



The Impact of the Northern Ethiopian Tigray War on Hypertensive Patients' Follow up: A Brief Quantitative Study

Abraha Hailu¹, Kibreab Gidey^{1*}, Dawit Zenebe², Ephrem Berhe¹, Meskelu Kidu¹, Samuel Berhane¹, Hailemariam Gebrearegawi³, Hagazi Tesfay¹, Desilu Mehari⁴, Hagos Kahsay¹, Senait Alemayehu², Kidanu Gebremariam², Tesfay Gebregziabher⁵

¹Department of Internal Medicine, Ayder Comprehensive Specialized Hospital, Ethiopia

²Department of Epidemiology, Mekelle University, Ethiopia

³Department of Pharmacy, Mekelle University, Ethiopia

⁴Department of Health Studies, Ayder Comprehensive Specialized Hospital, Ethiopia

⁵Department of Pediatrics, Ayder Comprehensive Specialized Hospital, Ethiopia

ABSTRACT

Background: A tragic and brutal war has been ongoing in Tigray, northern Ethiopia since November 2020. More than 70% of health facilities had been dysfunctional. The condition of the hypertensive patients follow up/care and other non-communicable disease is not studied since the war started.

Material and methods: This study was conducted in six zones of Tigray from July 03 to August 5, 2021. Health facilities were randomly selected and data on patient's follow up of pre-war period (September 2020-October 2020) as well as the subsequent 8 months war period (November 2020-June 2021). Data were collected using a check list. The number of patients who had visits during pre-war and the 8 month war period were compared to assess the impact of the war.

Results: Pre-war and post war data from 46 health facilities in Tigray region (31 health centers, 9 primary hospitals and 6 general hospitals) was collected and analysed. There were 2565 average monthly hypertension visits to health facilities before war period which dropped to 1211 during the war period, a 52.7% reduction. There was reduction of hypertension visits across all health facilities; with health centres 51.2% and hospitals a 53.5% reduction. Eastern and North West zone health facilities had worst impact of the war as both showed >85% reduction in clinic visits. The impact of the war was highest in rural areas especially remote areas than urban areas. There was no available data from western Tigray zone and some other zones' health centres and hospitals due to war destructions. The impact of the war on hypertensive patients could even be higher in these areas.

Conclusion: Due to the war, the care of hypertension had significantly decreased in Tigray. Reduction in the number of hypertensive patients follow up visits and hence care would lead to an increase in short and long term morbidity/mortality from stroke, acute coronary syndrome, heart failure and sudden cardiac death among other consequences. We recommend humanitarian/development agencies and other organizations to consider morbidity from hypertension and all other chronic non-communicable diseases when planning.

Keywords: Tigray war; Northern Ethiopia; Hypertension; Follow up visit

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Corresponding author Kibreab Gidey, Department of Internal medicine, Ayder comprehensive specialized hospital, Ethiopia, E-mail: kibreabgidey@yahoo.com, kibreabgidey55@gmail.com

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ABBREVIATIONS

Ayder Comprehensive Specialized Hospital (ACSH); Communicable Diseases (CD); Institutional Review Board (IRB); Mekelle University (MU); Non-Communicable Diseases (NCD); Non-Communicable Diseases and Injuries (NCDI); World Health Organization (WHO).

INTRODUCTION

War has a devastating impact on the physical, social, psychological and economic wellbeing of human being. Populations suffer much morbidity during, and in the aftermath of armed conflict because of damage to the health supporting infrastructure of society, including systems to provide medical care, safe food and water, transportation, communication, and electrical power among others [1].

Tigray is a region in northern Ethiopia, with an estimated population of 7 million [2]. A tragic and brutal war has been waging in Tigray since 4 November 2020. More than 70% of health facilities had been either deliberately vandalized or looted [3]. Promoting equitable health care service is crucial to maintain healthy and productive citizen/generation. According to WHO convention health care service is basic human right and health care service should be protected during war [4, 5]. Dysfunction of health care services results in lack of access to a basic service which leads to complications and death. The War in Tigray is expected many patients with both communicable diseases and non-communicable diseases like Hypertension by limiting their access to health care facilities for follow up and essential anti-hypertensive drugs as this is what has been witnessed in other wars globally [4-7].

