effectiveness of the support system in fostering transformative capacities.

The multiple regression analysis of the Comprehensive Teacher Support System (CTSS) presented below, which focuses on developing systems to enhance teachers' well-being, professional growth, and resilience in conflict-affected areas, reveals important insights into the impact of resilient capacities. The model exhibits an exceptionally high fit, with an R-squared value of 0.9998, indicating that approximately 99.98% of the variance in the comprehensive teacher support system is accounted for by the predictors. The F-statistic of 90351.20, with a p-value of 0.0000, confirms the model's strong statistical significance. This high goodness-of-fit demonstrates the model's

effectiveness in capturing the relationship between the resilient capacities and the comprehensive teacher support system.

Table 107: Regression Analysis for Comprehensive Teacher Support System

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3345089	0.0073415	45.56	0.000	0.3196468	0.349371
Adaptive Capacity	0.3277849	0.0089081	36.80	0.000	0.3097515	0.3458184
Transformative Capacity	0.3324757	0.0055736	59.65	0.000	0.3211926	0.3437588
_cons	0.0048938	0.016525	0.30	0.769	-0.028559	0.0383469
R <sup>2</sup>	0.9998					
F(5,38)	90351.20					
Prob > F	0.0000					
N	44					

The absorptive capacity of the Comprehensive Teacher Support System (CTSS) exhibits a highly significant positive relationship, with a coefficient of 0.335, a robust standard error of 0.00734, a t-value of 45.56, and a p-value of 0.000. This suggests that for every one-unit increase in absorptive capacity, the CTSS improves by approximately 0.335 units, assuming other variables remain constant. Enhancing absorptive capacity, defined as the ability to assimilate and learn from crisis situations, is critical to building support systems that effectively address teachers' well-being and professional growth in the context of armed conflict.

Similarly, the adaptive capacity of the CTSS shows a strong positive correlation, with a coefficient of 0.328, a robust standard error of 0.00891, a t-value of 36.80, and a p-value of 0.000. This finding indicates that a one-unit increase in adaptive capacity leads to an approximate 0.328 unit rise in CTSS, while controlling for other variables. Adaptive capacity, which promotes flexibility and responsiveness in teacher support systems, plays a pivotal role in fostering resilience and supporting professional development amidst disruptions caused by armed conflict.

Likewise, transformative capacity demonstrates a significant positive association with CTSS, reflected by a coefficient of 0.332, a robust standard error of 0.00557, a t-value of 59.65, and a p-value of 0.000. This suggests that a one-unit increase in transformative capacity results in an approximate 0.332 unit increase in CTSS, assuming other factors remain constant. Transformative capacity, which involves driving innovative changes in support systems to bolster teachers'

resilience and well-being, is essential for sustaining effective education delivery during periods of armed conflict.

Qualitative findings from various respondents of this study highlighted the critical need for a Comprehensive Teacher Support System (CTSS) to strengthen educators' resilience, professional growth, and well-being. Respondents like [T-KT-01] assert that "implementing a comprehensive teacher support system can transform crisis resilience and create a sustainable learning environment." This sentiment is echoed by many, emphasizing the transformative impact structured support systems can have on education. Meanwhile, [T-KT-04] points out the gaps in current teacher support and monitoring, stressing the need for more robust mechanisms to ensure consistent support. Professional development also stands as a pillar of teacher effectiveness, with [T-KT-07] noting the importance of "leadership training and ongoing supervision" and [T-RC-02] advocating for "continuous support and encouragement" to keep educators up to date with the latest teaching methods. Furthermore, respondents like [T-Seh-1] and [T-Bor-3] emphasize the role of motivation and commitment in sustaining teachers, pointing to the need for environments that inspire intrinsic dedication and professional growth.

In addition to professional growth, financial and socio-political support are viewed as essential in ensuring teacher stability. [T-Bor-1] emphasizes that "teachers' economic and socio-political status should be respected comprehensively," advocating for fair compensation and recognition of their contributions. [T-RC-05] highlights the importance of "psychological and economic assistance, timely salary payments, and continuous professional development" to enhance teacher effectiveness. Respondents also point to the need for effective communication and collaboration, as [T-S-01] stresses the value of "open discussions with teachers" to foster mutual understanding and feedback. Holistic support systems, as advocated by [T-H-01], should encompass "social, psychological, and economic dimensions," addressing the multifaceted nature of teachers' well-being and ensuring that all aspects of their professional and personal needs are met.

Similar studies from South Sudan and Yemen emphasize the importance of teacher support programs in conflict settings (*INEE, 2021*). In both contexts, comprehensive systems that include psychological support, professional development, and financial stability have been shown to significantly improve teacher retention and performance. The Tigray study notes a moderate transformative capacity in the teacher support system, indicating that while it helps teachers

manage crises, it may not lead to significant changes in teaching methods or educational outcomes. In contrast, programs in South Sudan have seen more transformative effects, with teachers empowered to innovate and adopt new teaching techniques that better serve students in conflict-affected areas, thanks to more robust professional development components. Comprehensive teacher support systems are essential for maintaining the quality of education during crises, but the Tigray study suggests that such systems need stronger professional development and innovation components to drive transformative change. By enhancing these aspects, Tigray's education system could see more long-term improvements in teaching practices and student outcomes, similar to the results seen in South Sudan.

#### 4.10.4. Child-Right to Education (Students)

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that child-right to education strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient students and safeguard them against being out of school. Advocating for and ensuring the right of every child to access quality education, regardless of the circumstances, including those affected by armed conflict (Khen, 2023; Aber et al, 2021).

Table 108: Descriptive Statistical Results for Child-Right to Education

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	109	3.4587	.13765	1.43715
Adaptive Capacity	109	3.4771	.13267	1.38508
Transformative Capacity	109	3.4771	.12877	1.34437
Valid N (listwise)	109			

**Mean scales:** low [1–2], medium (2–3], high (3–4], and very high (4–5]

**Standard Deviation:** Low: Less than 10% of the range of the data; High: More than 20% of the range

**Standard Error:** Low: Less than 5% of the mean; High: Greater than 10% of the mean.

The absorptive capacity of the Child-Right to Education strategy, with a mean of 3.4587, is classified as high on the resilience scale. This indicates that the education system has a strong ability to absorb shocks and continue functioning despite disruptions, such as conflict, natural disasters, or economic downturns. The standard error of 0.13765 is approximately 3.98% of the

mean, categorizing it as low, which means the estimate of the absorptive capacity is reliable and consistent across the sampled population. However, the standard deviation of 1.43715 is notably high, indicating substantial variability across different regions or contexts. While some areas demonstrate excellent absorptive capacity, others face challenges in maintaining educational continuity during crises. Addressing this disparity is key to ensuring all children can access education even in difficult circumstances.

The adaptive capacity of the strategy, with a mean score of 3.4771, is also rated as high, reflecting the system's ability to adjust to changing environments and crises. This suggests that many education institutions can modify their processes and approaches to ensure learning continues during disruptions. The standard error of 0.13267 represents 3.82% of the mean, which is considered low, indicating that the adaptive capacity data is stable and representative. However, the standard deviation of 1.38508 highlights significant variability across different regions, implying that while some areas are highly adaptive, others struggle to adjust to evolving challenges. Strengthening adaptive capacity in regions that lag behind is essential for ensuring that all children benefit from flexible, responsive education systems.

The transformative capacity of the strategy, with a mean of 3.4771, is likewise classified as high, pointing to the system's potential for long-term structural changes that can revolutionize the way education is delivered, especially in crisis situations. The standard error of 0.12877, which is about 3.70% of the mean, falls into the low category, suggesting that the data is reliable and reflects the true capacity of the system to innovate and evolve. However, the standard deviation of 1.34437 is high, indicating considerable variability in the transformative capacity across different regions or schools. This variability implies that while some areas are well-equipped to implement long-term changes, others face difficulties in initiating transformative practices that could enhance education in the face of crises. Reducing these disparities is crucial for fostering a universally resilient education system.

The regression analysis presented below also supported the descriptive results above. Overall, the model's exceptionally high explanatory power ( $R^2 = 0.9998$ ) highlights the strength of absorptive, adaptive, and transformative capacities in accounting for advocacy for children's education in conflict settings. The model's strong statistical significance ( $F = 99999.00, p < 0.001$ )

validates the relationship between resilient capacities (RC) and children's right to education (CRE), emphasizing the crucial role of resilience in championing and safeguarding every child's access to quality education, despite the adversities of armed conflict. Future research could explore contextual complexities and additional factors that shape educational advocacy, thereby refining strategies and interventions in conflict-affected regions.

Table 109: Regression analysis for Child-Right to Education

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3375021	0.0050913	66.29	0.000	0.3274047	0.3475995
Adaptive Capacity	0.3332036	0.0052309	63.70	0.000	0.3228294	0.3435778
Transformative Capacity	0.3314913	0.0039965	82.94	0.3235651	0.3235651	0.3394174
_cons	-0.000131	0.0076383	-0.02	0.986	-0.015279	0.0150178
R <sup>2</sup>	0.9998					
F(5,103)	99999.00					
Prob > F	0.0000					
N	109					

The analysis revealed a strong positive relationship between the Child-Right to Education and absorptive capacity, with a coefficient of 0.3375021. This indicates that for every unit increase in the CRE, absorptive capacity increases by approximately 0.34 units. The high t-value of 66.29 and a p-value of 0.000 suggest that this relationship is statistically significant, underscoring the critical role education plays in enabling children to absorb and process information from their environments. Absorptive capacity refers to a child's ability to recognize and assimilate new knowledge, which is essential for adapting to changing circumstances. The findings emphasize that when children are provided with educational opportunities, they are better equipped to understand and leverage their surroundings, thereby enhancing their overall resilience.

Similarly, the relationship between CRE and adaptive capacity is marked by a positive coefficient of 0.3332036. This suggests that each unit increase in the child-right to education corresponds to an increase of 0.33 units in adaptive capacity. With a t-value of 63.70 and a p-value of 0.000, this relationship is also highly significant. Adaptive capacity reflects a child's ability to adjust to new challenges and environments effectively. The strong correlation implies that education not only equips children with essential skills but also fosters the mindset necessary for adaptability. This capacity is particularly vital in today's rapidly changing world, where children often face

unforeseen challenges. By promoting educational access and quality, stakeholders can cultivate a generation of children who are more adept at navigating life's uncertainties and challenges.

The qualitative findings on child rights to education underscored the necessity of comprehensive support systems aimed at ensuring universal access to education while safeguarding children's rights across various contexts. [Respondent S-KT-01] highlights this significance by stating, "Because it helps all students to attend their education properly and their rights are respected." This reflects the fundamental role that such support plays in promoting equitable access to education, regardless of socio-economic barriers. Furthermore, addressing issues like child labor and exploitation, [Respondent S-KT-02] notes that comprehensive education support "is helpful for children to learn properly and avoid being in unwanted places." In addition, [Respondent S-KT-08] emphasizes the need for proactive educational frameworks to protect children from exploitation, indicating the importance of robust strategies to keep children in safe and nurturing learning environments.

Engaging parents and the community emerged as a pivotal element in effective child rights education. [Respondent S-KT-11] advocates for "supporting and monitoring the quality of education in all aspects and promoting effective practices to benefit all children," stressing the importance of collaborative efforts between schools, parents, and communities in creating a conducive learning atmosphere. Moreover, [Respondent S-KT-27] reinforces this perspective by highlighting the necessity for dialogue and collaborative problem-solving with parents, indicating that community involvement is crucial for sustaining educational outcomes. In terms of reintegration, [Respondent S-KT-13] states that comprehensive support systems "create opportunities for children who are out of school due to various obstacles to return to school," thereby underlining the need for tailored interventions that facilitate marginalized children's return to education.

Additionally, empowerment and advocacy are essential for advancing child rights education. [Respondent S-KT-30] and [Respondent S-KT-31] promote initiatives such as child rights clubs and community awareness campaigns aimed at combatting harmful practices, including early marriage. These initiatives empower children to advocate for their rights and foster community support for their educational needs. Addressing emotional well-being, [Respondent S-Seh-1] notes that comprehensive support systems maximize students' motivation to learn and enhance

emotional resilience. This holistic approach is further echoed by [Respondent S-Bor-1] and [Respondent S-Bor-6], who emphasize the importance of nurturing various aspects of children's development through structured care. In conclusion, these qualitative insights reveal that comprehensive support for child rights education is vital in promoting access, preventing exploitation, engaging communities, reintegrating marginalized children, empowering through advocacy, enhancing emotional well-being, and providing holistic developmental support, ultimately fostering an inclusive educational environment that respects and fulfills children's rights.

