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ORIGINAL RESEARCH

Prevalence of Post-Traumatic Stress Disorder and Depression and Associated Factors Among Internally Displaced Persons in Al-Galgala, Sudan

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Purpose: Conflict and war can have profound psychological and physical consequences, including the displacement of civilians. Sudan currently has the greatest child displacement crisis and the highest number of displaced individuals worldwide. Stressors, such as unemployment, poor socioeconomic conditions, and lack of social integration can increase the risk of developing mental health conditions and worsen pre-existing ones. This study aims to determine the prevalence of PTSD and depression and to investigate the association of sociodemographic and displacement characteristics with both PTSD and depression.

Patients and Methods: An observational descriptive cross-sectional community-based study was conducted among 143 IDPs, in Al-Galgala village, Sudan. The data was collected by seven, well-trained individuals over 2 weeks. The PTSD Checklist – Civilian version (PCL-C) scale was used for PTSD symptoms, and the Patient Health Questionnaire 9 (PHQ-9) scale was used for depression symptoms. The diagnostic criteria for PTSD and depression symptoms were based on the Diagnostic and Statistical Manual (DSM-IV). Descriptive statistics and Binary Logistic Regression analysis were adopted to determine the predictors for PTSD and depression symptoms. A P-value of 0.05 or lower was considered statistically significant.

Results: The prevalence of PTSD symptoms was found to be 25% based on DSM-IV symptoms' criteria and that of depression was 62%. Moreover, 23.1% of the participants had comorbid depression and PTSD symptoms. Being female (AOR = 8.434, 95% CI [1.026–69.325]), and having depression increased the risk of developing PTSD (AOR = 45.631, 95% CI [7.125–292.232]). Whereas, being older (40–59 years) (AOR = 6.473, 95% CI [1.054–39.766]) and having PTSD (AOR = 24.736, 95% CI [4.928 −124.169]) increased the risk of developing depression.

Conclusion: The estimated prevalence of PTSD and depression among IDPs in Al-Galgala, Sudan was found to be relatively high. This study revealed that depression, gender, occupation, education, and with whom you are currently staying were significantly associated with PTSD. In contrast, factors associated with depression were PTSD, age, and the duration of exposure to the armed conflict. The mental health among IDPs needs to be prioritized by implementing effective programs and providing psychosocial support to civilians residing in post-conflict regions.

Keywords: PTSD, depression, internally displaced persons, armed conflict, Sudan

Introduction

Conflict and war can have profound psychological and physical consequences, including the displacement of civilians,[1] which is one of the most significant humanitarian challenges of our time.[2] Internally displaced persons are those who have been compelled to leave their homes but still remain inside their nation's boundaries. They tend to frequently experience the most dangerous physical repercussions of war including death, injury, sexual assault, starvation, disease, disability, and poor access to essential services such as healthcare and education.[1,3] According to the Internal Displacement Monitoring Centre (IDMC), 71.1 million people were internally displaced worldwide by the end of

1155

2022 across 110 countries and regions.[4] However, this number continues to rise due to the rapidly growing instances of violence, conflict, and natural calamities.[5]

Conflict is a major cause of displacement in Africa.[6] The number of internally displaced people, refugees, and asylum seekers in Africa was 40.4 million in 2023, which was more than double the number in 2016. Of these 40 million, more than 77% were internally displaced people living in their nations.[7]

As of January 2024, 7.6 million people have been internally and externally displaced within and outside of Sudan since the conflict between the Sudanese Armed Forces and the Rapid Support Forces began on April 15, 2023. Sudan currently has the greatest child displacement crisis and the highest number of displaced individuals worldwide.[8] About one in every eight IDPs around the world is from Sudan, which represents 13% of all IDPs worldwide.[9] The regions in Sudan with the largest percentage of internally displaced people (IDPs) were South Darfur (12%), River Nile (11%), East Darfur (11%), White Nile (8%), Al Jazirah (8%), and North Darfur (8%).[8]

The high and persistent rates of mental disorders in countries affected by conflict require global attention from the humanitarian, development, health, and mental health sectors to prioritize the establishment of mental health services in conflict and post-conflict settings.[10] People affected by conflict suffer from mental health disorders at a rate more than double that of the general population.[11] This is believed to be attributed to exposure to traumatic events, lack of food, and the prolonged duration of displacement.[12] The most commonly reported mental health problems were depression and post-traumatic disorders.[13] Stressors, such as unemployment, poor socioeconomic conditions, and lack of social integration can increase the risk of developing mental health conditions and worsen pre-existing ones.[14]

