Resilience of Communities in Sagaing Region, Myanmar: A Comparative Study of the Impacts of Civil War and Cyclone Mocha

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ABSTRACT

Myanmar's Sagaing Region has faced both the devastating effects of the ongoing civil conflict and the destruction caused by Cyclone Mocha, creating a unique context for studying resilience in dual-crisis scenarios. This study investigates the severity of damage caused by both the civil war and the cyclone, assesses resilience levels, and explores the relationship between damage and recovery outcomes among affected communities in seven villages in Yinmarbin and Salingyi Townships. Data were collected remotely via surveys administered by local intermediaries due to security concerns, ensuring participant safety and data integrity. The study found that the civil war caused more significant property damage, particularly through airstrikes and military burnings, affecting homes, infrastructure, and livelihoods. In contrast, Cyclone Mocha, while devastating in agricultural areas, had a less widespread impact on residential and infrastructural properties. The resilience scores of respondents reflected a lower recovery capacity during the civil war, with more than 50% of participants reporting very low resilience, particularly in the areas of food access, education continuity, and income generation. After Cyclone Mocha, a higher percentage of respondents reported moderate to good resilience, indicating more effective recovery. The study highlights the compounded difficulties faced by communities, including safety concerns, housing destruction, and access to basic services such as food, medicine, and education. The findings emphasize the need for victim-centered, holistic approaches to disaster preparedness and recovery that address both the immediate and long-term challenges faced by communities living in dual-crisis environments.

Keywords: Civil war, Cyclone Mocha, Resilience scores, Damage levels, Adverse factor

INTRODUCTION

Myanmar is highly susceptible to both climate-induced natural disasters and political instability, making it one of Southeast Asia's most vulnerable nations. According to the Long-Term Climate Risk Index (Eckstein et al., 2021), Myanmar ranked among the top three countries most affected by extreme weather events over the past two decades. Cyclones, floods, and landslides have repeatedly disrupted livelihoods and damaged critical infrastructure. Cyclone Nargis in 2008, for instance, claimed over 138,000 lives and caused widespread devastation (Bankoff, 2019). More recently, Cyclone Mocha in May 2023 led to significant losses in Rakhine and Sagaing Regions.

In parallel, Myanmar's prolonged civil conflicts, particularly since the military coup in February 2021, have intensified internal displacement and human suffering. Over 1.6 million people have been displaced due to conflict-related violence, with widespread property destruction and socioeconomic disruption (Skidmore & Ware, 2023). The Sagaing Region has been a hotspot for both armed conflict and natural disasters, exacerbating vulnerabilities among already struggling communities.

While existing literature highlights the individual impacts of either conflict or natural disasters, there is limited research comparing resilience outcomes across these dual crises. Resilience, defined as the capacity to recover from adverse conditions, is influenced by the severity of damage, access to resources, and social support (Folke et al., 2010). Understanding the interplay between damage levels and resilience is critical for designing holistic recovery strategies that address both human and infrastructural needs.

This study aims to investigate the adverse factors faced by communities affected by the civil war and cyclone Mocha in Sagaing Region. Specifically, it compares damage severity, assesses resilience scores, and explores the relationship between these variables. The findings provide actionable insights for post-conflict reconstruction and disaster preparedness, emphasizing victim-centered approaches to enhance long-term resilience.

MATERIALS AND METHODS

Study Area

The study was conducted in seven villages located in Yinmarbin and Salingyi Townships, Sagaing Region, Myanmar. These areas have been heavily affected by both ongoing armed conflict since 2021 and the destructive impact of Cyclone Mocha in May 2023. The region's socio-political instability and frequent natural disasters make it a critical site for studying resilience in dual-crisis contexts.

Data Collection

Due to security concerns, direct access to the study sites was not feasible. Data collection was conducted through local intermediaries who were trained to administer surveys remotely. Communication took place via phone and online platforms to ensure participant safety and data reliability. Ethical guidelines were strictly followed, including obtaining informed consent, ensuring voluntary participation, and maintaining respondent confidentiality.

Questionnaire Design

The questionnaire was carefully designed to collect information in four main sections. The first section focused on the respondents' personal and household characteristics, including their age, education, occupation, and income levels. The second section addressed the effects of the political unrest, including the respondents' experiences of displacement, violence (such as airstrikes or invasions), and damage to key sectors such as education, healthcare, employment, and transportation. This section also explored the psychological impact of the unrest, such as feelings of fear or stress, and the challenges respondents faced in the aftermath of the conflict in their region. The third section focused on Cyclone Mocha, detailing the destruction caused by the cyclone, including damage to homes, schools, and transportation systems. It also covered the challenges respondents encountered after the disaster, such as rebuilding their livelihoods and coping with disruptions to education and healthcare. The final section of the questionnaire examined how respondents are addressing and coping with the challenges caused by both the cyclone and political unrest, as well as their priorities for rehabilitation, including measures to prevent future displacement caused by conflict or natural disasters.

