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Impact of Conflict and Displacement on Food Security in Rural Area of District North Waziristan, Khyber Pakhtunkhwa

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ABSTRACT

This study was to investigate the impact of conflict and displacement on household food security in rural areas, of district North Waziristan, Khyber Pakhtunkhwa. For this purpose, a total of 128 sample households were selected through a multistage sampling technique, and primary data were collected using interviews schedule method and questionnaires. Data were analyzed using descriptive statistics (percentage and graphs), Food Security Index (FSI), and a binary logit regression model. The study results indicated that most sampled household heads were middle-aged (41–50 years), with high (43%) illiteracy rates and large family sizes, alongside predominantly low incomes. The overall Food Security Index (FSI) was (0.70), representing moderate food security, but with unfavorably low food availability (0.09) due to interrupted agriculture production and supply chains. The results of binary logit model indicated the co-efficient and significant values of independent variables such as age of the respondents ($\beta = 0.150$, $p = 0.006$), family size ($\beta = 0.353$, $p = 0.008$), and losses of market infrastructure ($\beta = 2.854$, $p = 0.056$) had positively and significantly increased vulnerability to food insecurity in the study area while, respondents education ($\beta = -0.211$, $p = 0.010$), food received from aid organization ($\beta = -2.121$, $p = 0.039$), and involvements in non-farm activities ($\beta = -4.298$, $p = 0.003$) had statistical significantly abridged the adverse effects of conflict and displacement on food security. The model overall explained 79% of variation in food security outcomes, emphasizing the strong effect of socio-economic factors. Based on the study findings it is recommended that improving education and infrastructure, restoring livelihoods, and ensuring timely humanitarian support are essential to enhancing resilience in conflict affected rural sites.

Keywords: *Conflict & Displacement, Food Security, Binary logit model, North Waziristan*

INTRODUCTION

Food is an important for human health growth, well-being, and access everyone to it is a basic right. It provides a vital nutrients such as proteins, carbohydrates, and fats, which is necessary for energy and development (Britannica, 2023). Food is not only a renewable resource but also play a dynamic role in our daily life and social interactions, being deeply connected to culture and diversity (Kittler et al. 2011). Conversely, inadequate food can negatively impact health and survival (Schonfeldt et al. 2009). Food security, is defined as consistent access to sufficient, safe, and healthful food that meets nutritional needs and preferences, is a substantial challenge for present and future generations (Premanandh et al. 2011). It has four main components i.e. availability, accessibility, Stability, and utilization (FAO, 2009). The concept of food security emerged from 1974 World Food Summit, which stressed the need for global cooperation to address this issue (Olsen et al., 2021). The Universal Declaration of Human Rights also identifies that food as a fundamental right, with the idea tracing back to the global food crisis of 1972-1974

(Ahmad et al. 2010). Food security includes confirming that everyone can access enough food through various forms of local and large scale production (Ahmad et al. 2007). It has shifted from a global and national focus to addressing household and individual levels, highlighting the need for everyone to have access to enough food for an active and healthy life (Maxwell, 1996; Gentilini et al. 2002). However, food insecurity remains a significant problem in Khyber Pakhtunkhwa, which relies on subsidized imports to meet demand, with varying levels of food security across its districts (Fatima, 2024). Food security is define as four dimensional concept involving availability, access, stability and utilization. Availability refers to the presence of food at the state or regional level, while access pertains to whether households have the physical and financial means to obtain it. Utilization is at the individual level, focusing on how well an individual uses the nutrients in food, and stability needs all the three dimensions; availability, access, and utilization to be consistent over time to confirm food security (FAO, 2009).

