




# War-related sexual and gender-based violence in Tigray, Northern Ethiopia: a community-based study

Girmatsion Fisseha,<sup>1</sup> Tesfay Gebregzabher Gebrehiwot,<sup>2</sup> Mengistu Welday Gebremichael,<sup>3</sup> Shishay Wahdey,<sup>1</sup> Gebrekiros Gebremichael Meles ,<sup>1</sup> Kebede Embaye Gezae ,<sup>1</sup> Awol Yemane Legesse,<sup>4</sup> Akeza Awealom Asgedom,<sup>1</sup> Mache Tsadik,<sup>1</sup> Abraha Woldemichael,<sup>1</sup> Aregawi Gebreyesus,<sup>1</sup> Haftom Temesgen Abebe,<sup>1</sup> Yibrah Alemayehu Haile,<sup>5</sup> Selome Gezahegn,<sup>6,7</sup> Maru Aregawi,<sup>8</sup> Kiros T Berhane ,<sup>9</sup> Hagos Godefay,<sup>5</sup> Afework Mulugeta<sup>1</sup>

**To cite:** Fisseha G, Gebrehiwot TG, Gebremichael MW, *et al.* War-related sexual and gender-based violence in Tigray, Northern Ethiopia: a community-based study. *BMJ Glob Health* 2023;**8**:e010270. doi:10.1136/bmjgh-2022-010270

**Handling editor** Seye Abimbola

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/bmjgh-2022-010270>).

Received 30 July 2022  
Accepted 1 July 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

**Correspondence to**  
Professor Kiros T Berhane;  
[kiros.berhane@columbia.edu](mailto:kiros.berhane@columbia.edu)

## ABSTRACT

**Introduction** Sexual and gender-based violence (SGBV) during armed conflicts has serious ramifications with women and girls disproportionately affected. The impact of the conflict that erupted in November 2020 in Tigray on SGBV is not well documented. This study is aimed at assessing war-related SGBV in war-affected Tigray, Ethiopia.

**Methods** A community-based survey was conducted in 52 (out of 84) districts of Tigray, excluding its western zone and some districts bordering Eritrea due to security reasons. Using a two-stage multistage cluster sampling technique, a total of 5171 women of reproductive age (15–49 years) were randomly selected and included in the study. Analysis used weighted descriptive statistics, regression modelling and tests of associations.

**Results** Overall, 43.3% (2241/5171) of women experienced at least one type of gender-based violence. The incidents of sexual, physical and psychological violence, and rape among women of reproductive age were found to be 9.7% (500/5171), 28.6% (1480/5171), 40.4% (2090/5171) and 7.9% (411/5171), respectively. Of the sexual violence survivors, rape accounted for 82.2% (411/500) cases, of which 68.4% (247) reported being gang raped. Young women (aged 15–24 years) were the most affected by sexual violence, 29.2% (146/500). Commonly reported SGBV-related issues were physical trauma, 23.8% (533/2241), sexually transmitted infections, 16.5% (68/411), HIV infection, 2.7% (11/411), unwanted pregnancy, 9.5% (39/411) and depression 19.2% (431/2241). Most survivors (89.7%) did not receive any postviolence medical or psychological support.

**Conclusions** Systemic war-related SGBV was prevalent in Tigray, with gang-rape as the most common form of sexual violence. Immediate medical and psychological care, and long-term rehabilitation and community support for survivors are urgently needed and recommended.

## INTRODUCTION

Sexual and gender-based violence (SGBV) is a worldwide phenomenon without any

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Conflict-based sexual and gender-based violence (SGBV) is known to have serious immediate and long-term adverse societal impact with women and girls affected the most.

### WHAT THIS STUDY ADDS

⇒ This study provides first-of-its-kind objectively and carefully collected primary data on the scale and level of SGBV in the Tigray region, Northern Ethiopia, as a result of the conflict that erupted in November 2020.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ By providing carefully collected evidence on the level and impact of SGBV in the Tigray region, the study findings will help policy makers develop models of working with women who have experienced SGBV in the context of war, on establishing accountability for the atrocities committed and in planning for the unprecedented medical, psychological and rehabilitation needs of SGBV survivors.

geographical, cultural, social, economic, ethnic or other boundaries. It is a form of violence that is inflicted on the basis of gender differences.<sup>1</sup> War-related SGBV has significant and severe adverse social impact, both during and the postconflict period. SGBV against women is often committed on a massive scale during wars and conflicts. That is, women and girls are disproportionately targeted in conflicts, systematically raped, intimidated, sexually and physically abused, forced into unwanted pregnancies and/or killed.<sup>2–6</sup>

War-related sexual and human right abuses are still prevalent at the global scale. They mostly occur during conflicts in low-income

(especially in Africa) and some high-income countries in general.<sup>7–15</sup> Independent studies in many countries including in Africa have reported prevalence of sexual violence ranging from 2.6% in the current war crisis in Ukraine (2.6%) to 21.3% in South Sudan during the civil war between 2005 and 2011.<sup>8–15</sup> However, sexual violence in most conflicts has not been well assessed for several reasons including prolonged periods of conflict, as well as sociocultural and other complex issues, especially in low-income countries.<sup>7</sup>

Most sexually abused women suffer emotional breakdowns, especially those from the rural communities where the moral codes are strict. Raped women do not routinely report the incidents for fear of family alienation and stigmatisation by their communities. In low-income countries, raped daughters are often disclaimed by their parents, and raped wives are rejected by their husbands.<sup>16</sup>

Many impregnated women, after rape, undergo 'backstreet' abortions that put their lives at risk. Some cannot even look at their babies. Still others give them away.<sup>5 6</sup> During a conflict, men and women often lose their lives from various causes and are likely to be tortured and abused in various ways for biological, psychological or socio-economic reasons. While relatively more men are killed during wars, women often experience violence, forced pregnancy, abduction, sexual abuse and slavery. The harm, silence and shame women experience because of war is pervasive; with their redress, almost non-existent. The situation of women in armed conflicts has been systematically neglected<sup>5 17</sup> in taking concrete actions, although the United Nation has designated SGBV as war crimes in Article 8 of the Rome Statute of the International Criminal Court.<sup>18</sup>

On 4 November 2020, war erupted in the Tigray region of Ethiopia following years of growing tensions between the federal government of Ethiopia and the regional government of Tigray in Ethiopia. The causes and development of the war in Tigray were highly complex and multidimensional including the involvement of both internal and external parties' interests.<sup>19</sup> A complete account and analysis of the cause of the conflict is beyond the scope of this manuscript. During the war, several parties were involved with the Tigray regional special forces on one side and allied forces such as the Ethiopian National Defence Forces Amhara regional special armed forces and Amhara militias, and the Eritrean Defence Forces on the other side.<sup>20 21</sup>

The war in Tigray that erupted in the beginning of November 2020 has resulted in a massive humanitarian crisis. Preliminary reports have shown that Tigrayan women and girls have experienced deliberate and organised widespread war-related SGBV, in which some were subjected to severe violence including gang-raping, and the insertion of foreign objects to their reproductive organs.<sup>20</sup> According to the report of the Human Rights Watch (HRW), 2204 survivors sought services for sexual violence at health facilities across Tigray from November 2020 through June 2021.<sup>21</sup> This figure is more likely to

be under-reported owing to the fact that many of the victims had poor healthcare access and some of them are less likely to seek healthcare for fear of stigmatisation. Besides, many of the health facilities were non-functional because the war has eroded the more than two decades previous investment and progress in the health systems and resulted in 70% of the health institutions either destroyed or their status could not be ascertained.<sup>20 22</sup>