Tigray health facilities at different levels were delivering service to the public with different non-communicable diseases in a way to address their growing need for early diagnosis and intervention [8,9]. Hypertension is one of the common non-communicable diseases which need appropriate follow up and treatment. Hypertension is a major public health problem that affects more than 1 billion people worldwide, of which 75% are estimated to live in developing countries including Africa [10–13]. Over the last few years, the prevalence and the health impact of hypertension have been increasing in Tigray, Ethiopia. Based on the report of Ethiopia Non-communicable Diseases and Injuries (NCDI) Commission, the prevalence of hypertension on institution based survey was 21%, Community based only urban 26.5%, Community based both urban and rural 15.8% and STEPs survey 15.8%.

Hypertension prevalence has been increasing and is the leading risk factor for Non communicable diseases. Health facilities in Tigray were delivering Hypertension care at different levels of capacity to prevent hypertension related complications such as stroke, myocardial infraction, heart failure and other complications. Prior to the war, Tigray had three functional tiers of health system with two tertiary hospitals delivering referral service, secondary care service delivered by 16 general hospitals and primary health service given by 29 primary hospitals, 233 health centers and 712 health posts. However after the war broke out, 89% of ambulances, 82.5% health centers, 62.5% hospitals and 100% of (712 health posts) were not deliv-

ering any form of service.

The condition of the hypertensive patients' follow up and care is not yet known since the war started. This study assessed the status of the follow up of hypertensive patients in Tigray health facilities amid the ongoing war. It is believed that the findings will have significant impact in estimating the degree of damage in hypertension health care services in Tigray. Furthermore, this will help health care professionals, government bodies, international communities and other stake holders to draft strategies to overcome the ongoing challenges and to resume the basic hypertension care to patients in Tigray.

METHODS

Study Area and Setting

Tigray is located in the northern Part of Ethiopia bordered by Eritrea in the North and Sudan in the west. Of the seven zones in Tigray, this study was conducted in six zones from July 03, to August 5, 2021 as the western zone was under occupation. Prior to the war, the Tigray health sector had two referral hospitals (tertiary), 14 general hospitals (secondary), and 24 primary hospitals, 224 health centres as well as 741 health posts under the primary health care unit. There were also more than 750 private facilities including hospitals, clinics, pharmacy, and drug vendors.

Study Design and Population

A facility based cross sectional study was conducted among health facilities.

Health Facility Sampling Technique

Southern, South East, Mekelle, Eastern, Central and North West zones except west zone were included in the study. Two health centers and one primary hospital representing the primary health care unit and one general hospital (secondary health care) from the selected woreda were randomly included in this study.

Data Collection Procedure and Data Quality Control

A checklist that fits to answer the research question of health service disruption among hypertension patients was developed by the research team members. The checklist was conceptualized based on scientific hypothesis which is related to access of healthcare among hypertension patients during the war time.

A rapid retrospective registry assessment was conducted on 71 health facilities in Tigray (54 Health Centers, 11 primary hospitals and 6 general hospitals). Reports and registration books were checked for number of visits of hypertensive patients 2 months before the war and 8 months into the war.

One day training was given to data collectors and supervisors with health backgrounds. People with research skill and experience supervised the data collection process.

The completeness and consistency of the data were checked during supervision. Of the research team, two senior members from Mekelle University have been involved to guide the overall situation of the data collection process. The senior supervi-

sors conducted an immediate supervision at the central sites in majority of the districts. Furthermore; they meet with the field supervisors, briefly discuss the progress, and convey some important messages which had contributed in improving the data quality. The immediate field supervisors play major role in facilitating the overall data collection and ensure the data quality. Furthermore, transferring essential and timely messages from one field supervisor to another was used as a means of communication in the absence of total communication block out in Tigray.

Operational Definitions

Visit: if a hypertensive patient has attended a health institution for follow up services, treatment, medical advice or any related service.

Pre-war period: the months of September and October, 2020 were considered as pre-war period where as from November, 2020 to June, 2021 were considered as war period.

Urban health facilities health facilities in larger cities of Tigray like Mekelle, Axum, Adigrat, Maichew, Alamata and Mekoni.

Difference in average number of visits (%): average number of visits during the pre-war in % average number of visits during the war in %.

Zone: second largest administrative unit next to region.

Data Analysis

Data were cleaned prior to data analysis and analysed using Microsoft excel. Descriptive statistics using frequency, proportions, table and graph were calculated. Based on the analysis, the number of hypertension patients who had visits during pre-war and the war period were compared using frequency and percentages.