Data Analysis

Descriptive statistics were used to summarize sociodemographic data and assess the severity of damage in the study areas. This approach provided an overview of the key characteristics of the respondents, such as age, education, income, occupation, and the extent of damage they experienced due to both conflict and natural disasters.

To analyze the relationship between damage severity and resilience, a linear regression model was employed:

$$y=\beta 0+\beta 1x$$

Where:

y represents the resilience score (dependent variable),

x represents the level of damage (independent variable),

β_0 is the intercept, and

β_1 is the coefficient associated with damage.

Statistical significance was determined at $p<0.05$, which allowed for evaluating how different levels of damage affected resilience outcomes in the affected households.

The regression model considered several key factors that could influence the relationship between damage and resilience. These include the severity of the conflict, which was measured by the frequency of violent events such as airstrikes and forced displacements. The model also took into account the severity of the disaster, specifically the damage caused by Cyclone Mocha, including the destruction of homes, loss of livelihoods, and the disruption of critical infrastructure. Additionally, demographic characteristics such as age, education, income, and occupation were considered, as these factors may affect individuals' ability to recover from the damage. Lastly, the psychological impact of the conflict and disaster, including stress, trauma, and other emotional effects, was integrated into the analysis to better understand its role in shaping resilience outcomes.

By applying the regression model, the analysis provides insights into how these factors interact to influence the severity of damage and resilience in the communities affected by both the civil conflict and Cyclone Mocha. This understanding can help identify key areas for intervention, offering guidance on how communities can better prepare for and recover from such events in the future.

Ethical standards were adhered to throughout the research process. Participation in the survey was voluntary, and respondents were fully informed about the purpose of the study. Despite the challenges posed by the volatile security situation in the survey areas, which limited access and introduced potential biases, the research team implemented strategies to ensure the validity and reliability of the data. This ensured that the study provides meaningful insights into the resilience of communities facing the compounded impacts of conflict and natural disasters.

RESULTS AND DISCUSSION

Sociodemographic Characteristics

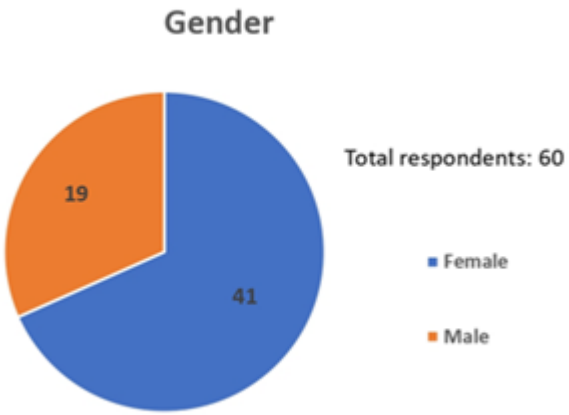


Fig.1 Household respondents by gender

The gender distribution of household respondents in the study was shown in Figure 1. Our study sample consisted of 68% female respondents and only 32% male respondents, representing a substantial shift from national census. In comparison to the 2014 Myanmar Population and Housing Census (MPHC), which reported 47.3% male and 52.7% female in the Sagaing region, the gender ratio in our study significantly differed. This discrepancy is likely attributed to the ongoing civil conflict, with many men serving on the frontlines and therefore unable to participate in the survey.

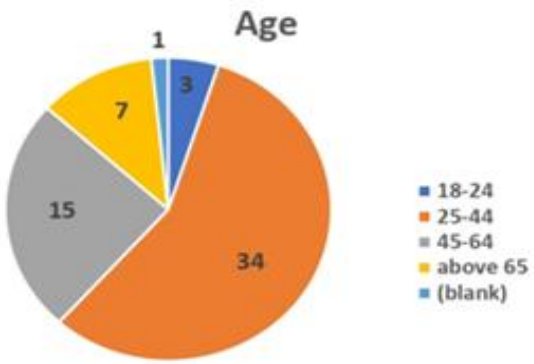


Fig.2 Household respondents by age

The age groups in this study were classified into four categories: 18-24 years, 25-44 years, 45-64 years, and 65 years and above (Figure 2,). In comparison to the 2014 census, where the largest share (57%) fell within the working-age group (25-44 years), the current study found that the 25-44 age group made up the highest percentage (57%), followed by the 45-64 age group at 25%. The proportion of older individuals (65+) was relatively low, at just

5%. This suggests that the majority of respondents were of working age, a key indicator of the region's economic prospects even amidst the ongoing civil war.