A meta-analysis of the rates of PTSD and major depression in the global adult population of war survivors revealed that 242 million and 238 million of them have PTSD and major depressive disorder, respectively.[15] Another study in South Darfur showed that psychiatric diagnoses were detected in 62.2% of the participants. Post-traumatic stress disorder (PTSD) was the most commonly reported condition, accounting for 14.9% of the participants, followed by depression (13.5%), and comorbid PTSD and depression (8.1% of participants).[16] A study conducted in Somalia revealed that unemployment, cumulative traumatic exposure, and the frequency and duration of displacement were significant predictors of the development of psychiatric morbidity.[17] Based on a meta-analysis, being a female migrant and having a non-partnered marital status were significant determinants of depression among displaced people.[18] It is estimated that 8 million deaths annually (14% of all deaths worldwide) are indirectly caused by mental diseases; therefore, efforts must be made to measure and manage the global burden of mental diseases.[19]

In cases of mild to moderate post-traumatic stress disorder (PTSD) and depression, psychotherapy and medication have shown positive outcomes. However, for severe cases that do not respond to standard treatments, advanced neuro-regulatory techniques such as electroconvulsive therapy (ECT) and transcranial magnetic stimulation (TMS) become crucial and have been proven effective.[20–22] In Sudan, the burden of mental health treatment is immense. Basic medications are scarce, and the situation worsens for those with resistant mental health issues requiring ECT. Unfortunately, ECT is only accessible in the capital city, which is now engulfed in conflict. This vicious cycle—where war contributes to mental health problems, yet essential drugs remain unavailable—exacerbates the suffering of those in need.

As far as we know, no previous studies have been conducted on PTSD and depression among IDPs in this village of Al-Galgala since the armed conflict in Khartoum started in mid-April 2023. The main aim of the present study was to determine the prevalence of PTSD and depression and to investigate the association of sociodemographic and displacement characteristics with both PTSD and depression. This study adds to the growing body of knowledge on the mental health challenges faced by IDPs, which is a field that requires more attention.

Materials and Methods
Study Setting
The study was conducted in August 2023 over 2 weeks in Al-Galgala village, AlKamlin locality, AlGazeira state, Sudan. The village was selected because there were high numbers of IDPs. It is located 70 km from Khartoum, the capital of Sudan. It is considered one of the nearest villages to Khartoum, resulting in a high influx of IDPs.

Study Design

An observational, descriptive, cross-sectional, community-based study was conducted among adult IDPs. IDPs were defined as people who have been displaced from Khartoum, as a result of the armed conflict following the 15th of April 2023. We excluded those who owned homes in the village and came on vacation regularly before the armed conflict.

Sample Size Determination/Sampling Technique

The sample size was calculated using a single population proportion formula with the assumptions of a 10.5% prevalence of PTSD from a previous study among IDPs in Al-Gazeira,[23] Z = 1.96 for a confidence level of 95%, margin of error of 0.05, and a 1.4% non-response rate. The total sample size was 143.

$$n = \frac{z^2 \times p(1-p)}{e^2}$$

Sample

Adults who were displaced to the region because of the armed conflict in Khartoum. The participants had no previous diagnosis, neither with PTSD nor with depression. The study included 143 participants, with a 99% response rate. The majority of the study participants 74 (51.7%) were within the 20–39 years age group, 123 (86%) were females, 70 (49%) were married, 60 (42%) had attended university education at least, 104 (72.7%) were not working, and 106 (74.1%) had no comorbidity. The majority of the respondents had been exposed to the armed conflict for more than 2 months (35.0%) and had been displaced for more than 2 months (49.7%). Socio-demographic characteristics are described in Table 1.

Table 1 Characteristics of the Study Participants/IDPs in Al-Galgala, 2023 (n = 143)

Variable		Count	Column N %
Age	Less than 20 years	30	21.0%
	20–39 years	74	51.7%
	40–59 years	29	20.3%
	More than 60 years	10	7.0%
Gender	Male	20	14.0%
	Female	123	86.0%
Educational level	Illiterate	6	4.2%
	Primary	37	25.9%
	Secondary	40	28.0%
	University	49	34.3%
	Postgraduate	11	7.7%
Marital status	Married	70	49.0%
	Divorced	4	2.8%
	Single	60	42.0%
	Widowed	9	6.3%

(*Continued*)

Table 1 (Continued).