RESULTS

Characteristics/Description of Health Facilities

Out of the selected 71 health facilities (54 Health Centers, 11 Primary hospitals and 6 General hospitals), only data of 46 (64.8%) health facilities (31 health centers) (67.4%), 9 prima-

ry (19.6%) and 6 general hospitals (13.0%) which had baseline data of hypertension services on pre-war and during war were included for analysis. From this 35(76.1%) were rural health facilities where as the remaining 11(23.9%) health facilities were urban.

Hypertensive Patients’ Follow ups/Visits Aggregated by Zone during Pre-war and War Period in Hospitals of Tigray

Compared to the pre-war period, the number of hypertensive patients decreased sharply on almost all zones in the beginning of the war. This trend continued during the subsequent 8 months. However, southern zone had little decrement in comparison to the rest (Figure 1).

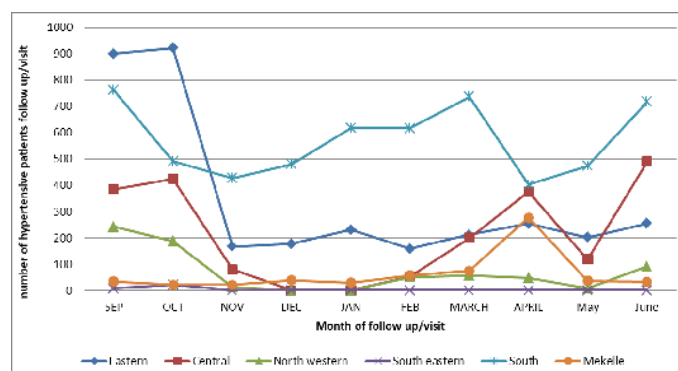


Figure 1: Trend of hypertensive patients’ follow-up pre-war and during war in hospitals, September-2020 – June-2021

Average Number of Hypertensive Patients’ Follow up/Visits Pre-war and During the War in Hospitals of Tigray, Northern Ethiopia

During the pre-war period, an average of 15 and 1361 hypertensive patients visited south eastern and eastern zone hospitals, respectively. However, during the war period, no one visited south eastern zone and 207 patients visited eastern zone. This implies that 100.0% and 84.8% decline in these hospitals. Similarly, the decrement was seen in all zonal selected hospitals except in Mekelle, where we have a 60.0% increment (Table 1).

Table 1: Average number of hypertensive’s visit pre and during-war in hospitals, September 2020-June 2021.

Zone	Average number of hypertensive patients’ follow up/ visits during pre-war and the war period in hospitals of Tigray		
	Before war (baseline), n (100%)	During war, n (%)	Difference in average number of visits in %
Eastern	1361	207(15.2%)	-84.80%
Central	405	164(40.6%)	-59.40%
North western	215	33 (15.4%)	-84.60%
South eastern	15	0(0%)	-100.00%
Southern	627	559(89.2%)	-10.80%
Mekelle	45	71(159.8%)	59.80%
Total	2199	103 (47.0%)	-53.00%

Hypertensive Patients' Follow up/Visits by Zone During Pre-war and War Period in Health Centres of Tigray

The total number of visits of hypertensive patients in selected health centres of Tigray showed a remarkable decline during the war compared to the pre-war period in all zones of the region. This decrement was striking in the first fourth months of the war. However, in the next four months, a very slow progress was observed. But it was never close the pre-war (baseline) (Figure 2).

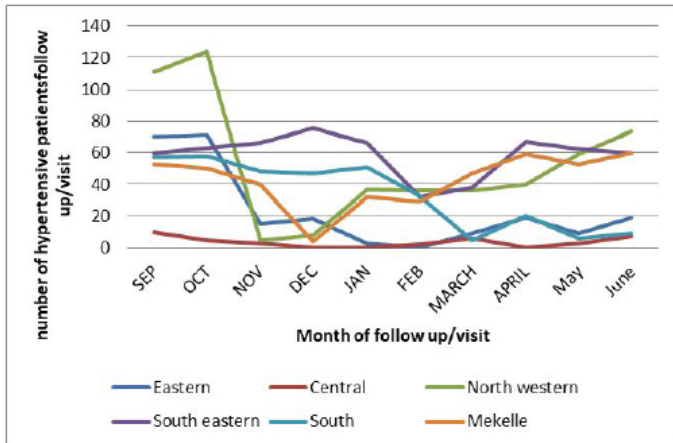


Figure 2: Trend of hypertensive's follow up/ visit pre-war and during war period in health centres, September, 2020 – June, 2021.