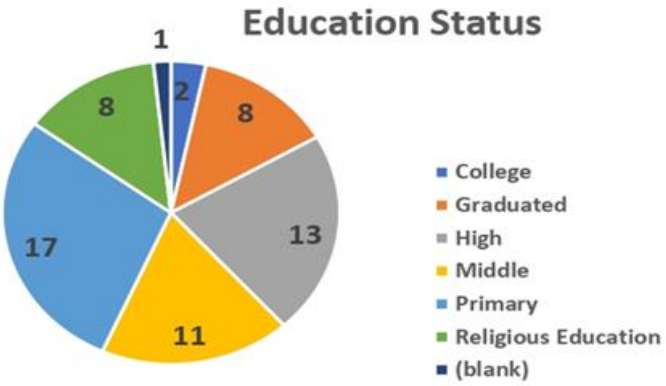


Fig 3. Household respondents by education status

Regarding the educational background of respondents, among the 60 respondents, only 2 had attended college, and 8 were university graduates (Figure 3). The majority, 17 respondents, had completed primary education, while 13 respondents had completed high school, 11 had middle school education, and 8 had religious education. This distribution reflects the educational challenges faced by the population, exacerbated by the ongoing conflict.

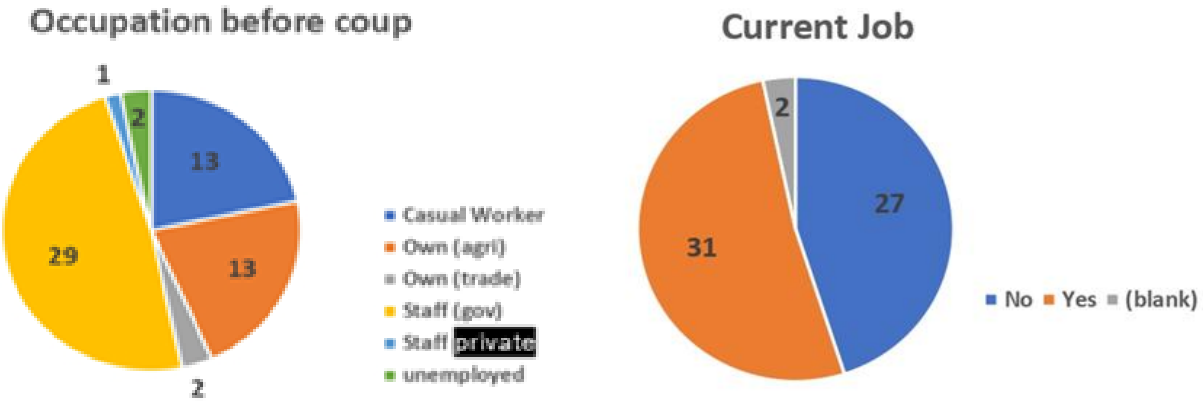


Fig 4. Household respondent by Occupation Status Current occupation status

Nearly half of the respondents (29 individuals) were employed as government staff (Figure 4). In contrast, only 2 respondents were involved in trade, with the remainder working in casual labor or private farming businesses. The study also found that 45% (27 respondents) were unemployed, indicating a significant proportion of the population lacked personal income for survival. This highlights the challenges faced by households in securing a stable livelihood during the conflict.

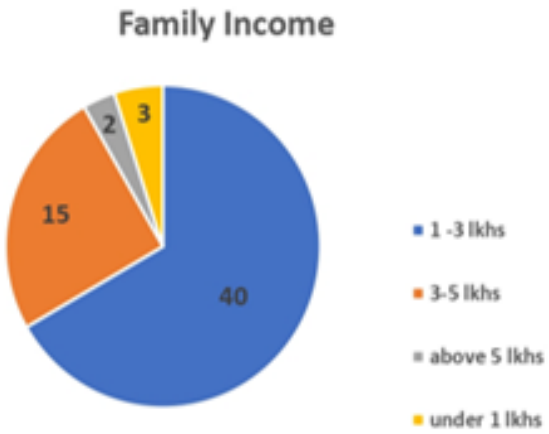


Fig.5 Household respondent by Family Income

The respondents' family income was categorized into four groups (Figure 5): under 1 lakh, 1-3 lakh, 3-5 lakh, and above 5 lakh. The majority of respondents (67%) fell into the 1-3 lakh income bracket, while 25% were in the 3-5 lakh range. The remaining 8% were split between the under 1 lakh and above 5 lakh categories, with 3% and 5% of respondents respectively. This suggests that the majority of households live with modest incomes, which may affect their resilience during crises.

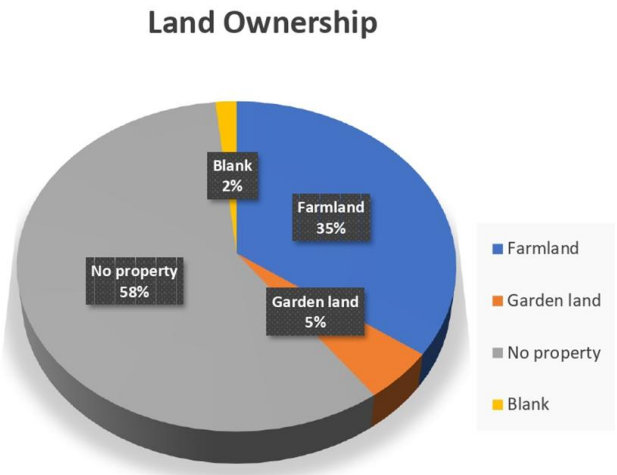


Fig. 6 Household respondent by Land Ownership

The land ownership status of respondents before the coup was presented in Figure 6. It was found that 58% did not own land, while 35% owned farmland, and only 5% owned

garden land. This aligns with the occupation status, where nearly half of the respondents were government staff who typically do not own land, highlighting a reliance on non-agricultural livelihoods.

