

Effect of the War on Tigray's Cattle-keeping Households, *the case of North-Western Zone*

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Acronyms

CSA : Central Statistics Agency

FDRE : Federal Democratic Republic of Ethiopia

HHs : Households

MA : Meakelay Adyabo

NGOs : Non-Governmental Organizations

SPSS : Statistical Packages for Social Sciences

TA : Tahetay Adyabo

TK : Tahetay Koraro

UN : United Nations

UNCHR : United Nations Center for Human Rights

WB : World Bank

Declaration

I, Micheale Asgedom Adhanom, declare that the thesis entitled “Effect of the War on Tigray's Cattle-keeping Households, *the case of North-Western Zone*” is the result of my own effort. I have conducted the research independently with the guidance and support of the research advisor. The study has not been submitted to the award of any degree in any university. It is submitted for the partial fulfillment of the requirement of the Degree of Master of Arts Degree.

Name: Micheale Asgedom Adhanom: _____ Date: _____

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ABSTRACT

In order to study effects of the war on Tigray's Cattle-keeping Households in North-Western Zone of the region, a survey of 120 sample household heads from three woredas (Tahetay Adyabo, Meakelay Adyabo and Tahetay Koraro) of the Zone, was collected through questionnaires and in-depth interviews with three government officials from each woredas. Besides, secondary data were observed from literature. Descriptive analysis method with triangulation is used for analysis. Major results of the study shows the war has inflicted immense effects on livestock-cattle sector of the region. Most of the' cattle were raided or looted by the armed groups, and significant number of cattle are killed and slaughtered by the invaders. The perpetrators are: Eritrean Soldiers, ENDF and Amhara Militia & Fano. Besides, due to the veterinary centers were also looted and destroyed by the Eritrean Soldiers, large size of the region's cattle were died from various animal diseases. Additionally, due to the war the farmers' annual revenues obtained from sales of their live-cattle and cattle-products have alarmingly decreased. For instance, results of the finding indicate that their revenues from sales of live-cattle, Milk and Dung have decreased by 112%, 300% and 157% respectively. Moreover, during the post-war period, 67% of the sample farmers couldn't use fertilizer, mainly because they don't have the financial capacity to buy the fertilizer. As a result, their cattle-crop production level have highly decreased. Finally, due to the war-driven challenges, currently, large amount of youths are now left unemployed (unengaged) from their former crop-cattle production activities, and women are found to be in a more severe position than their male counterparts. Some of the recommendations forwarded are: Since, there is no adequate data about the levels of damage the war has inflicted on the livestock sector, any concerned bodies especially scholars should make a detailed full scale research on the sector; unpaid old credits of the farmers who took for financing their crop-cattle activities, should be either cancelled or minimized by the financial institutions and provide them with new credits which could help them in reinstating to their economic (at least cattle-owning) status.; the government should provide the chemical fertilizer at a very cheaper price; Labour-intensive type of investments should be encouraged in order to minimize the war effects on the youth's unemployment rates; and special affirmative actions should be taken where women could get the primarily benefits from the opportunities in the livestock-cattle sector.

Chapter one: Introduction

1.1 Background of the Study

Livestock and Cropland abandonment due to conflict was apparent in countries such as Bosnia and Herzegovina (Witmer, 2008). Although the context-specific variation in the relationship between conflict and livestock abandonment is evident, their individual respective impact on local food supply and the repercussion of conflict induced impacts on livestock in the affected regions is poorly understood (Olsen et al., 2021). This is even more important to understand in nations like Ethiopia dominated by smallholder farmers where more than 80% of their population directly dependent on mixed crop-livestock production system (Samberg et al., 2016).

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country (CSA, 2021). The livestock sector is estimated to account for 10% of the GDP and provides employment to over 30% of the agricultural labour force. Livestock also contributes to about 11% of all formal export earnings (FAO, 2018).

Similarly, Behnke & Metaferia 2011, described that livestock provide most of the needed draught power for about 80% of Ethiopian farmers who use animal traction to plough their crop fields. They also provide nutritious food, a source of cash income and wealth accumulation, transportation, manure for fertilizing the soil and fuel for cooking. They also serve as a coping mechanism against shocks and as a store of value in the absence of formal financial institutions and functional markets.

By the same token, the Central Statistics Agency, indicated that the total cattle population for the country is estimated to be about 70 million. Out of this total cattle population, the female cattle constitute about 56 percent and the remaining 44 percent are male cattle. On the other hand, the results obtained indicated that 97.4 percent of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 2.3 percent and 0.31 percent, respectively (CSA, 2021).

According to the Integrated Food Security Phase Classification (IPC) (2021), Prior to the Tigray war that broke out in November 4th 2020, about 80 percent of the population in Tigray relied on agriculture as their primary source of food and income. In Tigray, mixed crop-livestock farming is the dominant production system, with crops as the primary livelihood source, followed by livestock. IPC (2021) further added that in this system, livestock provide power for ploughing and manure for fertilizer, and crop residue provides feed for livestock. Transhumance systems are also present in western Tigray and involve the seasonal movement of animals from highland to lowland range lands.

Besides, Nyssen, et al (2021) explained that in Tigray, about 75% of the total population of 5.7 million are farmers that rely on local yields for their food supply. Farmers in this region rely primarily on a mix of farming teff, wheat, and barley crops as well as livestock. FAO (2021) added even amidst the conflict and displacements in Tigray, agriculture and livestock production are crucial to livelihoods in these regions.

The Tigray war that began and was fought within Tigray between November 4th 2020 and July 2021 later spread to neighboring Afar and Amhara regions of Ethiopia accounted for the displacement of close to 4 million people in 2021. The war was fought between the Tigray regional government's Tigray Defense Force and the Ethiopian National Defense Force along with its allies including formal and informal Amhara and Afar regional forces and more importantly neighboring country Eritrean army. Civilians were forced to flee from their homes due to widespread heinous crimes against humanity such as extrajudicial killings, massacres, conflict-related sexual violence, mass arrests and detentions (Gesese et al., 2022; HRW, 2022).

Targeting severe destruction and looting of livestock, harvests, health facilities, schools, universities, banks and all other public service infrastructures uprooted livelihood and shut off basic services in Tigray (HRW, 2022). The devastating war fought under the defacto siege in Tigray for almost two years, characterized by complete telecommunication and internet blackouts without a humanitarian corridor, made the region largely inaccessible to international aid and left people at risk of starvation.

1.2 Statement of the Problem

During the war in Tigray, agricultural production has been targeted to weaken the region's political and economic position as the majority of the population is dependent on rainfed subsistence agriculture for their food needs and livelihoods, and instances of direct attacks on the agricultural sector have been reported repeatedly (Corey-Boulet et al, 2020).

For instance, in May 2021, the deputy head of Tigray's interim government stated that farmers had been disallowed from carrying out agricultural activities and that seeds had been blocked from reaching parts of the northern region (ibid). While 75 percent of the Tigrayan population relies on agriculture as their primary source of food and income, 80 percent of households in conflict-affected areas had no food stocks or limited food stocks by May 2021, partially due to the missed harvest as well as crop destruction (Nyssen, et al, 2021).

Additionally, in a June 2021 news report, farmers, aid workers, and local officials noted that farmers had been stopped from ploughing or harvesting, seeds for planting had been stolen, farm equipment had been looted, and livestock had been killed (Muhumuza, 2021). Another report noted direct instances of crop pillaging and burning. Women and children were also reported to have worked the lands during the daytime while adult men remaining in the rural villages worked at night to avoid being a target (Waal, et al, 2021). Furthermore, by June 2021, most agricultural services were no longer available as many outlets and warehouses had been closed or vandalized, reducing the availability of agricultural inputs and seeds (Nyssen, et al, 2021).

Since the onset of the war, livestock have been lost as a result of looting, displacement, and disease, and oxen that are used to plough fields have been looted and killed by armed forces (FAO, 2021). In April 2021, conflict zones in Tigray shifted to areas with high livestock populations, including in the South Eastern, Eastern, and Southern administrative zones of Tigray, and an estimated 80 to 90 percent of cattle were looted in parts of the Western, North-west and Central zones (IPC, 2021). According to a UN briefing from June 6th, 2021, 90 percent of oxen and livestock had been looted or slaughtered in a

northwestern town in Tigray. Many households that still held livestock resorted to selling them off to generate income for food purchases. This in turn generated a high supply of livestock in the trade market, decreasing the sale price for herders (ibid).

In line with this, OCHA (2021) reported that 183 of 198 veterinary clinics had been damaged or destroyed as of October 2021, and livestock diseases have resulted in high mortality due to limited access to veterinary services. The combination of looting, displacement, and diseases has degraded the livelihoods and income-earning opportunities of the livestock-keeping households, and many have been forced to eat or sell their remaining animals to afford basic food items. Furthermore, WFP (2022) report also showed that the delayed onset of the February to May 2022 rains resulted in water and pasture shortages, leading to the death of thousands of livestock, and this has led to extremely limited income and food access.

Due to the blockade in Tigray, the people were entirely dependent on local crop harvests for survival (OCHA, 2022). Lack of information made comprehensive assessment on the status of livestock in the region very challenging, if not impossible. Although the severity of the lack of access to information in Tigray is extreme, the challenge of conducting field surveys in conflict zones overall is not unique to Tigray (Bush and Duggan, 2013).

Therefore, in order to have a better understanding of the consequences of the war on livestock-cattle related livelihoods of the farmers, this research has focused on the following major objectives and research questions to be studied in the North-Western zone of the regional state of Tigray.

1.3 Objectives of the Study

1.3.1 General Objective:

The general objective of the research is to study impacts of the war on Tigray's Cattle-keeping Households in North-Western Zone of the region.

1.3.2 Specific Objectives:

- 1) To identify major consequences of the war on the Cattle located at North-Western Zone of Tigray;
- 2) To examine the war's effect on households' annual revenue from sales of live cattle and cattle products;
- 3) To assess effects of the war on Crop production and soil fertility, in crop-livestock production system of the study area;
- 4) To measure consequences of the war on youth employment in the livestock-cattle sector of the study area;

1.3.3 Research Questions:

An effort was made to address the following specific research questions in the study area.

- A. How many cattle (Oxen, Cows, Calves, Heifers, and Bulls) were looted, slaughtered, killed, and died were there in the North-Western zone of Tigray region during the war broke-out? And by whom?
- B. What was/is the cattle-keeping households' annual revenue obtained from sales of their live-cattle and cattle products? Both, before and after the war?
- C. In crop-livestock production system, what are the effects of the war on mode, size of crop production and soil fertility of the households'?
- D. What is the level of consequence inflicted upon the youth employment (with a special focus on women) in the livestock-cattle sector of the study area?

1.4 Significance of the Study

The significance of this research will have paramount importance for policy makers to consider the postwar reinstate polity for the affected households in the research area, NGOs, the governments (both the regional and federal governments) and other concerned bodies.

The findings have indicated the existing economy related challenges of the cattle-keeping households, such outcomes would help the NGOs, Aid agencies and governments to effectively intervene in solving the problems, and would help them to include the issue in their plans for resettlement, rebuilding and development of the war affected areas.

Knowing the direct impact of the war on the region's cattle size, quality and health will help to look for alternative solutions when supporting the farmers in their mixed crop-livestock production system.

The war has definitely affected the households' incomes that are collected from sales of their live-cattle and cattle products; youth employment, crop production and soil fertility. Hence, examining the affected levels of those major issues will help the concerned bodies to plan, quantify and act accordingly for the purposes of effective intervention through aid, fund, credit, or/and paying indemnities.

The research also help for researchers who interested further investigation in the study area.

1.5 Scope of the Study

This study has covered the impact of the war on cattle and cattle-related revenues of the households located at the selected three Woredas of the North-Western zone of Tigray region. The study has also assessed the number of cattle such as: (Bulls, Oxen, Cows, heifers, Calves) that were looted, slaughtered, killed, and died (because of lacking medication) by any part of the armed groups during the war time. Another, focus scope of the research was studying effects of the war on: mode and size of crop production of the households; soil fertility of the households' farmland; and on youth employment in the livestock-cattle sector of the study area.

