


Research

Major depressive disorder: point prevalence, suicidal ideation, and risk factors among Sudanese children and adolescents during Sudan army conflict: a cross-sectional study

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Abstract

Background Tiredness, poor concentration, disturbed sleep and poor appetite can all be caused by depression, which is a common mental disorder and a leading cause of disability worldwide. This study aimed to assess the prevalence of major depressive disorder, suicidal ideation, and risk factors in Sudanese children and adolescents during the Sudanese army conflict.

Methods A descriptive cross-sectional community-based study was carried out among Sudanese children between 11 and 17 years old who living in Sudan at the start of the conflict by using a self-administered questionnaire under the guidance of parents, if necessary. The questionnaire was adapted from the Patients Health Questionnaire-9 (PHQ-9) checklist for the assessment of major depression disorder symptoms according to the Diagnostic and Statistical Manual Edition 5th Edition (DSM-5). The questionnaire was translated into Arabic by two expert translators, and its validity and reliability were confirmed. Data analysis was performed using Statistical Package for the Social Sciences version 25 software, and descriptive analysis and any appropriate statistical tests were performed.

Results Among the 963 participants, the mean age was 15.18 ± 2.1 years, 65.5% were female, and 67.7% had major depressive disorder. There was a significant relationship between MDD score, age, sex, current residency status, and traumatic event exposure, with P values less than 0.001 for all variables.

Conclusion Major depressive disorder was highly prevalent among Sudanese children and adolescents included in the present study. Additionally, suicidal ideation, which requires immediate intervention, was reported to be very high. The findings will help the government to provide proper mental health interventions for affected people.

Keywords Major depression disorder · Conflict · Sudan · Mental illness · Prevalence · Displacement

Abbreviations

DSM-5	Diagnostic and Statistical Manual Edition 5th Edition
OR	Odds ratio
PHQ-9	Patient Health Questionnaire-9
SPSS	Statistical Package for the Social Sciences
UNHCR	United Nations High Commissioner for Refugees

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1 Background

Tiredness, poor concentration, disturbed sleep and poor appetite can all be caused by depression, which is a common mental disorder and a leading cause of disability worldwide. Five percent of adults are estimated to have depression, which is also known as depressive disorder [1, 2]. In the year 2000, depression ranked as the 4th leading cause of disease burden, and regarding the total disability adjusted life year, it accounted for 4.4% [3].

The previous literature has documented the effect of the war on mental health, and depression was one of the common war-related mental health conditions [4–6]. Several studies have indicated that adults, adolescents, and children who are refugees experience a high level of mental health issues, with anxiety, posttraumatic disease, and depression being the most commonly reported [7].

Armed conflict and political issues are among the common causes of forced displacement and migration [8]. The reported prevalence of depression ranged from 5 to 80% among internally displaced persons and refugees [9]. Chronic civil conflict characterized by massive displacement and widespread suffering is associated with between 28 and 97% of major depressive disorder (MDD) cases [10–16]. However, treatment and support services for depression are often underdeveloped or absent in low-middle-income countries [1].

Among African regions, a cross-sectional study was conducted among internally displaced people and refugees. In Northern Uganda, the prevalence of depression was 67% [16], that of Somali refugees in Ethiopia was 38.3% [17], and that of refugees in civil conflict in Sudan, which has lasted more than 20 years, was 49.9% [18].

Regarding gender variation, previous studies have shown inequality in depression incidence rates between women and men, especially in Juba, where there is an obvious contradiction between genders, with 58.7% of women and 40.9% of men reporting depression [18]. A similar variance was detected in northern Uganda, where 78% of the participants were women and 51.4% were men [16]. In addition, in the experiences of Eritrean refugees in Ethiopia, the prevalence rates continue to differ, with 56% of the refugees being women and 27.1% being men [19].

Regarding the causes of this difference, some studies have reported that 60% of refugee women are victims of sexual abuse or rape and have shown that many women and young girls may have experienced abortions [16, 20]. Low income, history of chronic disease, rape or sexual abuse, unnatural death of family/friends, murder of strangers or strangers, being tortured or beaten, not having shelter, and marital separation were important risk factors for depression [16, 17, 21].