Similar advocacy programs are seen in conflict-affected regions like Syria and Iraq, where UNICEF and other international organizations have worked to secure children's access to education despite ongoing conflicts (*UNICEF, 2021*). Both the Tigray study and these initiatives stress the importance of maintaining education continuity to prevent children from being forced into harmful situations such as child labor or exploitation. While the Tigray study shows a high variability in transformative capacity, with some regions showing greater success in reintegrating children into schools than others, efforts in countries like Syria have been more uniform due to international support and stronger monitoring mechanisms. In Syria, robust child protection systems have been integrated with educational programs to ensure that children not only attend school but also receive psychosocial support and safe learning environments, which is not as consistently emphasized in the Tigray study. The child-right to education is crucial for protecting vulnerable children in conflict zones, but the Tigray study suggests that greater coordination and support—particularly through integrating child protection systems with educational programs—could improve transformative outcomes. Ensuring a holistic approach that combines education with psychosocial support, as seen in Syria, could strengthen efforts in Tigray to protect and reintegrate children into safe learning environments.

#### **4.10.5. Parental Skills Education (Parents)**

The statistical findings, both descriptive and inferential, derived from the quantitative analysis, combined with the qualitative insights outlined in this section, demonstrate that the parental skill education strategy exhibits strong adaptive, adoptive, and transformative resilience. These capacities enable the strategy to develop crisis-resilient parents and safeguard them against being education averse parents. This approach refers to providing parents and caregivers with training

and resources to support their children's learning, well-being, and development, even during armed conflict crisis (Bhadra, 2022; Corley et al, 2022).

Table 110: Descriptive Statistical Results for Parental Skills Education

Resilient Capacities	N	Mean	Std. Error	Std. Deviation
Absorptive Capacity	58	3.2241	.18248	1.38973
Adaptive Capacity	56	3.2500	.16564	1.23950
Transformative Capacity	56	3.5357	.17648	1.32066
Valid N (listwise)	56			

*Mean scales: low [1–2], medium (2–3), high (3–4), and very high (4–5)*

*Standard Deviation: Low: Less than 10% of the range of the data; High: More than 20% of the range*

*Standard Error: Low: Less than 5% of the mean; High: Greater than 10% of the mean.*

The absorptive capacity of the Parental Skills Education program is measured at a mean score of 3.2241, which falls within the high range on the resilience scale. This suggests that the program effectively enables parents to absorb and manage challenges faced by their children, particularly in educational contexts. The standard error of 0.18248 equates to approximately 5.66% of the mean, categorizing it as high, indicating that there is a greater degree of uncertainty in this estimate. Additionally, the standard deviation of 1.38973 indicates significant variability in the absorptive capacity scores across different participants. While some parents demonstrate strong skills in providing supportive environments for their children, others may require additional training or resources to effectively manage educational challenges. Enhancing consistency in the development of absorptive capacity among all parents is vital for fostering a supportive learning environment for children.

The adaptive capacity of the program, with a mean of 3.2500, is also classified as high, reflecting the program's effectiveness in equipping parents with skills to adjust their approaches in response to their children's evolving needs. The standard error of 0.16564, which is around 5.09% of the mean, is considered low, indicating a stable and representative estimate of adaptive capacity among the participants. However, the standard deviation of 1.23950 suggests variability in how parents adapt to changes, implying that while many parents can modify their strategies to support their children effectively, some may struggle with these adjustments. To maximize adaptive

capacity, targeted support and training should be offered to those who find it challenging to implement adaptive strategies.

The transformative capacity of the Parental Skills Education program stands out with a mean of 3.5357, which is categorized as very high. This indicates that the program not only prepares parents to support their children in crises but also fosters a mindset of innovation and change. The standard error of 0.17648, representing approximately 4.98% of the mean, is considered low, further reinforcing the reliability of this capacity assessment. The standard deviation of 1.32066 suggests that while many parents exhibit strong transformative capacity, there remains notable variability in their ability to implement transformative practices in parenting. Ensuring that all parents have access to the necessary resources and training to enhance transformative practices will be essential for creating a more resilient educational environment.

The regression analysis presented below also supported the findings from the descriptive analysis above. Overall, the model demonstrates high explanatory power (R-squared = 0.9997) and strong statistical significance (F = 66179.64, p < 0.001), affirming the robust relationship between resilient capacities (RC) and parental support for education (PSE) in enhancing parental capacities to support children's education during armed conflict. This finding underscores the importance of investing in parental skill education as a vital strategy to protect children's right to education and foster resilience in conflict-affected communities. Future research could delve into additional contextual factors and interventions to further refine and optimize parental support systems in these challenging settings.

Table 111: Regression Results for Parental Skills Education

Resilient Capacities	Coef.	Robust S.E	t	P> t	[95% conf. interval]	
Absorptive Capacity	0.3318164	0.0085567	38.78	0.000	0.3146298	0.3490031
Adaptive Capacity	0.3280288	0.0038711	84.74	0.000	0.3202535	0.3358041
Transformative Capacity	0.3387501	0.0057736	58.67	0.000	0.3271534	0.3503468
_cons	-0.010359	0.0112642	-0.92	0.362	-0.032983	0.0122662
R <sup>2</sup>	0.9997					
F(5,50)	66179.64					
Prob > F	0.0000					
N	56					

The analysis reveals a significant positive relationship between Parental Skills Education and absorptive capacity, with a coefficient of 0.3318164. This indicates that for every unit increase in parental skills education, absorptive capacity increases by approximately 0.33 units. The high t-value of 38.78 and a p-value of 0.000 confirm that this relationship is statistically significant. Absorptive capacity refers to a child's ability to absorb and integrate new information from their surroundings. The findings suggest that when parents are educated about effective parenting practices, their children are better equipped to engage with and understand their environment. This enhanced capacity is critical for children to thrive academically and socially, highlighting the importance of investing in parental education as a means of fostering resilience.

Similarly, the analysis indicates a positive and significant relationship between PSE and adaptive capacity, with a coefficient of 0.3280288. This suggests that for each unit increase in parental skills education, adaptive capacity rises by approximately 0.33 units. The t-value of 84.74 and a p-value of 0.000 reinforce the robustness of this finding, indicating a strong and statistically significant correlation. Adaptive capacity reflects a child's ability to adjust to new challenges and situations effectively. The results imply that when parents are equipped with the skills to support their children's development, they enable their children to adapt more successfully to changing circumstances. This adaptability is crucial in today's dynamic world, where children frequently encounter new challenges. Therefore, enhancing parental skills is vital for fostering a generation of children who are better prepared to navigate life's complexities.

The analysis further demonstrates a positive correlation between PSE and transformative capacity, with a coefficient of 0.3387501. This indicates that with each unit increase in parental skills education, transformative capacity increases by approximately 0.34 units. The t-value of 58.67 and a p-value of 0.000 signify a highly significant relationship. Transformative capacity refers to a child's potential to enact positive changes in their environment and community. The findings suggest that educated parents are more likely to inspire their children to take initiative and engage in transformative actions. This capacity is essential for cultivating socially responsible and proactive individuals, thereby contributing to community resilience. By investing in parental skills education, stakeholders can empower families to create a more positive and transformative environment for their children.

The qualitative findings from interviews and focus group discussions on parental skill education underscored various strategies aimed at enhancing parental support, fostering positive attitudes, promoting community engagement, ensuring continuous monitoring, and developing parents' skills for the well-being of their children. Responses highlight the critical role of parents in supporting their children's education and nurturing a positive outlook toward learning. For instance, [P-KT-01] emphasizes, "By tolerating any challenges to prioritize their children's learning," underscoring the importance of parental commitment despite obstacles. Similarly, [P-KT-02] stresses the need "to enhance parents' belief and hope in education and to support their children materially and in their learning," advocating for comprehensive parental involvement in education. Positive attitudes and effective coping mechanisms are essential for parents facing challenges, as noted by [P-Seh-1], who states that parents can "broaden their understanding; they can resist the challenge even in crises," emphasizing resilience-building through positive thinking.

Community and stakeholder engagement play a pivotal role in parental skill education. [P-Bor-1] suggests initiatives like "giving religious lectures; organizing telethons; putting forward common solutions to common problems," fostering community collaboration to support children's education. [P-Bor-6] highlights the importance of "providing various loans; providing economic assistance; exchanging advice and support," empowering parents economically and socially. Continuous monitoring and support mechanisms are crucial for ensuring children's educational progress. [P-RC-01] advocates for "having parents visit schools, monitor financial aid received by parents, observe student attendance," emphasizing parental involvement in monitoring educational outcomes. It was also highlighted the importance of creating a conducive environment for parental involvement, with [P-Seh-1] noting the need for "creating a conducive environment and providing all-rounded aids and supports to parents." In summary, these insights underscore the multifaceted strategies required to create crisis-resilient parents who can actively support their children's education, even in challenging circumstances.

Similar findings are seen in programs implemented in Lebanon and Jordan, where NGOs like War Child and Save the Children have provided parental training to improve parents' capacity to support their children's learning during conflict (*War Child, 2021*). In both contexts, the focus on educating parents has been highly effective in increasing their engagement with their children's education and overall well-being. While the Tigray study notes significant variability in absorptive

capacity, with some parents better equipped to support their children than others, parental education programs in Lebanon and Jordan have implemented community-based support networks to reduce disparities. These networks provide continuous support to parents, helping those who struggle to apply the skills they've learned, ensuring more consistent outcomes across different regions. Parental skills education is critical for supporting children's education during crises, but the Tigray study highlights the need to address variability in absorptive capacity among parents. Implementing community-based support networks, as seen in Lebanon and Jordan, could provide ongoing assistance to parents, helping them apply the skills learned through educational programs and ensuring more equitable support for children across different regions in Tigray.

#### **4.11. Summary of Key Findings of The Study**

This study employed a concurrent-embedded mixed-methods research design to investigate innovative, crisis-responsive, and resilience-building strategies aimed at fortifying the education system in the conflict-affected Tigray region of Ethiopia. Data were drawn from a representative sample of 300 participants, including students, teachers, parents, and education officials across eight districts, complemented by insights from experts at the regional education bureau and key NGOs. A dual approach to data collection integrated quantitative data with embedded qualitative insights, analyzed using descriptive and inferential statistics, such as mean, standard deviation, standard error, and multiple regression analysis. Qualitative data were further examined using mixed-model content analysis, providing contextual depth to the quantitative findings.

##### **4.11.1. Key Findings: Education Crises in Tigray Region**

The quantitative and nested qualitative findings of the first question of the first objective of this study highlighted the profound effects of the war in Tigray on the regional education system, revealing substantial levels of exposure, sensitivity, and vulnerability to the crisis. The statistical analysis demonstrated a significant, consistent, and precise correlation, showing that with each unit increase in the severity of the crisis, there is a corresponding unit increase in the disruption of the education system.

In Tigray, the war led to severe education policy disruptions where the existing education policies were reversed, abandoned, or inconsistently implemented. These disruptions resulted from leadership instability, with decision-making authority often being in flux due to the conflict. The

study showed that the conflict in Tigray severely undermined education governance stability. Leadership structures within the education sector were destabilized, leading to inconsistent decision-making, administrative failures, and an inability to maintain educational services. Institutional capacity erosion was a major consequence of the war in Tigray, with schools losing staff, resources, and the ability to deliver education effectively. The study highlighted severe disruptions in educational aid and funding, which exacerbated operational challenges. The war in Tigray resulted in significant depletion of educational infrastructure, with the majority of schools either destroyed or repurposed for military use. The study also showed that the education ecosystem in Tigray became severely fragmented due to the war. The conflict disrupted curriculum continuity, teacher training, student mobility, and educational partnerships.

Furthermore, the quantitative and nested qualitative findings of the second question of the first objective of this study demonstrated that the war in Tigray has precipitated a severe crisis in the teaching and learning process, with heightened levels of exposure, sensitivity, and vulnerability across the region. Statistical analysis revealed a direct and proportional relationship, indicating that for every one-unit increase in the severity of the crisis, there is a corresponding one-unit increase in the disruption of the teaching-learning process.