1.6 Limitations of the Study

The study has faced some limitations. These are: since there is no adequate data about the Tigray-war impacts on the literature, some of the findings could be over or under estimated. So, such limitations could be reduced by conducting a full scale regional-level studies. Besides, due shortage of sufficient financial capacity by the researcher, the study has been limited to only three woredas of the select North-west zone of Tigray, this may a little bit affect the findings' conclusions. Moreover, the regional even the federal governments don't have all the required data about the total impacts of the war inflicted on the socio-economic sectors of the societies in Tigray, particularly the governments don't know how many and to what level the two-year war has impacted the livestock-cattle sectors of Tigray. As a result, the researcher could not get adequate secondary data about this, hence some findings of the study (for instance, concerning the war impact level on cattle) may be over or understated.

CHAPTER TWO: REVIEW OF RELATED LITERATURES

2.1 Definitions and Concepts

Mixed Crop-livestock production system :- The mixed crop-livestock farming system is the dominant livestock production system in the Ethiopian highlands. In this system, crops and livestock play interdependent roles, with livestock providing draught power and manure for crop agriculture while crop residues provide feed for the livestock (Yisehak, 2008). In the mixed farming system, livestock follow crops as the means of livelihood (Tegegne et al., 2013). Cattle are the most important livestock species in this system because they are used for ploughing, threshing crops, and providing manure. Some farmers also keep one or more improved cows for milk production (Abate, 2012).

Cattle:- cattle is one group of livestock and its herd composition by age and sex are:- Oxen, Cows, Calves, Heifers, and Bulls. Usually, in developing countries, Oxen are the dominant animals in the herd, serving as source of draft power for land ploughing; and an important business for households. The bigger proportion of cows next to oxen shows the paramount importance of cattle production in producing calves to replace retired oxen (Waal and Alex, 2021).

Households' Revenue from sales of live-cattle & cattle products:- Are the households' annual revenue that are or used to be obtained from sales of their live-cattle as well as from sales of their cattle products, such as: meat (beef), milk, skin, manure, dung and others.

Youth Employments in Livestock-Cattle Sector:- According to Ethiopia's national youth policy (2004) the definition of "Youth" is those who are between the age range of 15 to 29 years old. Therefore, the theoretical framework for this term to be used for the purpose of this study is, the individuals who are within the aforementioned age range that are or that can employed in the cattle and cattle-products-related activities.

Tigray War of November 4th 2020:- The Tigray war that began and was fought within Tigray between November 4th 2020 and July 2021 later spread to neighboring Afar and Amhara regions of Ethiopia accounted for the displacement of close to 4 million people in 2021 (Paravicini, et al, 2023). The war was fought between the Tigray regional government's Tigray Defense Force and the Ethiopian National Defense Force along with its allies including formal and informal Amhara and Afar regional forces and more importantly neighboring country Eritrean Defense Force. Civilians were forced to flee from their homes due to widespread heinous crimes against humanity such as extrajudicial killings, massacres, conflict-related sexual violence (Gesese et al., 2022; HRW, 2022), mass arrests and detentions. Targeted severe destruction and looting of livestock, harvests, health facilities, schools, universities, banks and all other public service infrastructures uprooted livelihood and shut off basic services (HRW, 2022). The devastating war fought under the defacto siege in Tigray for almost two years, characterized by complete telecommunication and internet blackouts without a humanitarian corridor, made the region largely inaccessible to international aid and left people at risk of starvation.

2.2 Review of Related Empirical Studies

2.2.1 Livestock and Armed Conflicts:

The livestock sector, which contributes significantly to people's food security and income (alongside other functions and roles including draught power, cultural and social value, and as a safety net), is affected in several ways by armed conflicts. This can include disruption to livestock markets and value chains, the reduction in access to veterinary services and inputs affecting the health of animals, undermining of pastoralist livelihoods, as well as the physical loss of productive assets due to conflict (FAO, 2016).

Witmer (2008) said that Livestock and Cropland abandonment due to conflict was apparent in countries such as Bosnia and Herzegovina. Olsen et al. (2021) also concluded that although the context-specific variation in the relationship between conflict and livestock abandonment is evident, their individual respective impact on local food supply and the repercussion of conflict induced impacts on livestock in the affected regions is poorly understood.

According to the Ukrainian Statistical Office, Ukrainian farmers kept a herd of more than 1.6 million cattle before Russia's invasion. In the first three months of the war alone, Ukrainian dairy farms lost at least 50,000 cattle. The value of the livestock lost so far is estimated at over \$136 million. Experts estimate that more than 100,000 animals could fall victim to the war (Tetiana Shyrochenko, 2022).

Similarly, for South Sudan, the share of livestock sector is about 15 percent of the gross domestic product of the country. As a result, the economic impact of the current South Sudan civil war on the livestock sector has been extensive; livestock have been direct targets of insurgency and counterinsurgency warfare (GRSS, 2013).

FAO 2014, also reported that the conflict in South Sudan triggered an unprecedented forced migration of millions of heads of livestock. Disrupted traditional migration routes have affected not only the conditions of livestock and the livelihoods of livestock-dependent communities but also the livelihoods and physical security of resident farming communities in Greater Equatoria. In some cases, herders' choices of migration routes were influenced by the need to protecting their livestock rather than feed and water availability (FAO/WFP, 2014).

Similarly, Ouédraogo, Moussa (2020) said that pastoralism is an important economic activity in Burkina Faso, with pastoralists representing 40 percent of the workforce and livestock production representing over 30 percent of agricultural GDP. Chand, A. (2020) added that live animals make up the third largest export product, making Burkina Faso one of few net exporters in the region. However, the country's continuous violent conflicts have considerably affected this sector.

Likewise, Behnke, R. H. (2008) described Somalia as a pastoral country. The pastoralist production system is mainly oriented towards the commercial export of live animals to countries like Saudi Arabia and the Gulf, in addition to the significant cross-border trade with Kenya and Ethiopia. However, according to FAO (2020) because of a lack of central state governing the sector, there are no reliable statistics on the value of pastoralism to overall GDP. However, the FAO estimates that livestock accounts for around 40 percent of the country's GDP and employs roughly 60 percent of the population, both directly and indirectly. Meefster et al (2020) also said that since export taxes are the main income stream for government bodies, livestock represents a

large share of government revenues. While pastoralism and livestock have a relation to the dynamics of conflict in Somalia, they are the most negatively affected sectors in the country.

2.2.2 Overview of the Ethiopian Livestock - Cattle Sector

2.2.2.1 Ethiopian Livestock

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country. It is eminent that livestock products and by-products in the form of meat, milk, honey, eggs, cheese, and butter supply, provide the needed animal protein that contribute to the improvement of the nutritional status of the people. Livestock also plays an important role in providing export commodities, such as live animals, hides, and skins to earn foreign exchanges to the country (CSA, 2021).

The livestock sector is estimated to account for 10% of the GDP and provides employment to over 30% of the agricultural labour force. Livestock also contributes to about 11% of all formal export earnings. However, when informal cross-border trade is considered, the contribution increases to about 24% (Behnke & Metaferia, 2011).

On the other hand, draught animals provide power for the cultivation of the smallholdings and for crop threshing virtually all over the country and are also essential modes of transport to take holders and their families long-distances, to convey their agricultural products to the market places and bring back their domestic necessities. Livestock as well confer a certain degree of security in times of crop failure, as they are a “near-cash” capital stock. Furthermore, livestock provides farmyard manure that is commonly applied to improve soil fertility and also used as a source of energy (Kidanemariam G.E, et al 2018).

Livestock provide most of the needed draught power for about 80% of farmers who use animal traction to plough their crop fields (Behnke & Metaferia, 2011). Livestock also provide nutritious food, a source of cash income and wealth accumulation, transportation, manure for fertilizing the soil and fuel for cooking. They also serve as a coping mechanism against shocks and as a store of value in the absence of formal financial institutions and functional markets.

However, according to USAID (2016), the overall livestock productivity of the country has been significantly affected by various animal diseases. In Ethiopia, there are several endemic animal diseases caused by bacteria, viruses, protozoa, and parasites that compromise the productivity of livestock. Additionally, the CSA (2021) explained that livestock diseases have numerous negative impacts on productivity of herds i.e. death of animals, loss of weights, slow down growth, poor fertility performance, decrease in physical power and the likes. There have been many ways of fighting against diseases and among these, vaccinations (preventive measures) and treatments (curative measures) are the major ones.

2.2.2.2 Ethiopian Cattle

The total cattle population for the country is estimated to be about 70 million. Out of this total cattle population, the female cattle constitute about 56 percent and the remaining 44 percent are male cattle (CSA, 2021).

About 99.4% of the cattle population consists of the local Zebu breeds. The overall number of dairy animals is low and is estimated at around 1 million. The predominant cattle breeds include the Borana, Fogera, Horro, Begait, Sheko, Abigar and Afar breeds. European breeds, especially Friesian and Jersey, have been imported for many years and crossbred with the indigenous breeds to improve milk production (Tegegne et al., 2006). Most of these types of animals are found in urban and peri-urban areas. About 25% of cattle aged between 3 and 10 years is used for draught purposes. Only a fraction of the cattle population (0.72%) is reared exclusively for meat production. The number of cows that are primarily kept for milk production is estimated at 6.3 million or about 14.6% of the total cattle population (Muhumuza and Rodney. 2021).

On the other hand, the results obtained indicated that 97.4 percent of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 2.3 percent and 0.31 percent, respectively. Moreover, distribution of cattle by purpose is: among cattle aged 3 years and less than 10 years, those used for draught purposes accounted for 22 percent and the percentage share of beef cattle is the lowest that is about 1.2 percent. Beef cattle here refer to all cattle reared exclusively for meat that is used either for home consumption or for sale (CSA, 2021).

2.2.2.3 Contributions of livestock

Besides, to its high contribution to the economy, FAO (2018) listed the livestock sector have also other roles, such as:- Value addition, food and nutritional security, crop production and soil fertility, job creation, export market, and Manure production and utilization.

As reported by the Ethiopian Revenue and Customs Authority (2017/2018), livestock and their products, mainly live animals, skins and hides, meat and meat products, and leather and leather products represent important export commodities, preceded only by coffee, oil seeds, gold, and chat in order of their importance. During the same reporting year, livestock and livestock products contributed to about 9.1% of the country's total export earnings, with a value of about 182 million USD. However, the value of the official trade in meat and live animals is a small fraction of the value of unofficial cross-border live animal exports.

Livestock value chains also make significant contributions to the national economy through value added processing and marketing. The total contribution of livestock production and processing and marketing, both monetary and non-monetary, to the national economy amounts to about USD 9.44 billion, or 21% of GDP (Abebe, 2012). The direct contribution of livestock to GDP is estimated at USD 7.33 billion per year, which amounts to 17% of GDP and 39% of the agricultural GDP.

Moreover, developing livestock value chains creates huge opportunities for job creation, particularly for the youth. For example, an estimated 750 to 900 million people globally live on dairy farms. In Ethiopia, over two-thirds of the labour requirement for livestock herding in traditional smallholder mixed farming systems and urban and peri-urban dairy systems is provided by youth. Women are also involved in the management of farm animals, milk processing and marketing. Labour use in milk processing and marketing activities in different production systems in Ethiopia totalled an equivalent of 174,000 full-time jobs in 2004 (Haile, 2009). Assuming 224.5 persons/jobs per 1,000 liters of milk and 5 billion liters of annual milk production, the dairy sector could create an estimated 1.125 million full-time jobs. Similarly, the Ethiopian Ministry of Livestock and Fisheries (2009) reported that 10.04 million improved-breed chicken were distributed to

894,863 beneficiary households (48.4% of which being female-headed households), which created 355,921 jobs for youths.

Additionally, this sector has paramount importance in achieving households' food and nutrition security (CSA, 2021). Undernutrition, particularly at an early age, can result in mental impairment, intelligence loss and reduced educational capacity and productivity. A study by WFP (2013) on the cost of hunger in Ethiopia indicates that a loss of \$4.8 billion USD or ETB 55.5 billion (16.5% of GDP) in 2009 was due to malnutrition, absenteeism, reduced physical capacity and increased healthcare costs. In 2011, about 44% children were chronically malnourished and stunted, 10% were wasted (acute malnutrition) and 29% were underweight, the highest being in Amhara (52%), followed by Tigray (51%), Afar (50%), SNNPR (44%) and Oromia (41%). As a major source of protein, the contribution of livestock in reducing stunting and malnutrition is substantial.