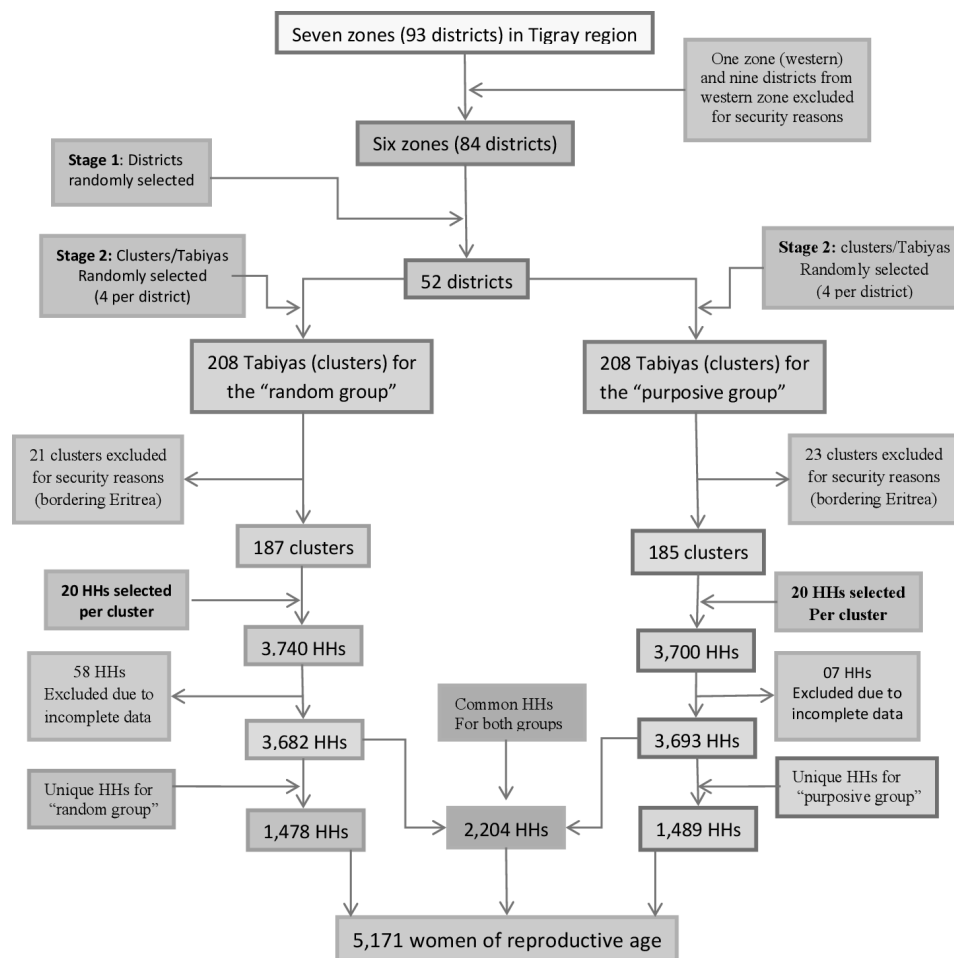
Furthermore, a recent survey report revealed that only 17.5% of the health centres were functional after 6 months of the war.<sup>22</sup> Most of the available evidence on SGBV in Tigray during the conflict period was based on reports from the limited functioning health facilities and hence it is likely to be unrepresentative. The scale and burden of the war-related violence at community level in Tigray is also not comprehensively known.<sup>21</sup> Thus, the purpose of this study was to determine the extent, and distribution of the SGBV and its impact on survivors using community-level survey during the first round of the active war period of the war in Tigray. The findings of this study are anticipated to be used as baseline data on the burden, severity and factors of the SGBV during the war period in Tigray, Ethiopia. Besides, the findings contribute valuable data to humanitarian agencies, as well as national and local authorities in providing a comprehensive medical and psychological support to survivors, and in reducing the burden of SGBV against women and girls during wars and conflicts in Tigray and elsewhere. The findings will also provide guidance on the needs for, and/or availability of, health services for survivors of SGBV, including further intervention for establishing medical and psychological services, continuous follow-up and support for survivors.

## METHODS

A community-based survey was conducted in six zones of Tigray, after the Eritrean, Ethiopian and Amhara forces left Mekelle, the capital of Tigray, Ethiopia. By 28 June 2021, the Regional Government of Tigray restored its administrative control of most parts of Tigray. After the withdrawal of the allied forces, there was a relatively reduced active conflict in the parts of Tigray under the control of the Regional forces of the Government of Tigray. Thus, the survey was conducted during 4–20 August 2021 immediately after the withdrawal of the allied forces from most parts of Tigray. The western zone of Tigray and the districts bordering Eritrea were not included due to security reasons.

Women of reproductive age (ie, 15–49 years) recruited from the study communities were included as primary respondents in this survey. Information on girls under 15 years and women above 50 years of age were also collected from the primary respondents and is separately presented in this study. The period of the SGBV incidents covered from 4 November 2020 to 28 June 2021.

Multistage cluster sampling was used to select women of reproductive age from selected households (HHs).



**Figure 1** The sampling framework for the study. HHs, Households.

Tabiya/Kebelle (smallest administration unit) was considered as a cluster. A total of 52 districts out of 84 districts in the 6 zones of Tigray were randomly included in the study. The 52 districts included in this study accounted for 64.4% of the Tigray population. From each of these 52 districts, 4 Tabiyas/clusters were randomly selected and from each cluster, 20 HHs were randomly selected making a total sample size of 4160 HHs. If a selected HH had multiple women of reproductive age, only one woman was randomly selected for the interview.

Taking the prevailing situation on the ground into consideration, two sampling approaches (random and purposive) were designed with their own sample sizes. In the random approach, the list of all the Tabiyas/clusters in the district was used as a sampling frame and four Tabiyas/clusters were selected randomly. However, in the purposive approach, the Tabiyas/clusters were grouped into moderately and severely war-affected ones. The list of the severely affected Tabiyas/clusters was used as a sampling frame and four severely affected Tabiyas/clusters were randomly selected (figure 1). ‘Random group’ and ‘purposive group’ was defined based on the information obtained from the local administrative authorities at the field level related to war situation of the context. The ‘purposive group’ was composed of those clusters which

sustained repeated fighting in their communities, longer duration of stay of the combatants and harassment among the community members in the context. However, the ‘random group’ involved randomly selected clusters irrespective of the active war, and other characteristics of the prevailing situation. At the beginning of sampling, we planned to select four distinct Tabiyas/clusters per district from each group. However, due to the availability of only few Tabiyas/clusters in some districts, some Tabiyas/clusters were selected in both groups. Due to this situation, HHs data from a subset of Tabiyas/cluster were shared by both groups. A total of 3693 HHs were included from the purposive group and of these, 1489 HHs were unique to the purposive group. From the random group, 3682 HHs were randomly selected of which 1478 HHs were unique for random group. Thus, 2202 HHs were included in both groups. During the preliminary stage of the analysis, it was observed that there were no significant differences in sexual violence/rape between the two groups (online supplemental table 1). Thus, the findings reported in this study are the results generated from the merged data of 5171 HHs. Additionally, the study included SGBV incidents on other members of the HH (including underage girls, men and old age women) based on the report of the index woman in each HH interviewed. Then, detailed

interviews were conducted with each reported HH member about the types of violence and consequences. Generally, the dataset for the final analysis included a total of 5171 women of reproductive age group (15–49 years), 1196 men, 53 girls aged <15 years and 227 women aged 50 years and older.

The outcome variables of this study were types of SGBV, and consequence of SGBV. For modelling the SGBV outcome variables like age, residence, religion, occupation, education, reproductive health characteristics, family member violence and health-facility utilisation were used as explanatory variables. For the consequence of SGBV, types of SGBV, age and education were used as explanatory variables.

### Data collection, management and analysis

The data collection and field coordination process was challenging due to the ongoing war. Furthermore, all services including telephone network, electricity and transportation were not available in Tigray because of the war and siege.<sup>21</sup> For these reasons and other security-related issues, the application of electronic data collection tools including the use of mobile applications was impossible. Thus, we used a standard and validated interviewer-administered paper-based questionnaire to collect data following adoption of the tool from those used in WHO multicountry study<sup>23</sup> (online supplemental file 1). The questionnaire was translated from English to Tigrigna (the local language) and then back translated to English by another translator to ensure consistency of the tool in data collection. The questionnaire consisted of various sections that enable the collection of data related to sociodemographic, reproductive health characteristics, SGBV, consequences, coping mechanism, self and family member violence and health-facility utilisation by victims.