The study found significant curriculum disruption due to the war, with high exposure, sensitivity, and vulnerability to the crisis. The conflict has led to compressed instructional timeframes, forcing students to cover two grades in a year, impacting their ability to master the curriculum. The war in Tigray has introduced instructional challenges, including teacher shortages, overcrowded classrooms, and inadequate teaching materials. Teachers are overburdened with overlapping subjects and fewer resources, leading to reduced instructional quality. The study revealed severe learning and academic regression caused by the war. Students are at least a year behind academically due to disruptions and compressed curriculum delivery. Many students expressed frustration over the lost years and the pressure to catch up with insufficient learning support.

The war in Tigray severely disrupted learning assessments, with compressed timelines for exams, insufficient preparation, and increased cheating. Many students reported that they had little time to absorb the material before sitting for exams, leading to academic inconsistencies and unreliable results. The war in Tigray created adverse learning environments, where schools were physically damaged, leaving students without proper infrastructure. The war severely strained teacher-learner

relationships in Tigray, with overcrowded classrooms and emotional distress leading to deteriorating communication. Teachers and students alike expressed frustration over the growing divide, with some students showing disrespect towards teachers.

Finally, the quantitative findings, supported by nested qualitative analysis, of the third question of the first objective of this study underscored that the conflict in Tigray has precipitated a profound crisis among education stakeholders, characterized by heightened exposure, sensitivity, and vulnerability. Statistical results demonstrated that for each incremental increase in the severity of the overall crisis, there is a corresponding and significant rise in the challenges faced by education agents, with these effects being consistent and precise.

The study found the weaponization of education, where schools were repurposed for military use, and educational institutions were systematically targeted. This resulted in the destruction of infrastructure, loss of resources, and a breakdown in educational continuity. The study highlighted that the war in Tigray severely constrained education aid efforts by NGOs, largely due to security risks, destruction of infrastructure, and logistical challenges. Many aid organizations found it difficult to deliver educational materials, rebuild infrastructure, or provide training and support to teachers due to ongoing hostilities and a lack of safe access to affected areas. The study also revealed that the war in Tigray led to a decline in teachers' professional development and well-being. Economic hardships, psychological trauma, delayed salaries, and strained relationships with students caused teachers to experience professional regression. Teachers struggled to maintain teaching quality, with many expressing low morale and limited support.

The war led to a significant increase in out-of-school children in Tigray, with many parents becoming averse to sending their children to school due to safety concerns. The conflict forced some children into early marriages, child labor, and military recruitment, while others faced psychological issues that hindered their ability to attend school. The study also found that the conflict in Tigray led to a significant rise in education-averse parents, where safety concerns, economic hardship, and trauma caused many parents to pull their children out of school or avoid sending them altogether. Some parents perceived schools as unsafe due to their use by military forces, while others were concerned about the financial burden of education during the war.

#### **4.11.2. Key Findings: Education Crises Response Approaches**

The quantitative findings, reinforced by a complementary qualitative analysis of the first question of the second objective of this study examined innovative crisis response strategies within the education system crises, evaluating their effectiveness based on key attributes such as availability, accessibility, acceptability, and adaptability. Statistical analysis revealed a clear and significant correlation: as the strength of these educational attributes increases, the capacity of education system crisis response mechanisms also rises, with these effects demonstrating both consistency and precision throughout the study.

The study highlighted the conflict-sensitive education policy as a moderate but effective approach to mitigating disruptions in education during crises. The policy focuses on minimizing the negative effects of conflict and promoting sustainable education. Education cluster coordination was identified as a response to governance instability. The strategy involves collaboration between governments, NGOs, and international organizations to deliver education services during crises. Cross-institutional partnerships were proposed as a response to the erosion of institutional capacity. These partnerships between educational institutions and NGOs aimed to pool resources and address educational challenges. The smart aid distribution network was also proposed as a way to improve the delivery of education aid and resources.

The study also emphasized Temporary Learning Spaces (TLS) as a vital response to the destruction of school infrastructure during the Tigray conflict. These spaces provide temporary, safe, and conducive environments for learning, often utilizing makeshift classrooms or community centers. Community-Led Learning Networks (CLLN) also emerged as a critical strategy in response to the fragmentation of the education ecosystem in Tigray. These community-driven initiatives involve local leaders, parents, and community members in maintaining education during conflicts.

Additionally, the quantitative results, supported by an in-depth qualitative analysis of the second question of the second objective of this study assessed innovative strategies for addressing the teaching-learning crises, focusing on their effectiveness through key dimensions of the education attributes: availability, accessibility, acceptability, and adaptability. Statistical analysis identified a strong, significant correlation: as the robustness of these educational attributes improves, the

effectiveness of crisis response mechanisms in teaching-learning proportionally strengthens. This relationship was consistently observed and precisely measured throughout the study.

According to the findings of this study, curriculum condensation, which streamlines educational content to essential outcomes, was found to be effective response strategy in crises by ensuring instructional time is used efficiently. Blended teaching-learning, which combines in-person and remote methods, proved effective in maintaining education continuity indicating that diverse and flexible teaching methods can better serve students during crises. Accelerated education programs (AEPs) were also shown to effectively address academic regression caused by crises. The study underscored the need for accessibility and acceptability in delivering intensive educational programs to fast-track learning for students who have missed significant instructional time.

This study also found that targeted learning assessment helps to gauge student progress and identify areas needing immediate attention. Accessibility and acceptability were again highlighted as key factors, ensuring that assessments are tailored to students' needs. Interim Learning Sanctuaries were also explored as response approaches to provide safe environments for continued education during crises. Availability and acceptability of these spaces are critical to their success, though the study notes variability in access and quality. Mental Health and Psychosocial Support (MHPSS) was also found as a strategy to address the psychological challenges faced by students and teachers during crises, with a focus on accessibility and acceptability. The study highlighted its critical role in restoring teacher-learner relationships.

Furthermore, the quantitative results, supported by an accompanying qualitative analysis of the third question of the second objective of this study investigated innovative crisis response strategies employed by education agents during crises. The evaluation focused on their effectiveness in relation to key educational attributes, including availability, accessibility, acceptability, and adaptability. Statistical analysis indicated a clear and significant correlation: as the strength of these educational attributes improves, so does the capacity of education agents' crisis response mechanisms consistent and precise.

The study highlighted Military-Free Education Advocacy as an essential approach to keeping schools free from military occupation and ensuring that educational environments remain safe during conflict. Life-Saving Education Advocacy by NGOs was also highlighted as a key

approach to providing education in conflict zones, and solve the constrained education aid and funding. The study high pointed Targeted Professional Development as a strategy to address the professional regression of teachers due to the conflict. The establishment of Community-Learning Centers (CLCs) was proposed as a way to address the issue of out-of-school children. The study also identified Mobile Parent Education as a key strategy for addressing parental disengagement in crisis situations and provide educational resources and training to parents and caregivers to support their children’s learning during the conflict in Tigray.

#### **4.11.3. Key Findings: Education Crises Resilient Approaches**

The quantitative findings, supplemented by a qualitative analysis of the first question of the third objective of this study investigated innovative strategies that enhance the crisis resilience of educational systems. This evaluation assessed the effectiveness of these strategies through the lens of key resilience capacities, including absorptive, adaptive, and transformative resilience. The statistical analysis demonstrated a robust and significant correlation: as the strength of these resilience capacities increases, there is a proportional enhancement in the efficacy of the resilient approaches, characterized by strong significance and precision.

The study found the Agile Education Policy as a strategy that emphasizes flexibility and adaptability in response to crises. The policy focuses on integrating local realities with international best practices to ensure continued access to education, even during disruptions such as armed conflict. It identified Community-Driven Financing as essential for ensuring sustainable education funding in crisis-affected areas. Involving local stakeholders in the mobilization and management of educational resources helps absorb shocks, adapt to changing conditions, and potentially transform the education system. It also emphasized the importance of empowering local actors, such as educators and administrators, to manage education services during crises.

The study also identified Decentralized Education Governance as a key approach to building resilience in the education system. Decentralizing decision-making authority to local communities ensures that education services are responsive to the specific needs of the affected areas. Future-Proof Infrastructure is highlighted as critical for ensuring that educational facilities can withstand disruptions allowing schools to absorb external shocks and adapt to changing conditions, such as damage or displacement caused by conflict. It stressed the importance of Empowered Local Capacity for building resilience in the education system. By strengthening the skills and resources

of local educators, administrators, and communities, the education system can better manage and sustain services during crises.

Furthermore, the quantitative findings, complemented by a nested qualitative analysis of the second question of the third objective of this study explored innovative strategies that bolster the crisis resilience of the teaching-learning process, assessed through the framework of key resilience capacities: absorptive, adaptive, and transformative. The statistical analysis revealed that for each unit increase in resilience capacities, there is a significant, consistent, and precise proportional enhancement of resilient approaches to addressing teaching-learning crises.

The study found Agile Curriculum Development as a strategy that supports educational resilience by enabling rapid curriculum adjustments during crises. The agile curriculum allows schools to quickly adjust content and delivery methods to suit changing needs while ensuring learning quality. Hybrid Pedagogical Instruction, blending in-person and remote teaching methods, is highlighted in the study as an effective way to deliver education during crises. The strategy is shown to have strong resilience capacities, enabling flexible teaching approaches that can accommodate disruptions and varying levels of access to education. It also emphasized Targeted Mastery-Based Learning as a strategy that focuses on helping students master essential skills and competencies, allowing for flexibility in learning progression during crises.

Learner-Based Assessment strategies, which focus on individualized assessment methods that consider each student's strengths and needs, are identified in the study as essential for maintaining educational quality during crises. This approach is shown to have strong resilient capacities, allowing assessments to be flexible and responsive to students' unique circumstances. The finding also identified Protective Learning Environments as a key strategy for safeguarding students' safety, well-being, and emotional health during crises. This showed that creating safe and supportive learning environments enhances absorptive and adaptive capacities, helping students feel secure and focused on their education despite external threats. The study also highlighted Life Skills and Well-Being Education as a critical component for helping students cope with the psychological and social challenges brought on by conflict. This approach focuses on developing students' emotional resilience, interpersonal skills, and practical abilities needed to navigate their environments.

Ultimately, the quantitative findings, enriched by a nested qualitative analysis of the third question of the third objective of this study examined innovative strategies that enhance the crisis resilience of educational agents. This assessment was conducted through the lens of key resilience capacities: absorptive, adaptive, and transformative. The statistical analysis demonstrated that for each unit increase in resilience capacities, there is a significant, consistent, and precise proportional enhancement in the effectiveness of strategies employed by educational agents to navigate crises.

The study highlighted the importance of Peace and Ethical Education in fostering resilience that integrates peace education into the curriculum, promoting conflict resolution, empathy, and ethical behavior in areas affected by conflict. It also found that Family Endowment for Education, where NGOs provide financial and emotional support to families, helps build resilience in the education sector to enable families to cope with the financial strain of educating children during crises as families adjust to changing circumstances. It identified a Comprehensive Teacher Support System as crucial for building teacher resilience. The system includes professional development, well-being programs, and psychological support to help teachers cope with the challenges of teaching during armed conflict.

The study emphasized the significance of safeguarding the Child-Right to Education, which ensures that every child, even in conflict-affected areas, has access to quality education, indicating that efforts to protect children's right to education are highly effective in enabling students to overcome disruptions caused by conflict. It also highlighted Parental Skills Education as an essential strategy for building resilience among parents in conflict zones. This approach provides parents with the tools, knowledge, and resources they need to support their children's education and well-being during crises. The findings show that parental education programs have strong absorptive and transformative capacities, helping parents adapt to difficult circumstances and become active participants in their children's educational development.

## CHAPTER FIVE

### IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1. Implications of the Study

##### 5.1.1. Academic Implications

This study makes a significant contribution to the existing body of literature by offering empirical evidence on the impact of war on the education system, teaching and learning processes, and educational stakeholders, while also examining their crisis-responsive and resilience strategies. It challenges established theories on crisis scope, educational attributes, and resilience capacity by presenting a refined framework that aligns with the complexities of the education system. Moreover, the study broadens the discourse on the structural composition of the education sector by introducing key elements such as the system itself, teaching and learning dynamics, and education agents. This enriches our understanding of the educational field, particularly in relation to policy development and strategic management.