Behnke and Metaferia (2011) also explained that in the mixed crop-livestock system, the most important service provided by livestock is animal power for ploughing, transport and haulage. About 80% of Ethiopian farmers use animal traction to plough their crop fields. The value of animal draught-power input into arable production is about one-quarter (26.4%) of the value of annual crop production. Based on these figures, nearly a third (31%) of the total gross value of livestock output is represented by the value of animal draught power as an input in crop cultivation, an estimated 22 billion ETB (2.17 billion USD) in 2008-09. Likewise, according to Nigussie et al (2015), the value of dung produced by livestock-keeping households was estimated at 3.43 billion ETB (339 million USD), of which dung valued at an estimated 1.4 billion ETB (138.4 million USD) was used by producer households for soil fertility and fuel, while the remaining 2 billion ETB (197.7 million USD) worth of dung was marketed.

Abebe (2012) in his study quantified the contribution of cattle in manure production. The average daily manure production by livestock in Ethiopia (kg DM per TLU/day) is estimated at 3.3 for cattle. More than 80% of the manure produced comes from cattle. Tesfay (2014) added that under an extensive production system, most of the manure is disposed-off on grazing lands. In the mixed crop-livestock system, manure is collected and used as fertilizer in crop fields or dried and stored for use as cooking fuel.

2.2.3 Pre-War Situation in Tigray

2.2.3.1 Background of Agricultural Production

Prior to the conflict, about 80 percent of the population in Tigray relied on agriculture as their primary source of food and income. In the Ethiopian highlands, including Amhara and Tigray regions, mixed croplivestock farming is the dominant production system, with crops as the primary livelihood source, followed by livestock. In this system, livestock provide power for ploughing and manure for fertilizer, and crop residue provides feed for livestock. Transhumant systems are also present in western Tigray and Amhara and involve the seasonal movement of animals from highland to lowland rangelands (IPC, 2021).

In Tigray, about 75 percent of the total population of 5.7 million are farmers that rely on local yields for their food supply. Farmers in this region rely primarily on a mix of farming teff, wheat, and barley crops as well as livestock (Nyssen, et al, 2021). Most Tigrayan farmers also have small plots of less than a hectare in total and grow subsistence crops on rainfed lands and cash crops on irrigated lands near river banks. Even amidst the conflict and displacements in Tigray, agriculture and livestock production are crucial to livelihoods in these regions (FAO, 2021).

Low soil fertility is among the major constraints in Tigray region that reduce crop productivity. Poor soil fertility is attributed to the overall land degradation. Most soils in the region have been highly degraded because of long years' of continuous cultivation, poor soil fertility management, deforestation, soil erosion, improper land use systems etc.

As indicated by various literatures, as a means of maintaining or improving soil fertility most farmers use manure and some also apply commercial fertilizers for improving soil fertility. During the pre-war period, availability of commercial fertilizers had not been a constraint but their prices were said to be high as a result commercial fertilizer consumption rates are low. In addition to applying fertilizer, most Tigray farmers also use intercropping, crop rotation and fallowing which contributes to soil fertility improvement (Kidanemariam G.E, et al. 2018).

2.2.3.2 Economy and Social protection mechanisms:

Overall Investment: Between 1992 and 2017, Tigray received a large share of Ethiopia's total domestic investment, and specific investment across agricultural, manufacturing, and construction sectors. Between 2012 and 2019 Tigray consistently ranked in the top three out of all regions in Ethiopia for number of micro and small-scale enterprises (MSEs), which directly contributes to the reduction of poverty and unemployment (Seid & Lamesegen, 2019).

For more details, please see the following two consecutive tables that depict Tigray's pre-war GDP and investment conditions.

Table 2. 1GDP of Tigray and main sectoral contributors

GDP 2016/17	TIGRAY	COMPRISES
Agriculture	36.7%	Export of items including sesame, gum, cereals, and leather products.
Service	37.0%	Contributions from tourist destinations in Tigray.
Industry	26.3%	Construction and transportation.

Source: PEFA Assessment 11/12/2019; Bureau of Plan and Finance 11/2011)

Table 2. 2Investment in Tigray from 1997-2017

	FIGURE	REGIONAL RANK
% of Ethiopia's Domestic Investment	20%	2/11
% of Ethiopia's employment from Domestic Investment	43%	1/11
% of total Foreign Direct Investment in Tigray	1.7%	5/11
% of total employment from Foreign Direct Investment in Tigray	4.7%	5/11
% of total Ethiopia Agricultural Investment	37.4%	1/11
% of total Ethiopia Manufacturing Investment	14.8%	4/11
% of total Ethiopia construction sector investment	13.8%	2/11

Source: Seid & Lamesegen 27/03/2019

In addition to this, a Productive Safety Net Programme (PSNP) was launched in 2005 to address the chronic needs of food-insecure rural households through five outcomes: ensure food consumption, prevent asset depletion, improve access to services, stimulate markets through use of cash transfers, and restore natural environment through public works. The PSNP system provides cover to workers during the six months of the year where

agricultural activities are minimal and to directly support households that do not have any adult over 18 who can carry out labour (WFP, 2013).

2.2.3.3 Living Conditions

In the past 20 years, poverty in Tigray has decreased due to agricultural growth and investments in basic services and social protection. Between 2011 and 2016, the poverty rate in Tigray declined from 31.8% to 27%; however, this was the highest poverty rate in the country in 2016, with the national average being 23.5%. Poverty rates are significantly higher in rural areas of Tigray than in urban areas. In 2016, the poverty rate stood at 31.1% in rural areas and 14.2% in urban areas (WB, 2020).

A) Livelihoods and Food Security:

As the population of Tigray is largely rural, most households are dependent on agriculture, mainly subsistence crop farming. 26.5% of households in Tigray have non-farm enterprises, such as a shop or market trading (CSA, 2020).

In 2013, Tigray regional state had an overall unemployment rate of 5.5%, although the rate was higher among women than men. The urban unemployment rate was significantly higher than the rural unemployment rate for the region. Compared with national unemployment rates, Tigray had slightly higher rates across all categories. Women had the highest rates of unemployment in both urban and rural categories across Tigray and Ethiopia (CSA 2013). For more details, please see the following table provided by CSA.

Table 2. 3 Unemployment Rate, all ages (2013)

	TIGRAY TOTAL	URBAN	RURAL	ETHIOPIA TOTAL	URBAN	RURAL
Total	5.50%	17.40%	2.50%	4.50%	16.50%	2.00%
Female	7.70%	24.60%	3.20%	6.50%	23.00%	2.90%
Male	3.40%	9.90%	1.90%	2.70%	10.50%	1.10%

Source: (CSA 2013)

Livelihoods in rural Tigray are mostly related to agriculture and labour. Especially poorer households with smaller land holdings and less livestock generate additional non-farm incomes through seasonal migratory labour, particularly to the sesame-producing Western zone, local agricultural work, and construction work in towns. Wealthier households tend to rely more on livestock sales for additional non-farm income (Kidanemariam G.E, et al. (2018).

Availability and accessibility of food in Tigray, are typically highest during the meher harvest between September and January (USAID, 2016). Key challenges for food security and households' own food production in Tigray include: -

- Reliance of crop production on rainy seasons, which are short in some areas. Irregularity in onset, end, or amount of precipitation has the potential to disrupt harvests.
- Soil fertility, which is particularly a problem in Tigray due to land degradation, as well as erosion in highlands.
- Reduction of available land for crop cultivation and livestock grazing per household. Most households cannot meet their food needs from their own production but need to purchase food, thus requiring additional sources of income (predominantly from labour and sales).

In the October-December 2020 period, not accounting for the full food security impact of the armed conflict, over 429,000 people were in Crisis (IPC Phase 3) or worse levels

of acute food insecurity. These figures represent a deterioration in comparison to August 2020. Even without integrating the full impact of the armed conflict into the analysis, the food security situation in Tigray had deteriorated in 2021. At the national level, for the October-December 2020 period, 1.4 million people were in Emergency (IPC Phase 4) Nutrition Trends of nutrition data indicate a significant improvement of the nutritional status of children in Tigray between 2011 and 2019, however the rates for stunting, wasting, and underweight remain above the national average. Factors that impact children's nutrition in Tigray include child feeding and child caring practices, lack of access to water and sanitation, and the food security impact of the 2015/16 El Niño (UNICEF, 2019).

B) Historical coping strategies and mechanisms :

Historically, households in Tigray responded to food insecurity by reducing expenditure of non-essential or expensive items. Seeking labour in other areas including seasonal agricultural employment for instance at sesame farms in Humera, local labour, and casual work in urban areas is common among poor households while wealthier households tend to sell livestock. Sale of assets can also include crops and trees. Trade in goods such as sugar, livestock trading, and crop trading were additional strategies (ibid).

2.2.3.4 Cattle Situation

Regionally, about half of the households (49.22 percent) are involved in livestock farming activities. The involvement of households in livestock activities is higher in rural areas (74.54 percent) as compared to infant towns (45.61 percent) and urban areas (11.47 percent) (Kidanemariam G.E, et al. 2018). Out of the total 70 million cattle in the country, Tigray comprises 4,908,964 of them. By the same token, the North-western zone of Tigray holds about 1,954,132 of it. In other words, this zone accounted the highest number that is (39.8%) of the total cattle size of Tigray (CSA, 2021). As a result, this zone is expected to be most affected by the war.

Farmers in Tigray raise various animal types for different purposes. Rural households keep cattle for the purpose to draft power, income and manure in the rank of first, second and third (World Bank, 2020).

Cattle herd composition by age and sex (oxen, cows, calves, heifers, and bulls). Oxen are the dominant animals in the herd, serving as source of draft power for land ploughing, an important business for households. The bigger proportion of cows next to oxen indicates the paramount importance of cattle production in producing calves to replace retired oxen (Waal and Alex, 2021).

Livestock holders buy animals using a cash/finance obtained from different sources. Holders secure cash from: own farm, sale of animals, and saving, ranking as first, second and third. The holders get cash also from loans, gifts and other sources (Kidanemariam G.E, et al. 2018).

However, according to IRC (2020) and OCHA (2019), the livestock in Tigray has been used to be considerably affected by various livestock diseases even before the Tigray war period. The following table shows the different kinds of animal diseases which are prevalent in all the six zones of Tigray.

Table 2. 4 Livestock Diseases in Tigray by Zones

Central	Eastern	North-Western	South-Eastern	Southern	Western
anthrax, foot and mouth disease (FMD), lumpy skin disease (LSD), Newcastle disease, pasteurellosis, goat pox, Contagious Caprine Pleuropneumonia (CCP), tick-borne diseases	anthrax, black leg, FMD, Newcastle Disease, pasteurellosis, scabies	anthrax, LSD, FMD, goat pox, Newcastle disease, pasteurellosis, blackleg, CCP, peste des petits ruminants (PPR)	anthrax, black leg, FMD, Newcastle Disease	pasteurellosis, blackleg, foot rot, anthrax, FMD, LSD, CCP, Newcastle disease	internal parasites, LSD, FMD, Newcastle disease

Source: IRC 17/11/2020, and OCHA 03/11/2019

2.2.4 War Consequences on Tigray Agricultural Production and Livestock

In the regional state of Tigray, conflict has had a significant impact on agricultural production in affected regions. But, Crop Monitor for Early Warning (2020) argued that even prior to the onset of conflict, production in Tigray had been impacted by erratic and below-average rainfall, the worst desert locust invasion in 25 years, and the onset of the

COVID-19 pandemic that resulted in disruptions to agricultural input distribution. While national cereal yields for the 2019 Meher season were near-average, some localized areas of the region experienced below-average production due to the desert locust invasion.