Variable		Count	Column N %
Occupational status	Employed	24	16.8%
	Freelance work	15	10.5%
	Not working	104	72.7%
	Retired	0	0.0%
Comorbidities	Yes	37	25.9%
	No	106	74.1%
Duration of exposure to the armed conflict	Less than 7 days	24	16.8%
	7–29 days	40	28.0%
	30–60 days	29	20.3%
	More than 60 days	50	35.0%
The period of displacement	Less than 30 days	27	18.9%
	30–60 days	45	31.5%
	More than 60 days	71	49.7%
The decision of displacement	Sudden	127	88.8%
	Prepare for in less than one week	10	7.0%
	Prepare for in less than one month	4	2.8%
	Prepare for in one month or more	2	1.4%
Number of displaced family members	Whole family	92	64.3%
	Part of the family	51	35.7%
Presence of relatives in the war still	Yes	66	46.2%
	No	77	53.8%
With whom you are currently staying	Relatives	101	70.6%
	Friends	27	18.9%
	Stranger to the area	15	10.5%
Exposure to direct violence	Yes	19	13.3%
	No	124	86.7%

Sampling Technique

Because of the poor infrastructure and disorganization in the village, which hindered access to some of the sample sites and the fact that the IDPs were displaced to specific regions within the village, a convenience sampling technique was regarded as appropriate for this study. This technique facilitated the researchers to select the most accessible and available participants for the study. The inclusion criteria included adult males and females, while the exclusion criteria included adults who owned homes in the village and those who came on vacation regularly before the armed conflict.

1158

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Neuropsychiatric Disease and Treatment 2024:20

Study Instrument

The Arabic version of PHQ-9 and PCL-C questionnaires were used. The Questionnaire consisted of three parts. The first part covered sociodemographic and displacement characteristics, the second part covered the Patient Health Questionnaire 9 (PHQ-9) scale for depression symptoms, and the third part covered the PTSD Checklist – Civilian version (PCL-C) scale for PTSD symptoms.

The PHQ-9 was formulated by Drs. Robert L. Spitzer, Janet W.B. Williams, and Kurt Kroenke in the year 1999.[24] The PHQ-9 is the nine-item depression subscale of the Patient Health Questionnaire and is a widely used tool for assisting primary care clinicians in diagnosing depression as well as monitoring treatment. The PHQ-9 is based directly on the diagnostic criteria for major depressive disorder in DSM-IV. It asks about symptoms in the previous two weeks such as little interest or pleasure in doing things; feeling down, depressed or hopeless; trouble falling asleep, staying asleep, or sleeping too much. Then scores each symptom as follows: 0 (not at all), 1 (several days), 2 (more than half the days), and 3 (nearly every day). PHQ-9 total score ranges from 0 to 27 with severity categories as follows: absence of depression (0 to 4), mild depression (5 to 9), moderate depression (10 to 14), moderately severe depression (15 to 19), and severe depression (20 to 27).[25]

The PTSD Checklist (PCL) was initially created in the 1990s by Frank Weathers and his team at the National Center for PTSD, as documented in their publication in 1993.[26] The PCL-C consists of 17 items that correspond to the Diagnostic and Statistical Manual (DSM-IV) symptoms of PTSD. The respondents indicated how much they have been bothered by each symptom in the past month, on a 5-point Likert scale categorized as 1 (not at all), 2 (a little bit), 3 (moderately), 4 (quite a bit), and 5 (extremely) with regards to stressful life experience which is in this case; the war experience. The PCL-C total score ranges from 17 to 85. There is no absolute method for determining the correct cut-point on the PCL-C. In this study, a cut-point score of 30 was used according to the prevalence of PTSD in a previous study in Al-Gazeira.[23]

Using the symptom cluster method, a symptom item rating of moderately or higher (ie, a score of 3 or more on a 5-point scale) constituted an endorsement of that symptom. Individuals were candidates for a PTSD diagnosis if they endorsed one or more Cluster B items (ie, reexperience symptoms such as repeated, disturbing memories, thoughts, or images of the war), three or more Cluster C items (ie, avoidance symptoms such as avoid thinking about or talking about the war), and two or more Cluster D items (ie, hyperarousal symptoms such as feeling irritable or having angry outbursts). The final diagnosis of PTSD was obtained by using both the severity score and symptom cluster methods.[27]

Data Collection and Procedure

IDPs resided either with the villagers or in local schools, so a door-to-door approach was adopted to reach the participants. Each participant was informed verbally about the aim and the nature of the study. Data was collected by seven, well-trained individuals who were residents of the village. They were trained for 2 days on the use of the study questionnaire and interview techniques prior to the onset of the study. Data collection occurred over 2 weeks and the duration of the interview ranged from 10 to 15 minutes.