We recruited two supervisors per district with educational level of MSc and above from the College of Health Sciences of Mekelle University, Tigray Health Research Institute and Tigray Regional Health Bureau. They were trained on the objectives of the study and the administration of the tool for 5 days in Mekelle, capital of Tigray. Transportation was arranged for field work 1 week ahead of the data collection period to facilitate the recruitment of competent female health extension workers (HEWs) for the data collection, to develop a map of each selected cluster and to prepare list of the HHs in the selected clusters. Two female HEWs were used as interviewers (data collectors) at each selected Tabiya/cluster; and a total of 416 HEWs participated in the 52 districts. HEWs were assigned one per group for both the ‘purposive group’ and the ‘random group’. The team of supervisors provided training to the data collectors for 3 days at each district. A representative of the health office at each selected district participated in the orientation of the HEWs to support the process of data collection. Then, the HEWs were allowed a 1 day exercise and pretest of the tool in the field in the same community but in HHs

that were not sampled for the study. The tool was further adapted and adjusted to maximise the validity and reliability of the collected data. The supervisors used the closest health facility for accommodation and the district health office as a meeting place. Besides, they checked the completed questionnaires daily for any unclear or incomplete information or wrong coding. Errors were checked and addressed in the field, if any. The entire data collection process was coordinated and supervised by six teams of investigators (one team per zone), and any challenges during the data collection were addressed in a timely manner.

The collected data were entered into EpiData V.3.1. Quality of the data was further ascertained during data-entry and cleaning through visualisation and thorough correction of any errors and outliers. Besides, the rejected responses were re-evaluated. All these processes were done together with senior biostatisticians. Descriptive statistical analyses, with sampling weighting as necessary, were used for tabulation, cross-tabulation and computation of frequencies and percentages on selected variables. Sensitivity analysis was conducted by considering weighting for each selected district (Woreda) in the descriptive analysis. The  $\chi^2$  test was used to test for any associations of SGBV types with the consequences of the SGBV, with attention to potential corrections for multiple comparisons.<sup>24</sup> A logistic regression model for binary data was also used to assess the factors associated with war-related rape in the study area. All analyses were performed using the statistical package STATA V.15.1 (StataCorp, College Station, Texas, USA) and we considered the association to be statistically significant at a value of  $p < 0.05$ .

### Measurements

SGBV was measured according to WHO standard guidelines.<sup>23</sup>

#### Sexual violence

Includes, at least, rape/attempted rape, sexual abuse and sexual exploitation. Sexual violence is any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances or acts to traffic a person’s sexuality, using coercion, threats of harm or physical force, by any person regardless of relationship to the victim, in any setting, including but not limited to home and work. Sexual violence can take many forms, including rape, sexual slavery and/or trafficking, forced pregnancy, sexual harassment, sexual exploitation and/or abuse and forced abortion.

#### Rape

Rape was defined to occur if a woman experienced any act of non-consensual sexual intercourse. This can include the invasion of any part of the body with a sexual organ and/or the invasion of the genital or anal opening with any object or body part. Rape and attempted rape involve the use of force, threat of force and/or coercion. Any

penetration without consent is considered rape. Efforts to rape someone which do not result in penetration are considered attempted rape.

#### Physical violence

An act of physical violence that is not sexual in nature. It was measured as physical violence, if a woman had experienced at least one of the following: hitting, slapping, choking, cutting, shoving, burning, shooting or use of any weapons, acid attacks or any other act that results in pain, discomfort or injury. This incident type does not include female genital mutilation or cutting.

#### Psychological violence

Infliction of mental or emotional pain or injury. It was measured as psychological violence, if a woman had experienced at least one of the following: threats of physical or sexual violence, intimidation, humiliation, forced isolation, stalking, harassment, unwanted attention, remarks, gestures or written words of a sexual and/or menacing nature, destruction of cherished things, etc.

#### 'Purposive group'

Tabiyas/clusters selected randomly from the severely war-affected Tabiyas/clusters. The Tabiyas/clusters were considered severely affected if they are exposed to sustained active war and/or intermittent war, long duration of stay of the combatants in the area and harassment among the community members in context.

#### 'Random group'

Tabiyas/clusters selected randomly from a given district using the list of all Tabiyas/clusters (moderately and severely affected) as a sampling frame. Regardless of active war and other characters of the situation, random selections of Tabiyas/clusters were conducted.

#### Calculation of weights

Lists of districts/Tabiyas/clusters included in 'random group' and 'purposive group' based on the population of women aged 15–49 years were grouped and taken from the Tigray regional Health Bureau during 2020/21. Three columns were then created (list of districts, total sample taken, total population of women in the selected clusters per district) for each group within Excel. To calculate proper weights, we summed up the total samples and total population in each group separately. Then, weights were calculated as follows:

Average weight  $w$

$$\text{(district in random group)} = \frac{w1 \text{ (district in random group)}}{w2 \text{ (district in random group)}}$$

Average weight  $w$

$$\text{(district in purposive group)} = \frac{w1 \text{ (district in purposive group)}}{w2 \text{ (district in purposive group)}}$$

where  $w1$  (district in purposive group)=total population in each district in purposive group/total population in

purposive group;  $w1$  (district in random group)=total population in each district in random group/total population in random group;  $w2$  (district in purposive group)=total sample in each district in purposive group/total sample in purposive group and  $w2$  (district in random group)=total sample in random group/total sample in random group.

Then, weighting data were generated in STATA. Based on this mechanism, the weight assigned to each selected district is found in online supplemental table 4.

#### Patient and public involvement

The development of the research topic was directly motivated by the unprecedented experience of the people of Tigray due to the devastating conflict and the need to document the experienced conflict related to SGBV. The participation of study subjects was via their willingness to respond to the survey instruments. Findings from the study are disseminated to the local communities and appropriate authorities in order to inform policy decisions in restoring health services and providing much-needed medical and psychological treatment for SGBV victims.

#### Ethical considerations

As the interview was conducted by trained female HEWs, the probability of harm or discomfort in this assessment is anticipated to be minimal. All filled-questionnaires were anonymised via subject-level numerical identifiers and kept confidential.

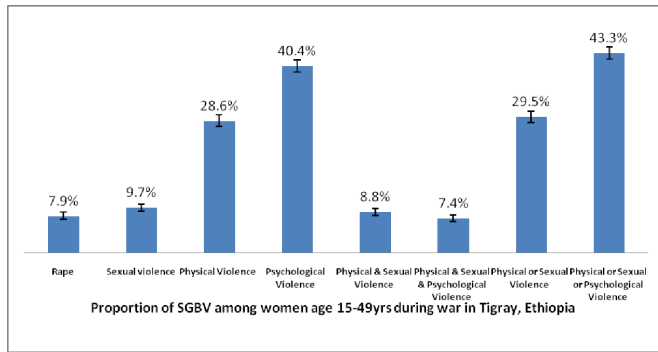
## RESULTS

### Sociodemographic characteristics of women of reproductive age

In this study, information about 5171 women of reproductive age was included from six zones. Women included in this study were mainly from central (32.3%), eastern (28.2%) and north-west (15.2%) zones of Tigray. The median age of women was 32 years (IQR 26–38). Roughly, half of the study participants were from rural residences (2602, 50.3%). More than a third of the women interviewed were unable to read or write (1879, 36.3%); and 70% of the women were married while 34.5% of them reported their occupation as housewives and 29.9% as farmers (online supplemental table 2). To enable contextual comparisons, the current population profile of Tigray, Northern Ethiopia is included in online supplemental table 3.