Comparison of Property Damage Caused by Civil War and Cyclone Mocha

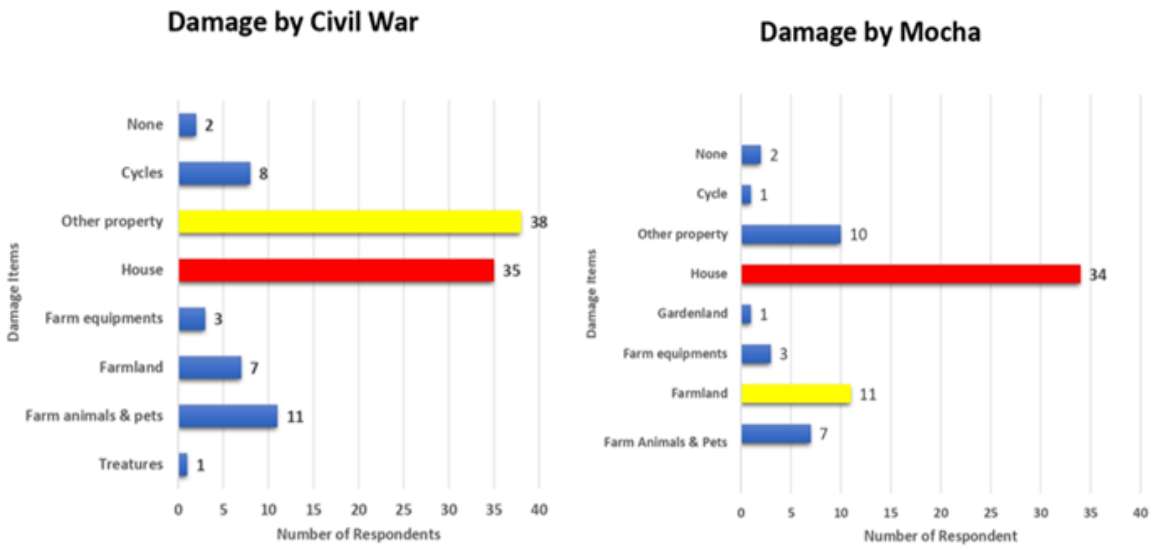
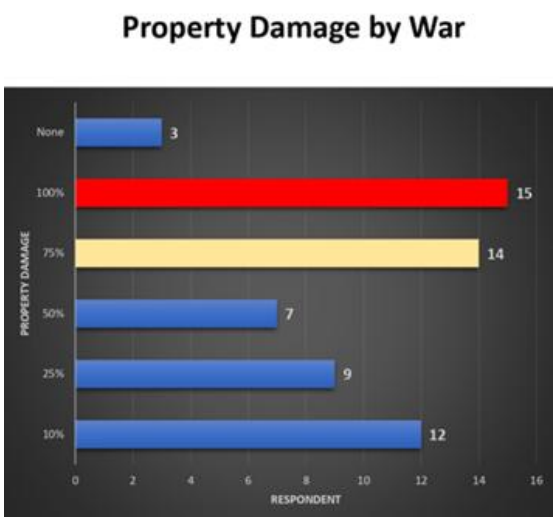


Fig 7. Property Damage Items caused by Civil War Fig 8 Property Damage Items by Mocha Cyclone

The damage of property items caused by the civil war and Cyclone Mocha was compared in Figure 7 and 8. The findings indicate that the civil war caused more significant property damage, particularly in terms of housing and other properties. The impact of airstrikes and military burnings led to extensive damage. Although the damage from Cyclone Mocha was severe, particularly in agricultural areas, it was less destructive overall compared to the civil war. The cyclone's impact on farmland was more pronounced, affecting a larger number of properties than the war.

In addition, the extent of property damage during the civil war and Cyclone Mocha was presented in Figure 9 and 10. Over 48% of respondents reported total property damage due to the civil war, while only 10% experienced total property damage due to the cyclone. The results indicate that the civil war had a more devastating effect on households, with 35% of respondents losing less than 50% of their property in the cyclone. These figures suggest that while the cyclone caused significant damage, its impact was less severe compared to the civil war.