Data Entry and Analysis

All statistical analyses were carried out by using the Statistical Package for the Social Sciences (SPSS) program version 23 for Microsoft Windows. Descriptive statistics (frequencies, means, and standard deviations) were used for analyzing all sociodemographic and displacement characteristics, depression symptoms, and PTSD symptoms. Continuous variables were analyzed as mean values and standard deviation (SD). For categorical variables, differences were analyzed with $\chi2$ (chi-square) test. The normality of the data was checked using Shapiro–Wilk's test and Kolmogorov–Smirnov's test.

Binary Logistic Regression analysis was adopted to determine the predictors for PTSD and depression symptoms. Crude Odds Ratio (COR) and Adjusted Odds Ratio (AOR) with respective 95% confidence intervals were reported along with p-values for the Logistic Regression models.

Ethical Consideration

The study complies with the Declaration of Helsinki. Technical and ethical approval was obtained from the University of Khartoum (community medicine department). Permission was obtained from Al-Galgala administrative unit. Informed consent was given by every participant in the study area. Data was used for research purposes only.

Results

Prevalence of PTSD Symptoms

The prevalence of PTSD symptoms was found to be 25% based on DSM-IV symptoms' criteria, while according to the total severity score, the prevalence of PTSD symptoms was found to be 58%, with the score 30 being the cut-point score. The prevalence of PTSD is 27% among females, and 15% among males. Figure 1 shows the prevalence of PTSD among IDP in Al-Galgala.

All participants who met the criteria for PTSD according to DSM-IV had a PCL-C score of 30 at least. In contrast, 57% of the participants who scored 30 and above did not meet the criteria for PTSD according to DSM-IV.

The mean PCL-C score is 34.72. Regarding the PCL-C subscale, the mean score for the intrusive or reexperience symptoms, avoidance symptoms, and hyperarousal symptoms was 10.50, 13.62, 10.60, respectively, Table 2.

Prevalence of Depression Symptoms

The mean PHQ-9 score was 7.9. About 62% of IDPs met the symptoms criteria for depression. The depression rates were 63% among females and 55% among males. Figure 2 shows the distribution of depression symptoms among participants; 37.8% of the participants had no depression, 28.7% of participants had mild depression, 14.7% had moderate depression, 12.6% had moderately severe depression, and 6.3% had severe depression.

Prevalence of Depression and PTSD

Most of the participants with PTSD symptoms (92%) had depression. About 23.1% of the participants had comorbid depression and PTSD symptoms, 35.7% had no depression or PTSD, 39.1% had depression without PTSD, and 2.1% had PTSD without depression.
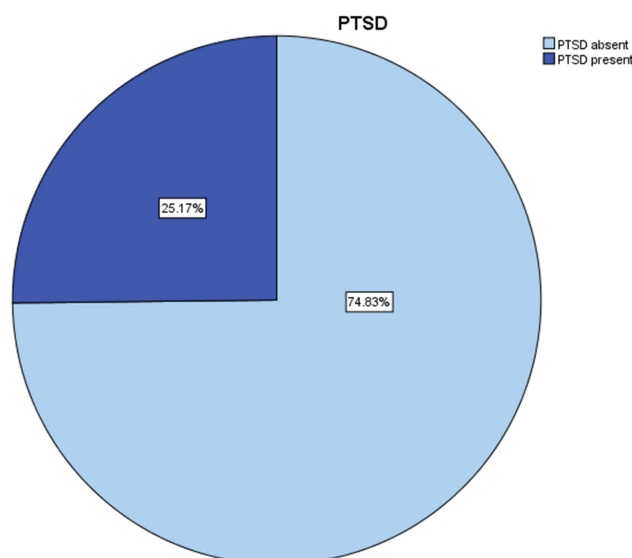

PTSD

☐ PTSD absent
■ PTSD present

25.17%

74.83%

Figure 1 Shows the prevalence of PTSD among IDP in Al-Galgala.

Table 2 Descriptive Statistics of PHQ-9 and PCL-C Scores of IDPs in Al-Galgala, 2023 (n = 143)

	PHQ-9 Score	PCL-C Score	Reexperience Score of PCL-C	Avoidance Score of PCL-C	Hyperarousal Score of PCL-C
N	143	143	143	143	143
Mean	7.89	34.72	10.50	13.62	10.60
Median	6.00	32.00	10.00	13.00	9.00
Mode	0.00	17.00	5.00	7.00	5.00
Std. Deviation	6.44	13.49	4.43	5.61	5.18

Predictors for PTSD and Depression

Tables 3 and 4 show crude and adjusted odds ratio results of binary logistic regression analysis, which was carried out to examine the potential predictors for PTSD and depression, respectively.