### Reproductive and obstetric characteristics of women aged 15–49 years

Of the 5171 surveyed women, 3476 (67.2 %) had at least one child under 5 years of age; and 422 (8%) were pregnant at the time of the survey. Of these pregnant women, 75 (17.8%) of the pregnancies were unwanted. A total of 137 (2.7%) women had an abortion during the study period (first 8 months of the war) (online supplemental table 5).



**Figure 2** War time prevalence of sexual and gender-based violence (SGBV) among women of reproductive age in 52 districts of Tigray (n=5171), 4 November 2020 to 28 June 2021.

### Magnitude of sexual and gender-based violence

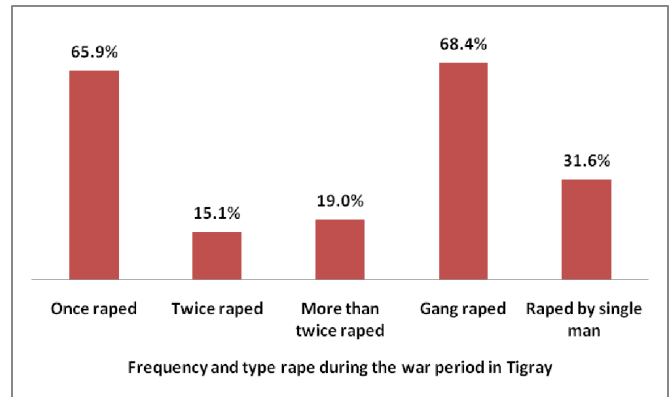
The incidents of sexual violence, physical violence and psychological violence were found to be 9.7%, 28.6% and 40.4%, respectively. Detailed disaggregated data on types of violence is provided in online supplemental table 6. Overall, 43.3% (2241/5171) women experienced at least one type of gender-based violence (psychological, physical or sexual violence). Most women experienced various, and at times, multiple forms of violence. Nearly 7.4% of the women who experienced sexual violence had at the same time experienced physical and psychological violence (figure 2).

### Sexual and gender-based violence in relation to some sociodemographic characteristics

The level of SGBV varied among zones as well as by age, residence, education and marital status. Sexual, physical and psychological violence were highest in central zone followed by eastern zone of Tigray. Of the 500 women that reported experiencing sexual violence, 202 (40.4%) women were from the central zone followed by 144 (28.8%) women in the eastern zone. Similarly, 146 (29.2%) young women aged 15–24 years reported as being highly sexually abused, whereas women aged 35–39 years were more physically (307/1480; 20.7%) or psychologically (459/2091; 21.9%) abused. Women in reproductive age living in urban residence were more sexually abused (243, 48.6%), whereas rural residents were more physically (660; 44.6%) or psychologically (1011; 48.3%) abused. The women who did not join formal education (both those ‘unable to read and write’ and those ‘able to read and write’) were the most sexually abused groups (249; 43.8%). Of the 692 pregnant women who responded to the violence related to questions during the war time, 62 (12.6%) pregnant women reported of being sexually abused (online supplemental table 7).

### Sexual violence

About 9.7% (500/5171) of the women of reproductive age had suffered from sexual violence; and 7.9% (411/5,171) women were raped during the study period. Of the 411 women that experienced sexual violence,



**Figure 3** Frequency and type of rape during Tigray war, 4 November 2020 to 28 June 2021.

411/500 (82.2%) reported of being raped (online supplemental table 7). Repeated cases of sexual violence were reported by women. Of those 411 women that reported being raped, 271 (65.9%) were abused once, 62 (15.1%) twice and 78 (19.0%) three times or more (figure 3). Women of reproductive age were sexually abused on average by three soldiers to a maximum of nine (median=3, IQR 2–6). Most raped women reported being gang-raped, 68.4% (247/361). The remaining 50 raped women did not respond to this question. Most (45.9%) of the sexual violence on women of reproductive age had taken place during the first 150 days of the war, while 26.3% of the sexual violence occurred during the subsequent 86 days—a period that corresponded to the second-round of a large-scale military operation by the allied forces against Tigray forces.

### Consequences of SGBV

The consequences of sexual, psychological and physical violence during the conflict period ranged from behavioural problems and injury to potentially lifelong health and physical complications. In this study, physical trauma was the most common consequence of SGBV (28.3%; 533/2241) including incidents of dislocations (cases=84), fracture or broken bone (cases=37), perforated eardrum or eye injuries (cases=20) and broken teeth (cases=8). Moreover, severe consequences of sexual violence among those who visited a health facility included HIV infection (11 cases), sexually transmitted infections excluding HIV infection (68 cases), unwanted pregnancy (39 cases) and others. The emotional and behavioural consequences of physical and sexual violence were also common, including depression (19.2%; 431/2241), social isolation (3.8%, 85/2241), suicidal ideation and attempt (2.6%, 58/2241) and others. As a result of the SGBV, majority of women reported an emotional change such as stress (84.1%; 1438/1709), anxiety (11.5%; 197/1709) as well as instances of flashbacks of the incidence, nightmare or sleeping disturbance. Although many women of reproductive age experienced various forms of violence, nearly 90% of the women (1629/1817) did not receive any medical care at a health facility (424 women did not

**Table 1** Consequences of SGBV in women of reproductive age from Tigray, 4 November 2020 to 28 June 2021

Consequences of SGBV (n=2241)	Unweighted, n (%)	Weighted, n (%)
Physical trauma	533/2241 (23.8)	491/1976 (24.8)
Depression	431/2241 (19.2)	376/1976 (19.0)
Experiencing the event	233/2241 (10.4)	220/1976 (11.1)
Avoidance (event, place and person)	121/2241 (5.4)	127/1976 (6.4)
Suicidal ideation and attempt	58/2241 (2.6)	47/1976 (2.4)
Excessive worry	617/2241 (27.5)	608/1976 (30.7)
Social isolation	85/2241 (3.8)	81/1976 (4.1)
Unwanted pregnancy	39/411 (9.5)	33/407 (8.1)
Sexual transmitted infections—non-HIV	68/411 (13.6)	74/407 (16.6)
HIV infection	11/411 (2.7)	10/407 (2.5)
Emotional change developed after violence (n=1709)		
Fear	1438 (84.1)	1250 (84.2)
Stress	197 (11.5)	170 (11.4)
Anxiety	29 (1.7)	30 (1.9)
Depression	9 (0.5)	7 (0.5)
Flashbacks	12 (0.7)	14 (0.9)
Nightmare	16 (0.9)	9 (0.6)
Sleep disturbance	8 (0.5)	8 (0.5)
Received healthcare after any psychological, physical or sexual violence (n=1829)		
Yes	188 (10.3)	195 (12.3)
No	1629 (89.7)	1391 (87.7)
Reasons for not receiving psychological and medical care after violence (n=1169)		
Victims disappointed	316 (27.0)	290 (31.2)
Victims unable to move	148 (12.7)	117 (12.6)
Victims do not find a person who support	87 (7.4)	73 (7.9)
The health facility was destroyed	618 (52.9)	449 (48.3)

SGBV, sexual and gender-based violence.

provide a response about healthcare use after violence). The main reported reasons for not receiving healthcare were destruction of the health facilities (52.9%; 618/1169), victims' disappointments (leading to hopelessness) (27.0%; 316/1169) and other reasons including physical disability and lack of transport (table 1).

The findings showed that women who were physically abused had experienced statistically significant physical trauma, depression, suicidal ideation or attempt and social isolation ( $p < 0.001$ ). Similarly, sexually abused women experienced physical trauma, excessive worry, depression, suicidal ideation and attempt ( $p < 0.001$ ) (table 2). These findings were still statistically significant after Bonferroni-type corrections were made for multiple comparisons within a given type of violence (ie, physical or sexual).