Future research should build upon these findings by further exploring the impact of war on education, alongside the crisis response and resilience strategies identified in this study. Special attention should be given to educational attributes and the resilience capacities within the proposed models. Employing methodologies such as a concurrent-embedded mixed research approach can help evaluate the effectiveness of these strategies. Additionally, longitudinal studies may provide valuable insights into the long-term effects of war on education, while comparative studies could shed light on the diverse challenges faced by conflict-affected areas.

The findings have profound implications for both teaching practices and academic curricula. Specifically, courses focusing on educational crises, crisis response strategies, and resilience approaches should be developed and integrated into academic programs. Educators are encouraged to incorporate these topics into their instruction, addressing the current gaps in knowledge related to educational crises and the corresponding response and resilience mechanisms. This integration could lead to improved student engagement and more effective learning outcomes.

### **5.1.2. Policy Implications**

Based on the study's findings, policymakers should consider implementing the explored education crisis response and resilient strategies to address the education crises brought due to the war in Tigray. Though there are some generic assessments and response modalities following the war in Tigray, education policy makers should consider the crisis extents including exposure, sensitivity, and vulnerability used in this study to do comprehensive and impactful assessment of the effects and impacts of the war in the region. It would also be useful if the policy makers evaluate the response mechanisms, they use in terms of the education attributes or features such as availability, accessibility, acceptability and adaptability for precise effectiveness of the implementation. They can also use evaluate in terms of adoptive, adaptive, and transformative resilient capacities when they plan for crisis resilient education strategies.

The findings suggest a need for reform in existing policies, particularly the education policy in Tigray. For example, the current education policy of the region is not changed during and after the war in the region given that education policy makers required to revise the policy and make it conflict-sensitive education policy and prepared to the post-war impacts. This study provides a basis for reviewing the effectiveness of current policies and making necessary adjustments to better address the education crisis in the region and prepare it with resilience to shocks. It also supports for education policy makers on identifying the components of the education sector under education system, teaching-learning, and education agents' categories for clear educational policy and strategic management settings.

Key stakeholders such as government agencies, educational institutions, private sectors, consulting firms, NGOs, and other education agents must be actively involved in discussions regarding these policy implications. Collaboration among these groups can facilitate the assessment of education crisis and proposal of response and resilient strategies are addressed effectively.

### **5.1.3. Intervention Implications**

The findings of this study underscore the critical need for targeted interventions, such as education crisis assessments, emergency education programs, and initiatives aimed at building crisis-resilient education systems. These efforts should be led by government agencies, academic institutions, funding organizations, NGOs, and private sector partners. The insights gained from this

assessment, along with the explored response strategies and resilience measures, can guide these stakeholders in enhancing their understanding and improving their approaches. For effective implementation of these interventions, it is essential to take practical actions, such as providing training to practitioners and conducting pilot tests. Additionally, a robust evaluation framework should be established, grounded in the conceptual framework and findings of this study, to assess the effectiveness of the proposed measures and ensure continuous improvement.

## **5.2. Conclusion of the Study**

The war that unfolded in Tigray from November 4, 2020, through 2022 has inflicted profound and multifaceted disruptions on the education system, teaching and learning processes and education agents with high exposure, sensitivity, and vulnerability crisis extents within the educational landscape, demanding urgent and comprehensive responses. When assessing education crises, checking the level of crisis using these crisis extent factors is helpful as there is a direct relation of the crisis extents and education crises where a one-unit increase/decrease of the coefficients of the crisis extents there is another one-unit increase/decrease of the effects of the war on education.

To address these adverse effects, there is a critical need for the development and deployment of innovative, crisis-responsive educational strategies characterized by high levels of availability, accessibility, acceptability, and adaptability education attributes, ensuring that education remains a viable and inclusive service even amidst instability. These education attributes have a direct relationship with the response strategies where a one-unit increase/decrease of the coefficients of the education attributes there is another one-unit increase/decrease of the response strategies.

Furthermore, building a crisis-resilient education system necessitates the adoption of resilient models that embed adaptive, adoptive, and transformative resilience capacities. These models must not only withstand current shocks but also anticipate and prepare for future disruptions. These resilient capacities have a direct relationship with the resilient strategies where a one-unit increase/decrease of the coefficients of the resilient capacities there is another one-unit increase/decrease of the resilient strategies.

Given the rising frequency and intensity of global crises, this study underscores the imperative for crisis-sensitive education policies worldwide. It contributes a valuable framework for reimagining education systems that are both equitable and resilient, offering strategic insights for academics,

governments, humanitarian and development partners, and education actors committed to sustaining learning during and after crises.

### **5.3. Recommendations of the Study**

Building on its findings and drawing from insights gained through discussions with previous studies, this research offers key recommendations for policymakers, practitioners, and researchers. These recommendations aim to leverage the study's strengths while addressing its limitations. The study encourages future efforts to capitalize on these strengths and close the identified gaps, ensuring continuous improvement and advancement in the field.

#### *Policy Makers and Practitioners:*

Education policymakers and practitioners should gain a deeper understanding of what the education sector, as an integrated system, entails- comprising elements such as the education system, teaching-learning processes, and the key stakeholders examined in this study. This understanding is essential for more effective educational policy design and strategic management.

Additionally, it is recommended that policymakers and practitioners consider the extent of crises- specifically exposure, sensitivity, and vulnerability- when assessing the impacts of conflict on the education sector. In formulating responses to these crises, it is crucial to evaluate proposed strategies in terms of their alignment with core educational principles: availability, accessibility, acceptability, and adaptability to ensure they meet the needs of the target beneficiaries.

When developing resilient strategies, it is essential to assess their absorptive, adaptive, and transformative capacities to ensure they can effectively enhance the sector's resilience. Finally, following the structured framework presented in this study- assessing the crisis, providing immediate response, and building resilient strategies- will facilitate a more coherent approach to education crisis policy design, implementation, leadership, and management, avoiding the risks of bypassing critical stages in the process. The researcher also happily requests the practitioners to pilot test the proposed education crisis response and resilient strategies for scaleup applications in crisis settings and future education protections.

#### *Academics and research Institutions:*

Based on the key findings of this study, several recommendations for further research are essential to advance the field and support future researchers. It is particularly important to explore in greater depth the components within the education system, including teaching and learning processes and the roles of education agents, in order to develop a more comprehensive and inclusive framework for education. Further studies, especially longitudinal ones, would offer a more nuanced understanding of how armed conflict impacts various aspects of education over time, helping to assess the long-term effects of conflict beyond the short-term focus of this research, which was limited to the immediate impacts of the war in Tigray.

There is also considerable scope for future researchers to conceptualize and theorize the extent of the crisis by developing metrics to assess education crises, examining the capacity of educational responses, and evaluating the resilience of proposed strategies. Moreover, global knowledge in this field would benefit if upcoming researchers validate and test the models and approaches introduced in this study. These efforts will not only enrich academic understanding but also inform practical interventions in post-conflict education systems.

#### **5.4. Limitations of the Study**

Although this study was designed with comprehensive research questions and multiple variables, it encountered several limitations. One of the main limitations is the geographical coverage, which may not accurately represent the broader context of Tigray. The South and West zones were under the control of Amhara forces during the study period, and the North-West zone was not included. While the study initially aimed to assess the widespread effects of the war across the region using secondary data sources, the education sector in Tigray lacked sufficient documentation beyond a few rapid assessment reports covering limited geographical areas.

Additionally, the study did not include a comparative analysis between conflict-affected areas and those without conflict, as the entire region was embroiled in war. A comparison with other regions in Ethiopia that have not experienced conflict would have been insightful. The focus was limited to the recent war in Tigray, which began in November 2020, and did not take into account the impact of earlier conflicts in the region, which could have influenced the study's findings. Moreover, the study did not compare the effects of the war on the education sector with its pre-

war capacity. Such a comparison would have been valuable in understanding the extent of change, and it opens opportunities for future research to explore this area.

The study structured its research objectives under three key components of the education system: the system itself, the teaching and learning process, and education stakeholders. While it addressed specific elements within these categories, this framework may not fully represent the complexities of Tigray's education structure, as additional substructures could be considered. Furthermore, the study focused primarily on the immediate effects of the armed conflict, rather than the long-term impacts on Tigray's education system, as the research was conducted during a short period following the conflict. This presents an opportunity for future researchers to explore the long-term impacts.

Lastly, the response and resilience strategies identified in the study were based solely on the perceptions of respondents and were not pilot tested or implemented through design-based research. This limits the practical effectiveness of the proposed strategies, leaving room for further research to test and validate these approaches on the ground.

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## ANNEXES

### Annex 1: Conceptual Framework Item Descriptions

#### A. Impact of Armed Conflict Crisis on education system, teaching-learning, and education agents

##### I. Impact of Armed Conflict Crisis on Education System

Variables	Definition of the Variables
Education Policy Disruptions	The disruptions caused by armed conflict crisis that affect the formulation and implementation of education policies at various levels, leading to inconsistencies and deviations from planned educational strategies.
Education Governance Instability	The instability and uncertainty in the management and oversight of the education system due to armed conflict, often resulting in changes in leadership, decision-making, and administrative processes.
Education Institutional Capacity Erosion	The gradual weakening or deterioration of the capacity of educational institutions to deliver quality education services, caused by the impact of armed conflict crisis on resources, staffing, and infrastructure.
Educational Aid and Funding Disruption	The interruption or diversion of financial support and aid meant for education due to the armed conflict crisis, resulting in reduced resources available for educational programs and initiatives.
Educational Infrastructure Depletion	The deterioration, destruction, or degradation of physical facilities such as schools, classrooms, and educational materials, as a consequence of armed conflict, impeding the delivery of education.
Education Ecosystem Fragmentation	The fragmentation and disruption of the education ecosystem, including disruptions in curriculum continuity, teacher training, student mobility, and educational partnerships, due to the impact of armed conflict crisis.

##### II. Impact of Armed Conflict Crisis on Teaching-Learning

Variables	Definition of the Variables
Curriculum Disruption	The interruption or modification of educational curricula caused by armed conflict crisis, leading to gaps or deviations from the planned learning content and outcomes.
Instructional Challenges	The difficulties faced by teachers and educators in delivering effective instruction and learning experiences to students due to armed conflict-related disruptions and limitations.
Learning and Academic Regression	The setback in students' learning progress and academic achievements resulting from interrupted learning environments and inadequate educational support during armed conflict crisis.
Disrupted Learning Assessment	The disruption or modification of methods and processes for evaluating student learning and progress due to armed conflict crisis, affecting the accurate measurement of educational outcomes.

<b>Variables</b>	<b>Definition of the Variables</b>
Adverse Learning Environment	The negative and often unsafe physical, psychological, and social conditions in which teaching and learning take place as a result of armed conflict crisis, hindering effective education.
Strained Teacher-Learner Relationship	The strain and challenges in the relationship between teachers and students caused by armed conflict crisis, impacting the quality of teaching, learning, and communication within the educational context.

### **III. Impact of Armed Conflict Crisis on Education Agents**

<b>Variables</b>	<b>Definition of the Variables</b>
Weaponizing Education (Government Body)	The use of education as a tool for political or military purposes by government bodies during armed conflict, often leading to the manipulation of educational content and structures.
Constrained Education Aid (NGOs)	The limitations and challenges faced by non-governmental organizations (NGOs) in providing educational aid and support to affected regions during armed conflict crisis, impeding their capacity to deliver assistance.
Teachers' Professional Regression (Teachers)	The decline or regression in teachers' professional development, well-being, and capacities caused by armed conflict crisis, affecting their ability to provide quality education.
Out-of-School Children (Students)	Children who are unable to access or continue formal education due to armed conflict crisis, leading to an increase in the number of students who are not enrolled or attending school.
Education-Averse Parents (Parents)	Parents and caregivers who are hesitant or unwilling to send their children to school due to armed conflict crisis, often due to safety concerns, thereby affecting students' access to education.

### **IV. Status of Crisis**

<b>Variables</b>	<b>Definition of the Variables</b>
Exposure	The degree to which an education system, teaching-learning processes, and education agents are directly affected by the impact of armed conflict, including physical destruction, disruption, and destabilization.
Sensitivity	The susceptibility of education systems, learning environments, and education agents to the negative effects of armed conflict crisis, considering their vulnerabilities and existing conditions.
Vulnerability	The level of risk and fragility of education systems, teaching-learning contexts, and education agents in the face of armed conflict, indicating their likelihood to be adversely affected.