Then from the onset of conflict in November 2020, production in Tigray has been further impacted by both direct attacks on the agricultural sector, such as restricted field access, supply and transportation blockages, destruction of agricultural tools and livestock, and burning and pillaging of crops by armed forces, as well as indirect consequences of conflict, including displacement, field abandonment, market disruptions, economic downturn, and input shortages. As a result, agricultural production has been significantly hindered in Tigray impacted by insecurity (Waal, et al, 2021).

2.2.4.1 Targeting the Agriculture Sector

During the war in Tigray, agricultural production has been targeted to weaken the region's political and economic position as the majority of the population is dependent on rainfed subsistence agriculture for their food needs and livelihoods, and instances of direct attacks on the agricultural sector have been reported repeatedly (Corey-Boulet et al, 2020).

For instance, in May 2021, the deputy head of Tigray's interim government stated that farmers had been disallowed from carrying out agricultural activities and that seeds had been blocked from reaching parts of the northern region (ibid). While 75 percent of the Tigrayan population relies on agriculture as their primary source of food and income, 80 percent of households in conflict-affected areas had no food stocks or limited food stocks by May 2021, partially due to the missed harvest as well as crop destruction (Nyssen, et al, 2021).

Additionally, in a June 2021 news report, farmers, aid workers, and local officials noted that farmers had been stopped from ploughing or harvesting, seeds for planting had been stolen, farm equipment had been looted, and livestock had been killed (Muhumuza, 2021). Another report noted direct instances of crop pillaging and burning. Women and children were also reported to have worked the lands during the daytime while adult men remaining in the rural villages worked at night to avoid being a target (Waal, et al, 2021).

Furthermore, by June 2021, most agricultural services were no longer available as many outlets and warehouses had been closed or vandalized, reducing the availability of agricultural inputs and seeds (Nyssen, et al, 2021).

Due to the blockade in Tigray, the people were entirely dependent on local crop harvests for survival (OCHA, 2022). Lack of information made comprehensive assessment on the status of livestock in the region very challenging, if not impossible. Although the severity of the lack of access to information in Tigray is extreme, the challenge of conducting field surveys in conflict zones overall is not unique to Tigray (Bush and Duggan, 2013).

2.2.4.2 Targeting the Agricultural Inputs

In Tigray, productive assets such as seeds, animals, or tools have been looted or destroyed by armed forces. As such, even when farmers have been able to access their fields, they often do not have the inputs or tools necessary to farm.⁶⁰ Additionally, seed markets have disappeared due to the breakdown of essential services and infrastructure (FAO, 2021). Prior to the conflict, Tigray did not have a seed enterprise for local seed production and instead relied on seed sourced from the Office of Agriculture. While regional authorities have since established one, adequate seed supply remains a concern. Of the farmers that do have access to seeds, many have had to resort to eating the seeds they needed to plant for the next season due to severe food insecurity (OCHA, 2021).

Additionally, based on the study made by Beal (2015), he concluded that 70 percent of farmers in Tigray used fertilizer, primarily for cereal crops. While only 10 percent of surveyed farmers reported being able to purchase fertilizer with credit. However, farmers now face difficulties purchasing agricultural inputs such as seed and fertilizer primarily due to market supply disruptions and, to a lesser extent, inflation and loss of income.

2.2.4.3 Targeting of the Livestock Sector

In 2016, the livestock sector accounted for 10 percent of the country's export income. Since the onset of the war, livestock have been lost as a result of looting, displacement, and disease, and oxen that are used to plough fields have been looted and killed by armed

forces (FAO, 2021). In April 2021, conflict zones in Tigray shifted to areas with high livestock populations, including in the South Eastern, Eastern, and Southern administrative zones of Tigray, and an estimated 80 to 90 percent of cattle were looted in parts of the Western, North-west and Central zones (IPC, 2021). According to a UN briefing from June 6th, 2021, 90 percent of oxen and livestock had been looted or slaughtered in a northwestern town in Tigray. Many households that still held livestock resorted to selling them off to generate income for food purchases. This in turn generated a high supply of livestock in the trade market, decreasing the sale price for herders (ibid).

In line with this, OCHA (2021) reported that 183 of 198 veterinary clinics had been damaged or destroyed as of October 2021, and livestock diseases have resulted in high mortalities due to limited access to veterinary services. The combination of looting, displacement, and diseases has degraded the livelihoods and income-earning opportunities of the livestock-keeping households, and many have been forced to eat or sell their remaining animals to afford basic food items. Furthermore, WFP (2022) report also showed that the delayed onset of the February to May 2022 rains resulted in water and pasture shortages, leading to the death of thousands of livestock, and this has led to extremely limited income and food access.

Chapter THREE: RESEARCH METHDOLOGY

3.1 Description of the Study Area

Tigray is one of the regional federal state of the country, is located north at 12° 15'N latitude and 36° 27'E 39° 51'E longitude and neighbored by Eritrea, the Sudan, Afar region, and Amhara region in the north, west, East and south, respectively. The region has seven administrative zones and divided into 34 rural and 12 urban Woredas (district). The regions' total area is estimated to be 53,623 square kilometers out of which 18.87 percent is cultivable (BOFED 2006). The population of Tigray is 5,685,601; the sex composition is almost equal (OCHA, 2021).

Agro ecologic zone of the region includes lowland, mid-highland and highland; the average temperature and rain fall is between 15-27.50c and 450-980mm, respectively. Agriculture is the dominant economy, which contributes 57% of GDP that is about 36% from crop, 17% from livestock and 4% from forestry (BOFED 2006). According to CSA,2021, the livestock population of the region is:- 4,908,964 (Cattle); 2,097,619 (Sheep); 4,838,969 (Goats); 6,317,518 (Poultry). Purpose of keeping Cattle in Tigray are: Draft power, manure, meat, milk, and cash.

3.1.1 North-Western Zone of Tigray:

According to OCHA (2021), the north-western zone of Tigray has population size of 923,343 where 49.8% are male and 50.2% are female. Additionally, this zone comprises 39.8% of the total cattle size in the regional state of Tigray. Total Area of the zone is 18,325.11 km². The data in CSA(2021) shows that, this zone had the highest number of cattle in Tigray region before the war. Out of the total 4,908,964 cattle size of Tigray, the North-western zone comprised about 1,954,132 of it. In other words, this zone accounted 39.8% of the total cattle size of Tigray.

The North Western Zone is bordered on the east by the Central Zone, the south by the Amhara Region, the west by the Western Zone and on the north by Eritrea. The Zone is subdivided into the fifteen woredas (districts), which are:- Tahetay Adyabo, Laeilay Adyabo, Seyemti Adyabo, Maekekay Adyabi, Tsimbela, Asgede, Tahetay Koraro, Laeilay Koraro, Shiraro (town), Shire (city), Endaba-Guna (town), Zana (town), Laeilay Tselemti (currently under invaders), Tahetay Tselemti (currently under invaders), and My-Tsebri (town currently under invaders).

Table 3. 1Tigray 2021 population estimates by zone - gender and rural/urban

TIGRAY ZONES	TOTAL	MALE %	FEMALE %	RURAL %	URBAN %
Mekele	520,930	50.58%	49.42%	11.15%	88.85%
Central	1,481,017	49.10%	50.90%	77.07%	22.93%
Eastern	1,048,223	47.78%	52.22%	71.68%	28.32%
North Western	923,343	49.77%	50.23%	76.92%	23.08%
South Eastern	451,060	49.48%	50.52%	89.28%	10.72%
Southern	793,139	49.18%	50.82%	72.81%	27.19%
Western	467,889	51.55%	48.45%	69.42%	30.58%
Total Tigray	5,685,601	49.30%	50.70%	69.76%	30.24%

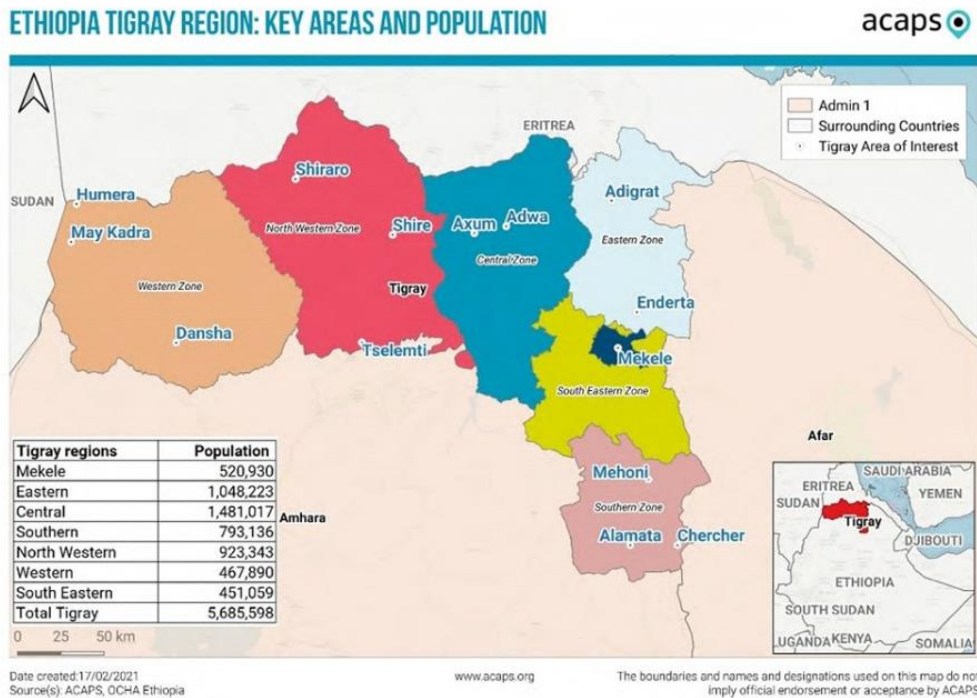
Source: (OCHA, 2021)

Table 3. 2Number of Cattle: National, Tigray Region and Zones

National Total	70,291,776
Tigray Total	4,908,964
Central zone	725,700
Eastern zone	466,981
North Western zone	1,954,132
South Eastern zone	523,671
Southern zone	390,934
Western zone	847,546

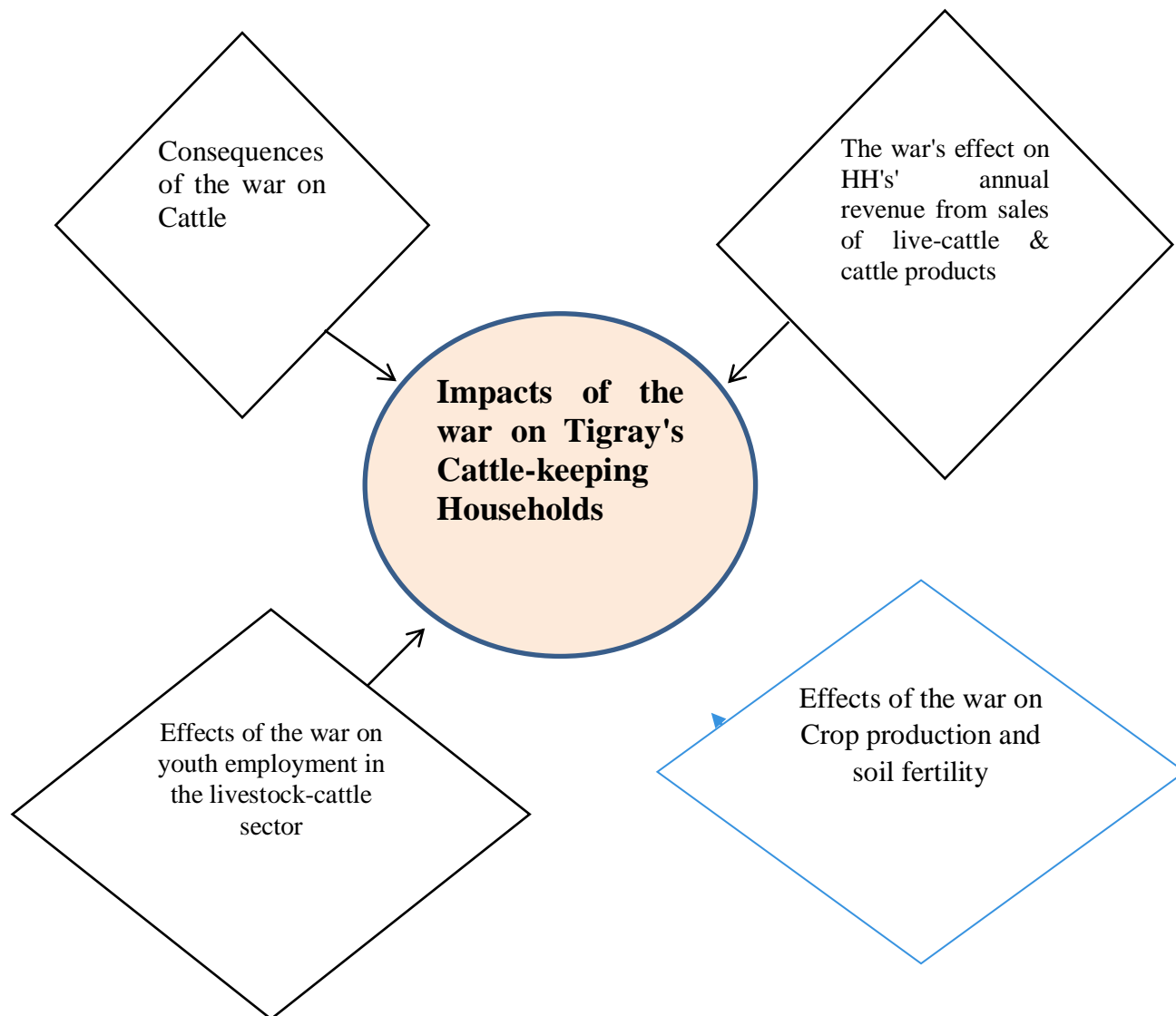
Source : (CSA, 2021)