The United Nations Agenda 2030 for Sustainable Development in 2015, was supported by 192 countries of worldwide, which comprises 17 Sustainable Development Goals (SDGs) aimed at addressing universal challenges. The sustainable development goal number 2 focuses on eradicating hunger by approving food security, improving nutrition, and promoting sustainable agriculture. Beside these struggles, 8.9% of the worldwide population was malnourished in 2019, with this 1.5 billion people deficient basic nutritional elements, and the adult fatness rates were exceeding by 13% worldwide (FAO, 2020). The SDGs reveals the links between food security, nutrition, rural transformation, and sustainable agriculture, identifying the factors such as climate change, conflicts, and displacement impact on global food systems. These pressures have increased the number of malnourished people from 804 million in 2016 to virtually 821 million in 2017, predominantly affecting the most susceptible populations by reducing their access to food (UN, 2015).

Conflicts and their effect

Conflict is a complex phenomenon that arises from discrepancies rooted in religious, financial, political, and cultural differences (Canary, 2003). It can noticeable at various levels personal, societal, political, and international and usually involves two or more parties with mismatched goals, partial resources, and common interference. These conflicts usually originate from dissimilarities in customs, beliefs, and ideologies, resulting in extensive social interruptions like damaged markets, demolished infrastructure, interrupted transportation systems, and unfavorably food insecurity. In rural area agriculture is the backbone of rural livelihoods, is predominantly susceptible due to conflict. Continuing violence hinders agricultural activities, confines access to land and water, and decreases crop yields, thereby undermining household income and food availability (Wilmot and Hocker, 2017).

As conflicts persevere, the shortage of vital assets like water becomes more severe, compounding the challenges confronted by rural communities who dependent on agriculture for their survival. Conflicts impose severe to physical destruction, such as psychological harm, comprising anxiety, trauma, and long-term

mental health problems (Olanrewaju et al., 2023). In recent years, the intensity and frequency of conflicts have increased worldwide. For instance, conflict incidents increased by 61% in 2013 as compared to the previous year, with various being linked to religious and cultural tensions (Aro, 2013). These rising conflicts have deep insinuations for food security, economic development, and overall human well-being, predominantly in susceptible and agricultural communities.

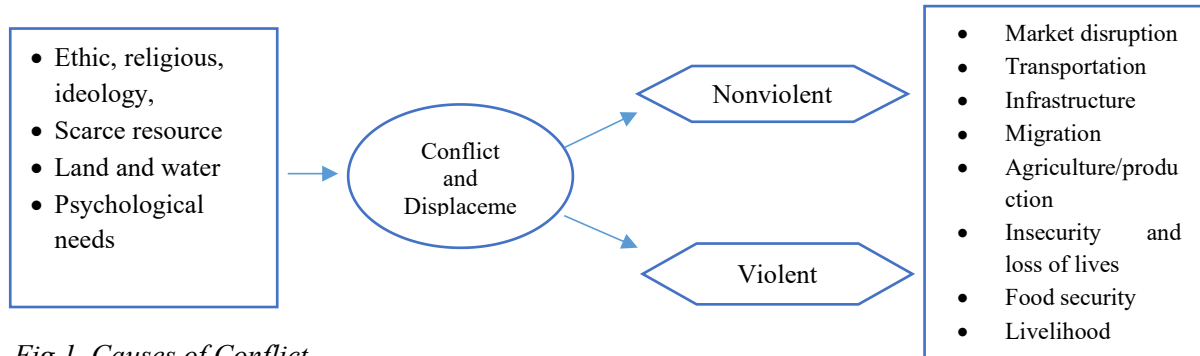


Fig 1. Causes of Conflict

Conflict and its impact on food security

The violent conflict effect on food security is deep and complex, disrupting food supply chains, decreasing agriculture productivity, and rising food prices. Conflicts directly serious damage infrastructures, such as roads, water supply systems, and agricultural lands, leading to long term food insecurity and displacement (Martin-Shields and Stojetz, 2019; Brück et al., 2019). The destruction of agriculture land and movement of populations additional aggravate food crises, as seen in conflict affected regions like Yemen, Afghanistan, and Syria (FAO, 2018). Small scale agriculture, vital for subsistence economies, is particularly susceptible to these distractions, with farmers frequently unable to continue farming due to the lack of seeds, fertilizers, and market access (Bellemare, 2015). The connection among conflict and food insecurity is well-documented, with studies showing that war worsens hunger and poverty, leading to a vicious cycle of worsening conditions (Brück et al., 2019). Conflict related factors, such as the destruction of livelihoods and reduced agricultural efficiency, significantly decline food availability and accessibility, further deepening food insecurity (Marchesi and Rockmore, 2023).