The psychological or psychiatric issue may be the result of experiences before a flight to such poor housing, poverty, limited access to health services, and simply limited access to preventive health measures of infectious disease, or during a flight from their homes, especially to particular groups such as women, children, and elderly people. This may also be associated with a risk related to health problems, including a lack of access to health care in an emergent situation and inability to have basic survival needs for such food and water, or issues they may face on arrival in their new homeland summarized in problems through the displacement process due to the sudden influx of large groups of people to certain states/provinces/countries that may exceed their nature and capacity for receiving [22].

The conflict in Sudan that occurred on 15th April resulted in the displacement of 4.5 million people inside Sudan, and 1.2 million people fled to neighboring countries according to the Office of the United Nations High Commissioner for Refugees (UNHCR) [23]. In our study, we shed light on the mental health of children and adolescents who were present in the 2023 War of Sudan and explained how important early psychological intervention is for this group, especially given the lack of mental health centers before the war and the current disastrous health conditions, which supports our use of the PHQ-9. To our knowledge, no recent studies have been conducted to assess depression in Sudanese children and adolescents. This study aimed to assess the prevalence of major depressive disorder and suicidal ideation in Sudanese children and adolescents during the Sudan War in 2023 and to determine the associations between MDD incidence and age, sex, traumatic exposure, and current residency.

2 Methods and materials

2.1 Study design and setting

A descriptive cross-sectional community-based study was carried out among Sudanese children and adolescents who were living in Sudan at the start of the army conflict on the 15th of April 2023.

2.2 Participants:

The inclusion criteria were as follows: (1) Sudanese children and adolescents between 11 and 17 years old. (2) Attend the conflict that occurred on the 15th of April 2023. The exclusion criteria were as follows: (1) None Sudanese children and adolescents, (2) Younger than 11 or Older than 17 years old. (3) Did not Attend the conflict that occurred on the 15th of April 2023. (4) whose parents did not show willingness to participate.

At the end of the study, 963 valid responses were collected using a convenience sampling technique.

2.3 Data collection method and tools

The data were collected via a self-administered online questionnaire was filled by children under parents supervision following the parents' instructions, if necessary. The questionnaire was adapted from the Patient Health Questionnaire-9 (PHQ-9) checklist for the assessment of major depressive disorder symptoms according to the Diagnostic and Statistical Manual Edition 5th Edition (DSM-5). The questionnaire was translated into Arabic by two expert consultants, a pediatrician and a psychiatrist, and its validity and reliability were confirmed [24].

The questionnaire consists of participant general characteristics (four items) and the PHQ-9 checklist (9 items). The PHQ-9 consists of 9 items. For each question, the score ranges from 0 to 3, where higher scores represent greater severity. This scale is consistent with the Likert scale: 0 = not at all, 1 = several days, 2 = more than half of the days and 3 = nearly every day. Major depressive disorder was diagnosed by a cut-off raw score ≥ 10 [25]. MDD was categorized as follows: 0–4, no or minimal depression; 5–9, mild depression; 10–14, moderate depression; 15–19, moderately severe depression; and 20–27, severe depression [25].

2.4 Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 25. Qualitative statistics are described by frequencies and percentages, and quantitative statistics are described by means and standard deviations after the Shapiro–Wilk test was used to test the normality of the data. Pearson's Chi-square test, association correlation, and logistic regression were used to determine any statistically significant relationships between variables. A P value less than or equal to 0.05 was considered to indicate statistical significance.

3 Results

Table 1 shows that the total number of participants was 963. More than two-thirds had MDD (652, 67.7%). The MDD severity categories were no (118, 12.3%), mild (193, 20.0%), moderate (234, 24.3%), moderately severe (208, 21.6%), and severe (210, 21.8%). Most of the participants were female (632, 65.5%), and the majority of them had moderate MDD (161 participants). There was a significant relationship between sex and MDD, with a p value less than 0.001. The mean age was 15.182 ± 2.180 years. Most of the participants were aged 17–18 years (489, 50.8%), and the majority of them had severe MDD (137 participants), followed by those aged 14–16 years (305, 31.7%) and those aged 11–13 years (169, 17.5%). There was a significant relationship between age and MDD, with a p value less than 0.001.