Figure 3. 1Map of Tigray and Tigray Zones



Source: OCHA 2021

Figure 3. 2Conceptual Framework



As the Conceptual framework indicates that, in order to study the impacts of the war on Tigray's Cattle-keeping Households in North-Western Zone of the region, the four major perspectives are taken in to account, those are:- the direct consequences of the war on the Cattle themselves ; its effects on the sample households' annual revenue from sales of their live -cattle and their products; on cattle-driven crop production and soil fertility; as well as on youth employment in the livestock-cattle sector of the study area.

3.2 Methodology of the study

3.2.1 Data Collection techniques:

The method that used in this research is a household survey study. The research has employed both qualitative and quantitative types of data, and the data collection techniques are based on primary and secondary data. The secondary data are collected from published research papers, Books, manuals, the Internet, and annual report of concerned organizations (be it NGOs and Non-NGOs). And, the primary data were collected from sample households and Woreda-level government officials through questionnaire and in-depth interviews respectively.

For the household survey, a semi-structured questionnaire with both open ended and close ended questions have been prepared. The questionnaires were first tested and then the necessary amendments were made. After wards, they have been administered by selected enumerators. For the in-depth interview, one respondent from each selected woredas' government official was purposively selected.

3.2.2 Sampling Design and Techniques:

A probability sampling method was utilized to collect the primary data from target household respondents. Among the current seven zonal administrations of Tigray, North-western zone is selected as a study area. This zone is selected because according to CSA (2021), it had the highest number of cattle in Tigray region before the war period. Out of the total 4,908,964 cattle size of Tigray, the North-western zone comprised about 1,954,132 of it. In other words, this zone accounted 39.8% of the total cattle size of Tigray. As a result, this zone was proposed to be most affected by the war.

Likewise, the interim administration of Tigray has restored its structural administration unlike that of the western zone, this has helped the researcher and data collectors for easier and more secured way of primary data collections from the sample households.

When selecting the sample households from the North-western zone, a disproportional stratified random sampling. First, all of its fifteen Woredas were listed (i.e. stratified based on Woredas), out of which seven of them was not taken into account for they are either urban centers (towns)

or/and currently under invaders. Hence, the remaining eight woredas are taken into account. Then, out of the eight eligible woredas, only three woredas were randomly selected, then from the three woredas 40 households have been disproportionally and randomly selected (using systematic random sampling method). List of the households was obtained from the regional and zonal government offices.

Therefore, the total sample size for the primarily data collection are 123 (i.e. 120 households plus 3 Woreda-level government officials), based on which results of the study have been inferred after being triangulated with the secondary data.

This study applied a simplified formula provided by Yamane (1967) as cited by Yilma Muluken to determine the required sample size at 95% confidence level, degree of variability= 0.5 and level of precision (e) = 9%.

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

Where n is sample size, N is the total number of households, e is the level of precision. According to this formula, this research required a minimum of 120 household head respondents, N =60,645.

Table 3. 3Sampling Frame

North-Western Zone's Eligible Woredas	Randomly Selected Woredas	Systematically & Randomly selected HH heads
Tahetay Adiyabo	Tahetay Adiyabo	40
Laeilay Adyabo		
Seyemti Adyabo		
Maekekay Adiyabo	Maekekay Adyabo	40
Tsimbela		
Asgede		
Tahetay Koraro	Tahetay Koraro	40
Laeilay Koraro		
Total selected Sample Respondents		120

3.2.3 Methods of Data Processing and Analysis :

After the data was collected, it was processed and analyzed quantitatively as well as qualitatively. Most of them are quantified by using different statistical methods (like: frequency, percentages and ratios) so as to reduce unmanageable data for ease of manipulation and analysis.

A descriptive analysis method was applied in the process of transforming the raw data in to a form that would make them easy to understand, interpret, rearrange order and manipulate data in order to provide descriptive information. Results of the research are presented in a qualitative manner as well as quantitatively by using percentages, tabulations and different types of graphs followed by discussions under each specific objectives of the research. Finally, possible solutions and recommendations are provided by the researcher. Computer software (like: MS-Office, STATA, etc) have been used as main tools during data entry, process, analysis and presentation.

Chapter Four: Results and Discussions

4.1 Characteristics of the Respondents

The following *table* shows the general characteristics of the all the 120 sample respondent household heads randomly selected from the three woredas of the North-Weat zone on Tigray. The randomly selected sample woredas are: - *Tahetay Adyabo, Maekelay Adyabo and Tahetay Koraro*. And 40 sample household head farmers were randomly selected from each the those three woredas for the questionnaire. In line with this, three concerned government officials (1 from each woredas) was selected for the in-depth interview.

When describing the general characteristics of the sample respondents from those three woredas, all the 120 samples for the questionnaire has been described regardless of their woredas due to it is assumed that would not have significant effect on the objectives of the research.

Table 4. 1General Characteristics of the Respondents

Items	Categories	Respondents (in %)	Respondent size (in freq)
Gender	Male	78%	120
	Female	22%	
Age	18 to 28	4%	120
	29 to 39	20%	
	40 to 50	51%	
	Above 50	25%	
Household size	2	7%	120
	3 to 5	27%	
	6 to 8	45%	
	Above 8	21%	
Educational	Uneducated	49%	120
	Primary	31%	

Status	Secondary	11%	
	Diploma	0	
	Others	9%	

(Source: Author Field Study, May 2024).

In the general characteristics of the 120 sample household head questionnaire respondents, 78% are male and 22% are female headed households. And, most of them are in the age range of 40 to 50 years (51%), above 40 years (25%) and from 29 to 39 years old (20%). Besides, in the case of their educational status, 49% of them are uneducated, 31% are primary school level, and 11% are secondary school level. Based on their household sizes, 45% of the respondents have a household size between 6 to 8, and 27% have between 3 to 5, 21% of them have above 8 household members, while 7% have only 2 members.

In a similar manner, in the case of the in-depth interview sample respondents: - all of the three purposively selected sample government officials are Male who are from the randomly selected three woredas i.e. Tahetay Adyabo, Maekelay Adyabo and Tahetay Koraro. Moreover, the officials are all first degree holders; with their age range between 34 to 48 years old.

4.2 Major Consequences of the War on Cattle

Before the war period, most of the respondents said that they primarily use cattle for the purposes of :- a draft-power for their farmland ploughing, for crop harvesting activities, for milking, and for renting to plough others' farmland,

According to a UN briefing from June 6th, 2021, 90% of oxen and livestock had been looted or slaughtered in a northwestern town in Tigray.

According to the interviews made with the three government officials from the three case study sample woredas, they officials all socio-economic sectors of their respective woredas are extremely harmed by the war. Among the sectors, the agricultural sector particularly the livestock is more severely affected by the war. They added as of now, the regional government doesn't have a full statistical data that explains about the levels of damage the war has inflicted

on the livestock- cattle sector of the sample woredas in particular and in the whole regional state in general

Table 4. 2Pre-War Average Number of Cattle Holdings Per-HH by Woredas

Cattle Type	Woredas			Grand Average (in freq)
	TA	MA	TK	
Ox	3	4	3	3
Cow	2	2	2	2
Calf	2	3	2	2
Heifer	1	2	1	1

Note! TA = Tahetay Adyabo; MA = Maekelay Adyabo; TK = Tahetay Koraro

As indicated in this table, the Pre-War average number of cattle (ox, cow, calf and heifer) holdings by the 120 sample respondents, is 3 (for Ox), 2 (for Cow), 2 (for Calf) and 1 (for Heifer). In more detail manner, based on the three sample woredas, for instance, in each woredas ox has higher average sizes among the sample households. In Maekelay Adyabo woreda the 40 sample HHs have higher average size of Ox (which is 4) than the other two sample woredas.

Table 4. 3War Consequences on Cattle

Question :- "How did you lose your cattle? "						
Cattle Type	Woreda	Responses (in freq)				Total Respondents
		Killed	Slaughtered	Raided (looted)	Died	
Ox	TA	16	8	12	1	37
	MA	14	6	15		35
	TK	10	2	19	2	33
Cow	TA	6	5	17	2	30
	MA	3	4	18	1	26
	TK	7	5	22		34
Calf	TA	9	11	13		33
	MA	8	3	21		32
	TK	10	2	25	3	40
Heifer	TA	12	7	16		35
	MA	8	4	19	2	33
	TK	11	6	20	3	40
Grand Average (in freq)		12	5	25	1	

Note! TA = Tahetay Adyabo; MA = Maekelay Adyabo; TK = Tahetay Koraro

The figures in the previous table show the major and direct consequences of the war on cattle of the sample households. For the above listed kinds of cattle (i.e. Ox, Cow, Calf and Heifer) and based on each sample woredas' households, they respondents have forwarded thier responses about the direct impacts of the war inflicted on their cattle as:- "killed", "Slaughtered", or/and "Looted" by any sides of the armed groups, and as:- "Died" due to the indirect effect of the war due to animal disease and likes.

Accordingly, the overall figures in the table indicate that most of the sample respondents cattle are raided or looted by the armed groups during the two-year war period. "Killed" and "Slaughtered" by the armed groups are the second and third level direct impacts respectively. The perpetrator (armed groups) for the killings, slaughterings and looting, are indicated in the following table.

Additionally, the figures also show that there similarity in severity and types of the direct impacts of the war on cattle, among the three sample woredas (Tahetay Adyabo, Maekelay Adyabo and Tahetay Koraro).

In line with this, among the 120 sample respondents of the questionnaire, some of them also said that some of their cattle were died due to the indirect impact of the war, where most of their reason behind was because of various animal diseases (among others:- anthrax, Newcastle disease, pasteurellosis and blackleg).

Besides, the interviewed government officials added that the farmers couldn't get veterinary services around because the animal veterinary centers in the woredas were looted and destroyed by Eritrean Soldiers. As shown in the previous table, based on 120 respondents about 15 cattle were died due to the indirect consequences of the war.

Table 4. 4Perpetrators

<i>Question :- "Who is to blame for the killings, slaughterings and looting of your cattle during the War? "</i>		
No	Perpetrators :-	Responses (in %)
1	TDF	--
2	ENDF	26%
3	Eritrean Soldiers	62%
4	Amhara Militia and Fano	4%
5	I don't know	8%
Total Response (in freq)		116

This table shows the percentage responses of the 116 (4 are missed) sample respondent households, about the perpetrator (armed groups) for the killings, slaughtering and looting of their cattle during the war period.