### SGBV to any household members other than women of reproductive age

During the first 8 months of armed conflict, gender-based violence was not confined to women of reproductive

age only. Other HH members (children, men/boys or elderly women) were also victims of SGBV as reported by the women of reproductive age interviewed in the study. Based on the responses obtained from the primarily interviewed respondents, more than a quarter (27.8%; 1417/5171) of other members (children, men/boys or elderly women) of the HH were reported to be victims of some form of psychological, physical or sexual violence. A total of 57.4% (686/1196) men/boys were reported to have experienced physical violence. Moreover, about 17.0% (9/53) of girls under 15 years of age and 8.4% (19/227) of older women above the age of 49 years were experienced sexual violence. Deaths of 242 HH members perpetrated by the allied forces were also reported in this study (table 3).

### Factor associated with war-related rape

After entering significant variables with  $p$  value  $< 0.05$  in the bivariate and multivariate logistic regression models, women in the age group 20 and 24 years, with no formal education, being urban residence, student

**Table 2** Consequences of SGBV in relation to the types of violence and sociodemography of women, Tigray, 2021

Consequences of SGBV								
Types of violence and sociodemographic relation	Physical trauma	Depression	Experiencing the event	Avoidance (event, place and person)	Suicidal ideation and attempt	Excessive worry	Social isolation	
Physical violence	Yes	466 (31.5%)*	302 (30.4%)†	202 (13.7%)*	106 (7.2%)*	50 (3.4%)*	479 (32.4%)*	80 (5.4%)*
	No	67 (8.8%)	129 (16.9%)	31 (4.1%)	15 (2.0%)	8 (1.1%)	138 (18.1%)	5 (0.7%)
Sexual violence*	Yes	206 (41.2%)*	140 (28%)*	111 (22.2%)*	61 (12.2%)*	31 (6.2%)*	227 (45.4%)*	66 (13.2%)*
	No	327 (18.8%)	291 (16.7%)	122 (7.0%)	60 (3.5%)	27 (1.5%)	390 (22.4%)	19 (1.1%)
Psychosocial violence	Yes	513 (24.5%)‡	418 (20.0%)*	226 (10.8%)†	117 (5.6%)	58 (2.8%)†	597 (28.5%)*	83 (4.0%)
	No	20 (13.3%)	13 (8.7%)	7 (4.7%)	4 (2.7%)	0	20 (13.3%)	2 (1.3%)
Age of women (years)	15–24	128 (30.5%)*	85 (20.3%)	59 (14.1%)‡	32 (7.6%)‡	19 (4.5%)†	137 (32.7%)†	28 (6.7%)*
	25–34	181 (22.5%)	154 (19.2%)	86 (10.7%)	49 (6.1%)	18 (2.2%)	219 (27.3%)	33 (4.1%)
	35+	224 (23.0%)	192 (18.8%)	88 (8.6%)	40 (3.9%)	21 (2.1%)	261 (25.6%)	24 (2.4%)
Educational status of women	No formal education	224 (22.3%)	158 (15.7%)‡	90 (9.0%)	43 (4.3%)	23 (2.3%)	259 (25.8%)	32 (3.2%)
	1–8 grades	145 (24.8%)	136 (23.3%)	69 (11.8%)	33 (5.7%)	19 (3.3%)	171 (29.3%)	22 (3.8%)
	9–12 grades	120 (24.9%)	104 (21.6%)	55 (11.4%)	34 (7.0%)	14 (2.9%)	138 (28.6%)	23 (4.8%)
	College and +	44 (25.6%)	33 (19.2%)	19 (11.1%)	11 (6.4%)	2 (1.2%)	49 (28.5%)	8 (4.7%)

P value using Pearson's  $\chi^2$  or Fisher's exact test.  
 \*P<0.001.  
 †P=0.05–0.01.  
 ‡P=0.10–0.001.  
 SGBV, sexual and gender-based violence.



**Table 3** SGBV among children, elderly women household members and women of reproductive age in Tigray war, 4 November 2020 to 28 June 2021

	Men/Boys (n=1196)	Female children aged <15 years (n=53)	Elderly women aged ≥50 years (n=227)	Women of reproductive aged 15–49 years (n=5171)	Total (n=6647)
Psychological violence					
Yes	776 (64.9%)	24 (45.3%)	103 (45.4%)	2091 (40.4%)	2994 (45.0%)
No	420 (35.1%)	29 (54.7%)	124 (54.6%)	3080 (59.6%)	3653 (55.0%)
Physical violence					
Yes	686 (57.4%)	20 (37.7%)	72 (31.7%)	1480 (28.6%)	2258 (34.0%)
No	510 (42.6%)	33 (62.3%)	155 (68.3%)	3691 (71.4%)	4389 (66.0%)
Sexual violence					
Yes	–	09 (17.0%)	19 (8.4%)	500 (9.7)	528/5451 (9.7%)
No	–	44 (83.0%)	208 (91.6%)	4671 (90.3)	4923/5451 (90.3%)
Rape					
Yes	–	07 (13.2%)	17 (7.5%)	411 (7.9%)	435/5451 (8.0%)
No	–	46 (86.8%)	210 (92.5%)	4760 (92.1%)	5016/5451 (92.0%)

SGBV, sexual and gender-based violence.

and unemployed, living in the temporary shelter within the community and rental house and having knowledge about raped incidence in the community were associated with war-related rape (table 4).

## DISCUSSION

SGBV was one of the most serious and life-threatening occurrences that have affected women and children during the first 8 months of the war in Tigray. The findings from women of reproductive age showed that 1 in 10 women and girls experienced sexual violence, mostly rape, physical violence and psychological violence. Many women experienced severe forms of sexual violence such as gang-rape, sexual salivary, insertion of foreign objects into the vagina and harassment. Gang-rape was the most common form of sexual violence reported among those who were raped. Young girls under 15 years and elderly women above 49 years were also victims of sexual violence, mostly rape. Living in a temporary shelter within the community, age 20–24 years, being urban residence, no formal education, being student and unemployed by occupation were the risk factors associated with war-related rape in this study.

The findings from this study indicate higher incidence (nearly 10%) of rape than those reported in other studies during conflicts such as in Northern Uganda (4.2%),<sup>13</sup> Sierra Leone (8%)<sup>15</sup> and Ukraine (2.6%).<sup>8</sup> Similarly, the physical violence (28.6%) observed in this study was higher than the findings for East Timor, Indonesia where 22.7% of the women were physically assaulted.<sup>25</sup> However, the finding for the current study is lower than other studies for the Kurdistan region of Iraq (16.6%)<sup>10</sup> and South Sudan (21.3%).<sup>11</sup> The difference

in prevalence with the Iraq study might be due to the fact that the study was at camp and dealing with a vulnerable group, and the South Sudan study covering a long duration of civil war from 2005 to 2011. In contrast, the current study was conducted at community level for only 8-month duration of war. Overall, the sexual violence observed in the current study showed consistently and systematically higher levels of incidence in the central and eastern zones of Tigray, where the invading allied forces of Ethiopia and Eritrea had more control. The higher incidence of rape and physical violence in this study compared with other studies may be due to (i) ill-intentions of the perpetrators to use systemic raping as weapon of war to dehumanise the population and (ii) the relatively long duration of the war (8 months) inside Tigray at the hands of the invaders, thereby exposing victims to more violence.