## B. Response and Recovery Approaches to Education System, Teaching-Learning, and Education Agent Crisis

### I. Response Approaches for Education System Crisis

Variables	Definition of the Variables
Conflict-Sensitive Education Policy	The development and implementation of education policies that take into consideration the impact of conflict, aiming to minimize negative effects and promote sustainable education in crisis-affected areas.
Education Cluster Coordination	The collaborative efforts among various stakeholders, including governments, NGOs, and international organizations, to coordinate and deliver education services and support in crisis situations.
Cross-Institutional Partnerships	Collaborative partnerships between different educational institutions, organizations, and agencies to pool resources, expertise, and efforts in responding to education system crises caused by armed conflict.
Smart Aid Distribution Network	An efficient and targeted distribution network for educational aid and resources, ensuring that assistance reaches the most affected and vulnerable populations during armed conflict crisis.
Temporary Learning Spaces	Provision of temporary, safe, and conducive spaces for teaching and learning to continue in crisis-affected areas, often using makeshift classrooms or community centers.
Community-Led Learning Networks	Community-driven initiatives that support and sustain local educational efforts during armed conflict crisis, involving active participation of community members, parents, and local leaders.

### II. Response Approaches for Teaching-Learning Crisis

Variables	Definition of the Variables
Curriculum Condensation	Streamlining and adapting the curriculum to focus on essential learning outcomes and skills during armed conflict crisis, ensuring that limited instructional time is used effectively.
Blended Teaching-Learning	Utilizing a combination of in-person and remote teaching methods to facilitate continuous learning even in situations where traditional classroom teaching is disrupted by armed conflict.
Accelerated Education Program	Intensive educational programs designed to fast-track learning and make up for lost instructional time, often targeted at students who have been affected by armed conflict crisis.
Targeted Learning Assessment	Implementing focused and efficient assessment strategies to gauge students' learning progress and identify areas that require immediate attention during armed conflict crisis.
Interim Learning Sanctuary	Creating safe and supportive learning environments where students can continue their education during armed conflict crisis, even in the absence of traditional school settings.

<b>Variables</b>	<b>Definition of the Variables</b>
Mental Health and Psychosocial Support	Providing psychological and emotional support to students and educators affected by armed conflict crisis, addressing the mental health challenges arising from the crisis.

### III. Response Approaches for Education Agents Crisis

<b>Variables</b>	<b>Definition of the Variables</b>
Military-Free Education Advocacy (Governments)	Advocacy efforts by governmental bodies to keep education free from military interference and to ensure that educational spaces remain safe and conducive for learning during armed conflict.
Life-Saving Education Advocacy (NGOs)	Advocacy by non-governmental organizations to prioritize and provide life-saving education opportunities, especially for vulnerable populations affected by armed conflict crisis.
Targeted Professional Development (Teachers)	Providing specialized training and support for teachers to enhance their skills, resilience, and ability to deliver quality education despite the challenges posed by armed conflict.
Community-Learning Centers (Students)	Establishing community-based learning centers where students can access education and resources even when formal schooling is disrupted by armed conflict.
Mobile Parent Education (Parents)	Providing parents and caregivers with educational resources, training, and information to support their children's learning and well-being during armed conflict crisis.

### IV. Features of Education

<b>Variables</b>	<b>Definition of the Variables</b>
Availability	The first principle, availability, emphasizes the need for education facilities and services to be physically and economically accessible. Schools, teachers, and learning materials should be readily available to all individuals, ensuring that they are not deprived of education due to distance or economic constraints. Availability is a fundamental aspect of ensuring that education is provided as a universal right.
Accessibility	The second principle, accessibility, focuses on removing barriers that may prevent certain groups from accessing education. Economic, cultural, social, and physical barriers should be eliminated to ensure that marginalized groups, such as girls, children with disabilities, and minority populations, have equal opportunities to access education. By promoting equal access, the 4As framework seeks to create an inclusive and equitable educational environment.
Acceptability	The principle of acceptability underscores the importance of respecting individuals' cultural identity, values, and languages within the educational context. Education should be sensitive to the diverse needs and backgrounds of learners, ensuring that it is inclusive and culturally relevant. This approach fosters an environment where learners feel recognized and valued, leading to better engagement and participation in the educational process.

<b>Variables</b>	<b>Definition of the Variables</b>
Adaptability	Adaptability is the fourth principle of the 4As framework, emphasizing the need for education systems to be flexible and responsive to the changing needs of individuals and society. This involves offering diverse learning opportunities and approaches that cater to different learning styles, abilities, and interests. By being adaptable, education can better meet the evolving demands of a dynamic world and equip learners with relevant skills for their personal development and societal contribution.

### **C. Crisis Resilient Approaches for Education System, Teaching-Learning, and Education Agents**

#### **I. Resilient Approaches for Education System Crisis**

<b>Variables</b>	<b>Definition of the Variables</b>
Agile Education Policy	Flexible and adaptable education policies that can respond to changing circumstances during and after armed conflict crisis, ensuring continued access to quality education.
Decentralized Education Governance	Delegating decision-making authority to local and community levels to ensure that education is responsive to the needs and context of the crisis-affected areas.
Empowered Local Capacity	Strengthening the capacities and skills of local educators, administrators, and communities to effectively manage and sustain education services despite armed conflict challenges.
Community-Driven Financing	Involving communities and local stakeholders in resource mobilization and management to ensure sustainable funding for education initiatives in crisis-affected regions.
Future-Proof Infrastructure	Designing and constructing educational infrastructure that is resilient to armed conflict and other crises, ensuring that learning spaces can withstand disruptions.
Networked Local Ecosystem	Building strong networks and partnerships among various local actors, such as schools, NGOs, community organizations, and businesses, to create a collaborative and supportive educational ecosystem.

#### **II. Resilient Approaches for Teaching-Learning Crisis**

<b>Variables</b>	<b>Definition of the Variables</b>
Agile Curriculum Development	Developing curricula that can be adapted and adjusted quickly to suit the changing needs and challenges posed by armed conflict crisis while maintaining learning quality.
Hybrid Pedagogical Instruction	Blending different teaching methods and approaches to accommodate various learning environments and situations during armed conflict, ensuring effective instruction.
Targeted Mastery-Based Learning	Focusing on students' mastery of essential skills and competencies rather than strictly following a set timeline, allowing flexibility in learning progression during armed conflict.
Learner-Based Assessment	Shifting towards assessment methods that consider individual student strengths, needs, and circumstances, recognizing the diversity of learners affected by armed conflict crisis.

<b>Variables</b>	<b>Definition of the Variables</b>
Protective Learning Environment	Creating learning environments that prioritize students' safety, well-being, and emotional health, especially in contexts where armed conflict poses threats to these aspects.
Life Skills and Well-Being Education	Integrating life skills and well-being education into the curriculum to equip students with essential skills for coping with the challenges of armed conflict and promoting resilience.

### **III. Resilient Approaches for Education Agents Crisis**

<b>Variables</b>	<b>Definition of the Variables</b>
Peace and Ethical Education (Governments)	Integrating peace education and ethical values into the curriculum to promote conflict resolution, empathy, and understanding, especially in areas affected by armed conflict.
Family Endowment for Education (NGOs)	Establishing programs that support families and caregivers in providing financial and emotional support for children's education despite the challenges posed by armed conflict crisis.
Comprehensive Teacher Support System (Teachers)	Developing comprehensive support systems that address teachers' well-being, professional development, and resilience in the face of armed conflict-related challenges.
Child-Right to Education (Students)	Advocating for and ensuring the right of every child to access quality education, regardless of the circumstances, including those affected by armed conflict.
Parental Skill Education (Parents)	Providing parents and caregivers with training and resources to support their children's learning, well-being, and development, even during armed conflict crisis.

### **IV. Capacities of Resilience**

<b>Variables</b>	<b>Definition of the Variables</b>
Absorptive Capacity	The ability of education systems, institutions, and agents to absorb and manage the shocks and challenges of armed conflict crisis while minimizing negative impacts on learning and well-being.
Adaptive Capacity	The capability to adapt and adjust educational strategies, policies, and practices to changing circumstances and effectively address the challenges posed by armed conflict.
Transformative Capacity	The potential to bring about positive and lasting changes in education systems, teaching-learning approaches, and education agents in the aftermath of armed conflict crisis, aiming for improved resilience and sustainability.

## Annex 2: English Version Data Collection Tools

### SURVEY QUESTIONNAIRE

For Students, Parents, Teachers, Education Government Bodies and NGOs

#### Demographic Profile of Study Respondents

##### Instruction: -

Kindly please fill your age, gender, family background, parenthood, and occupation in the respective spaces provided below.

1. Age: \_\_\_\_\_ 2. Gender: \_\_\_\_\_
3. Education Background: \_\_\_\_\_
4. Family Background:
  - a. Single (never married): \_\_\_\_ b. Married: \_\_\_\_ c. Divorced: \_\_\_\_ d. Widowed: \_\_\_\_
5. Number of children if any: \_\_\_\_\_
6. Occupation:
  - a. School Teacher: \_\_\_\_ b. School Principal: \_\_\_\_ c. Education Office: \_\_\_\_
  - d. Education Bureau: \_\_\_\_ e. Student: \_\_\_\_\_ f. School PTA (Parent): \_\_\_\_\_
  - g. NGO: \_\_\_\_\_ h. Any other: \_\_\_\_\_

#### SECTION I: - Impact of Armed Conflict Crisis on Education System, Teaching-Learning, and Education Agents

##### INSTRUCTION:

Measure the provided impacts of armed conflict crisis on each of the education system, teaching-learning, and education agents identified in the tables below in terms of exposure, sensitivity, and vulnerability, with ratings from 1 to 5 (1 being low impact and 5 being high impact) taking the following rating procedures and definitions annexed with this tool.

- **1-5 Rating Procedures:**

1. **Exposure (1-5):**

- 1: Minimal or negligible impact of armed conflict on the specific aspect being measured.
- 2: Low impact, with occasional or isolated incidents affecting the aspect.
- 3: Moderate impact, with notable occurrences of armed conflict affecting the aspect.
- 4: Substantial impact, with frequent or widespread incidents impacting the aspect.

5: Severe impact, with pervasive and continuous armed conflict significantly affecting the aspect.

**2. Sensitivity (1-5):**

1: Highly resilient and minimally affected by changes or disruptions caused by armed conflict.

2: Moderately resilient, with some adaptability to cope with changes and disruptions.

3: Moderately sensitive, showing noticeable responses to changes and disruptions.

4: Relatively sensitive, experiencing significant responses and challenges to cope with changes.

5: Highly sensitive, being significantly impacted and vulnerable to changes and disruptions.

**3. Vulnerability (1-5):**

1: Highly robust and well-equipped to withstand adverse impacts caused by armed conflict.

2: Moderately resilient, with some capacity to cope with challenges arising from armed conflict.

3: Moderately vulnerable, experiencing difficulties but having some ability to adapt.

4: Relatively vulnerable, facing significant difficulties and limitations in coping with the impact.

5: Highly vulnerable, having limited capacity to cope with and recover from armed conflict's adverse effects.