There is a strong association between gender and the presence of PTSD, as females were more than 8 times more likely to develop PTSD symptoms compared to males (AOR = 8.434, 95% CI [1.026–69.325]). Staying with friends was associated with a more than five-fold increase in PTSD risk, as opposed to staying with relatives (AOR = 5.334, 95% CI [0.998–28.522]). Moreover, having depression increased the risk of developing PTSD by more than 45 times (AOR = 45.631, 95% CI [7.125–292.232]).

Protective factors against the development of PTSD were primary education (AOR = 0.028, 95% CI [0.001–0.739]) compared to illiterate and freelance work (AOR = 0.049, 95% CI [0.004–0.652]) and not working (AOR = 0.044, 95% CI [0.006–0.339]) compared to employed status.

For depression, being older (40–59 years) (AOR = 6.473, 95% CI [1.054–39.766]) was more than six times more likely to develop depression. In addition, having PTSD (AOR = 24.736, 95% CI [4.928−124.169]) increased the risk of developing depression by more than 24 times. On the other hand, being in the war for 30–60 days (AOR = 0.157, 95% CI [0.026−.950]) compared to less than a week was protective against depression.

Discussion

To the best of our knowledge, this is the first study to be conducted among IDPs in Al-Gazeira state during the ongoing armed conflict in Khartoum. This study shed light on various aspects of internally displaced persons in central Sudan,
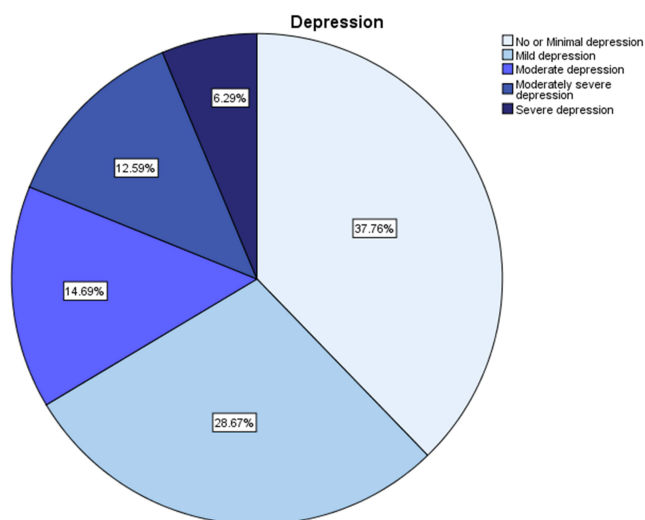

Figure 2 shows the distribution of depression symptoms among participants.

Table 3 Independent Predictors for PTSD Among IDP in Al-Galgala, 2023 (n = 143)

Sociodemographic Characteristics		PTSD		COR	P-value	AOR	P-value
		PTSD absent	PTSD present				
		%	%				
Age	Less than 20 years	22.4%	16.7%	1	1	1	1
	20–39 years	46.7%	66.7%	1.920 (0.693–5.316)	0.209	1.918 (0.376–9.798)	0.434
	40–59 years	22.4%	13.9%	0.833 (0.224–3.103)	0.786	0.139 (0.010–1.848)	0.135
	More than 60 years	8.4%	2.8%	0.444 (0.047–4.222)	0.480	0.042 (0.001–2.522)	0.129
Gender	Male	15.9%	8.3%	1	1	1	1
	Female	84.1%	91.7%	2.078 (0.572–7.552)	0.267	8.434 (1.026–69.325)	**0.047***
Educational level	Illiterate	3.7%	5.6%	1	1	1	1
	Primary	31.8%	8.3%	0.176 (0.022–1.395)	0.100	0.028 (0.001 - 0.739)	**0.032***
	Secondary	28.0%	27.8%	0.667 (0.106–4.206)	0.666	0.172 (0.008–3.515)	0.253
	University	29.0%	50.0%	1.161 (0.193–6.983)	0.870	0.109 (0.005–2.287)	0.153
	Postgraduate	7.5%	8.3%	0.750 (0.087–6.468)	0.794	0.024 (0.001–1.100)	0.056
Marital status	Married	51.4%	41.7%	1	1	1	1
	Divorced	3.7%	0.0%	0.000	0.999	0.000	0.999
	Single	37.4%	55.6%	1.833 (0.837–4.014)	0.130	2.186 (0.558–8.558)	0.262
	Widowed	7.5%	2.8%	0.458 (0.053–3.958)	0.478	0.319 (0.012–8.853)	0.501
Occupational status	Employed	13.1%	27.8%	1		1	1
	Freelance work	11.2%	8.3%	0.350 (0.078–1.573)	0.171	0.049 (0.004 - 0.652)	**0.022***
	Not working	75.7%	63.9%	0.398 (0.156–1.012)	0.053	0.044 (0.006 - 0.339)	**0.003***
	Retired	0.0%	0.0%	–	–	–	–
Comorbidities	Yes	23.4%	33.3%	1	1	1	1
	No	76.6%	66.7%	0.610 (0.267–1.391)	0.240	0.382 (0.085–1.718)	0.210