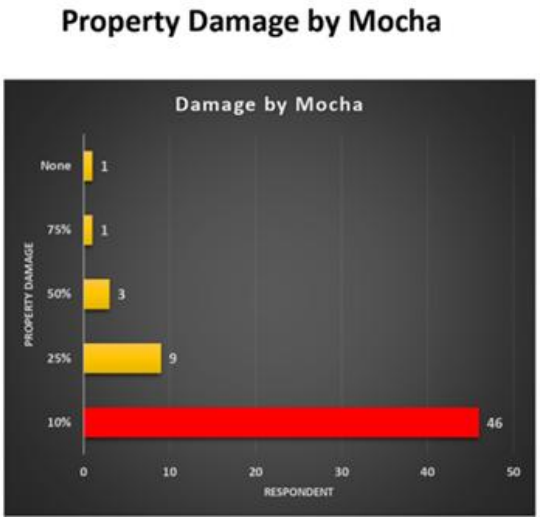


Fig 9 Property Damage by War (%)

Fig.10 Property Damage by Mocha (%)

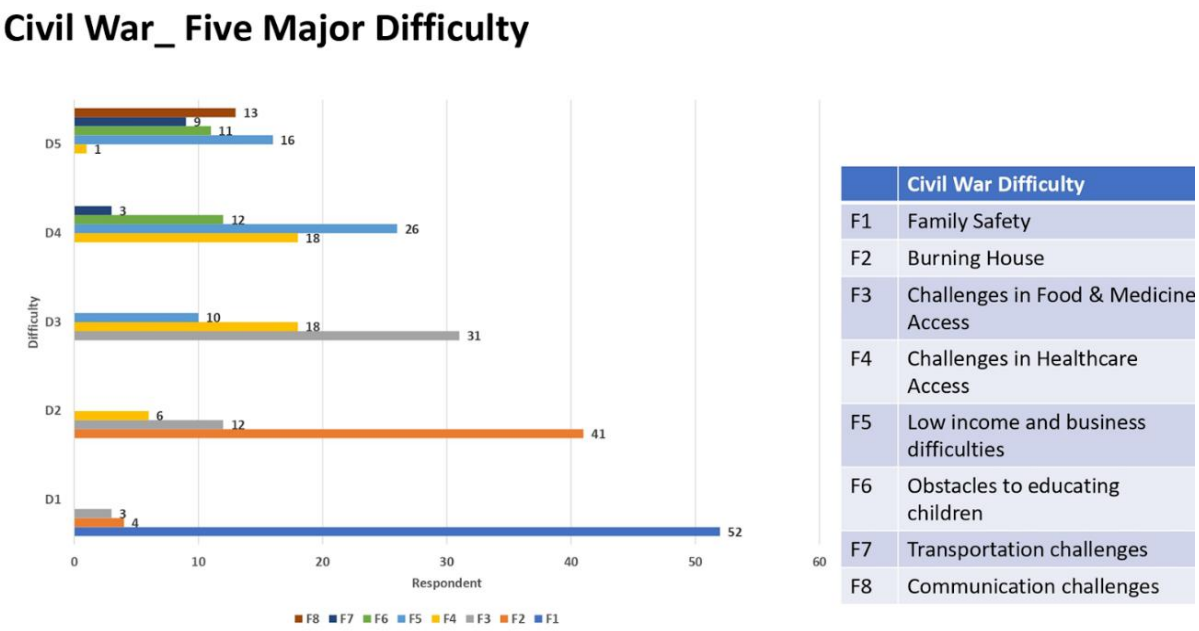
Major Difficulties of Civil War and Mocha Cyclone

The major difficulties faced by respondents due to the civil war and Cyclone Mocha were listed in Table 3. Respondents identified concerns for family safety as the most significant difficulty during both crises, followed by house burnings and challenges in accessing food and medicine. Low income and business difficulties were also prominent, especially in the civil war context, while communication challenges were less critical for the majority of respondents.

Table.3 Major difficulties of civil war and mocha cyclone

No.	Civil War Difficulty	Mocha Cyclone Difficulty
F1	Concerns for Family safety	Concerns for Family safety
F2	Burning house	Anxiety over clean water & disease
F3	Challenges in Food & Medicine access	Challenges in Food & Medicine access
F4	Challenges in health care access	Challenges in business & earnings
F5	Low income & business difficulty	Concerns for property and farm
F6	Obstacles to children education	Obstacles to children education
F7	Transportation challenges	Transportation challenges
F8	Communication challenges	Communication challenges