**1.1. Impacts of Armed Conflict Crisis on System the of Education (For Education Authorities and Education NGOs only)**

- *Measure each of the provided impact of armed conflict crisis on the system of the education in terms of exposure, sensitivity, and vulnerability rating 1-5 points. Look the definitions of the measuring terms and the rating procedure in the above instruction. You can also get the definitions of each impact factors in the annex of this tool.*

<b>Impact on System</b>	<b>Exposure (1-5)</b>	<b>Sensitivity (1-5)</b>	<b>Vulnerability (1-5)</b>
Education Policy Disruptions			
Education Governance Instability			
Education Institutional Capacity Erosion			
Educational Aid and Funding Disruption			
Educational Infrastructure Depletion			
Education Ecosystem Fragmentation			

- *Explain your reasons why you measured with the point you rated for each of the provided impacts in terms of each exposure, sensitivity, and vulnerability, and how these impacts the education system of primary schools in Tigray*

<b>Impact on System</b>	<b>How these impact the whole system of education</b>
Education Policy Disruptions	
Education Governance Instability	
Education Institutional Capacity Erosion	
Educational Aid and Funding Disruption	
Educational Infrastructure Depletion	
Education Ecosystem Fragmentation	

**1.2. Impacts of Armed Conflict Crisis on Teaching-Learning (For Teachers and Students only)**

- *Measure each of the provided impact of armed conflict crisis on the teaching-learning in terms of exposure, sensitivity, and vulnerability rating 1-5 points. Look the definitions of the measuring terms and the rating procedure in the above instruction. You can also get the definitions of each impact factors in the annex of this tool.*

<b>Impact on Teaching-Learning</b>	<b>Exposure (1-5)</b>	<b>Sensitivity (1-5)</b>	<b>Vulnerability (1-5)</b>
Curriculum Disruption			
Instructional Challenges			
Learning and Academic Regression			
Disrupted Learning Assessment			
Adverse Learning Environment			
Strained Teacher-Learner Relationship			

- *Explain your reasons why you measured with the point you rated for each of the provided impacts in terms of each exposure, sensitivity, and vulnerability, and how these impact the teaching-learning of primary schools in Tigray.*

<b>Impact on Teaching-Learning</b>	<b>How these impact the whole teaching-learning</b>
Curriculum Disruption	
Instructional Challenges	
Learning and Academic Regression	
Disrupted Learning Assessment	
Adverse Learning Environment	
Strained Teacher-Learner Relationship	

**1.3. Impacts of Armed Conflict Crisis on education agents (For respective in bracket)**

- *Measure each of the provided impact of armed conflict crisis on the education agents in terms of exposure, sensitivity, and vulnerability rating 1-5 points. Look the definitions of the measuring terms and the rating procedure in the above instruction. You can also get the definitions of each impact factors in the annex of this tool.*

<b>Impact on Education Agents</b>	<b>Exposure (1-5)</b>	<b>Sensitivity (1-5)</b>	<b>Vulnerability (1-5)</b>
Weaponizing Education (Government Body)			
Constrained Education Aid (NGOs)			
Teachers' Professional Regression (Teachers)			
Out-of-School Children (Students)			
Education-Averse Parents (Parents)			

- *Explain your reasons why you measured with the point you rated for each of the provided impacts in terms of each exposure, sensitivity, and vulnerability, and how these impact the education agents of primary schools in Tigray.*

<b>Impact on Education agents</b>	<b>How these impact the respective education agents?</b>
Weaponizing Education (Government Body)	
Constrained Education Aid (NGOs)	
Teachers' Professional Regression (Teachers)	
Out-of-School Children (Students)	
Education-Averse Parents (Parents)	

## **SECTION II: - Response and Recovery Approaches to Education System, Teaching-Learning, and Education Agent Crisis**

### **INSTRUCTION:**

Measure the provided response and recovery approaches for each of the education system, teaching-learning, and education agents' crises identified in the tables below in terms of the 4As such as availability, accessibility, acceptability, and adaptability with ratings from 1 to 5 (1 being low feature and 5 being high feature) taking the following rating procedures and annexed definitions.

- **1-5 Rating Procedures:**

- 1. Availability (1-5):**

- 1: Very limited availability - The response approach is rarely accessible or not accessible at all, making it challenging to implement or utilize.

- 2: Limited availability - The response approach is somewhat accessible, but its availability is not widespread or consistent.

- 3: Moderate availability – The response approach is reasonably accessible, and it is available in some instances, but there may still be limitations in its widespread adoption.

- 4: Good availability – The response approach is generally accessible and readily available in most cases, but there might be occasional barriers.

- 5: Highly available - The response approach is easily accessible and widely available, making it straightforward to implement and utilize in various contexts.

- 2. Accessibility (1-5):**

1: Very difficult to access - The response approach is highly challenging to reach or utilize, with significant barriers or obstacles preventing its effective implementation.

2: Difficult to access - The response approach is somewhat challenging to access, and there may be some barriers or limitations in its implementation.

3: Moderate accessibility - The response approach is reasonably accessible, but there might be some difficulties or challenges in utilizing it effectively.

4: Good accessibility - The response approach is generally accessible, and there are relatively few obstacles in implementing and utilizing it.

5: Highly accessible - The response approach is very easy to access and utilize, with minimal barriers, allowing for smooth implementation and utilization.

**3. Acceptability (1-5):**

1: Highly unacceptable - The response approach is not acceptable in the given context, and there are significant concerns or objections to its implementation.

2: Unacceptable - The response approach is somewhat unacceptable, and there may be notable reservations about its suitability for the specific situation.

3: Moderately acceptable - The response approach is reasonably acceptable, but there might be some mixed opinions or concerns about its suitability.

4: Acceptable - The response approach is generally acceptable and aligns well with the context, with only minor concerns or reservations.

5: Highly acceptable - The response approach is highly acceptable and well-suited for the specific context, with broad consensus on its appropriateness.

**4. Adaptability (1-5):**

1: Not adaptable - The response approach is rigid and difficult to modify or adjust according to changing circumstances or needs.

2: Low adaptability - The response approach has limited flexibility and may require substantial effort to adapt to different situations.

3: Moderate adaptability - The response approach has some degree of flexibility, but there may be areas where improvements could enhance its adaptability.

4: Good adaptability - The response approach is relatively adaptable and can be adjusted to fit various circumstances with moderate effort.

5: Highly adaptable - The response approach is highly flexible and easily adjustable to accommodate different contexts or evolving requirements.

## 2.1. Recovery Approaches for Education System Crisis (Education Authorities and NGOs)

- *Measure the provided response and recovery approaches for the education system crisis identified in the tables below in terms of availability, accessibility, acceptability, and adaptability with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided response and recovery approaches in the annex of this data collection tool.*

<b>System Response Approach</b>	<b>Availability (1-5)</b>	<b>Accessibility (1-5)</b>	<b>Acceptability (1-5)</b>	<b>Adaptability (1-5)</b>
Conflict-Sensitive Education Policy				
Education Cluster Coordination				
Cross-Institutional Partnerships				
Smart Aid Distribution Network				
Temporary Learning Spaces				
Community-Led Learning Networks				

- *Explain the reasons for the measures you rated and how each of the response and recovery approaches works for the recovery of the whole education system*

<b>Response Approach</b>	<b>How these response approaches recover the education system crisis?</b>
Conflict-Sensitive Education Policy	
Education Cluster Coordination	
Cross-Institutional Partnerships	
Smart Aid Distribution Network	
Temporary Learning Spaces	
Community-Led Learning Networks	

## 2.2. Teaching Learning Crisis Response and Recovery Approaches (Students and Teachers)

- *Measure the provided response and recovery approaches for the teaching-learning crisis identified in the tables below in terms of availability, accessibility, acceptability, and adaptability with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided response and recovery approaches in the annex of this data collection tool.*

<b>Teaching-Learning Response Approach</b>	<b>Availability (1-5)</b>	<b>Accessibility (1-5)</b>	<b>Acceptability (1-5)</b>	<b>Adaptability (1-5)</b>
Curriculum Condensation				
Blended Teaching-Learning				
Accelerated Education Program				

Teaching-Learning Response Approach	Availability (1-5)	Accessibility (1-5)	Acceptability (1-5)	Adaptability (1-5)
Targeted Learning Assessment				
Interim Learning Sanctuary				
Mental Health and Psychosocial Support				

- Explain the reasons for the measures you rated and how each of the response and recovery approaches works for the recovery of the teaching-learning crisis.

Response Approach	How these response approaches recover the teaching-learning crisis
Curriculum Condensation	
Blended Teaching-Learning	
Accelerated Education Program	
Targeted Learning Assessment	
Interim Learning Sanctuary	
Mental Health and Psychosocial Support	

### 2.3. Education Agents Crisis Response and Recovery Approaches (Respective in brackets)

- Measure the provided response and recovery approaches for the education agent's crisis identified in the tables below in terms of availability, accessibility, acceptability, and adaptability with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided response and recovery approaches in the annex of this data collection tool.

Education Agents Response Approach	Availability (1-5)	Accessibility (1-5)	Acceptability (1-5)	Adaptability (1-5)
Military-Free Education Advocacy (Governments)				
Life-Saving Education Advocacy (NGOs)				
Targeted Professional Development (Teachers)				
Community-Learning Centers (Students)				
Mobile Parent Education (Parents)				

- Explain the reasons for the measures you rated and how each of the response and recovery approaches works for the recovery of the education agents crisis.

Response Approach	How these response approaches recover the crisis of education agents
Military-Free Education Advocacy (Governments)	

<b>Response Approach</b>	<b>How these response approaches recover the crisis of education agents</b>
Life-Saving Education Advocacy (NGOs)	
Targeted Professional Development (Teachers)	
Community-Learning Centers (Students)	
Mobile Parent Education (Parents)	

### **SECTION III: Crisis Resilient Approaches for Education System, Teaching-Learning, and Education Agents**

#### **INSTRUCTIONS:**

Measure the provided resilient approaches for each of the education system, teaching-learning, and education agents identified in the tables below in terms of the absorptive, adaptive, and transformative resilient capacities with ratings from 1 to 5 (1 being low resiliency and 5 being high resiliency) taking the following rating procedures and annexed definitions.

- **1-5 Rating Procedures:**

1. **Absorptive Capacity (1-5):**

- 1: Very low absorptive capacity - the approach lacks the ability to learn from external knowledge, experiences, or shocks.
- 2: Low absorptive capacity - limited ability to absorb and apply new knowledge or adapt to changes.
- 3: Moderate absorptive capacity - some ability to learn and adapt, but improvements are needed.
- 4: High absorptive capacity - the approach demonstrates a good ability to learn and adapt to changes.
- 5: Very high absorptive capacity - the approach effectively absorbs and applies new knowledge and experiences to enhance resilience.

2. **Adaptive Capacity (1-5):**

- 1: Very low adaptive capacity - the approach shows little to no capability to adjust to changing circumstances or challenges.
- 2: Low adaptive capacity - limited ability to respond effectively to new situations or challenges.
- 3: Moderate adaptive capacity - some ability to adjust and respond to changes, but further improvements are required.
- 4: High adaptive capacity - the approach can effectively respond and adapt to changing circumstances.
- 5: Very high adaptive capacity - the approach demonstrates exceptional responsiveness and adaptability.

3. **Transformative Capacity (1-5):**

- 1: Very low transformative capacity - the approach lacks the potential to drive significant positive changes or innovations.
- 2: Low transformative capacity - limited ability to bring about transformative changes.

3: Moderate transformative capacity - some potential to initiate transformative changes, but improvements are needed.

4: High transformative capacity - the approach can effectively drive positive transformative changes.

5: Very high transformative capacity - the approach shows exceptional capacity to catalyze transformative and lasting changes.

**3.1. Resilient Approaches for Education System in Crisis** (Education Authorities and NGOs)

- *Measure the provided resilient approaches for the education system crisis identified in the tables below in terms of absorptive, adaptive, and transformative with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided resilient approaches in the annex of this data collection tool.*

System Resilient Approach	Absorptive Capacity (1-5)	Adaptive Capacity (1-5)	Transformative Capacity (1-5)
Agile Education Policy			
Decentralized Education Governance			
Empowered Local Capacity			
Community-Driven Financing			
Future-Proof Infrastructure			
Networked Local Ecosystem			

- *Explain the reasons for the measures you rated and how each of the resilient approaches works for the resiliency of the education system.*

Resilient Approach	How these approaches work for the resiliency of education system
Agile Education Policy	
Decentralized Education Governance	
Empowered Local Capacity	
Community-Driven Financing	
Future-Proof Infrastructure	
Networked Local Ecosystem	

**3.2. Resilient Approaches for Teaching-Learning in Crisis** (Students and Teachers)

- *Measure the provided resilient approaches for the teaching-learning crisis identified in the tables below in terms of absorptive, adaptive, and transformative with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided resilient approaches in the annex of this data collection tool.*

Teaching-Learning Resilience Approach	Absorptive Capacity (1-5)	Adaptive Capacity (1-5)	Transformative Capacity (1-5)
Agile Curriculum Development			
Hybrid Pedagogical Instruction			

<b>Teaching-Learning Resilience Approach</b>	<b>Absorptive Capacity (1-5)</b>	<b>Adaptive Capacity (1-5)</b>	<b>Transformative Capacity (1-5)</b>
Targeted Mastery-Based Learning			
Learner-Based Assessment			
Protective Learning Environment			
Life Skills and Well-Being Education			

- *Explain the reasons for the measures you rated and how each of the resilient approaches works for the resiliency of the teaching-learning.*

<b>Resilience Approach</b>	<b>How these approaches work for the resiliency of teaching-learning</b>
Agile Curriculum Development	
Hybrid Pedagogical Instruction	
Targeted Mastery-Based Learning	
Learner-Based Assessment	
Protective Learning Environment	
Life Skills and Well-Being Education	

### 3.3. Resilient Approaches for Education Agents in Crisis (Respective in brackets)

- *Measure the provided resilient approaches for the education agents in crisis identified in the tables below in terms of absorptive, adaptive, and transformative with ratings from 1 to 5 based on the definitions and rating procedures provided in the above instruction. You can also get the clarifications about the provided resilient approaches in the annex of this data collection tool.*

<b>Education Agents Resilience Approach</b>	<b>Absorptive Capacity (1-5)</b>	<b>Adaptive Capacity (1-5)</b>	<b>Transformative Capacity (1-5)</b>
Peace and Ethical Education (Govs)			
Family Endowment for Education (NGOs)			
Comprehensive Teacher Support System (Teachers)			
Child-Right to Education (Students)			
Parental Skill Education (Parents)			

- *Explain the reasons for the measures you rated and how each of the resilient approaches works for the resiliency of the education agents.*

<b>Resilience Approach</b>	<b>How these approaches work for the resiliency of education agents?</b>
Peace and Ethical Education (Govs)	
Family Endowment for Education (NGOs)	
Comprehensive Teacher Support System (Teachers)	
Child-Right to Education (Students)	

Resilience Approach	How these approaches work for the resiliency of education agents?
Parental Skill Education (Parents)	

## INTERVIEW QUESTIONS

### To Students and Parents

Objective 1: To assess the impacts of armed conflict crisis on the education system, teaching-learning, and education agents of primary schools, and determine the extent of crisis in these areas.