1163

Mohamed and Kheir

Duration of exposure to the armed conflict	Less than 7 days	17.8%	13.9%	1	1	1	1
	7–29 days	27.1%	30.6%	1.441 (0.432–4.810)	0.552	3.144 (0.521–18.963)	0.212
	30–60 days	19.6%	22.2%	1.448 (0.403–5.197)	0.571	5.823 (0.558–60.715)	0.141
	More than 60 days	35.5%	33.3%	1.200 (0.369–3.904)	0.762	4.364 (0.465–40.988)	0.197
The period of displacement	Less than 30 days	20.6%	13.9%	1	1	1	1
	30–60 days	32.7%	27.8%	1.257 (0.379–4.168)	0.708	1.345 (0.201–9.002)	0.760
	More than 60 days	46.7%	58.3%	1.848 (0.617–5.533)	0.272	8.012 (0.891–72.025)	0.063
The decision of displacement	Sudden	87.9%	91.7%	1	1	1	1
	Prepare for in less than one week	7.5%	5.6%	0.712 (0.144–3.525)	0.677	0.259 (0.015–4.412)	0.350
	Prepare for in less than one month	3.7%	0.0%	0.000	0.999	0.000	0.999
	Prepare for in one month or more	0.9%	2.8%	2.848 (0.173–46.844)	0.464	99.925 (0.370–27,004)	0.107
Number of displaced family members	Whole family	65.4%	61.1%	1	1	1	1
	Part of the family	34.6%	38.9%	1.204 (0.552–2.625)	0.641	1.047 (0.194–5.643)	0.958
Presence of relatives in the war still	Yes	47.7%	41.7%	1	1	1	1
	No	52.3%	58.3%	1.275 (0.594–2.736)	0.533	1.049 (0.201–5.471)	0.954
With whom you are currently staying	Relatives	71.0%	69.4%	1	1	1	1
	Friends	16.8%	25.0%	1.520 (0.606–3.810)	0.372	5.334 (0.998–28.522)	**0.050***
	Stranger to the area	12.1%	5.6%	0.468 (0.099–2.216)	0.338	1.254 (0.131–11.980)	0.844
Exposure to direct violence	Yes	12.1%	16.7%	1	1	1	1
	No	87.9%	83.3%	0.691 (0.242–1.978)	0.491	1.109 (0.205–6.012)	0.904
Depression	Absent	47.7%	8.3%	1	1	1	1
	Present	52.3%	91.7%	10.018 (2.895–34.663)	**0.000***	45.631 (7.125–292.232)	**0.000***

Notes: * P value ≤ 0.05, which is considered statistically significant.

Table 4 Independent Predictors for Depression Among IDP in Al-Galgala, 2023 (n = 143)