Conflicts and Displacement effects on food security in North Waziristan, Khyber Pakhtunkhwa, Pakistan

The 9/11 attacks had global repercussions, with the conflict eventually shifting to Pakistan, where extremist groups began to rise in North and South Waziristan (Javai, 2020). Despite military operations and peace negotiations, terrorism escalated, particularly in the Ex Federally Administered Tribal Areas (FATA), which faced severe disruption in social services and infrastructure due to military actions (The News, 2012). This region, home to 3.5 million people, mostly poor Pashtun Muslims, became a hotbed for extremism and violence, leading to mass displacement. By 2009, Pakistan experienced a significant increase in armed attacks, with 3.8 million internally displaced persons (IDPs) due to ongoing conflict (Hameed,

2015). These displacements strained regional resources, affecting food security through population and expenditure shocks (Verme et al., 2017; Sarvimäki et al., 2009). The ongoing worldwide trend of internal displacement peaked in 2021, with 59.1 million people displaced globally. This figure expected to rise further due to conflicts like those in Ukraine (Council, 2019). In Bannu district that hosted 800,000 IDPs, the influx led to higher food prices, rise crime rates, and strained local resources. The government struggled to manage the displacement, with various IDPs enduring harsh conditions at food distribution centers, feeling abandoned and stripped of their identities (Rasool and Anwar 2019).

North Waziristan, is one of the poorest district in Khyber Pakhtunkhwa, and mostly people in this region reliant on agriculture for their livelihoods. The ongoing conflict has severely disturbed farming and non-farming activities, resulting in a severe deficiency of food resources for the local inhabitants. The conflict has not only abridged food availability but also led to substantial displacement. Due to continuing conflict thousands of families migrated from the district to other regions of the provinces of Pakistan. This displacement deteriorates already dire food insecurity, as the partial resources are insufficient to meet the needs of the increasing population. The ongoing conflict continues to exacerbate the situation, making food insecurity pressing issue for the susceptible population in district North Waziristan. This study is conducted to critically examine the impact of conflict and displacement on food security in rural North Waziristan an area that has received limited empirical attention in this context. Unlike previous studies that focus either on conflict or food insecurity in general, but this study focuses on the direct link between conflict induced displacement and household level food security. By investigating these two dimensions through local data, this study offers an exclusive contribution to the existing literature and aims to inform evidence based strategies and humanitarian policies that are specifically tailored to the needs of conflict affected rural populations. The main **objectives** of the study are:

- To investigate the food security status of the households in district North Waziristan.
- To identify the impact of conflict and displacement on food security in district North Waziristan.

RESEARCH METHODS

Study Area, Sample Design & Size

The study was conducted in district North Waziristan. The total area of the North Waziristan district is 4707 sq. kms and it is situated to the east of Afghanistan, north of Kurram and Hangu, on the west of district Bannu and the south of district South Waziristan. A multistage sampling technique was used for sample selection. In the first stage, Tehsil Shewa was selected from District North Waziristan for the study. In the second stage, two villages namely, Maimi and Saifali were purposively selected. The total number of households in these two villages was 190, with 105 in Maimi and 85 in village Saifali. From these households, a total of **128** sample size

were selected using the following Yamane's formula.

$$n = N / (1 + N(e)^2) \dots \dots \dots (1)$$

After the selection of sample size it was distributed in each village through the following proportional allocation sampling technique.