Accordingly, for all the killings, slaughtering and looting of the cattle in three sample woredas, Eritrean Soldiers are blamed by 62% of the respondents, ENDF (26%), and Amhara Militia and Fano (4%). However, the remaining 8% of the respondents didn't know whom to blame. Similarly, the interviewed sample government officials also ranked the perpetrators as Eritrean Soldiers (1st), ENDF (2nd), and Amhara Militia and Fano (3rd), based on the perpetrators' severity on killings, Slaughtering, and looting of the cattle in the sample woredas.

Accordingly, the overall figures in the table indicate that most of the sample respondents cattle are raided or looted by the armed groups during the two-year war period. "Killed" and "Slaughtered" by the armed groups are the second and third level direct impacts respectively. The perpetrator (armed groups) for the killings, slaughtering and looting, are indicated in the following table.

Table 4. 5Veterinary Services and Vaccination

No	Questions :-	Responses (in %)		
		YES	NO	I don't know
1	Before the war period, did you have access to any veterinary services when your cattle got sick?	89%	8%	3%
2	Before the war period, did your cattle used to get Vaccinations?	68%	25%	7%
3	After the war, have your cattles got Vaccinations?	11%	88%	1%

Before the war period, even though 89% of the respondents had access to veterinary services for their cattle, but, only 68% of them have got their cattle vaccinated, while 25% of the respondents

haven't got their cattle vaccinated. By same token, during post war period, out of the 120 respondents, 88% of them haven't got their cattle vaccinated.

The interviewed sample government officials said that even though, they were not enough, but there were functional veterinary clinics in their respective woredas. But, currently due to the war those veterinary clinics have already been totally damaged and looted by the Eritrean Soldiers. As a result, they added that currently in those woredas there are no functional veterinary services and as of now no vaccine has been provided to any livestock - cattle in the woredas.

OCHA (2021) reported that due to the war in Tigray, 183 of 198 veterinary clinics had been damaged or destroyed as of October 2021, and livestock diseases have resulted in high mortalities due to limited access to veterinary services. The combination of looting, displacement, and diseases has degraded the livelihoods and income-earning opportunities of the livestock-keeping households, and many have been forced to eat or sell their remaining animals to afford basic food items.

4.3 War Effect on HH's Annual Revenue from Cattle-related Activities

Various literatures describe that historically, before the Tigray-war period, Livelihoods in rural Tigray are mostly related to agriculture and labour. Especially poorer households with smaller land holdings and less livestock generate additional non-farm incomes through seasonal migratory labour, particularly to the sesame-producing Western zone, local agricultural work, and construction work in towns. Wealthier households tend to rely more on livestock sales for additional non-farm income (Kidanemariam G.E, et al. (2018).

Table 4. 6 Pre-War Sources of Financing Cattle and Cattle Products

Sources	Total Respondents (in freq)
Own Saving	77
Support from family/friends	34
Debt from family/friends	45
Debt from financial institution	52
Aid from NGOs/Government	8
Others	5

Result of the finding in this table shows that during the Pre-War period, sources of the households' finance for their cattle and cattle products own saving as responded by 77 respondents of the total 120. Likewise, "Debt from financial institution" said by 52 of the total; "Debt from family/friends" (by 45); "Support from family/friends" (by 34); and only 8 individuals have said that their sources were obtained from "Aid from NGOs/Government".

Table 4. 7 Annual Revenue from Sales of Live-Cattle and Cattle Products (Pre-War Period)

From Sales of:-	Annual Revenue (in birr)			Total Respondents (in freq)
	Min	Max	Average	
Live-Cattle	18,000	125,000	42,723	72
Milk	5,800	53,450	21,550	68
Dung (Manure)	3,000	22,000	15,734	93

Besides, when we see the Pre-War period of annual revenue of the households that were obtained from sales of their live-cattle and cattle products, the finding indicates that out of the total 120 sample respondents 72 of them said that they used to get revenues from sales of live-cattle; and it

was calculated that the minimum annual revenue they get from this was 18,000 birr; the maximum was 125,000 birr; and on average their revenue from live-cattle sales was about 42,723 birr.

Similarly, out of the 120 respondents 68 of them also used to sell milk for the market before the war period. And, their annual minimum and maximum revenues from sales of milk was 5,800 and 53,450 birr respectively. As a result, their average annual revenue from this was calculated to be about 21,550 birr.

Moreover, out of the 120 respondents 93 of them also used to sell dung for the market. And, their annual minimum and maximum revenues from sales of dung was 3,000 and 22,000 birr respectively. As a result, their average annual revenue from this was found to be 15,734 birr.

Therefore, in order to understand the war's impact on the households' annual revenues from sales of their live-cattle and cattle products before and after the war periods, by using the same question after the war period was also studied. Therefore, the following table shows the findings of the same question but for the post-war period.

Table 4. 8 Annual Revenue from Sales of Live-Cattle & Cattle Products (Post-War Period)

From Sales of:-	Annual Revenue (in birr)			Total Respondents (in freq)
	Min	Max	Average	
Live-Cattle	13,000	55,000	20,245	19
Milk	2,000	18,000	5,400	23
Dung (Manure)	1,200	5,500	6,115	51

By the same token, the Post-War period of annual revenues of the sample respondents was also studied. The result shows that out of the 120 respondents only 19 of them said that they still get revenues from sales of live-cattle; and it was calculated that the minimum annual revenue they get from this is 13,000 birr; the maximum is 55,000 birr; and on average their revenue from live-cattle sales is about 20,245 birr.

Moreover, out of the 120 respondents only 23 of them still sell milk for the market after the war period. And, their annual minimum and maximum revenues from sales of milk is found to be about 2,000 and 18,000 birr respectively. And, their average annual revenue from this is calculated to be about 5,400 birr.

Furthermore, out of the 120 respondents 51 of them still sell dung for the market. And, their annual minimum and maximum revenues from sales of dung is 1,200 and 5,500 birr respectively. And, their average annual revenue from this is 6,115 birr.

The interviewed officials didn't know the overall total monetary values of the war impact on the live-cattle and cattle products in their respective woredas. This is due to a full scale research is not yet conducted by the government or other concerned bodies.

Generally, when the average annual revenues of the households (from sales of their live-cattle and cattle-products) is analyzed before and after the war-periods, we can see a very high impact of the Tigray-war on the households' revenues. For more details, please see the finding in the following table.

Table 4. 9 Annual Revenue Gaps Before and After the War Periods

From Sales of:-	Average Annual Revenue (in birr)		Annual Revenue Gap (in %)
	Pre-War Period	Post-War Period	
Live-Cattle	42,723	20,245	112%
Milk	21,550	5,400	300%
Dung (Manure)	15,734	6,115	157%

The last column in this table shows that the households' annual revenues from sales of their live-cattle have significantly decreased from 42,723 birr (before-war average revenue) to 20,245 birr (After-war average revenue). In other words, it is possible to conclude that the Tigray-war has highly decreased the households' annual revenue from sales of their live-cattle by 112%.

Moreover, the households' annual revenues from sales of milk to the market have alarmingly decreased from 21,550 birr (before-war average revenue) to 5,400 birr (After-war average revenue). As a result, due to the war households' average annual revenue from sales of milk to the market has decreased by around 300%.

In addition to this, similar impact of the war can clearly be seen from the revenues obtained from sales of dung (manure). The households' annual revenues from sales of dung have also downed from 15,734 birr (before-war average revenue) to 6,115 birr (After-war average revenue). As a result, due to the war households' average annual revenue from sales of dung to the market has fallen by around 157%.

Table 4. 10 HHs with 100% Loss of their Live-Cattle and Cattle Products Due to the War

From Sales of:-	Number of the Respondents answered for:-		Respondent Gap (in freq)
	the Pre-War Period question	the Post-War Period question	
Live-Cattle	72	19	53
Milk	68	23	45
Dung (Manure)	93	51	42

It is not only the annual revenue gaps that clearly show the war's impact on the households' revenues, but as listed in this table (compiled from previous tables), out of the 120 sample household respondents, for the questions forwarded (about their revenues from live-cattle and cattle products): we can clearly see a considerable difference among the number of the respondents who have responded for the "Pre-war and for the Post-war period questions".

In other words, this indicates that for respondents who answered for the "Pre-war period question..." but not for the "Post-war period question..." in the questionnaire, this is due to their total or 100% loss of their live-cattle by the Tigray-war. For instance, the figure in the previous

table shows that at least 74% of the respondents who had own cattle before the war breakout, have lost 100% of their cattle due to the war.

Table 4. 11 Coping Mechanisms for Revenue Gaps

<i>Question :- " What Coping Mechanisms are you using to fill your current Revenue gaps resulted from the lack of cattle and cattle products incomes due to the War effect? "</i>		
No	Coping Mechanisms	Response size (in %)
1	Debt from family /friends	17.5%
2	Debt from Micro financial institutions	5.8%
3	Support from family /friends	15%
4	Aid from NGOs /government	81.6%
5	Working at Off-farm activities (e.g. daily labourer, stone collection, hair dressing, etc)	53.3%
6	No a single coping mechanism option	18.3%
7	Others	6.6%

After the Tigray-war ended, there should be some sorts of coping mechanisms where the households could at least minimize their income gaps resulted in from war-loss of their live-cattle and cattle products. Accordingly, the household heads have responded to the alternative coping mechanisms listed in this table.

Results of the finding show that out of the 120 individuals, 81.6% of them answered that among the various coping mechanisms they utilize is "Aid from NGOs /government". Moreover, out of the 120 respondents, 53.3% of them also added that "Working at Off-farm activities (e.g. daily labourer, stone collection, hair dressing, etc)" is also their coping mechanism.

Additionally, 17.5% of the household heads said that they get debt from family /friends as among the alternative coping mechanisms. On the other hand, out of the total sample respondents 18% of them forwarded that they don't have even a single coping mechanism option.

In line with this, according to the interviewed sample government officials, they said that before the war period, many household heads had used to take credits from different available micro-finances for financing their activities and engagements in the cattle sector. Despite some of them had been repaying before the war broke out, however, during and after the war periods, as of now no one has begun or continued the repayment for an obvious reason. Moreover, the government officials added that let alone to force the farmers to repay their old debts who are currently in need of an emergency aid for their basic survival, it is better to cancel their old debts and support them with further aid and provide them new credits which could help them in reinstating to their economic (cattle owning) status.

4.4 War Effect on HH's Crop Production and Farmland's Soil Fertility

Different literatures argues that low soil fertility is among the major constraints in Tigray region that reduce crop productivity. Poor soil fertility is attributed to the overall land degradation. Most soils in the region have been highly degraded because of long years' of continuous cultivation, poor soil fertility management, deforestation, soil erosion, improper land use systems etc. (Kidanemariam G.E, et al. 2018).

As indicated by various literatures, as a means of maintaining or improving soil fertility most farmers use manure and some also apply commercial fertilizers for improving soil fertility (Ibid).

According to the interviewed sample government officials, they explained that before the war-period, most of the farmers (almost all in Tahetay Adyabo woreda) used to buy commercial fertilizers from the government. However, during post-war period, since they has highly affected the financial capacities of the farmers, currently more than 90% of them couldn't not purchase the fertilizer for their farmlands. As a result, this has significantly reduced soil fertility of the farmlands of the woredas which inturn the farmers' crop production quantity as well as quality has downed to an alarming level.