According to their residency during the conflict, most of the participants were internally displaced (371, 38.5%), and the majority of them had moderately severe MDD (98 participants). Among those who were externally displaced, refugees or asylum seekers (260, 27.0%), the majority had moderate MDD (66 participants). Among those who did not experience conflict (236, 24.5%), the majority had mild MDD (58 participants). However, in the conflict area (96, 10.0%), the majority of the participants had severe MDD (29 participants). Approximately one-third of the participants suffered from serious injury, death, or loss of one of their family members or close friends during the conflict (296, 30.7%), and the majority of them had severe MDD (83 participants) (Table 1).

Table 2 presents the PHQ-9 responses of the study participants. Regarding feeling down, depressed, irritable, or hopeless, the majority said "Several days" (381, 39.6%). There was little interest or pleasure in doing things, and the majority said "Several days" (349, 36.2%). Trouble falling asleep, staying asleep, or sleeping too much, the majority said "Several days" (287, 29.8%). For poor appetite, weight loss, or overeating, the majority of participants said "Several days" (318, 33.0%). Feeling tired or having little energy, the majority said "Not at all" (351, 36.4%). With regard to feeling bad about

Table 1 Bivariate analysis between major depressive disorder (MDD) and general characteristics of the research participants (n = 963)

Parameters	Total; n (%) MDD; n (% with total)						Chi-Square	P value
	Negative; 311 (32.3)			Positive; 652 (67.7)				
	NO; 118 (12.3)	Mild; 193 (20.0)	Moderate; 234 (24.3)	Moderately severe; 208 (21.6)	Severe; 210 (21.8)	Severe; 210 (21.8)		
Age (years)								
11–13	169 (17.5)	26 (2.7)	46 (4.8)	45 (4.7)	31 (3.2)	21 (2.2)	38.994	< 0.001
14–16	305 (31.7)	50 (5.2)	62 (6.4)	78 (8.1)	63 (6.5)	52 (5.4)		
17–18	489 (50.8)	42 (4.4)	85 (8.8)	111 (11.5)	114 (11.8)	137 (14.2)		
Sex								
Male	331 (34.4)	51 (5.3)	87 (9.0)	73 (7.6)	65 (6.7)	55 (5.7)	22.078	< 0.001
Female	632 (65.6)	67 (7.0)	106 (11.0)	161 (16.7)	143 (14.8)	155 (16.1)		
Residency during the conflict								
Still in the conflict area	96 (10.0)	9 (0.9)	20 (2.1)	22 (2.3)	16 (1.7)	29 (10.0)	53.521	< 0.001
Internally displaced	371 (38.5)	25 (2.6)	62 (6.4)	93 (9.7)	98 (10.2)	93 (9.7)		
Externally displaced, refugee or asylum-seekers	260 (27.0)	38 (3.9)	53 (5.5)	66 (6.9)	41 (4.3)	62 (6.4)		
Hadn't been in the conflict area	236 (24.5)	46 (4.8)	58 (6.0)	53 (5.5)	53 (5.5)	26 (2.7)		
Suffering any serious injury, death or loss of one of their family members or close friends during the conflict								
Yes	296 (30.7)	22 (2.3)	46 (4.8)	75 (7.8)	70 (7.3)	83 (8.6)	21.062	< 0.001
No	667 (69.3)	96 (10.0)	147 (15.3)	159 (16.5)	138 (14.3)	127 (13.2)		

yourself—or feeling that you are a failure or that you have let yourself or your family down—the majority said “Several days” (306, 31.8%).