$$n_i = \frac{N_i}{N} \times n \dots \dots \dots (2)$$

Whereas;

N = Total number of household in village of the study

N = Total number of household in the study area

n = Total sample size required for research

n = Sample household for village

n = 105×128/190 = 70 (Miami) n = 85128/190 = 58 (Saifali)

Data collection and analytical framework

To achieve the objectives of the study, primary data were randomly collected from the selected sample households through interview schedule method. For this purpose, a well-structured questionnaire was developed. After the data collection, the information was analyzed using SPSS. Descriptive statistics (percentages and graph), Food Security Index, and a Binary Logit Regression Model were employed. The Food Security Index was calculated using the following formula:

$$FSI = \frac{X_{FA} + X_{FA} + X_{FU} + X_{FS}}{4} = \sum_{i=1}^4 xi/4 \dots \dots \dots (3)$$

FSI= Food Security Index

XFA=Food availability (1= Yes, 0 = No)

XFX=Food accessibility (1= Yes, 0 = No)

XFU=Food utilization (1=Yes, 0 = No)

XFS=Food stability (1= Yes, 0 = No)

Binary logistic regression Model

In this study, the dependent variable is the impact of conflict and displacement on food security. It is measured as a binary (dummy) variable, where Y = 1 indicates that conflict and displacement have affected food security, and Y = 0 indicates no such impact.

$$Y = \left(\frac{P}{1-P} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 D_1 + \beta_5 D_2 + \beta_6 D_3 \dots \dots \dots (4)$$

Whereas;

Y_i = Conflict and displacement impact on food security (Yes = 1, No = 0)

X₁ = Age of the respondent (years)

X₂ = Education of the respondent (years)

X₃ = Family Size (numbers)

D₁ = Food received from aid organization (Yes =1, No = 0)

D₂ = Market infrastructure lose due to conflict (Yes =1, No = 0)

D₃ = Household involvement in non -farm activities (Yes =1, NO = 0)

β₀ = Constant

β₁...β₆ = Coefficient for the variables

RESULTS AND DISCUSSION

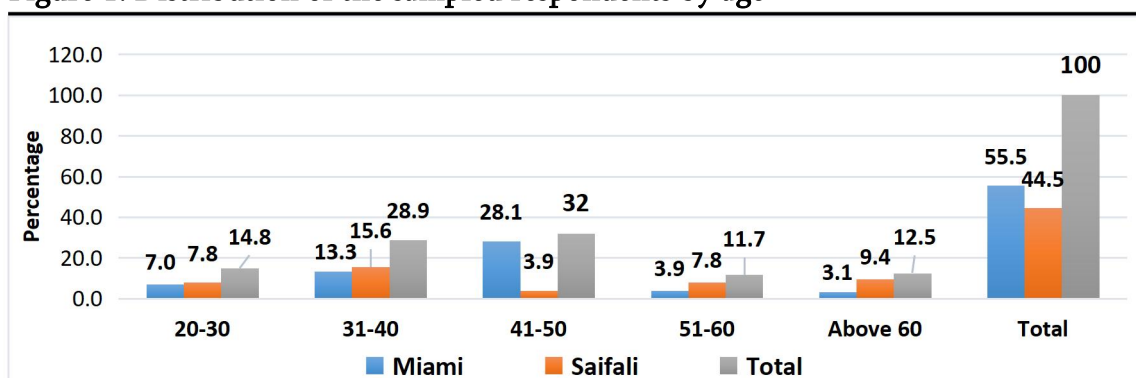
Socio-economic characteristics

This section outlines both the descriptive statistics and the empirical analysis of the study. The descriptive statistics highlight the socio-economic profile of the respondents, while the empirical analysis covers the food security index, as well as the effects of conflict and displacement on food security, along with their estimation. To present the findings clearly, the discussion begins with the socio-economic characteristics of the respondents.