Average Number of Hypertensive Patients' Follows up/Visits Pre-war and During the War in Health Centres of Tigray

The monthly average of hypertensive patients who had visited selected health centers of eastern zone in pre-war period was 106. However, an average of 12 hypertensive patients visited the same health centres during the war showing 89.1% decrement. Furthermore, it is observed that the two prominent discrepancies of patient visits are in Eastern and North Western zones. The overall discrepancy in number of visits decreased by 51.2% during the war time compared to the pre-war time (Table 2).

Table 2: Average number of hypertensive patients' visit before and during war in health centres, September 2020-June 2021.

Zones	Before war (baseline), n (100%)	During war, n (%)	Difference in average number of visits in %
Eastern	106 (100%)	12 (10.9%)	-89.10%
Central	8 (100%)	3 (35%)	-65.00%
North western	118 (100%)	37 (13.4%)	-86.60%
South eastern	92 (100%)	58 (63.8%)	-36.20%
Southern	58 (100%)	27(47.6%)	-52.40%
Mekelle	78 (100%)	41 (51.9%)	-48.10%
Total	366 (100%)	177 (48.8%)	-51.20%

Hypertensive Patients' Follow up/Visits Aggregated by Location of Health Facility during Pre-

war and War Period in Health Facilities of Tigray

The total number of visits of hypertensive patients showed remarkable downfall during the beginning of the war in both urban and rural health facilities compared to the pre-war period. In urban health facilities, the total number of follow up visits increased during the course of the war and in June we see an all-time high. On the contrary, in the rural health facilities, it remained low throughout the time (Figure 3).

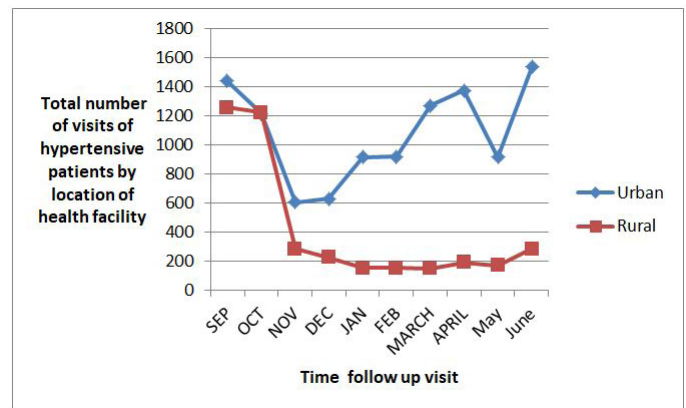


Figure 3: Trend of hypertensive patients' follow up/ visits in health facilities of Tigray, September 2020-June 2021.

DISCUSSION

In developing countries like Ethiopia, there is an epidemiologic transition from communicable disease to non-communicable diseases (NCDs), like hypertension [14]. The prevalence of hypertension among Ethiopian adult population was common (15.6%) even using the previously used cut-off >140/90 according to the steps survey done in 2015 [15]. Hypertension and other NCD care will be highly affected by the devastating wars like what happened in Tigray. So, assessing the impact of the war on hypertension follow up and other NCDs would be important as the effect of the war is expected to be high. Across all health facilities, whether health centres or the hospitals, a significant reduction was observed in the number of patients who visited for hypertension care.

The impact of the war was staggeringly evident with the monthly average hospital and health centre visits, where there were around the 2565 monthly average patient visits that dropped to 1211 during the war in the region. This is a reduction of 52.8% of the average monthly combined hospital and health centres visits in the region's hypertension follow up. Although hypertension prevalence was common in Ethiopia according to the STEPS survey, the number of people on follow up was very low during the war even if it was below par before the war too [16]. This may underestimate or overestimate the actual degree on ground, but still it shows how gravely hypertension follow up and treatment was affected in the region. Lacking Data from some of the zones in Tigray, (e.g. western Tigray zones) were not studied, reason being either data was not available or could not be collected. However, the authors do believe this would not prevent our study from showing the grave reduction of hypertension care during the war.

Even if the reduction of monthly health facility visit was staggering across all studied zones of Tigray, some zones were even more harshly hit. Eastern zone and North West zone showed

the highest reduction of health facility monthly visit among hypertension patients. Eastern zone was also harshly hit with reduction of -89.1% in health centres and -84.8% in hospitals. In central zone, the total degree of reduction is estimated to be higher as there was no data from the highly impacted health centres and all the data included was only from primary hospital. This shows all zones and health facilities were affected by this war/conflict in the region. There was no data from western Tigray zonal hospital facilities and the impact can be higher and needs study in the future.