Most of the sexual violence reported in the current study was due to gang-rape, mainly perpetrated by soldiers and other armed groups affiliated with the governments of Ethiopia and Eritrea. This is a severe form of sexual violence and is likely to cause severe forms of psychological, mental, social and sexual disorders among the survivors. Similar findings during a conflict period were reported in eastern Democratic Republic of the Congo (DRC), Rwanda, Bosnia and Herzegovina.<sup>14 26 27</sup> Moreover, in the current study, many women and girls experienced sexual violence by three to nine soldieries. This is generally in-line with the report of the joint United Nations Office of the Human Rights Commission and Ethiopian Human Rights Commission, where women and girls in Tigray were sexually abused by maximum of six armed men during the war period.<sup>20</sup> Most sexual

**Table 4** Factors associated with war-related rape in Tigray, Ethiopia (n=411)

Variables	Rape		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes (%)	No (%)		
Age (years)				
15–19	43 (18.2)	193 (81.8)	<b>4.0 (2.41 to 6.61)*</b>	1.71 (0.88 to 3.32)
20–24	87 (13.2)	572 (86.8)	<b>2.7 (1.75 to 4.24)*</b>	<b>2.40 (1.41 to 4.07)†</b>
25–29	74 (7.1)	961 (92.9)	1.38 (0.88 to 2.16)	1.48 (0.88 to 4.50)
30–34	65 (6.5)	933 (93.5)	1.25 (0.79 to 1.97)	1.65 (1.00 to 2.74)
35–39	75 (6.8)	1021 (93.5)	1.32 (0.84 to 2.06)	1.54 (0.95 to 2.51)
40–44	39 (6.3)	578 (93.7)	1.21 (0.73 to 1.99)	1.60 (0.95 to 2.69)
45–49	28 (5.3)	502 (94.7)	1	1
Family size				
≤3	167 (11.1)	1341 (88.9)	<b>1.69 (1.28 to 2.24)*</b>	0.93 (0.65 to 1.33)
4–6	164 (6.5)	2355 (93.5)	0.94 (0.71 to 1.25)	0.90 (0.65 to 1.23)
≥7	78 (6.9)	1060 (93.1)	1	1
Educational status				
No formal education	172 (7.3)	2197 (92.7)	1.01 (0.67 to 1.52)	<b>3.07 (1.78 to 5.32)*</b>
1–8 grade completed	99 (7.6)	1207 (92.4)	1.06 (0.69 to 1.63)	1.93 (1.12 to 3.32)
9–12 grade completed	111 (10.2)	982 (89.8)	1.46 (0.95 to 2.23)	1.77 (1.06 to 2.95)
Collage and above	29 (7.2)	374 (92.8)	1	1
Residence				
Rural	185 (5.9)	2958 (94.1)	1	1
Urban	226 (11.1)	1802 (88.9)	<b>2.0 (1.64 to 2.46)*</b>	<b>1.36 (1.03 to 1.79)‡</b>
Occupation				
Housewife	104 (5.8)	1698 (94.2)	1	1
Farmer	77 (4.9)	1486 (95.1)	0.85 (0.63 to 1.15)	1.09 (0.78 to 1.52)
Employed (government or NGO)	26 (7.8)	308 (92.2)	1.38 (0.88 to 2.15)	1.45 (0.84 to 2.50)
Private business	43 (12.5)	302 (87.5)	<b>2.32 (1.60 to 3.39)*</b>	1.34 (0.87 to 2.08)
Daily labourer	53 (22.9)	178 (77.1)	<b>2.46 (1.69 to 3.59)*</b>	1.19 (0.76 to 1.86)
Student	65 (11.4)	503 (88.6)	<b>4.86 (3.37 to 7.00)*</b>	<b>1.95 (1.13 to 3.37)‡</b>
Unemployed	65 (11.4)	503 (88.6)	<b>2.10 (1.52 to 2.92)*</b>	<b>1.45 (1.003 to 2.09)†</b>
Marital status				
Single	120 (18.5)	527 (81.5)	<b>1.67 (1.23 to 2.26)†</b>	1.16 (0.77 to 1.76)
Married	191 (5.3)	3408 (94.7)	<b>0.41 (0.31 to 0.54)*</b>	0.88 (0.61 to 1.28)
Widowed	18 (7.4)	225 (92.6)	<b>0.59 (0.34 to 0.99)‡</b>	0.60 (0.34 to 1.07)
Divorced/Separated	82 (12.0)	600 (88.0)	1	1
Living household				
Own household	125 (4.2)	2831 (95.8)	1	1
Rental house	158 (11.1)	1259 (88.9)	<b>2.84 (2.23 to 3.63)*</b>	<b>1.95 (1.42 to 2.69)*</b>
Family house	108 (14.4)	644 (85.6)	<b>3.8 (2.89 to 4.92)*</b>	<b>2.26 (1.61 to 3.17)*</b>
Temporary shelter	20 (43.5)	26 (56.5)	<b>17.4 (9.47 to 32.06)*</b>	<b>9.5 (4.52 to 20.1)*</b>
With whom do you live				
Alone	116 (15.2)	648 (84.8)	0.99 (0.53 to 1.85)	1.67 (0.83 to 2.24)
With my partner	129 (4.3)	2843 (95.7)	<b>0.25 (0.13 to 0.47)*</b>	0.57 (0.28 to 1.15)
With my family	139 (11.5)	1065 (88.5)	0.72 (0.39 to 1.34)	0.96 (0.49 to 2.88)
With my relatives	13 (15.3)	72 (84.7)	1	1
Have a child				

Continued

Table 4 Continued

Variables	Rape		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes (%)	No (%)		
Yes	212 (6.1)	3264 (93.9)	1	1
No	199 (11.7)	1496 (88.3)	<b>2.05 (1.67 to 2.51)*</b>	1.21 (0.93 to 1.58)
Know in the community/neighbour about raped woman/girl				
Yes	215 (15.2)	1202 (84.8)	1	1
No	191 (5.2)	3485 (94.8)	<b>0.31 (0.25 to 0.38)*</b>	<b>0.29 (0.23 to 0.36)*</b>

The bolding identifies all findings that have statistical significance at 0.05 level (i.e., the P-Value less than 0.05).  
 \*P<0.001.  
 †P=0.001–0.009.  
 ‡P=0.01–0.04.  
 NGO, non-governmental organisation.

and physical violence was committed by Eritrean defence forces, consistent with the report of the HRW, where most brutal sexual violence was reported as committed by the Eritrean defence forces in the Tigray war.<sup>21</sup>

Severe forms of sexual violence such as insertion of foreign objects to vagina and anus, and high rate of HIV transmission were reported in the current study, again consistent with the report from HRW report in February 2021, where insertion of foreign objects into the vagina and transmission of HIV by different armed forces were reported in the Tigray war.<sup>20 21 28</sup> The finding on the severity of sexual violence in the Tigray war in this study is reminiscent and in conformity with similar observations elsewhere.<sup>3 16 17</sup> The risk of HIV infection during conflicts is reported to be relatively higher in Africa due to multiple perpetrators of sexual violence.<sup>29</sup>

Sexual violence of underage girls and elderly women reported in this study, ascertained indirectly via the interviewed index participants, are also consistent with the reports of different humanitarian agencies on the Tigray war during the same period.<sup>20</sup> This indicates that the extent and impact of sexual violence, mostly via rapes, were highly prevalent among all age groups of girls and women. The mental and psychological problems experienced by underage girls could have severe, lifelong and generational impact on sexual, behavioural, productivity and well-being of the victims and their families.

The incidence of sexual violence, mostly rape, was typically high in urban centres during the first 8 months of the war period (12% (urban) vs 8.3% (rural); online supplemental table 5). This is consistent with the other reports on the Tigray war, where most survivors who sought health services for postsexual violence (rape) were mainly from big towns.<sup>20</sup> Moreover, women from lower socio-economic status are less likely to disclose sexual violence as also reported in a study from eastern DRC.<sup>16</sup> The SGBV figures reported in this study are likely to be the tip of the iceberg of the problem as most of the women, particularly in the rural areas of Tigray are highly traditional and religious; have less sexual literacy and less access to healthcare during the early days of the

war as most of the communities, trapped by the war, were hiding in hard-to-reach areas away from their houses and villages. Moreover, potential gross underestimation of cases could result from the strict moral codes and fear of stigma by traditional community and family hostility.<sup>16</sup> All survivors from rural or urban areas appear to share the same level of mental, psychological and health consequences as a result of sexual violence.