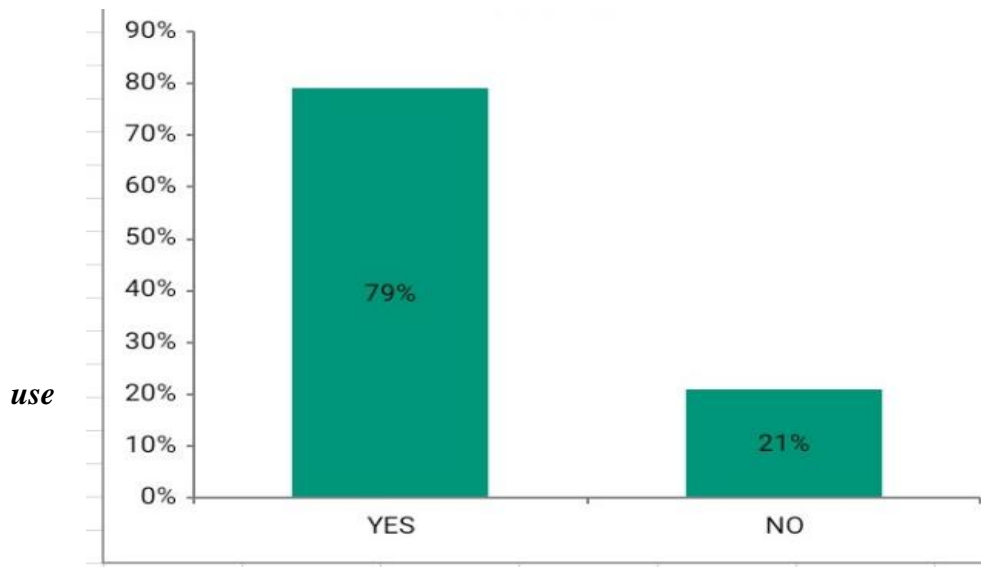


Figure 4.
1Fertilizer
Usage During
Pre-War
Period

*Question :-
 "Before the War
 period, did you
 to buy fertilizer to
 your farmland
 from the
 government ? "*

This figure shows that out of the total 120 sample respondents, 95 or (79%) of them said that before the war period they used to utilize chemical fertilizer for their farmlands, while the remaining 25 or (21%) did not.

Table 4. 12 Crop Production Improvement

<i>Question :- "If 'YES', by how many percent do you think that your crop production used to increase before the war-period ? "</i>			
Crop Production Improvement (in %)			Total Respondent Size
Min	Max	Average	
50%	200%	110%	95

Besides, those respondents (95 in number) who used to utilize chemical fertilizer for their farmlands, have also said that due to the application of the fertilizer their crop production had increased on average by 110% when compared against without fertilizer. Additionally, there are also some household heads whose crop production had used to increase by 200% before the war periods.

According to Nyssen, et al, (2021), While 75 percent of the Tigrayan population relies on agriculture as their primary source of food and income, 80 percent of households in conflict-affected areas had no food stocks or limited food stocks by May 2021, partially due to the missed harvest as well as crop destruction.

Table 4. 13 Fertilizer Usage During and Post-War Periods

No	Questions:-	Response Size (in %)		Total Respondents
		YES	NO	
1	<i>"During the 2 years War period, did you</i>	0	100%	120

	<i>use fertilizer for your farmland?"</i>			
2	<i>During the Post-War period, have you used fertilizer for your farmland?"</i>	33%	67%	118

Kidanemariam G.E, et al. (2018), explained that during the pre-war period , availability of commercial fertilizers had not been a constraint but their prices were said to high as a result commercial fertilizer consumption rates are low.

However, as indicated in the above table, during the two years of the Tigray war, all the 120 sample respondents said that they didn't use any chemical fertilizer for their farmlands. They added that let alone to think about using the unavailable fertilizer, most of them didn't even plough their lands due to the scale of war was formidable.

Likewise, in the above table question number 2, for those who said "NO", their main reasons for not using fertilizer for their farmlands were: mainly because they don't have the financial capacity to buy the fertilizer, besides some of them also added that there is still high shortage of adequate amount of fertilizer brought from the government.

Table 4. 14 Cattle's Dung Usage (Pre-War Period)

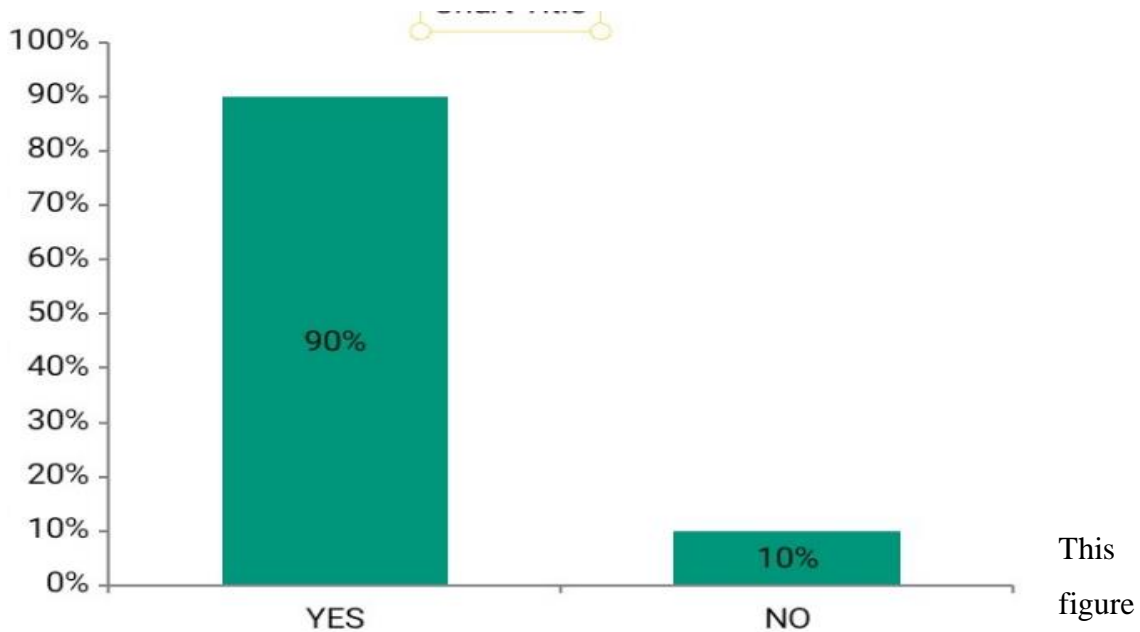
<i>Question:- " Before the War, did you use to utilize the cattle's dung as :-?"</i>				
No	Usage Options :-	Response Size (in %)		Total Respondents
		YES	NO	

1	as Local fuel for cooking	100%	--	120
2	as Local fuel for sales	53%	47%	118
3	as manure or fertilizer for farmland	81%	19%	120

Before the war periods, all 100% of the sample household heads said that they used their cattle's dung (manure) for local fuel for cooking; 53% of them also used to sell it to the market for local fuel. Additionally, 81% of them added that they also use the dung as fertilizer for their farmlands.

Figure 4. 2War Impact on Crop-Cattle Production Tools

Question :- " Are your crop-cattle production tools also damaged or looted due to the war? "



depicts that among the 120 respondents, 108 or (90%) of them said that during the two years Tigray war period, some or all of their agricultural tools were either damaged or looted by invaders. As a result, their cattle-crop production activities are almost totally halted or considerably impacted by the war.

4.5 War Effect on Youth Employment in the Livestock-Cattle Sector

According to the data from CSA (2013), In 2013, Tigray regional state had an overall unemployment rate of 5.5%, although the rate was higher among women than men. Compared with national unemployment rates, Tigray had slightly higher rates across all categories. Women had the highest rates of unemployment in both urban and rural categories across Tigray and Ethiopia (CSA 2013).

Table 4. 15 Youth Engagement on Crop-Cattle related Production Activities (at Household level)

Question :- " How many youth (be it family member or not) were/are engaged on your household's crop-cattle related production activities ? "				
Periods:-	Responses (in freq)			Total Respondents
	Min	Max	Average	
Before the War period	1	6	3	120
During the 2 years War period	0	1	0	120
Post-War period	0	2	1	120

Different literatures conclude that among the various impacts of a war, is the prevalence of high unemployment rates during the post-war period.

By the same token, results of the survey in the above table shows that before the Tigray-war period, the average size of engaged youth (be it a family member or not) in the crop-cattle related production activities at a household level was 3 youths. And, during the two-year war period the average had fallen to zero. And, during the post-war period it is now just one.

This clearly indicates that currently, due to the war and war-driven challenges, large amount of youths are now left unemployed (unengaged) from their former crop-cattle production activities. Besides, relatively among the those disadvantaged youth, women are found to be in a more severe position than their male counterparts.

According to the interviewed sample government officials, they said that before the war-period, most of the youths in the sample woredas had been actively engaged in various livestock -cattle and cattle product activities. Currently, during the post-war period, the most of the youths are out of their former jobs because they two-year war has already destroyed the livestock sector of the woredas, besides most youths are either displaced to urban areas (for searching job); or still engaged in the military service (by TDF); or migrated to abroad. Hence, it is possible to conclude

that the livestock -cattle sector in those woredas are currently facing shortage of active manpower (i.e. youth).

Additionally, the government officials, also added that among the currently unengaged youths in those sample woredas, women are gravely affected by the war and left unemployed. This has created relatively more severe socio-economic burdens in the households, because, in those woredas the women's role and contributions in the crop-cattle production activities were much higher than that of their male counterparts.

Chapter Five : Conclusions and Recommendations

5.1 Conclusions

Based on the analysis, the following major findings and conclusions are forwarded :

The war has inflicted immense effects on livestock-cattle sector of the region. Most of the' cattle were raided or looted by the armed groups, and significant number of cattle are killed and slaughtered by the invaders. For those direct effects, the perpetrators (ranked according to their intensity level) are: Eritrean Soldiers, ENDF and Amhara Militia & Fano.

Besides, due to the veterinary centers were also looted and destroyed by the Eritrean Soldiers, large size of the region's cattle were died, where most of their reason behind was because of various animal diseases (among others:- anthrax, Newcastle disease, pasteurellosis and blackleg).

Additionally, due to the war the farmers' annual revenues obtained from sales of their live-cattle and cattle-products have alarmingly decreased. For instance, results of the finding indicate that their revenues from sales of live-cattle, Milk and Dung have decreased by 112%, 300% and 157% respectively.

In line with this, during the post-war period utilization of chemical fertilizer for their farmlands have largely reduced. This due to lesser availability of the fertilizer and due to the farmers' diminishing financial capacity. During the post-war period, 67% of the sample farmers couldn't use fertilizer, mainly because they don't have the financial capacity to buy the fertilizer. As a result, their cattle-crop production level have highly decreased.

Finally, due to the war and war-driven challenges, currently, large amount of youths are now left unemployed (unengaged) from their former crop-cattle production activities. Besides, relatively among the those disadvantaged youth, women are found to be in a more severe position than their male counterparts.

5.2 Recommendations

Based on the above mentioned major findings of the research, the following alternative recommendations are forwarded:-

- Since, the regional government doesn't have a full statistical data that explains about the levels of damage the war has inflicted on the livestock- cattle sector of the sample woredas in particular and in the whole regional state in general, therefore, the government or any concerned NGOs should make a full scale and detailed research on this sector and others.
- Annual revenues of the households (from sales of their live-cattle and cattle-products) is alarmingly fell down due to the war, therefore, the government or any concerned bodies should either directly or indirectly open alternative opportunities for the society where they can use them as coping mechanisms for their revenues from the sector they engaged in.
- The interviewed sample government officials said that before the war period, many household heads had used to take credits from different available micro-finances for financing their activities and engagements in the cattle sector. However, during the post-war period, no one has the financial capacity to repay their old debts. Therefore, in this case it is clear that let alone to force the farmers to repay their old debts who are currently in need of an emergency aid for their basic survival, the concerned bodies especially the financial institutions should reconsider this and should how they can minimize if not total canceling of those households whose socio-economic status are ravaged by the war.
- Besides, is better to cancel their old debts and support them with further aid and provide them with new credits which could help them in reinstating to their economic (cattle owning) status.
- According to the interviewed sample government officials, currently more than 90% of the farmers couldn't not purchase the fertilizer for their farmlands. Therefore, the government should provide the fertilizer at a very cheaper price that considers the current financial capacities of the farmers. Or the government should sell the fertilizer to the farmers on credit basis and that can be repay after harvesting time.
- The government, NGOs and investors in the regional state and abroad, should devise various alternative business solutions where large size of the youth (with a special privilege to

women) can hier on. In other words, labour - intensive type of investments should be encouraged in order at least to minimize the war effect on the youth's unemployment rates of the region.

- Since the Tigray-war has created relatively more severe socio-economic burdens on women, and as long as the women's role and contributions in the crop-cattle production activities were much higher than that of their male counterparts. Therefore, special affirmative actions should be taken in such a way where women could get the primarily benefits from the opportunities in all socio-economic sectors.