The majority of respondents said “Several days” (285, 29.6%) that troubleshires concentrating on things such as school-work, reading, or watching TV. Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you were moving around a lot more than usual, the majority said “Several days” (332, 34.5%). Thoughts that you would be better if dead, or of hurting yourself in some way, the majority said “Several days” (317, 32.9%). A total of 276 (28.7%) participants responded “nearly every day” and had a high rate of suicide risk (Table 2).

Table 3 presents the results of the bivariate analysis between suicidal or self-harm ideation and the general characteristics of the research participants ($n = 963$). Regarding suicidal or self-harm ideation, not at all (132, 13.7%), several days (317, 32.9%), more than half of the days (238, 24.9%), and nearly every day (276, 28.7%) were included. Most of the participants were female (632, 65.5%), and the majority of them had nearly every day suicidal or self-harm ideation (207 participants). There was a significant relationship between sex and suicidal or self-harm ideation, with p values less than 0.001. Most of the participants were 17–18 years old (489, 50.8%), and the majority of them had nearly daily suicidal or self-harm ideation (183 participants) or 14–16 years old (305, 31.7%). The majority of them had several days of suicidal or self-harm ideation (106 participants). There was a significant relationship between age and suicidal or self-harm ideation, with p values less than 0.001. Most of the participants, according to their residency during the conflict, were internally displaced (371, 38.5%), and the majority of them had nearly daily suicidal or self-harm ideation (132 participants). Among those who were externally displaced, refugees or asylum seekers (260, 27.0%), the majority had several days of suicidal or self-harm ideation (82 participants). Among those who did not experience conflict (236, 24.5%), the majority had several days of suicidal or self-harm ideation (93 participants). However, in the conflict area (96, 10.0%), the majority of the participants experienced nearly daily suicidal or self-harm ideation (36 participants). The participants suffered any serious injury, death, or loss of one of their family members or close friends during the conflict (296, 30.7%), and the majority of them had suicidal or self-harm ideation for more than half of the days (94 participants) (Table 3).

Figure 1 shows the relationships between general characteristics and MDD symptom severity. The statistics are Pearson correlation coefficients (covariance in parentheses). All pathways were positively correlated with the others and were significant at $p < 0.001$. The following demographic variables were controlled for: age group, sex, residency during the conflict, and serious injury, loss, or death of a close friend or relative. MDD symptom severity was measured by the PHQ-9, and all scale questions were positively correlated with the total score.

Table 4 presents the logistic regression estimates for all participants and shows several important effects of age group, sex, residency, and serious injury, loss, or death to close friends or relatives on major depressive disorder. The logistic regression model was statistically significant ($X^2(2) = 84.533, p < 0.001$). The Nagelkerke coefficient was 0.392. This value indicated that the interpreted variation explained by the model (39.2%) was acceptable. The model correctly classified 77.7% of the cases.

The odds ratios (ORs) among the age groups were 1.298 for the 14–16 years group and 1.933 for the 17–18 years group. The P values of the Wald test were not significant among the 14- to 16-year-old group (0.202). There was a significant difference between the 17- to 18-year-old group (p value = 0.001). This result indicated that the chance of having MDD among this group was greater than the chance of not having MDD. Regarding sex, the odds ratio among females was 2.047, with a significant P value according to the Wald test (< 0.001). This result indicated that the chance of having MDD in females was more than double that in males (Table 4).

Regarding current residence, the odds ratios among the groups were 1.756 for people still in conflict areas, 2.636 for internally displaced people, and 1.473 for externally displaced, refugee or asylum-seekers. The P values of the Wald test were significant among all groups: participants still in conflict areas, internally displaced people, and externally displaced people (0.036, < 0.001 , 0.043, respectively). This means that the chance of having MDD was greater for these groups than for people who were not in conflict areas. Specifically, for internally displaced people, the chance was approximately triple. Regarding suffering any serious injury, death or loss of one of the family members or close friends, the odds ratio among the group of participants suffering from those injuries was 1.966, with a significant P value of the Wald test (< 0.001). This result indicated that the chance of having MDD in this group was almost double that in the other group (Table 4).