1. How have armed conflicts affected the education system in primary schools in Tigray?
2. What specific challenges have education agents (teachers, administrators, etc.) faced during the crisis?
3. Can you provide examples of how teaching-learning processes have been impacted by the armed conflict?
4. In your opinion, what areas of the education system have been most severely affected by the crisis?
5. How would you rate the extent of the crisis's impact on the education system and its stakeholders?

Objective 2: To identify approaches that can be employed to respond and recover the education system, teaching-learning, and education agents from crisis, and examine how these approaches align with the essential features of education.

1. Based on your experience, what measures or strategies have been effective in responding to the crisis and recovering the education system in Tigray?
2. How do you believe these approaches align with the essential features of education, such as inclusivity, accessibility, and quality of learning?
3. Are there any innovative or unique approaches that you have witnessed or implemented to address the challenges faced during the crisis?
4. What support or resources do you think are necessary to effectively implement these approaches and ensure their success in the long term?
5. How do you envision the successful integration of these approaches into the existing education system?

Objective 3: To explore resilient approaches that can be implemented to build a crisis-resilient education system, enhance teaching and learning processes, and support education agents, and investigate how these approaches align with the concept of resilient capacities.

1. In your view, what characteristics define a crisis-resilient education system in primary schools?
2. Can you provide examples of practices or initiatives that can enhance teaching and learning processes to make them more resilient to crises?
3. How can education agents be supported during times of crisis to ensure their well-being and effective performance?

4. From your perspective, how do these resilient approaches align with the concept of resilient capacities, and how might they contribute to the sustainability of the education system in Tigray?
5. What potential challenges do you foresee in implementing these resilient approaches, and how could these challenges be mitigated?

## **FOCUS GROUP DISCUSSION QUESTIONS**

### **By Students, Parents, and Teachers**

Objective 1: To assess the impacts of armed conflict crisis on the education system, teaching-learning, and education agents of primary schools, and determine the extent of the crisis in these areas.

1. How has the armed conflict crisis affected the education system in primary schools in Tigray?
2. What specific challenges have teachers and students faced during the crisis in terms of teaching and learning?
3. How has the crisis impacted the physical infrastructure and resources of primary schools?
4. In what ways has the well-being and mental health of education agents been affected by the crisis?
5. Can you provide examples of how the crisis has influenced the enrollment and attendance rates of students in primary schools?

Objective 2: To identify approaches that can be employed to respond and recover the education system, teaching-learning, and education agents from the crisis, and examine how these approaches align with the essential features of education.

1. What immediate response measures were taken to address the crisis's impact on education in primary schools?
2. How successful were these response measures in ensuring continuity of teaching and learning during the crisis?
3. What innovative methods or technologies were used to support education agents and enhance teaching during the crisis?
4. In your opinion, which aspects of the existing education system proved resilient during the crisis, and how can we build upon them?
5. How can we ensure that recovery efforts in the education system align with the essential features of education and meet the specific needs of primary schools in Tigray?

Objective 3: To explore resilient approaches that can be implemented to build a crisis-resilient education system, enhance teaching and learning processes, and support education agents, and investigate how these approaches align with the concept of resilient capacities.

1. What does a "crisis-resilient education system" mean to you, and what elements should it encompass?
2. Can you suggest practical and feasible approaches to make the education system in primary schools more crisis-resilient?
3. How can technology and digital resources be effectively utilized to enhance teaching and learning resilience during crisis situations?
4. In what ways can professional development and support be provided to education agents to enhance their resilience and adaptability during crises?
5. How can collaboration between stakeholders, such as government bodies, non-governmental organizations, and local communities, be strengthened to support a crisis-resilient education system in Tigray?

**Annex 3: Tigrigna Version Data Collection Tools**

(Sample)

**ሕቶታት ሙጽናዕቲ**

**ሞኒተሪንግ ተምሃሮ 7-8 ክፍልታት ቀዳማይ ብርኪ ኣብያተ ትምህርቲ**

**ቀዳማይ ክፋል :- መረዳእታ መልሲ ዝሃቡ ሰባት**

**መምርሒ :- ነዚ ኣብ ታሕቲ ዘሎ መረዳእታ ምልኡ**

1. ዕድሙ :- \_\_\_\_\_ 2 ጾታ:- \_\_\_\_\_

3. ብርኪ ክፍለ :- \_\_\_\_\_

4. ድሕረ ባይታ ስድራ ቤት :- \_\_\_\_\_

U/ በዝሒ 1ይ ብርኪ ትምህርቲ ዝወደኡ \_\_\_\_\_ለ/ ካልኣይ ብርኪ ትምህርቲ \_\_\_\_\_ሐ/ ልዕሊ ካልኣይ ብርኪ ትምህርቲ \_\_\_\_\_መ/ ዘይተምሃሩ \_\_\_\_\_

5. በዝሒ ስድራ ኣብ ገዛ:- \_\_\_\_\_

6. ስራሕ ስድራ/ወለዲ :- \_\_\_\_\_

8. ኣብ ትምህርቲ ዘሕለፍካዮ በዝሒ ዓመታት \_\_\_\_\_

9. ካብ ትምህርቲ ወጻኢ ዝኮንካሉ በዝሒ ዓመታት \_\_\_\_\_

**ካልኣይ ክፋል :- ኩናት ትግራይ ኣብ ምምሃርን ምስትምሃርን ቀዳማይ ብርኪ ትምህርቲ ትግራይ ዘሕደሮ ጽልዋ/ሳዕቤን**

**መምርሒ:-**

ነዘም ኣብቲ ዝስዕብ ሰደቓ ዝቐረቡ ሳዕቤናት ውግእ ትግራይ ኣብ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕዶም ብመንጽር ተቓላዕነት (Exposure)፣ ተኳሳሕነት (Sensitivity) ተጠቓዕነትን (Vulnerability) ካብ 1 ክሳብ 5 ነጥብታት ብምሃብ ዓቕን/ኒ። ዝርዝር መልስን ገለጻን ንዝሓቱ ሕቶታት ድማ ብዝርዝር ኣቐምጡ/ጡ።

1. ነዘም ኣብቲ ዝስዕብ ሰደቓ ዝቐረቡ ሳዕቤናት ውግእ ትግራይ ኣብ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕዶም ብመንጽር ተቓላዕነት (Exposure)፣ ተኳሳሕነትን (Sensitivity) ተጠቓዕነትን (Vulnerability) ካብ 1 ክሳብ 5 ነጥብታት ብምሃብ ዓቕን/ኒ።

ሳዕቤናት እቲ ውግእ ኣብ ከይዲ ምምሃር ምስትምሃር	ተቓላዕነት (Exposure)					ተኳሳሕነት (Sensitivity)					ተጠቓዕነት (Vulnerability)					ማእኸላይ ውጽኢት
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምዝንባዕ/ምብልሻው ስርዓተ ትምህርቲ																
ብድሆታት/ጸገማት ኣመሃህራ መምህራን																

ብትምህርትን ብርክን ንድሕሪት ምምላስ ተምሃሮ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምዝንባዕ ተፍታሽ/ፈተና ትምህርቲ ተምሃሮ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምፍጣር ሕማቕ አካባቢ ትምህርቲ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምሕርፋፍ ርክብ ተምሃሮን መምህራንን	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ህጻናት ካብ ትምህርቲ ወጻኢ ምዃን	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ማእኸላይ ውጽኢት																

2. ነዞም ኣብ ታሕቲ ተዘርዚሮም ዘለው ሳዕቤናት ውግእ ኣብ ልዕሊ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ብኸመይ ሳዕቤን ከምዘኸተሉ ኣብቲ ተዋሂቡ ዘሎ ቦታ ብዝርዝር ግለጽ/ዲ።

ሳዕቤናት እቲ ውግእ ኣብ ከይዲ ምምሃር ምስትምሃር	ዝርዝር ገልጻ ሳዕቤን ኣብ ከይዲ ምምሃር ምስትምሃር
ምዝንባዕ/ምብልሻው ስርዓተ ትምህርቲ	
ብድሆታት/ጸገማት ኣመሃህራ መምህራን	
ብትምህርትን ብርክን ንድሕሪት ምምላስ ተምሃሮ	
ምዝንባዕ ተፍታሽ/ፈተና ትምህርቲ	
ምፍጣር ሕማቕ አካባቢ ትምህርቲ	
ምሕርፋፍ ርክብ ተምሃሮን መምህራንን	
ህጻናት ካብ ትምህርቲ ወጻኢ ምዃን	

3. ኩናት ትግራይ ኣብ ልዕሊ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ዘስዓቦም ኣወንታውን ኣሉታውን ሳዕቤናት ብዝርዝር ግለጽ/ዲ።
4. ኩናት ትግራይ ኣብ ልዕሊ ተምሃሮ ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ዘስዓቦም ኣወንታውን ኣሉታውን ሳዕቤናት ብዝርዝር ግለጽ/ዲ።

**ሳልሳይ ክፋል: - ምላሽን ሕውየትን ጸገም/ቅልውላው ከይዲ ምምሃር ምስትምሃር**

**መምርሒ፡**

ነዞም ኣብቲ ዝስዕብ ሰይጃ ዝቐረቡ ስትራተጅታት ምላሽን ሕውየትን ብኩናት ትግራይ ንዝተፈጠሩ ጸገማትን ቅልውላዎትን ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕዶም ብመንጽር ህልውነት (Availability)፣ ተበጻሕነት (Accessibility)፣ ተቐባልነትን (Acceptability) ተዓጻጻፊነትን (Adaptability) ካብ 1 ክሰብ 5 ነጥብታት ብምሃብ ዓቕን/ኒ። ዝርዝር መልስን ገለጻን ንዝሓቱ ሕቶታት ድማ ብዝርዝር ኣቐምጡ/ጡ።

1. ነዘም ኣብቲ ዝስዕብ ሰደቓ ዝቐረቡ ስትራቴጂታት ህጹጽ ምላሽን ሕውዮትን ብኩናት ትግራይ ንዝተፈጠሩ ጸገማትን ቅልውላዋትን ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕድም ብመንጽር ህልውነት (Availability)፣ ተበጻሕነት (Accessibility)፣ ተቐባልነትን (Acceptability)፣ ተዓጻጻፊነትን (Adaptability) ከብ 1 ክሰብ 5 ነጥብታት ብምሃብ ዓቕን/ኒ።