Age of the sampled respondents

Figure.1 shows the age-wise distribution of the sample respondents in the study area. The figure results indicated that (32.0%) of the sampled respondents were in the age group of 41–50 years, indicating that most participants are in their productive middle age group, followed by 28.9 percent were in the age group of 31–40 years, 12.5 percent of the respondents aged above 60 years, while 11.7 percent of the sample respondents age between 51–60 years, showing a considerable presence of older adults in the study area. The remaining (14.8%) of the respondents age group of, 20–30 years, representing relatively low participation from youth. The results overall indicates that majority of the sample respondents were in the age group of 41-50 years, suggest the need to actively engage younger populations in rural development initiatives to ensure long-term sustainability and generational continuity.

Figure 1. Distribution of the sampled respondents by age

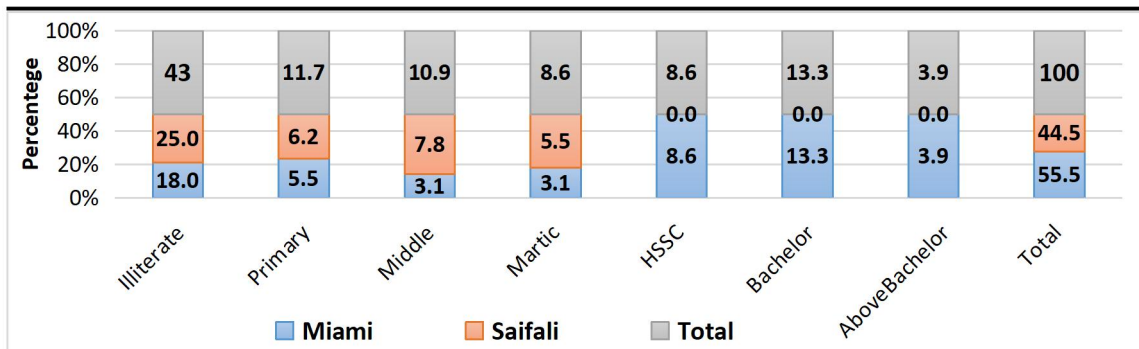


Literacy status and level of education

Figure.2 presents the literacy status and level of educational of the sampled respondents. The figure findings reveals that a significant portion 43 percent of the respondents were illiterate, which indicated low literacy levels in the study area. Primary level education was reported by 11.7 percent of the sample respondents, 10.9 percent of the respondents had attained middle level education and 13.3 percent of the respondents had bachelor level education while, only 8.6 percent of

respondents had completed matriculation, and intermediate level of education respectively in the study area. A relatively small proportion (3.9%) had above bachelor level of education in the stud area. These findings overall reveal that partial access to higher education and a high prevalence of illiteracy. This situation results from poor educational infrastructure, lack of awareness about the importance of education and insecurity, in North Waziristan district.

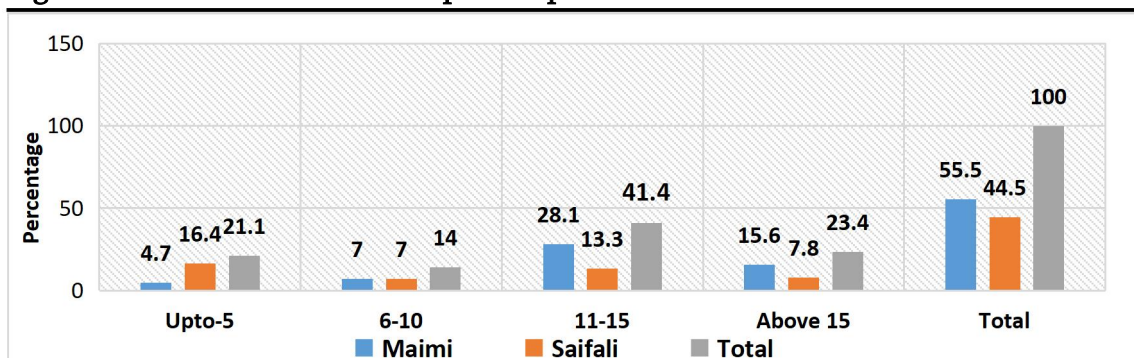
Figure 2. Distribution of the sampled respondents by literacy status and level of education