Regarding suicidal or self-harm ideation, the odds ratios were 9.212 for the several-day group, 63.467 for more than half of the days, and 622.462 for nearly every day. All the differences were significant according to the P value of the Wald test (P value < 0.001). This result indicated that the chance of having MDD in participants with nearly every day of suicidal or self-harm ideation was almost 9 times greater than that in the other groups (Table 4).

Table 2 Patient Health Questionnaire (PHQ-9) responses among the research participants (N = 963)

Parameter	Value; n (%)			
	Not at all	Several days	More than half of the days	Nearly every day
1. Feeling down, depressed, irritable, or hopeless?	130 (13.5)	381 (39.6)	219 (22.7)	233 (24.2)
2. Little interest or pleasure in doing things?	227 (23.6)	349 (36.2)	207 (21.5)	180 (18.7)
3. Trouble falling asleep, staying asleep, or sleeping too much?	211 (21.9)	287 (29.8)	217 (22.5)	248 (25.8)
4. Poor appetite, weight loss, or overeating?	202 (21.0)	318 (33.0)	207 (21.5)	236 (24.5)
5. Feeling tired, or having little energy?	351 (36.4)	310 (32.2)	169 (17.5)	133 (13.8)
6. Feeling bad about yourself – or feeling that you are a failure, or that you have let yourself or your family down?	145 (15.1)	306 (31.8)	239 (24.8)	273 (28.3)
7. Trouble concentrating on things like school work, reading, or watching TV?	236 (24.5)	285 (29.6)	172 (17.9)	270 (28.0)
8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you were moving around a lot more than usual?	197 (20.5)	332 (34.5)	195 (20.2)	239 (24.8)
9. Thoughts that you would be better if dead, or of hurting yourself in some way?	132 (13.7)	317 (32.9)	238 (24.7)	276 (28.7)

Table 3 Bivariate analysis between suicidal or self-harm ideation and the general characteristics of the research participants (N = 963)

Parameters	Total; n (%) Suicidal or self-harm ideation; n (%)				Chi-Square	P value		
	Not at all; 132 (13.7)	Several days; 317 (32.9)	More than half of the days; 238 (24.7)	Nearly every day; 276 (28.7)				
Age (years)								
	11–13	169 (17.5)	33 (3.4)	75 (7.8)	37 (3.8)	24 (2.5)	60.322	< 0.001
	14–16	305 (31.7)	57 (5.9)	106 (11.0)	73 (7.6)	69 (7.2)		
	17–18	489 (50.8)	42 (4.4)	136 (14.1)	128 (13.3)	183 (19.0)		
Sex	Male	331 (34.4)	60 (6.2)	122 (12.7)	80 (8.3)	69 (7.2)	20.373	< 0.001
	Female	632 (65.6)	72 (7.5)	195 (20.2)	158 (16.4)	207 (21.5)		
Residency during the conflict	Still in the conflict area	96 (10.0)	6 (0.6)	31 (3.2)	23 (2.4)	36 (3.7)	41.169	< 0.001
	Internally displaced	371 (38.5)	37 (3.8)	111 (11.5)	91 (9.4)	132 (13.7)		
	Externally displaced, refugee or asylum-seekers	260 (27.0)	45 (4.7)	82 (8.5)	65 (6.7)	68 (7.1)		
	Hadn't been in the conflict area	236 (24.5)	44 (4.6)	93 (9.7)	59 (6.1)	40 (4.2)		
Suffering any serious injury, death or loss of one of their family members or close friends during the conflict	Yes	296 (30.7)	26 (2.7)	83 (8.6)	94 (9.8)	93 (9.7)	20.712	< 0.001
	No	667 (69.3)	106 (11.0)	234 (24.3)	144 (15.0)	183 (19.0)		