ዝርዝር ስትራቴጂታት ህጹጽ ምላሽን ሕውዮትን	ህልውነት (Availability)					ተበጻሕነት (Accessibility)					ተቐባልነት (Acceptability)					ተዓጻጻፊነት (Adaptability)					ማእኸላይ ውጽኢት
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምሕጻር ስርዓተ ትምህርቲ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
መማረጺ-ብዙሕ ከይዲ ምምሃር ምስትምሃር	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
መደብ ቅልጡፍ/ስሉጥ ትምህርቲ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ዕሉም/ትኩር ተፍታሽን ገምገምን ትምህርቲ ተምሃሮ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ግዝያዊ መዕቆቢ ትምህርቲ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ጥዕና ኣእምሮን ስነ-ኣእምሮአዊ ማሕበራዊ ደገፍን	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ማሕበረሰባዊ ማእኸላት ትምህርቲ	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ማእኸላይ ውጽኢት																					

2. ነዘም ኣብ ታሕቲ ዝቐረቡ ስትራቴጂታት ምላሽን ሕውዮትን ብስንኪ ኩናት ትግራይ ንዝተፈተሩ ሳዕቤናት ከይዲ ምምሃር ምስትምሃር ትግራይ ብኸመይ መፍትሕታት ክኾኑ ከምዝኽእሉ ኣብቲ ዝተውሃበ ክፍቲ ቦታ ብዝርዝር ግለጽ/ዲ።

ዝርዝር ስትራቴጂታት ህጹጽ ምላሽን ሕውዮትን	ዝርዝር መግለጺ
ምሕጻር ስርዓተ ትምህርቲ	
መማረጺ-ብዙሕ ከይዲ ምምሃር ምስትምሃር	
መደብ ቅልጡፍ/ስሉጥ ትምህርቲ	
ዕሉም/ትኩር ተፍታሽን ገምገምን ትምህርቲ ተምሃሮ	
ግዝያዊ መዕቆቢ ትምህርቲ	
ጥዕና ኣእምሮን ስነ-ኣእምሮአዊ ማሕበራዊ ደገፍን	
ማሕበረሰባዊ ማእኸላት ትምህርቲ	

3. ብስንኪ ኩናት ትግራይ ኣብ ልዕሊ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ንዝበጸሑ ሰባብናት ስትራቴጂታት ህጹጽ ምላሽን ሕውዮትን ክኾኑ ዝኽእሉ ብዝርዘር ግለጽ/ዲ።
4. ብስንኪ ኩናት ትግራይ ኣብ ልዕሊ ተምሃሮ ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ንዝበጸሑ ሰባብናት ስትራቴጂታት ህጹጽ ምላሽን ሕውዮትን ክኾኑ ዝኽእሉ ብዝርዘር ግለጽ/ዲ።

**ራብዓይ ክፋል: ጸገማት/ቅልውላዎች ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር**

**መምርሒ፡**

ነዘም ኣብቲ ዝስዕብ ሰደቓ ዝቐረቡ ጸገማት/ቅልውላዎች ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕዶም ብመንጽር ክእለት ዓቃልነት/ጸዋርነት (Absorptive Capacity) ፣ ክእለት ተዓዳዳይነት (Adaptive Capacity) ፣ ክእለት ለዋጣይነት (Transformative Capacity) ካብ 1 ክሳብ 5 ነጥብታት ብምሃብ ዓቅን/ኒ። ዝርዘር መልስን ገለጻን ንዝሓቱ ሕቶታት ድማ ብዝርዘር ኣቐምጡ/ጢ።

1. ነዘም ኣብቲ ዝስዕብ ሰደቓ ዝቐረቡ ጸገማት/ቅልውላዎች ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ንሕድሕዶም ብመንጽር ክእለት ዓቃልነት (Absorptive Capacity) ፣ ክእለት ተዓዳዳይነት (Adaptive Capacity) ፣ ክእለት ለዋጣይነት (Transformative Capacity) ካብ 1 ክሳብ 5 ነጥብታት ብምሃብ ዓቅን/ኒ።

ጸገማት/ቅልውላዎች ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር	ክእለት ዓቃልነት/ ጸዋርነት (Absorptive Capacity)					ክእለት ተዓዳዳይነት (Adaptive Capacity)					ክእለት ለዋጣይነት (Transformative Capacity)					ማእኸላይ ውጽኢት
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
ምዕባለ ቅልጡፍ ስርዓተ ትምህርቲ																
ምብዛሕ መማረጽታት ከይዲ ምምሃር ምስትምሃር																
ትኩር ኣብ ክእለት እተመርኩሰ ትምህርቲ																
ተምሃራይ መሰረት ዝገበረ ስርዓት ተፍታሽን ገምጋምን ምምሃር																
ምፍጣር ውሑስ ኣከባቢ ትምህርቲ																
ትምህርቲ ክእለት ህይወትን ሕጉስነትን																
ኩለመዳይ ስርዓት ደገፍ መሰል ትምህርቲ ህጻናት																
ማእኸላይ ውጽኢት																

2. ነዘም ኣብ ታሕቲ ዝቐረቡ ጸገማት/ቅልውላዎት ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ትምህርቲ ትግራይ ብኸመይ መፍትሕታት ክኾኑ ከምዝኽእሉ ኣብቲ ዝተውሃበ ክፍቲ ቦታ ብዝርዝር ግለጽ/ዲ።

<b>ጸገማት/ቅልውላዎት ተጻወርቲ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር</b>	<b>ዝርዝር መግለጺ</b>
ምዕባለ ቅልጡፍ ስርዓተ ትምህርቲ	
ምብዛሕ መማረጽታት ከይዲ ምምሃር ምስትምሃር	
ትኩር ኣብ ክእለት እተመርኩሰ ትምህርቲ	
ተምሃራይ መሰረት ዝገበረ ስርዓት ተፍታሽን ገምጋምን ምምሃር	
ምፍጠር ውሑስ ኣከባቢ ትምህርቲ	
ትምህርቲ ክእለት ህይወትን ሕጉስነትን	
ኩለመዳይ ስርዓት ደገፍ መሰል ትምህርቲ ህጻናት	

3. ብስንኪ ኩናት ይኹን ኻልእ ሓደጋ ኣብ ልዕሊ ከይዲ ምምሃር ምስትምሃር ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ንዝበጸሉ ሳዕቤናት ተጻወርቲ ክኾኑ ዝኽእሉ ስትራቴጂታት ከይዲ ምምሃር ምስትምሃር ብዝርዝር ግለጽ/ዲ።
4. ብስንኪ ኩናት ይኹን ኻልእ ሓደጋ ኣብ ልዕሊ ተምሃሮ ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ንዝበጸሉ ሳዕቤናት ተጻወርቲ ክኾኑ ዝኽእሉ ስትራቴጂታት ብዝርዝር ግለጽ/ዲ።

**ሓምሻይ ክፋል፡ ጉጅለ ምይይጥ**

1. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ዘስዓቦም ሳዕቤናት ብምዝታይ ኩሎም ተሳተፍቲ ዝተስማዕሙሎም ዝርዝር ሳዕቤናት ብጽሑፍ ሓዘ።
2. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ንዘስዓቦም ሳዕቤናት ህጹጽ ምላሽን ሕውየትን ክገብሩ ዝኽእሉ ስትራቴጂታት ብምዝታይ ኩሎም ተሳተፍቲ ዝተስማዕሙሎም ዝርዝር ሳዕቤናት ብጽሑፍ ሓዘ።
3. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ንዘስዓቦም ሳዕቤናት ተጻወርቲ ክኾኑ ዝኽእሉ ስትራቴጂታት ብምዝታይ ኩሎም ተሳተፍቲ ዝተስማዕሙሎም ዝርዝር ሳዕቤናት ብጽሑፍ ሓዘ።
4. ነዚ መጽናዕቲ ክሕግዙ ይኽእሉ እዮም ዝተብሃሉ ተወሳኺቲ ሓሳባት ካብ ኩሎም ተሳተፍቲ ብምድማጽ ብጽሑፍ ሓዘ።

**ሻድሻይ ክፋል: መረዳኦታታት ትዕዝብትን ዶኩመንታትን**

5. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ዘስዓቦም ሳዕቤናት ዝገልጽ ዝኹን ይኹን ሰነድ ከም መዛግብቲ፣ ስእልታትን ቪድዮታትን ከም መረዳኦታ ሓዘ/ዚ ። ኣብቲ መጽናዕቲ እትገብረሉ ቦታ ንዝረኣኹዎ ዝኹን ይኹን ትዕዝብቲ ጽሒፍካ ፣ ስእሊ ስኢልኻን ቪድዮ ቐሪጽካን ሓዘ/ዚ።
6. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ንዘስዓቦም ሳዕቤናት ህጹጽ ምላሽን ሕውዮትን ክገብሩ ዝኸእሉ ስትራተጅታት ዝሓዘ ዝኹን ይኹን ሰነድ ከም መዛግብቲ፣ ስእልታትን ቪድዮታትን ከም መረዳኦታ ሓዘ/ዚ ። ኣብቲ መጽናዕቲ እትገብረሉ ቦታ ንዝረኣኹዎ ዝኹን ይኹን ትዕዝብቲ ጽሒፍካ ፣ ስእሊ ስኢልኻን ቪድዮ ቐሪጽካን ሓዘ/ዚ።
7. ኩናት ትግራይ ኣብ ተምሃሮን ከይዲ ምምሃር ምስትምሃርን ቀዳማይ ብርኪ ኣብያተ ትምህርቲ ትግራይ ንዘስዓቦም ሳዕቤናት ተጻወርቲ ክኾኑ ዝኸእሉ ስትራተጅታት ዝሓዘ ዝኹን ይኹን ሰነድ ከም መዛግብቲ፣ ስእልታትን ቪድዮታትን ከም መረዳኦታ ሓዘ/ዚ ። ኣብቲ መጽናዕቲ እትገብረሉ ቦታ ንዝረኣኹዎ ዝኹን ይኹን ትዕዝብቲ ጽሒፍካ ፣ ስእሊ ስኢልኻን ቪድዮ ቐሪጽካን ሓዘ/ዚ።
8. ነዚ መጽናዕቲ ክሕግዙ ይኸእሉ እዮም ዝተብሃሉ ጽሑፋት፣ ስእልታት፣ ቪድዮታትን ኻልኣትን ሓዚ/ዝ።

Annex 4: Mekelle University Ethical Clearance

**መቐለ ዩኒቨርሲቲ**  
**MEKELLE UNIVERSITY**  
Department of Educational Planning and Management  
የትምህርት አቅድና ስራ-አመራር ትምህርት ክፍል

ቁጥር/Ref. No: EdPM/0017/2023  
ቀን/Date 09/05/2016


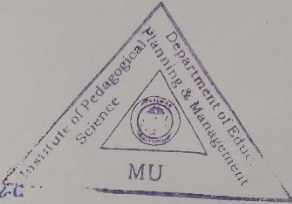
**ስሜሙ/ስም-ሁሉ**

ጉዳይ:- የድጋፍ ደብዳቤ መስጠት ነይመስታል

ተማሪ ሙሉ ስም ገዛክ አበሬ በመቐለ ዩኒቨርሲቲ በስነ ትምህርት ሳይንስ ተቋም ስር የሶስተኛ ዲግሪ ትምህርታቸው ላለፉት ስራ ትምህርት ስነ-ምግባር ቅጽተው ዛፀኑ ስለት የመመሪያ ማሟያ ሰነድ (PhD Dissertation) ለፈተው የሚያቀርቡ ስለሆነ ጥናታቸው ለማህዳድ የሚያስችላቸው በቂ ገዢ የሚያስፈልጋቸው ዘመዎች በጥናቱ ዘርፍ የሚያስፈልጋቸው መረጃ ለማስገኘት ይህን ደብዳቤ ለማስገኘት ተቀብሮ እየወጣቸው ለሚደረገላቸው ነብረት ሁሉ ስለቀደሙ ነገሮች ናቸው።

ክለሳምታ ዘር

መገራት ሃፍቱ በርሀ  
የትምህርት አቅድና ስራ አመራር  
ትምህርት ክፍል ሃላፊ  
Mebrat Haftu Berhe  
Head Department of Educational  
Planning and Management

  
  
MU

TEL: 251-344-410965 | Cell Phone: +251 0913663694 Fax: (034)440-9304/40 1090 | P.o. Box: 231 | Email: [director@mu.edu.et](mailto:director@mu.edu.et)  
Web: [www.mu.edu.et/ips](http://www.mu.edu.et/ips) | Mekelle, Ethiopia

"Quality is our priority! We Really Care".

# Annex 5: Study Areas Ethical Clearance

(Sample)