Household size

Figure 3 reveals the distribution of sample respondents based on family size in the study area. The results indicated that 41.4 percent of the sample respondents' households had 11-15 members, with village Miami accounting for 28.1 percent and Saifali 13.3 percent. This indicated a significant presence of large, extended families, especially in Miami. The second-largest group 23.4 percent consisted of families had more than 15 members, followed by 14 percent of households had 6–10 members and 21.1 percent of households had upto-5 members in the study area. The results overall, reflected a predominance of large family sizes in the study area. This trend suggests the influence of cultural norms, joint family systems, and partial access to family planning in North Waziristan. It indicates that extended family structures are common and points to potential challenges related to resource sharing, housing, and access to social services.

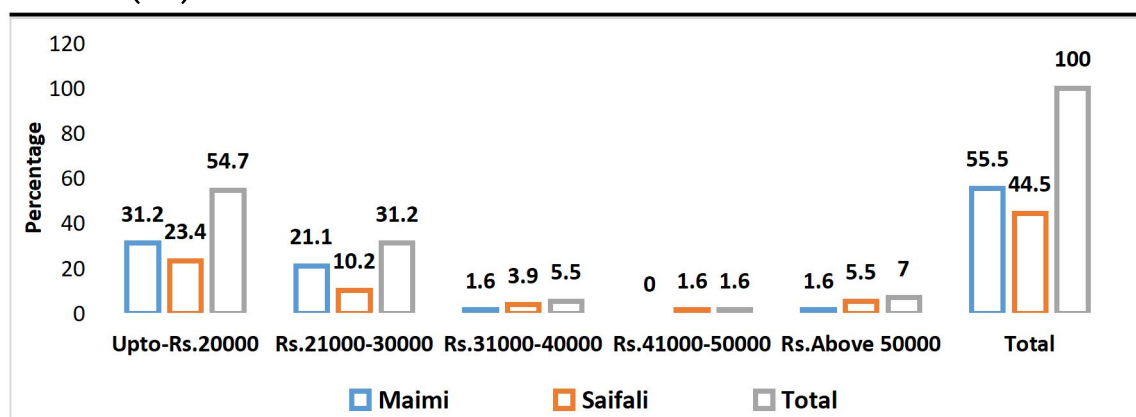
Figure 3. Distribution of the sampled respondents based on their household size



Household monthly income

Figure.4 reveals the distribution of the sampled respondents based on monthly household income in the villages of Miami and Saifali. The findings indicated that majority 54.7 percent of households earned up to PKR 20,000, which reflected extensive low-income conditions. In the PKR 21,000–30,000 range, 31.2 percent of sample households were recorded and 5.5 percent of households earned between PKR 31,000–40,000, showing limited middle-income while, a very few 1.6 percent of households fell in the PKR 41,000–60,000 range, and just 7 percent household reported their earnings above PKR 50,000 in the study area. These results overall, revealed a predominantly low-income rural economy, with minimal representation in higher income categories. The results illustrates that the mostly of the rural households face financial difficulties. This condition reflects the long term impacts of local conflict, underdeveloped infrastructure, and partial livelihood opportunities, all of which limit income diversification and financial resilience.

Figure 4. Distribution of sampled respondents regarding household monthly income (Rs.)