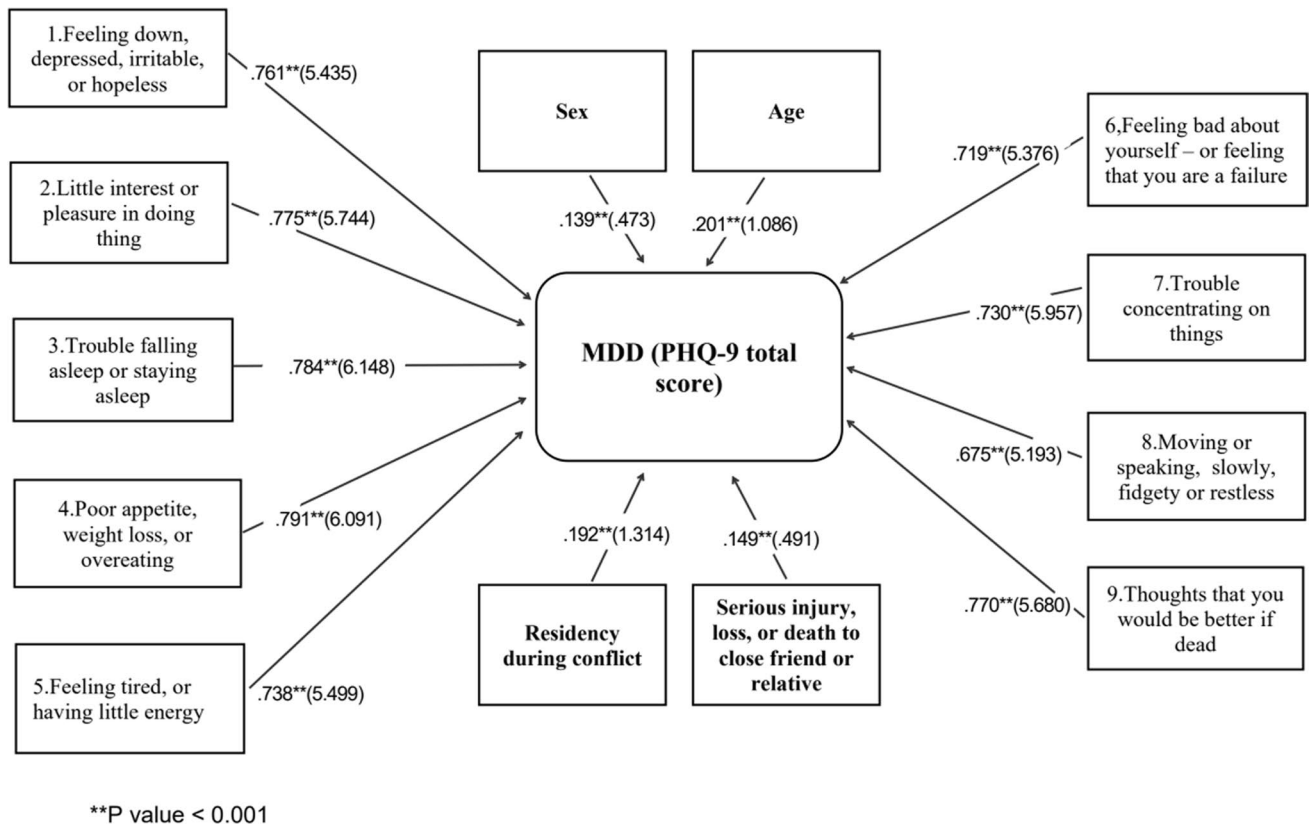


Fig. 1 Structural equation model of the correlation between general characteristics and MDD symptom severity

4 Discussion

This study revealed that most of the adolescents in Sudan during the 2023 war had depression. Approximately two-thirds had moderate to severe depression, and 20% had mild depression. There was a significant relationship between depression and age, sex, residence during the conflict and experience of war in the form of injury or loss of family members. All components of the PHQ-9 showed a strong positive correlation with the total score, while all the general characteristics, including sex, age, residency and loss, showed a weak positive correlation with the total score. All the general characteristics were significant contributors to MDD according to our regression model.