In this study, 90% of the sexually abused women were unable to receive medical and psychological support after experiencing sexual violence. This implies the likelihood of the majority of women and girls suffering from incidence of SGBV violence to suffer from its complications such as medical, behavioural and emotional disorders. This is consistent with the study on DRC conflict where only <5% women of SGBV victims sought medical care and the remaining women had to wait a year or longer prior to accessing SGBV services.<sup>30</sup> According to a recent survey, >70% of the health facilities in Tigray were non-operational in the first 6 months of the war (4 November 2020 to April 2021)<sup>22</sup> and only 17.5% of the health centres were functional, most of which were within the vicinities of Mekelle and other big cities such as Shire, Axum, Adwa, Adigrat and others on the main roads.<sup>20</sup> Therefore, the reason for the poor health seeking by survivors could be because most health facilities were destroyed, closed; lack of medications; absence of trained health providers; absences of transportation to health facility; traditional and religious barriers of discussing on sexual matters and fear for physical safety. The mental, psychological, economical and behavioural impact of SGBV on survivors and their families are thus severe and lifelong. Therefore, provisions of immediate medical and psychological support for all survivors are long overdue.

During the prewar period, the accessibility of health service in Tigray was >90%. Health centres could typically provide service for survivors of SGBV, including administered Pruritic papular eruption (PPE) in case of HIV exposure, test for pregnancy and other health services. However, during the period of war, 70% of the health facilities were non-functional<sup>22</sup> either due to complete

destruction or absence of medications and/or trained health providers. Most functional health facilities were located at big towns where survivors were usually using the service during the war period. During the war period, the interim office of Tigray health bureau was reporting the numbers of raped survivors who sought health facility every month.<sup>20</sup> There were also mobile clinics given to increase accessibility of healthcare during the war period by the interim Tigray health bureau and different non-governmental organisations (NGOs). However, the availability of health services to respond to cases of SGBV during the war was very low. Few NGOs such as Médecins Sans Frontières-Spain, International Committee of the Red Cross (ICRC), local NGO, Mothers and Children Multisectoral Development Organization (MCMDO) and mobile clinics were participating to support survivors. Overall, it was very difficult to assure whether survivors were using health services appropriately given that 70% of the health facilities were non-functional during the war period.<sup>22</sup> In this study, we did not assess the situation of the catchment of health facilities on whether functional or not. We simply asked the survivors about their use of health services after the violence and, where appropriate, the reasons for not getting health service.

Survivors of sexual violence are likely to be at high risk of severe and long-lasting health problems, including death from injuries or suicide.<sup>31</sup> The deaths from sexual violence were not captured in this study, as the study was solely based on responses from women of reproductive age that were alive at the time of the study. Health consequences such as unwanted pregnancy, unsafe or self-induced abortion and sexually transmitted infections (STIs), including HIV infections were reported by survivors. Moreover, physical, mental and psychological traumas and emotional breakdown, stigma and discrimination were reported as consequences of the sexual and physical violence. These consequences have lifelong impact.<sup>20 21</sup> Thus, treatment of STIs, HIV, abortion care for late pregnancy and care for the child born from rapist, emotional and psychological support from local and international healthcare and humanitarian stakeholders is urgently recommended. Involving family members in counselling with survivors is also an important strategy to reduce conflict, stigma, disagreement and divorce between family and couples. Comprehensive approach in caring for survivors including provision of medical, psychological, social and economic support is critically needed. Therefore, establishing rehabilitation centres to care for survivors at the affected sites and devising local integration strategies are important.

The association of rape with young age and living in the temporary shelter within the community during the war period was evident in this study. The higher the incidence of rape in those groups may be explained due to family breakdown and absence of legal and social protection during crisis. Living in shelter without protection for women is difficult. The higher incidence of rape in urban area can be explained by the higher number of

combatants who stayed in urban towns and distribution sites where most wars were taking place. In this study, most of the women in lower status were abused higher (girls/women with no formal education, student and/or unemployed women). This can be explained due to poor awareness of girls/women about combatants and may be disproportionately affected due to low status and poor protection given by family.

The findings of this study should be interpreted in the context of its strengths and limitations. The study has several notable strengths. It is the first population-based study of its kind to be conducted in Tigray following the eruption of the war on SGBV related, while still under severe siege. The study was carefully designed using sampling techniques that ensured adequate sample size randomly selected to represent all parts of Tigray region (except western zone and some northeastern districts occupied by the invaders) to systematically assess critical cross-cutting issues at the community level. Since the survey was conducted immediately after the invading forces left most parts of Tigray and not far from the time of the violence, the likelihood of recall biases is minimal. In the analysis, we considered weighted analysis in the summary statistics to minimise error in estimation of prevalence as result of the sampling procedure used. However, there are some limitations to be considered in using weighting in this study where the population figures are only likely to provide a partial picture during the conflict period as there is so much potential for forced mobility. Thus, calculating weighting by considering the fact that a district/Tabiya/cluster-level population may not show the actual population during the conflict period due to high mobility, even though it should still be valid in relative terms. The fact that the main findings do not change after the use of weighting is a strength and further evidence about the robustness of the findings reported in this study.

The interpretation of the findings should also consider some limitations of the study. Although the use of female local data collectors (ie, HEWs) may have had a positive outcome in creating an environment of safety and comfort for the respondents to disclose information, the use of the HEWs residing in the same place with the victims might also have negatively led to hiding or distortion of information for fear of shame or leak of information. Moreover, the HEWs are government employees in the specific area they may overestimate/underestimate finding. However, adequate orientation, and training was given with close supervision during data collection period. The majority of the western zone of Tigray and some pockets of areas bordering Eritrea were not included since they are currently under control of the Ethiopian and Eritrean forces and still active war areas. Note that the level of SGBV is expected to be more extensively prevalent in these areas where the conflict has been more severe and still ongoing.<sup>20 21</sup> Thus, the findings of this study are likely to be an underestimation of the true extent of SGBV in Tigray as a result of the war. Some

data were missing due to reluctance to respond owing to the sensitive nature of the variables. Moreover, internally displaced women living at camps were not included, even though displaced women within the community or living in their own new HHs were included. In general, the number or proportions of recorded sexual violence might be underestimated due to under-reporting of sexual violence from surviving victims and/or lack of information from victims who were murdered or perished due to injuries during or after the assault.

Survivors/Victims generally do not speak of the incident for many reasons, including self-blame, fear of reprisals, mistrust of data collectors, risk/fear of re-victimisation, fear of shaming and blaming, social stigma and often rejection by the survivor/victim's family and community. However, the findings in this study still indicate levels of SGBV that are substantially and alarmingly high—similar or even higher than reported levels from other conflict areas around the world.<sup>3 16</sup>

## CONCLUSIONS

SGBV was highly prevalent during the first 8 months of the Tigray war. Almost 10% of the girls and women of reproductive age interviewed were sexually abused, mostly by rape. Gang-rape was the most common and frequent form of sexual violence. Physical and psychological forms of violence were common too. Underage girls, elder women and men were also victims of sexual and physical violence. Physical traumas, depression, suicidal attempts, emotional change, unwanted pregnancy, STIs and HIV infection were the most common consequences of the SGBV reported. Ninety per cent of the survivors of sexual violence have not received medical care or psychological care because most health facilities were destroyed and looted. Urgent survivor centre approach with medical and psychological service; and sustained community support are recommended to reduce lifelong impact on behavioural, emotional, sexual, social and economic fortunes of SGBV victims. Of significant importance, there will be a need for further investigation of SGBV among girls and women in rural and urban communities of Tigray including those excluded from this study due to the occupation. Where and when possible, a complete inventory and investigation of every girl and woman of reproductive age in each Tabias/Kebeles is recommended in order to provide a full picture and extent of the SGBV as a result of the war throughout Tigray in order to reach out comprehensively to all victims to ensure they receive short-term and long-term rehabilitation, access to post-trauma services and socio-economic support.

Region-wide tracing of survivors is needed for further medical and psychological support. Because of the complete collapse of the health system in Tigray, the challenges in dealing with the health and psychosocial ramifications from this unprecedented crisis from SGBV in Tigray will require urgent and multisectoral effort by local and international partners.