Food security index

Food Security Index (FSI) is a composite measure that measures the level to which households have consistent access to sufficient safe, and nutritious food in the study area. Table 1 resents the Food Security Index and its components like Food Availability (FA), Food Accessibility (FX), Food Utilization (FU), and Food Stability (FS) in the study area. The overall Food Security Index (FSI) is 0.70, highlights that 70 percent of the food security dimensions are being met among the sampled households. However, a closer look at the respondents' components reveals some inequalities, followed by Food Stability (FS) 0.28, has the highest index value, suggesting that sampled households experience relatively reliable food supply over time and Food Utilization (FU) and Food Accessibility (FX) follow with index values of 0.19 and 0.15 respectively, showing moderate levels of dietary intake and physical/financial access to food in the study area. Additionally, Food Availability (FA) 0.09, has the lowest index value, reflecting a serious challenge in the local production or supply of food likely a result of the conflict and displacement that have interrupted all farm and non-farm in the area. The low availability of food has

direct implications for long-term food security, as consistent access and utilization cannot be sustained without sufficient food supply. The results of Food Security Index, whole shows a moderate level of food security, and low value of food availability highlights a severe area of concern. These outcomes emphasize the importance of targeted interventions to restore all farm and non-farm activities and improve food availability in conflict affected areas like North Waziristan.

Table 1. Food security index for various factors

No: Households	FA	FX	FU	FS	FSI
Total sample size 128	0.09	0.15	0.19	0.28	0.70

Logit regression model interpretation

The following table 2 presents the binary logit regression relationship and its effects on explanatory variables on conflict and displacement impact on food security. The independent variables in the table includes age, education, family size, food received from aid organization, household involved in non-farm activities and loses of market infrastructure. The table findings showed that the age of the sampled respondents had a positive relationship with the impact of conflict and displacement on food security. The p-value (0.006) was statistically significant at the 5% level of significance. The estimated odds ratio for age is (1.162), which is greater than 1. This means that there is a positive association between age and the impact of conflict and displacement on food security. If one year increase in the households head age, the odds of experiencing negative food security impacts from conflict and displacement increase by about 1.162 times. The present study align with Weldegiargis et al., (2023), indicated that older household heads in conflict settings often face reduced labour capacity and higher dependency burdens, which explains the increased vulnerability. According to the below table result the education ($\beta = -.211$) had a negative and statistically significant impact of conflict and displacement on food security, with a p-value of (0.010), indicating statistical significance at the 5% level. If one year increase in education level, we expect that lowers the odds of adverse food-security impacts of conflict and displacement by (.810) times in the study area. This study is similar to Engelhard and Hake (2020), they indicated that, higher education likely increases access to information, alternative income, and assistance. The family size ($\beta = .353$) had positive impact on food security by conflict and displacement and p-value (0.08), showing statistically significant at 5% level of significance. Larger households face higher risk, if one member increase in household, we expect that the odds of negative food-security impacts of conflict and displacement by 42.3%. The study of Tefera et al., (2022) align with this study, they revealed that bigger families have greater consumption demand and therefore greater vulnerability when displaced. The below table findings reveals that the coefficient for food received from aid organization ($\beta = -2.121$) had negative and significant impact of conflict and displacement on food security and p-value (0.039), highlights statistically significant association at 5% significance level. If one unit

increase in receiving food aid, is expected to decrease the impact of conflict and displacement on food security by (0.120) times, showing the strong protective role of humanitarian aid. This study is alike to Nisbet et al., (2022), they suggested that, timely and sufficient, food aid can markedly reduce the negative food-security impacts of conflict/displacement. The respondents' involvement in non-farm activities had negative and statistically significant relationship with the conflict and displacement impact on food security in the study area. The ($p < 0.05$) indicates a statistically significant association at 5% level of significance. If one-unit increase in non-farm activities, moving from not engaged to engaged is expected to decrease the impact of conflict and displacement on food security by (0.014) times, underscoring the protective role of livelihood diversification. The present study is align with Abebe et al., (2021), stated that livelihood diversification as a key resilience strategy. Likewise, the market infrastructure loses is greatly increases the risk of food insecurity in conflict and displacement situations. The odds ratio ($\text{Exp}(B) = 17.356$) suggests that such losses can make households about 17.4 times more likely to face adverse food-security outcomes. While the p-value (0.056) is marginally above the 0.05 threshold, representing marginal statistical significance. This study is similar with Bene et al., (2024), they revealed that when markets are disrupted, supply chains collapse, prices rise, and access to food becomes limited, all of which intensify the impact of conflict and displacement on food security. The intercept is not statistically significant ($p = 0.085$), meaning it has no substantive standalone interpretation outside of the predictors in the model. The R^2 value shows that the model explains a large share 79% variation in the dependent variables. However, the likelihood ratio (LR) Chi^2 test was performed to measure the statistical significance of all the independent variables. The test shows a Chi^2 value of (82.375) with a p-value of (0.000), indicates that the overall model predictors jointly have a statistically significant effect on food security outcomes.