Sociodemographic Characteristics		Depression		COR	P-value	AOR	P-value
		Depression Absent	Depression Present				
		%	%				
Age	Less than 20 years	25.9%	18.0%	1	1	1	1
	20–39 years	53.7%	50.6%	1.358 (0.577–3.195)	0.484	1.666 (0.438–6.330)	0.454
	40–59 years	14.8%	23.6%	2.297 (0.776–6.799)	0.133	6.473 (1.054–39.766)	**0.044***
	More than 60 years	5.6%	7.9%	2.042 (0.442- 9.438)	0.361	13.678 (0.812–230.364)	0.069
Gender	Male	16.7%	12.4%	1	1	1	1
	Female	83.3%	87.6%	1.418 (0.546–3.683)	0.473	1.495 (0.393–5.684)	0.555
Educational level	Illiterate	5.6%	3.4%	1	1	1	1
	Primary	24.1%	27.0%	1.846 (0.325–10.485)	0.489	6.711 (0.435–103.449)	0.173
	Secondary	33.3%	24.7%	1.222 (0.219–6.807)	0.819	2.630 (0.184–37.506)	0.476
	University	35.2%	33.7%	1.579 (0.288–8.646)	0.599	2.680 (0.177–40.507)	0.477
	Postgraduate	1.9%	11.2%	10.000 (0.739–135.327)	0.083	13.979 (0.386–506.780)	0.150
Marital status	Married	50.0%	48.3%	1	1	1	1
	Divorced	5.6%	1.1%	0.209 (0.021–2.117)	0.185	0.000	0.999
	Single	38.9%	43.8%	1.166 (0.570–2.387)	0.674	1.708 (0.513–5.685)	0.383
	Widowed	5.6%	6.7%	1.256 (0.290–5.446)	0.761	0.257 (0.025–2.600)	0.250
Occupational status	Employed	9.3%	21.3%	1	1	1	1
	Freelance work	13.0%	9.0%	0.301 (0.073–1.237)	0.096	0.717 (0.085–6.019)	0.759
	Not working	77.8%	69.7%	0.388 (0.135–1.121)	0.080	0.421 (0.073–2.428)	0.333
	Retired	0.0%	0.0%	-	-	-	-
Comorbidities	Yes	20.4%	29.2%	1	1	1	1
	No	79.6%	70.8%	0.620 (0.277–1.386)	0.244	1.089 (0.275–4.312)	0.903

Mohamed and Kheir

Duration of exposure to the armed conflict	Less than 7 days	14.8%	18.0%	I	I	I	I
	7–29 days	27.8%	28.1%	0.833 (0.288–2.413)	0.737	0.383 (0.086–1.704)	0.207
	30–60 days	24.1%	18.0%	0.615 (0.201–1.887)	0.396	0.157 (0.026 -. 950)	**0.044***
	More than 60 days	33.3%	36.0%	0.889 (0.318–2.481)	0.822	0.492 (0.082–2.950)	0.437
The period of displacement	Less than 30 days	20.4%	18.0%	I	I	I	I
	30–60 days	25.9%	34.8%	1.522 (0.564–4.112)	0.407	2.165 (0.531–8.822)	0.281
	More than 60 days	53.7%	47.2%	0.996 (0.404–2.453)	0.993	0.813 (0.190–3.479)	0.780
The decision of displacement	Sudden	88.9%	88.8%	I	I	I	I
	Prepare for in less than one week	9.3%	5.6%	0.608 (0.167–2.208)	0.449	1.125 (0.231–5.485)	0.884
	Prepare for in less than one month	0.0%	4.5%	981,554,334.897	0.999	1.353	0.998
	Prepare for in one month or more	1.9%	1.1%	0.608 (0.037–9.941)	0.727	0.177 (0.001–43.350)	0.538
Number of displaced family members	Whole family	66.7%	62.9%	I	I	I	I
	Part of the family	33.3%	37.1%	1.179 (0.579–2.399)	0.650	2.061 (0.552–7.700)	0.282
Presence of relatives in the war still	Yes	46.3%	46.1%	I	I	I	I
	No	53.7%	53.9%	1.009 (0.512–1.988)	0.979	1.341 (0.352–5.109)	0.667
With whom you are currently staying	Relatives	66.7%	73.0%	I	I	I	I
	Friends	20.4%	18.0%	0.806 (0.338–1.921)	0.626	0.305 (0.082 −1.138)	0.077
	Stranger to the area	13.0%	9.0%	0.633 (0.212–1.888)	0.412	0.837 (0.163 −4.283)	0.831
Exposure to direct violence	Yes	7.4%	16.9%	I	I	I	I
	No	92.6%	83.1%	0.395 (0.124–1.259)	0.116	0.331 (0.058 −1.909)	0.216
PTSD	PTSD absent	94.4%	62.9%	I	I	I	I
	PTSD present	5.6%	37.1%	10.018 (2.895- 34.663)	**0.000***	24.736 (4.928 −124.169)	**0.000***

Notes: * P value ≤ 0.05, which is considered statistically significant.

highlighting the similarities and differences of this setting in contrast to other internally displaced persons and refugees globally in terms of the impact of armed conflict on mental health.

This study proves that such a community survey can be done under extremely challenging conditions. For instance, poor infrastructure hindered access to some of the sample sites, and the safety situation required constant and cautious supervision. We aimed to assess the prevalence of PTSD and depression symptoms and their associated factors. The estimated prevalence was found to be 25% and 62%, respectively.