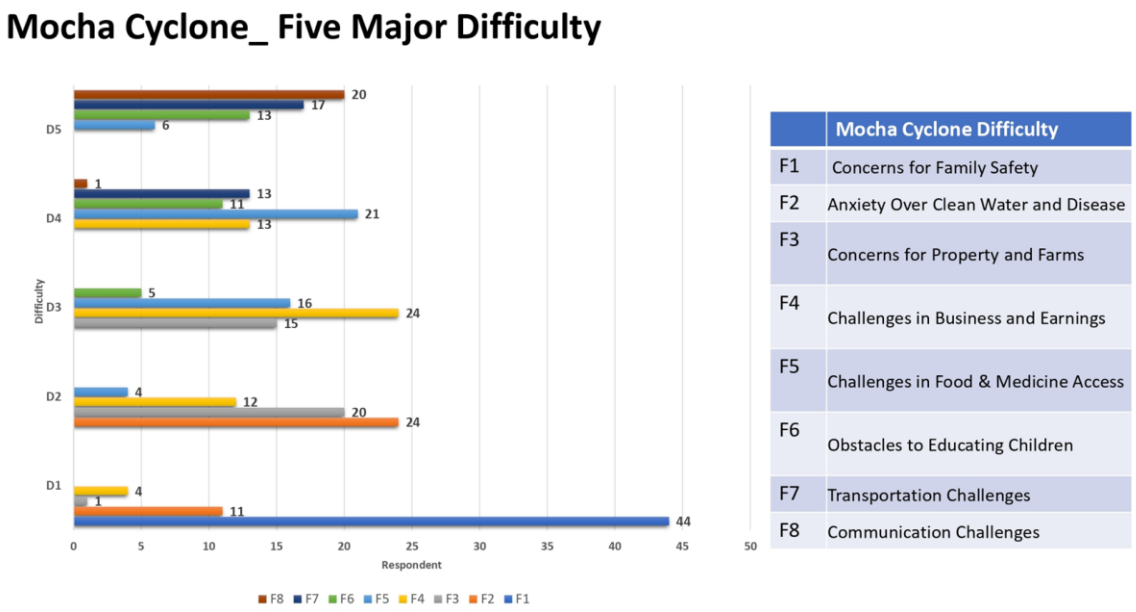
In the civil war, the greatest difficulty was concerns for family safety, followed by burning houses and food/medicine access challenges (Figure 13). Low income and business difficulties were also significant, while communication challenges were less prioritized.



	Civil War Difficulty
F1	Family Safety
F2	Burning House
F3	Challenges in Food & Medicine Access
F4	Challenges in Healthcare Access
F5	Low income and business difficulties
F6	Obstacles to educating children
F7	Transportation challenges
F8	Communication challenges

Fig 13 Major Difficulty affected by War

Five levels were classified as D1 to D5 (from the most to least) about the difficulty of civil war and mocha cyclone. According to the choice of respondents explained in Fig.13 , the largest number of respondents had concern about family safety as the most difficult (D1) while burning houses and challenges in food and medicine access were chosen by the second and third largest number of respondents as the most difficult levels (D2 & D3). In difficulty level(D4), low income and business difficulties were selected by a larger number of respondents. The number of choices by respondents were not significantly different for low income & business difficulties and communication challenges in the least difficult level (D5). Compared with these five major difficulties (family safety, burning house, challenges in food & medicine access, low income & business difficulty, communication challenges), the remaining difficulties were not selected by a large number of respondents for five major difficulties of civil war.



	Mocha Cyclone Difficulty
F1	Concerns for Family Safety
F2	Anxiety Over Clean Water and Disease
F3	Concerns for Property and Farms
F4	Challenges in Business and Earnings
F5	Challenges in Food & Medicine Access
F6	Obstacles to Educating Children
F7	Transportation Challenges
F8	Communication Challenges

Fig 14 Major Difficulty affected by Mocha

For Cyclone Mocha, respondents prioritized concerns for family safety, followed by anxiety over clean water and disease, as well as challenges in business and earnings. Communication challenges were again the least significant difficulty.

In regard to mocha cyclone difficulty which was explained in the following Figure 14. The large number of respondents selected the concerns for family safety as the most difficulty (D1) while anxiety over clean water & disease and Challenges in business & earnings were chosen by the same number of respondents in each difficulty level D2 and D3 but challenges in food & medicine access were selected the most in difficult level D4. Communication challenges were chosen as the least difficult level D5. Among the eight listed difficulties, concerns for property & farms, obstacles to educating children and transportation challenges were not selected as the most difficult, so it can be assumed that mocha victims did not have a serious impact on infrastructure and children ‘education.

Resilience Against the Damage From Civil War and Cyclone Mocha

The resilience scores of respondents based on their livelihood conditions during and after the civil war and Cyclone Mocha are shown in Figures 11 and 12. The respondents evaluated eight livelihood conditions during the civil war, and over 50% of them reported very low resilience scores (Table 1). Only 25% (15 respondents) achieved moderate resilience scores. After the war, nearly 32% of respondents maintained moderate scores, while only 20% reached high resilience scores. No respondents achieved high resilience scores during the war.

Table.1 The livelihood conditions during and after civil war

No.	During Civil War	After Civil War
1	Gain from farming	Gain from farming
2	Ability to sell crops	Ability to sell crops
3	Food & Medicine Purchases	Food & Medicine Purchases
4	Price trends	Price trends
5	Access to Medicine Care	Access to Medicine Care
6	Children's Education Continuity	Children's Education Continuity
7	Access to phone and internet	Access to phone and internet
8	Condition of Transportation	Condition of Transportation

Regarding the Cyclone Mocha, 70% of respondents reported low resilience scores (Table 2), while 27% reached moderate scores. After the cyclone, 30% of respondents showed moderate resilience, and 55% achieved good resilience scores, indicating better recovery conditions in the post-cyclone period compared to during the civil war.