The overall reduction of hypertension follow up was highest among non-urban health facilities as compared to the urban health facilities. The hypertension follow up showed the lowest reduction in mekele zone; the main reason can be the vast displacement of peoples from all over Tigray to relatively safer larger cities like mekele and relative lesser destruction of health facility in mekele. The higher impact seen in non-urban areas than urban shows the worst impact of the war was in the remote areas and rural areas. This is in line with a study that showed only 27.5% of hospitals and 17.5% of health centres were functional in the first six months during the war [17].

The decrement in hospital visit was maximal in the months of January and February, and remained well below the pre-war level until the month of June. Data were unavailable from some health institutions; the main reason being they were not functional during the data collection period and during the war.

Assessing the number of monthly visits does not show the full impact of the war on hypertension care as the quality of care would be affected too. During the war, there were transportation difficulties, shortage of availability of different classes of antihypertensive drugs, and the lack of health personnel due to displacement and other reasons might contribute to the poor access and poor quality of care. After the onset of the war, it is reported that more than 50% of members of the regional health work force were unable to report to their working institutions. War affects the economy of the general population, with which ability to afford buying medications would also be a problem. This had been documented in previous studies done in Iraq between 2014 to 2017, participants reported consistent barriers to NCD care during the war period, including drug shortages, in security and inability to afford privately sold medication. Similar other large studies have revealed armed conflict is associated with an increased coronary heart disease, cerebrovascular and endocrine diseases, in addition to increased blood pressure, lipids, alcohol and tobacco use.

In addition to lack of drug supplies, patient's adherence to life style modification will be also be poor due to psychological distress, displacement and economic crises. Medical and psychological complications that could potentially follow from this lack of proper hypertension follow up and care would warrant further study.

LIMITATIONS

The study did not include some zonal health centres like western zone due to occupation and ongoing war as well as primary hospitals from central and south zones due to destruction of the facilities data. It also did not include the referral hospitals including Ayder and Axum hospitals and private institutions.

The main reason for this unavailability of data was partly due to the destruction of the health facilities. However, we believe, this study is still important in showing the grave consequences of the Tigray war on hypertension follow up and treatment. This study also might not show adequately the impact of the war on the quality of the hypertension care in the region. The nature of the study (retrospective collection of data) could also have its own inherent limitations on data Quality. For example, data on number of patients who actually received the type of available antihypertensive drugs and those drugs that were lacking in each health facility is not studied. Also, the capacity of diagnostic facilities in each health institution is not studied.

CONCLUSION

Due to the war, overall the care of hypertension had hit rock bottom in Tigray and the degree of untreated hypertension, uncontrolled hypertension and unknown hypertension with its consequence could be highly increasing due to the direct and indirect impact of the war. Conflicts are associated with an increase in direct and indirect increment of morbidity and mortality and hence reduction in the number of hypertensive patients follow up visits and hence care which is evident in our study would lead to an increase in short and long term morbidity/mortality from stroke, acute coronary syndrome, heart failure and sudden cardiac death among other consequences. Hence, the estimates of various complications like stroke, myocardial infarction, heart failure, renal diseases and sudden cardiac death due to the consequences of uncontrolled hypertension during the war period is expected to be high; and needs further study.

We recommend humanitarian development agencies and other organizations to consider morbidity from all chronic non-communicable diseases like hypertension when planning relief/aid programs. This should include reconstruction of the breakdown in health facility infrastructures and health systems with its workforce to deliver low resource preventative and intervention efforts to prevent further hypertension related morbidity and mortality.

The transcripts generated from the research study are not publicly available due to the sensitive nature of the topic.

AUTHOR'S CONTRIBUTION

Public health department conceived the research project with TG taking the leading. AH coordinated assembly of the authors. EB, DM, HT and HK prepared the background and literature reviews. DZ lead the team consisting of MK, SA, KG and HG who worked in data extraction, analysis and writing of the results. KG* along with SB wrote the discussion and interpreting the results. All the authors held a meeting and revised drafts of the manuscript. KG* and AH wrote the first draft, revised subsequent drafts and prepared the manuscript. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated. All authors read and approved the final manuscript.

COMPETING INTERESTS

Authors declare no competing interests.

ETHICS APPROVAL

Ethical clearance was obtained from Mekelle University College of Health Science Institutional Review Board. Additional support letter from Tigray Health Bureau was approved before actual data collection. The research was carried out in accordance with the declaration of Helsinki.

CONSENT TO PARTICIPATE

Not applicable.

DATA AVAILABILITY STATEMENT

The datasets are available from the corresponding author on reasonable request.

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