The findings of this study were in line with similar studies among global populations such as IDPs in Georgia,[28] and refugees in Croatia,[29] which had prevalence rates of 23% and 26% for PTSD, respectively. The prevalence of depression was similar to that among IDPs in Somalia,[17] and Syrian refugees in Iraq,[30] which was found to be 59% in both studies.

However, this prevalence was considered high when compared with findings from similar studies among IDPs in Central Sudan,[23] and South Darfur,[16] with a prevalence of 12% and 15% for PTSD and 24% and 13.5% for depression, respectively. Similar studies conducted in Nepal[31] and Northern Uganda[32] found a higher prevalence of symptoms of PTSD and depression with a prevalence of 53% and 54% for PTSD and 80% and 67% for depression, respectively.

The prevalence of comorbid PTSD and depression was found to be 23.1%, which was similar to the result of the study among the refugee population in Croatia, which found a prevalence rate of 21%.[29] However, it was considered high when compared to a study in South Darfur, which found that 8.1% of the participants had comorbid depression.[16] This study found that depression, gender, occupation, education, and with whom you are currently staying were significantly associated with PTSD. In contrast, the factors associated with depression were PTSD, age, and duration of exposure to the armed conflict.

Being female (AOR = 8.434, 95% CI [1.026–69.325]), and having depression increased the risk of developing PTSD (AOR = 45.631, 95% CI [7.125–292.232]). A study among IDPs in south Ethiopia came to a similar conclusion.[33] Another study in northwestern Nigeria concluded that depression is an independent predictor of PTSD.[34] The association between gender and PTSD was also established in a study among Syrian refugees residing in the Kurdistan region of Iraq that reported that being female was a significant predictor of both PTSD and depression.[30]

On the other hand, PTSD (AOR = 24.736, 95% CI [4.928–124.169]) also increased the risk of developing depression. This was supported by findings from a study that assessed depression among IDPs in North Western Nigeria that found that comorbid PTSD was an independent predictor of depression.[35]

A study among the war-affected population in South Sudan highlighted that the comorbid condition and having PTSD alone shared similar risk factors, but they were distinct from the risk factors for depression only. This finding supports the idea that PTSD and comorbid PTSD depression may be indistinguishable constructs.[36] A study to understand the comorbidity of PTSD and depression also agrees with this.[37] The National Comorbidity Survey stated that 88% of men and 79% of women with chronic PTSD had at least one more psychiatric diagnosis. In those studies, major depression was one of the most common conditions co-occurring with PTSD.[38]

For depression, being older (40–59 years) (AOR = 6.473, 95% CI [1.054–39.766]) increased the risk of developing depression, this finding was consistent with that among Syrian refugees in Iraq that showed older age and being female to be independent predictors for depression.[30] However, our study failed to find a significant association between gender and depression.

The prevalence rates of PTSD and depression vary widely across studies. The variation in prevalence rates can be attributed to methodological factors and differences between conflict-affected internally displaced persons (IDP) and refugee populations.[39] The studies' timing in relation to the duration of the armed conflict and trauma may also account for the difference.[16] Despite the variation in results among studies, this study supports the fact that PTSD and depression are highly prevalent after displacement and armed conflicts.[39] These results can be used to acknowledge the prevalence of depression and PTSD in post-conflict regions and to implement effective mental health programs to tackle these issues.

Strengths and Limitations

A cross-sectional design was utilized which makes it challenging to establish a cause-and-effect relationship. Although the sampling procedures were designed to achieve good population coverage, it was not possible to obtain a truly random sample due to the ongoing war. As the main focus of the research was to identify the prevalence of PTSD and depression

among IDPs, it does not include how these two diseases could impact survival, educational outcomes, and social interactions.

Despite these limitations, our study was conducted in a relatively short period after exposure to armed conflict and displacement, with a high response rate of 99%. In addition, standard instruments (PCL-C and PHQ9) were used to assess PTSD and depression symptoms in a community-based study.

Conclusion

This study assessed the prevalence of PTSD and depression symptoms and their associated factors among IDPs in Al-Galgala village. The estimated prevalence of PTSD and depression was found to be 25% and 62%, respectively. This study found that depression, gender, occupation, education, and with whom you are currently staying were significantly associated with PTSD. In contrast, the factors associated with depression were PTSD, age, and the duration of exposure to the armed conflict. From this, we learn that mental health among IDPs needs to be prioritized by implementing effective programs such as the Comprehensive Mental Health and Psychosocial Support (MHPSS) that provide wide services including basic psychosocial support and specialized mental health services to civilians residing in post-conflict regions.

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Disclosure

The authors report no conflicts of interest in this work.

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