## Author affiliations

<sup>1</sup>School of Public Health, Mekelle University College of Health Sciences, Mekelle, Tigray, Ethiopia

<sup>2</sup>Epidemiology, Mekelle University College of Health Sciences, Mekelle, Tigray, Ethiopia

<sup>3</sup>Department of Midwifery, Mekelle University College of Health Sciences, Mekelle, Tigray, Ethiopia

<sup>4</sup>School of Medicine, Mekelle University College of Health Sciences, Mekelle, Tigray, Ethiopia

<sup>5</sup>Tigray Health Bureau, Mekelle, Tigray, Ethiopia

<sup>6</sup>Hennepin Healthcare, Minneapolis, Minnesota, USA

<sup>7</sup>University of Minnesota Medical School, Minneapolis, Minnesota, USA

<sup>8</sup>Global Malaria Program, World Health Organization, Geneva, Switzerland

<sup>9</sup>Biostatistics, Columbia University, New York, New York, USA

**Contributors** All authors have contributed significantly to the conduct of the study, analysis of the data, writing and interpretation of the manuscript and revision of this submission. GF is the guarantor with full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the 'Methods' section for further details.

**Patient consent for publication** Not applicable.

**Ethics approval** Ethical clearance was obtained from the Institutional Review Board (IRB) of the College of Health Sciences at Mekelle University (reference no: MU-IRB1905/2011) and support letters were secured from the Tigray Health Bureau and District Health Offices before the start of the actual data collection. Written consent (for adult women) or assents (for underage girls) were obtained prior to data collection.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available on reasonable request.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## ORCID iDs

Gebrekiros Gebremichael Meles <http://orcid.org/0000-0001-6563-0001>

Kebede Embaye Gezae <http://orcid.org/0000-0002-5874-3304>

Kiros T Berhane <http://orcid.org/0000-0003-2303-8493>

## REFERENCES

- 1 UN general assembly. *In declaration on the elimination of violence against women*. New York, NY, USA: UN, 1993.
- 2 Ward J, Marsh M. Sexual violence against women and girls in war and its aftermath: realities, responses, and required resources. 2006. Available: <https://www.unfpa.org/emergencies/symposium06/docs/finalbrusselsbriefingpaper.pdf>
- 3 Muluneh MD, Stulz V, Francis L, *et al*. Gender based violence against women in sub-Saharan Africa: a systematic review and meta-analysis of cross-sectional studies. *Int J Environ Res Public Health* 2020;17:903.

- 4 García-Moreno C, Pallitto C. *Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence*. Geneva, Switzerland: WHO, 2013.
- 5 Rashida M, Calleigh M. Gender-based violence and justice in conflict and post conflict areas. *Cornell International Law Journal* 2011;44:11.
- 6 Guidelines on reporting on sexual violence in conflict. n.d. Available: [https://www.coveringcrsv.org/wpcontent/uploads/2021/05/CRSV\\_Downloadable\\_UK\\_FULLL.pdf](https://www.coveringcrsv.org/wpcontent/uploads/2021/05/CRSV_Downloadable_UK_FULLL.pdf)
- 7 Stachow E. Conflict-related sexual violence: a review. *BMJ Mil Health* 2020;166:183–6.
- 8 Capasso A, Skipalska H, Gutmacher S, et al. Factors associated with experiencing sexual violence among female gender-based violence survivors in conflict-afflicted Eastern Ukraine. *BMC Public Health* 2021;21:789.
- 9 Bitar S, Parra LP. *Sexual violence as a weapon of war: the case of ISIS in Syria and Iraq*. Uppsala University, 2015.
- 10 Goessmann K, Ibrahim H, Neuner F. Association of war-related and gender-based violence with mental health States of Yazidi women. *JAMA Netw Open* 2020;3:e2013418.
- 11 Ellsberg M, Ovince J, Murphy M, et al. No safe place: prevalence and correlates of violence against conflict-affected women and girls in South Sudan. *PLoS One* 2020;15:e0237965.
- 12 Gingerich T, Leaning J. *The use of rape as a weapon of war in the conflict in Darfur, Sudan*. Washington (District of Columbia): Office of Transition Initiatives, US Agency for International Department 6e33, 2004. Available: <http://www.physiciansforhumanrights.org/library/documents/reports/the-use-of-rape-as-a-weapon.pdf>
- 13 Kinyanda E, Musisi S, Biryabarema C, et al. War related sexual violence and it's medical and psychological consequences as seen in Kitgum, northern Uganda: a cross-sectional study. *BMC Int Health Hum Rights* 2010;10:28.
- 14 Bartels SA, Scott JA, Mukwege D, et al. Patterns of sexual violence in Eastern Democratic Republic of Congo: reports from survivors presenting to Panzi hospital in 2006. *Confl Health* 2010;4:9.
- 15 Amowitz LL, Reis C, Lyons KH, et al. Prevalence of war-related sexual violence and other human right abuses among internally displace persons in Sierra Leone. *JAMA* 2002;287:513.
- 16 Kelly JT, Betancourt TS, Mukwege D, et al. Experiences of female survivors of sexual violence in Eastern Democratic Republic of the Congo: a mixed-methods study. *Confl Health* 2011;5:25.
- 17 Mahlet A. *Long-term effects of wartime sexual violence on women and families. The case of northern Uganda*. RAND corporation, 2018.
- 18 UN. Definition: war crime. n.d. Available: <https://www.un.org/en/genocideprevention/war-crimes.shtml>
- 19 Verhoeven H, Woldemariam M. Who lost Ethiopia? The unmaking of an African anchor state and U.S. foreign policy. *Contemporary Security Policy* 2022;43:622–50.
- 20 EHRC and OHCHR. *Report of the Ethiopian Human Rights Commission (EHRC)/Office of the United Nations High Commissioner for Human Rights (OHCHR) Joint Investigation into Alleged Violations of International Human Rights Humanitarian and Refugee Law Committed by all Parties to the Conflict in the Tigray Region of the Federal Democratic Republic of Ethiopia*. 2021.
- 21 Human Rights Watch. "I always remember that day". access to services for survivors of gender-based violence in Ethiopia's Tigray region. n.d. Available: <https://www.hrw.org/report/2021/11/09/i-always-remember-day/access-services-survivors-gender-based-violence-ethiopia>
- 22 Gesesew H, Berhane K, Siraj ES, et al. The impact of war on the health system of the Tigray region in Ethiopia: an assessment. *BMJ Glob Health* 2021;6:e007328.
- 23 Schraiber LB, Latorre M do RDO, França I, et al. Validity of the WHO VAW study instrument for estimating gender-based violence against women. *Rev Saude Publica* 2010;44:658–66.
- 24 Kleinbaum D, Kupper L, Nizam A, et al. *Applied regression analysis and other multivariable methods*. Cengage Learning, 2013.
- 25 Hynes M, Robertson K, Ward J, et al. A determination of the prevalence of gender-based violence among conflict-affected population in East Timor. *Disasters* 2004;28:294–321.
- 26 Denov M, Shevell MC. An arts-based approach with youth born of Genocidal rape in Rwanda: the river of life as an autobiographical mapping tool. *Glob Stud Child* 2021;11:21–39.
- 27 Loncar M, Medved V, Jovanović N, et al. Psychological consequences of rape on women in 1991-1995 war in Croatia and Bosnia and Herzegovina. *Croat Med J* 2006;47:67–75.
- 28 Elisabeth R, Ellen J. Women, war, and peace. In: *The independent experts Assessment on the impact of armed conflict on women and women's role in peace building*. UNFPA, 2002.
- 29 Watts CH, Foss AM, Hossain M, et al. Sexual violence and conflict in Africa: prevalence and potential impact on HIV incidence. *Sex Transm Infect* 2010;86 Suppl 3:iii93–99.
- 30 Steiner B, Benner MT, Sondorp E, et al. Sexual violence in the protracted conflict of DRC programming for rape survivors in South Kivu. *Confl Health* 2009;3:3.
- 31 Bastick M, Grimm K, Kunz R. *Sexual violence in armed conflict. Global overview and implications for the security sector*. Geneva, Switzerland: Geneva Centre for the Democratic Control of Armed Forces, 2007.