5.3 Implications For Further Studies

When conducting this research, it has some limitations which to some level have affected some results of the findings, as a result, in order to further fill gaps of this research, the following implications for further studies which could be conducted by scholars, are recommended :-

- The total impacts of the war on all socio-economic sectors of the regional state is still not well studied. Hence, a detailed sector-wise research could be conducted that can quantitatively measure the War's impact in more tangible manner.
- Even within the livestock sector, impacts of the War could be quantitatively studied for each and every they of animals. For instance, "Impact of the War on sheep, on goat, on hen, on donkeys, etc....."
- The overall impact of the War could be studied in a way that can measure the total monetary values of the war impact on the livestock sector of the whole regional state.
- Since the women's role and contributions in the crop-cattle production activities is much higher than that of their male counterparts. Therefore,
- a more detailed studies could be conducted about the impacts of the war on socio-economic Status of the women.

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Appendix

QUESTIONNAIRE

Dear respondents,

I am conducting a research thesis as a partial fulfillment for the award of the degree of Master of Arts in Development Studies from Mekelle University.

This is a study aimed at assessing impacts of the Tigray war (started on Nov 04/2020 and lasted for 2 years) on cattle-holding households in North-Western Zone of the Tigray regional state. The specific objectives of the study is: to identify major consequences of the war on the cattles; on households' annual revenue from sales of live cattle and cattle products; on Crop production and soil fertility, and on youth employment in the livestock-cattle sector of the study area. Therefore, this questionnaire is designed for household heads who are currently found in the selected Zone of Tigray.

Therefore, your factual information when filling this questionnaire will help any concerned bodies and stakeholders to identify the impacts and help them for effective intervention. When filling the questionnaire it should be remembered that anonymity is kept to maximum and no need to feel uncomfortable with any information provided.

I hereby kindly request you to fill this questionnaire with a great sense of responsibility.

Thank you in advance for your cooperation!

PART 1: GENERAL INFORMATION OF RESPONDENT

- 1) Woreda Name _____
- 2) Tabia Name _____
- 3) Sex of Household head
A) Female B) Male
- 4) Age of household head (*in years*)
A) 18 to 28 B) 29 to 39 C) 40 to 50 D) 51 to 61 E) above 61
- 5) Main Occupation of household head
A) Farmer B) Trader C) Labourer D) Government employee E) Other
- 6) Educational Status of household head
A) Uneducated B) Primary C) Secondary D) Diploma E) 1st Degree F) Others
- 7) Household size
A) 2 B) 3 to 5 C) 6 to 8 D) above 8
- 8) Religion of household head
A) Orthodox-Christian B) Muslim C) Protestant-Christian D) Catholic E) Other

PART 2: MAIN BODY OF THE QUESTIONNAIRE

- 1) How many cattle did you have exactly before the war broke out on November 04/2020?

Please fill the blank space if you had any of the listed cattle types.

Ox: _____

Cow: _____

Calf: _____

Heifer: _____

Bull: _____

- 2) During the War period, how many of them did you lose? And How?

Please fill the following table if you lost any of the listed cattle types, just put the number of cattle type you lost on the how you lost blank spaces.

Cattle Type	How?			
	Killed	Slaughtered	Raided	Died
Ox				
Cow				
Calf				
Heifer				
Bull				

2.1) If "Killed, Slaughtered , or Raided", who was the perpetrator?

- A) TDF
- B) ENDF
- C) Eritrean Forces
- D) Amhara Militia and Fano
- F) If other, please mention:_____

2.2) If "Died", was the cause because of livestock disease?

- A) Yes
- B) No
- C) I don't know

2.2.1) If "Yes", what was the disease?_____

2.2.2) Why didn't you take it/them to veterinary service center? _____?

3) Before the war period, did you have access to any veterinary services when your cattle got sick?

- A) Yes
- B) No

3.1) If "No", why?_____

4) Before the war period, did your cattle used to get Vaccinations?

A) Yes B) No C) I don't know

4.1) If "Yes", please mention name/s of the Vaccinations: _____

5) After the war, have your cattles got Vaccinations?

A) Yes B) No C) I don't know

5.1) If "Yes", please mention name/s of the Vaccinations: _____

5.2) If, "No", Why? _____

6) About your current cattle condition (if still have any), On average, by how many kilograms do you think that your cattle has decreased their weight for the last 3 years? _____ K.g.

7) What is the total monetary values of your lost cattle (killed, slaughtered , or raided or died) based on current market prices? _____ birr.

8) Before the war period, what was the source of your finance for owning your cattles?

A) Own saving

B) Debt from family or friends

C) Debt from Saving & Credit Associations

D) Others, please mention it _____

8.1) If your answer is either "B or C", so how are you planning to repay your debts if you have not yet paid back? _____

9) Before the war period, did you use to sell any of your live-cattle to market?

A) Yes B) No

9.1) If "Yes", please answer the following.

What was your reason for selling it? _____

on average, how much revenue did you get from sales of your live-cattle during the year before the war broke out? _____ birr.

10) After the war period, have you ever sold any of your live-cattle?

A) Yes B) No

10.1) If "Yes":- please answer the following.

What was your reason for selling it? _____

How much did you sell it? _____ birr.

What market price would it have if it were sold before the war period? _____ birr.

11) Before the war period, and if you had cow/s, how many liters of milk did you use to get from it/them per day? _____

11.1) How much of it and for what purpose did you use the milk? Please the following blank space if any.

_____ liter/per day, for family consumption

_____ liter/per day, for sales, with _____ birr average price.

If for other, please mention it _____

12) If your cow/s is/are one of the war victims, Currently, how many liters of milk do you get from it/them if you have any cow left/escaped the crises? _____ liters.

13) Before the war period if you had any cattle, for what purpose did you primarily use it? You may put your tick mark on more than one of the listed items.

_____ as a draft-power for my farmland ploughing

_____ for renting to plough others' farmland

_____ for crop harvesting activities

_____ for milking

If other, please mention it, _____

14) Are your crop-cattle production tools also damaged or looted due to the war?

A) Yes B) No

14.1) If "Yes", How are going to plough your farmland for the coming *Keremti* season?

15) Before the war period, and if you had any cattle, did you use the cattle's dung as manure for your farmland as soil fertilizer?

A) Yes B) No

15.1) If "Yes", on average by what percent do you think that your crop production would increase? _____ %

16) For the coming *Keremti* season, do you think that your crop production will decrease if you do not use the cattle's dung as manure for your farmland as soil fertilizer?

A) Yes B) No C) I don't know

17) Before the war period, did you buy and use Chemical fertilizer from the government?

A) Yes B) No

17.1) If "Yes", by how many percent do you think that your crop production used to increase?
_____ %

17.2) If "Yes", What was your source of finance for purchasing the chemical fertilizer?

18) Currently, are you planning to buy and use Chemical fertilizer from the government?

A) Yes B) No C) I don't know

18.1) If "Yes", What will be your source of finance for purchasing the chemical fertilizer?

18.2) If "No" Why?

19) Before the war period, and if you had any cattle, did you use to utilize the cattle's dung as:

19.1) as local fuel for own cooking? A) Yes B) No

19.2) as local fuel for sale? A) Yes B) No

19.2.1) If "Yes", on average how much did you earn per day?_____ birr

20) Before the war period, and if you had any cattle, how many youth (be it family member or not) used to be engaged on your crop-cattle production and cattle related activities?

20.1) And, currently, due to the war and war-driven challenges, how many of those youths are now left unemployed from their former crop-cattle production activities? _____

21) List and describe the roles of women in your household at the cattle products and cattle related activities?

22) Among members of your household, do you think that the women are relatively the most affected once by the war in relation to the cattle products and cattle related employments and benefits?

A) Yes B) No C) I don't know

22.1) If "Yes", how? please explain it

23) What coping mechanisms are you utilizing to fill your revenue gaps incurred from the cattle products and cattle related incomes due to the war effect?

24) Finally, please write anything you want say, recommend, etc relating to the war impacts on your overall livelihood or whatever you feel

Thank you for your cooperation !

IN-DEPTH INTERVIEW

PART 1: GENERAL INFORMATION OF RESPONDENT

- 1) Woreda Name _____
- 2) Sex of respondent?
A) Female B) Male
- 3) Age? _____ years
- 4) Governmental position of respondent in the Woreda _____
- 5) Main Duties and responsibilities of the government official respondent:

- 6) Educational Status
A) Primary B) Secondary C) Diploma D) 1st Degree E) Others

PART 2: MAIN BODY OF THE INTERVIEW

- 1) How do you explain the general impact of the war on the livelihoods of your Woreda?

- 2) Could you please list the sectors based on the war's impact severity?

- 3) Could you please explain the impact of the war in your Woreda sector wise?

- 4) In more detailed manner, could you please explain the impact of the war specifically on the Cattle in your Woreda?

5) During the War period, how many of the cattle were lost? And How? *Please fill the following table if your Woreda has lost any of the listed cattle types, just put the number of cattle type lost on the how they are lost blank spaces.*

Cattle Type	How?			
	Killed	Slaughtered	Raided	Died
Ox				
Cow				
Calf				
Heifer				
Bull				

6) For those that are either Killed, Slaughtered or Raided, by whom are they committed? You may rank (as: 1,2,3,....) based on frequency.

- ___ TDF
- ___ ENDF
- ___ Eritrean Forces
- ___ Amhara Militia and Fano
- ___ If other, please mention: _____

7) For those that are "Died", was the cause because of livestock diseases?

- A) Yes B) No C) I don't know

7.1) If "Yes", please list names of the diseases.

8) Before the war period, were there any Veterinary clinic centers in your Woreda?

- A) Yes B) No C) I don't know

8.1) If "Yes", Please explain about the veterinary service centers availability, access, vaccines and medicine issues, and other types of services they used to provide for the communities' livestock particularly Cattle sector.

Out of the total cattle population in your Woreda, how many were vaccinated? ____

8.2) If "No", How or/and Where did the communities use to get veterinary services for their Cattle when faced livestock diseases?

9) Could you please explain the impact of the war on the Veterinary clinic centers (if you had at least one) in your Woreda?

9.1) Currently, what is the level of functionality of the Veterinary clinic centers (if you had at least one) in your Woreda? And, please list what are missing for full functionality

10) Post the War period, how many cattle are died because of livestock disease in your woreda?

11) How much do you think is the total monetary values of the lost cattle (killed, slaughtered , raided or died) in your Woreda based on current market prices? _____ birr.

12) Could you please explain in details how your Woreda's Cattle-products (meat, milk, skin, manure, dung, etc) are affected? Explain it from the following perspectives:

Cattle-product Production level _____

Cattle-product Consumption level _____

Cattle-product market prices _____

And, others: _____

13) Before the war period, how many households have taken credits for financing their cattle, cattle-products and cattle-related activities? _____

13.1) And, post the war period, how do you think that they can repay those debts for those whose cattle and cattle-products are directly and indirectly affected by the war?

14) Please list and explain about crop-cattle production tools damaged or looted due to the war in your Woreda?

14.1) And, How are the governments or/and other concerned bodies, going to help those households in ploughing their farmland for the coming *Keremti* season?

15) Currently, for the coming *keremti* season, how is the government planning to provide Chemical fertilizers for the affected households? And, how are the households going to finance the cost for buying this?

16) Before the war period, how many of the youth in your Woreda had been engaged in crop-cattle production and cattle related activities? _____

16.1) And, particularly, how many of the Women were engaged in the sector? _____

17) Currently, due to the war and war-driven challenges, how many of those youths are now left unemployed from their former crop-cattle production activities? _____

17.1) And, particularly, how many of the Women are left unemployed from the sector due to the war? _____

18) In your Woreda, do you think that women are relatively the most affected once by the war in relation to the cattle products and cattle related employments and benefits?

- A) Yes B) No C) I don't know

18.1) If "Yes", how? please explain it

19) What coping mechanisms the governments (regional and federal) are utilizing or planning to use in order to fill revenue gaps of the affected households that were used to be obtained from the cattle-products and cattle related incomes due to the war effect?

20) Finally, please forward anything you want to say, recommend, etc relating to the war impacts

.....

Thank you for your cooperation !