Table.2 The livelihood conditions during and after mocha cyclone

No.	During Mocha Cyclone	After Mocha Cyclone
1	Planted crops during mocha	Able to replant crops after mocha
2	Damage crops by flooding	Ability to sell crops
3	Receive local support	Receive local support
4	Able to live at home	Able to live at home
5	Access to phone and internet	Access to phone and internet
6	_	Food & Medicine Purchases
7	_	Condition of Transportation

Relationship Between Property Damage and the Resilience Scores

The results, shown in Figure 15, reveal a significantly negative correlation between the percentage of property damage and resilience scores. Specifically, the greater the property damage, the lower the resilience scores of victims. This indicates that property damage during the civil war had a direct and negative impact on the ability of respondents to recover and maintain resilience.

Despite the relatively small sample size (55 valid responses), the regression model showed statistically significant results with an R-square value indicating a reasonable fit, and a p-

value less than 0.005 confirming the significance of the findings. These results suggest that even a small increase in property damage leads to a considerable decrease in resilience scores, underscoring the critical role that property loss plays in shaping the recovery of individuals in conflict-affected regions.

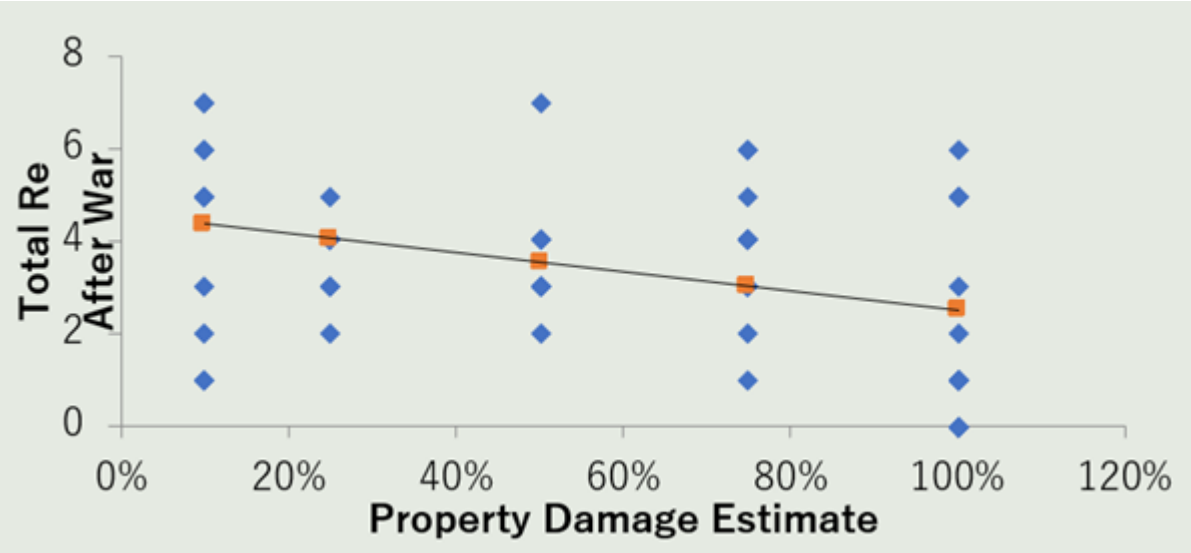


Fig.15 Liner Regression Analysis

Although the collected sample was 60, the answers of three respondents were not valid to use in this analysis and two respondents gave no response so the number of included observations was 55. In this analysis, the value of R Square showed that the variation of the resilience scores of victims can be explained by the percentage of property damage even though this regression model was not a better fit but it can be considered as a reasonable of collected data. However, less than 0.005 p-value explains that the results are highly statistically significant. Therefore, 1 percent increase to property damage of 2.1 will relatively decrease to nearly 2.5 resilience scores of victims.

GENERAL DISCUSSION

The compounded crises of civil conflict and natural disasters have profoundly impacted the communities in Myanmar's Sagaing Region. Recent data from the United Nations High Commissioner for Refugees (UNHCR) indicates that as of January 2025, there are approximately 3.5 million internally displaced persons (IDPs) in Myanmar, with significant concentrations in the Southeast and Rakhine State (UNHCR, . This widespread displacement exacerbates the vulnerabilities of affected populations, particularly in terms of access to essential services and livelihood opportunities.
The destruction of homes and infrastructure due to both civil conflict and natural disasters has led to significant challenges in shelter and basic services. The UN Office for the Coordination of Humanitarian Affairs (UNOCHA) reports that nearly 150,000 individuals

have been affected by recent floods and landslides, resulting in the destruction of homes, utilities, and farmland (AP news, 2024). This has created urgent needs for essentials such as water, food, and medicine.

The resilience scores observed in the study reflect the communities' capacity to cope with these adversities. The lower resilience during the civil war period, with over 50% of respondents reporting very low resilience, underscores the profound impact of conflict on community stability and individual well-being. In contrast, the post-cyclone period saw a relative improvement in resilience scores, with 55% of respondents achieving good resilience. This suggests that while natural disasters pose significant challenges, the presence of organized recovery efforts and external support can facilitate more effective community recovery.