Table 2. Empirical model estimation for conflict and displacement impacts on food security

Explanatory Variables	β	S.E	Wald	Exp.(β)	Sig.
Age	.150	.055	7.601	1.162	.006
Education	-.211	.082	6.575	.810	.010
Family size	.353	.134	6.957	1.423	.008
Food received from aid organization	-2.121	1.027	4.267	.120	.039
Household involvement in non-farm activities	-4.298	1.462	8.636	.014	.003
Market infrastructure lose	2.854	1.496	3.639	17.356	.056
Constant	-3.739	2.172	2.965	.024	.085
No. of observation = 128, $R^2 = 79\%$, LR Chi-square = 82.375, Ch^2 p-value = 0.00					

Justification on the findings

The findings reveal that socio-economic, and infrastructural factors had

significantly shape the vulnerability of households to the food security impacts of conflict and displacement. Older aged household heads, larger family sizes, and losses of market infrastructure increase vulnerability due to reduced labor capacity, higher consumption needs, and disrupted food supply chains. Conversely, higher education, engagement in non-farm activities, and receiving food aid reduce vulnerability by enhancing income diversification, access to resources, and external support. The high model explanatory power ($R^2 = 79\%$) and the significant LR Chi² test confirm that these variables collectively offer a strong explanation of food security outcomes in conflict-affected contexts.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that conflict and displacement have a strong negative impacts on household food security in district North Waziristan. Factors such as older household heads, larger family sizes, and damaged market infrastructure make families more vulnerable to food scarcities while, education, receiving food aid from organization, and engaging in non-farm activities help to protect households from these adverse impacts. The study also concludes that the middle-aged household heads, high literacy levels, large families, and generally low incomes, all of which create structural weaknesses. These situations make it harder for sampled households to cope with the interruptions caused by conflict. The overall food security index is moderate, it's revealed that there are severe problems with food availability in the study area. This shortage is predominantly due to distractions of agriculture productivity and supply chains which caused by the ongoing conflict. The results highlight that both social-economic factors play an important roles in determining household resilience. The study recommends that government, and developing agencies should focus on improving education, promoting non-farm livelihood opportunities, restore market infrastructure, and confirming consistent food aid delivery to conflict-affected households. Strengthening these areas can enhance resilience, reduce vulnerability, and increase food availability despite conflict related disruptions.

Limitations of the study and Future Research

This study is limited by its cross-sectional design, which limits the capability to establish the causal relationships between conflict, displacement, and food security outcomes. While, the results are founded on data from a single district, which may restricts their external validity to other conflict affected areas with different socio-economic and cultural contexts.

For future researches could assume longitudinal or panel data methods to track variations in household food security over time and well capture the dynamic impacts of conflict and displacement. Expanding the range to numerous regions and incorporating qualitative perceptions could also help in developing more targeted resilience-building strategies.

Ethical Declaration

The study was carried out in full compliance with the ethical principles and research standards approved by Institute of Development Studies, the University of Agriculture Peshawar, Khyber Pakhtunkhwa. Before to participation, all the respondents were informed about the research objectives, the voluntary nature of their involvement, and consent was obtained from every contributor before data collection. The data were used totally for academic and research purposes and were not shared with any third party.

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