The primary difficulties identified by respondents, including concerns for family safety, destruction of homes, and lack of access to essential services such as healthcare and food, highlight the multifaceted nature of the crises. These challenges are compounded by socioeconomic factors such as low levels of formal education and high unemployment rates, which further impede recovery efforts. The lack of land ownership, especially in areas with significant displacement, adds an additional layer of complexity to the recovery process, as many families depend on agricultural livelihoods that have been disrupted by both conflict and natural disasters.

The international community's response has been inadequate in addressing the escalating crisis. While some countries have reduced weapons transfers to Myanmar's military junta, others continue to provide support, exacerbating the situation. Human rights advocates and affected populations are appealing for increased international assistance and intervention to alleviate suffering and uphold human rights (Le Monde, 2024). Overall, the compounded impacts of civil conflict and natural disasters in Myanmar's Sagaing Region have led to significant challenges in terms of displacement, destruction of property, and access to essential services. The resilience of affected communities is influenced by a range of factors, including the nature of the crisis, the availability of external support, and underlying socioeconomic conditions. Addressing these challenges requires a comprehensive approach that integrates immediate relief efforts with long-term strategies aimed at rebuilding livelihoods, restoring essential services, and strengthening community resilience.

CONCLUSION

This study highlights the severe compounded impacts of the civil war and Cyclone Mocha on the communities in Sagaing Region, Myanmar. The findings underscore the need for more nuanced resilience strategies that account for both conflict and natural disaster contexts. Recovery efforts must prioritize the restoration of livelihoods, with a particular focus on rebuilding homes, improving access to education, healthcare, and income-generating opportunities. Given the overwhelming challenges faced by the population, effective post-crisis recovery must go beyond infrastructure rebuilding and address the psychological trauma and displacement that have long-term effects on resilience.

Furthermore, the study calls for greater attention to the role of external assistance, as communities that received support showed better recovery outcomes. In particular, humanitarian aid, government intervention, and international partnerships can significantly contribute to improving resilience scores, especially in conflict zones.

The disparities in education, occupation, and income underscore the importance of integrating economic development and educational programs into post-crisis recovery plans. The restoration of access to essential services, such as healthcare and education, is critical for rebuilding the social fabric of affected communities.

Lastly, this research emphasizes the importance of understanding the interlinkages between conflict and natural disaster impacts. Policymakers and humanitarian agencies must design interventions that are tailored to the unique challenges of dual-crisis environments. This study provides valuable insights into the specific needs of affected communities and offers guidance for future disaster preparedness and conflict recovery strategies.

REFERENCES

- Bankoff, G., 2019. Remaking the world in our own image: Vulnerability, resilience and adaptation as historical discourses. Disasters 43, 221–239.
- Black, R., Adger, W.N., Arnell, N.W., Dercon, S., Geddes, A., Thomas, D., 2011. The effect of environmental change on human migration. Glob. Environ. Change 21, S3–S11.Bank, W., 2024. Extremely Severe Cyclonic Storm Mocha, May 2023, Myanmar: Global Rapid Post-Disaster Damage Estimation (GRADE) Report.
- Eckstein, D., Künzel, V., Schäfer, L., 2021. The global climate risk index 2021. Bonn: Germanwatch.
- Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Chapin, T., Rockström, J., 2010. Resilience thinking: integrating resilience, adaptability and transformability. Ecology and society 15.
- Guy J. Abela et al.,2019. Climate, Conflict and Forced Migration: Global Environmental Change 54 (2019) 239–249.
- Kate Burrows et al.,2016. Exploring Climate change, Migration and Conflict Nexus: International journal of Environmental Research and Public Health.
- Kelley, C.P., Mohtadi, S., Cane, M.A., Seager, R., Kushnir, Y., 2015. Climate change in the Fertile Crescent and implications of the recent Syrian drought. Proc. Natl. Acad. Sci. 112, 3241–3246.
- Skidmore, M., Ware, A., 2023. After the Coup: Myanmar's Political and Humanitarian Crises. ANU Press.

Websites

- AP news (2024). https://apnews.com/article/myanmar-flood-relief-un-typhoon-monsoon-8a7efb83bedb5f178d3a01ce5416385e accessed on 31 January 2025.
- Global Conflict Tracker (2025). https://www.cfr.org/global-conflict-tracker/conflict/rohingya-crisis-myanmar accessed on 31 January 2025.
- Le Monde (2024). https://www.lemonde.fr/en/opinion/article/2024/10/16/cate-blanchett-and-filippo-grandi-without-a-nationality-you-live-in-fear-of-abuse-arrest-detention-and-even-expulsion-from-the-country-you-call-home_6729533_23.html?utm_source=chatgpt.com accessed on 31 January 2025.
- UNHCR. https://www.unhcr.org/countries/myanmar accessed on 31 January 2025.

CONFLICT OF INTEREST STATEMENT

The authors from our group declare no conflict of interest.