The total prevalence of depression in this study was extremely high (87.7%), and two-thirds had moderate to severe depression. Compared to Sudanese children before the war, the prevalence of depression among girls in one school for both anxiety and depression was 60.9% [26]. Another community-based study among adolescent girls reported that the prevalence of depression was 39.4% [27], indicating that this current prevalence is much greater than that previously reported among Sudanese adolescents. The number here is also high relative to children in other areas who were affected by war. In Gaza, 41.2% of the adolescents exceeded the cut-off point for depression [28]. Compared to adults who were affected by wars, such as those in Sri Lanka, 16.6% of those with postconflict depression were affected [29]. However, the high prevalence in our study could be due to the use of a self-rated questionnaire where people could show a greater perception than clinical data, and further clinical assessment should be performed. The majority of the participants also experienced trouble concentrating, which should be taken into consideration when reintegrating children into education in the future.

In compare our finding with the similar conflict area, a study was conduct in Afghanistan among the school age children founded that Two-third of them had depression, which similar to our study [30]. Also, suicidal ideation was reported in another study conduct among Afghan children to be near half of the study sample, which less than our study, and this difference could be due to the variability of the measurement between the study [31].

Table 4 Logistic regression estimates of general characteristics based on major depressive disorder. (N = 963)

Parameter	B	Sig	OR	95% Confidence interval for OR	
				Lower bound	Upper bound
Age (years)	11–13	0.001	–	–	–
	14–16	0.202	1.298	0.869	1.938
	17–18	0.001	1.933	1.321	2.829
Sex	Male	–	–	–	–
	Female	0.000	2.047	1.524	2.749
Residency during conflict	Still in conflict area	0.036	1.756	1.037	2.974
	Internally displaced	0.000	2.636	1.830	3.799
	Externally displaced, refugee or asylum-seekers	0.043	1.473	1.013	2.142
	Hadn't been in war area	0.000	–	–	–
During the conflict, did you suffer any serious injury, death or loss of one of your family members or close friends?	Yes	0.000	1.966	1.418	2.726
	No	–	–	–	–
Suicidal or self-harm ideation	Not at all	0.000	–	–	–
	Several days	0.000	9.212	4.988	17.011
	More than half of the days	0.000	63.467	31.875	126.369
	Nearly every day	0.000	622.462	198.843	1948.569
Constant	–0.0814	0.000	0.443	–	–

The most commonly reported symptoms on the PHQ-9 were feeling bad about themselves and having suicidal thoughts. Approximately 40% reported feeling little pleasure doing things, which is the same percentage reported by students at a Czech University after the Russia-Ukraine War reported feeling little interest or pleasure doing things [32]. Many adolescents also had sleep or appetite problems. It is highly concerning that almost one-third of the population reported thinking of suicide or self-harm daily. A study conducted in Uganda after the war showed that 17.9% of respondents had suicidal ideations and 18.8% had self-harming, which was greater among girls [33]. Our study had much higher rates. In a meta-analysis, suicide ideation among refugees was reported to be 16%, with a 2% rate of suicide attempt and a very low mortality rate [34]. However, the high prevalence of suicidal ideations among Sudanese youth calls for urgent intervention. It is important that these numbers are considered when providing psychological support or possible interventions.

Almost a quarter of the females had severe depression. There was a significant difference in the incidence of MDD between the sexes, as girls had a greater chance of developing MDD (OR = 0.72). This finding is consistent with previous studies; for instance, depression among university students after the Russia-Ukraine War was significantly greater among females [31]. Another study in Gaza showed a similar association between gender and depression, with a higher level of depression among females. This could be due to girls facing different types of experiences during war, especially since there has been an increase in sexual violence towards women and girls in Sudan during the current war [35]. Previously, in Uganda, sexual abuse was a significant predictor of depression in females, while the threat to loved ones was a significant predictor in males [36]. There was also a significant association between gender and suicide or self-harm, where nearly 30% of females experienced those thoughts daily compared to 20% of males. This could also be attributed to sex differences when encountering sexual violence and rape.

Almost one-third of adolescents above the age of 17 had severe depression, and more than one-third of the adolescents above the age of 17 had suicidal ideations or self-harm intentions daily, while only one-fifth had them daily among the 14–16 age group. Age was significantly associated with MDD. With increasing age, the risk of developing depression increased (OR = 1.93). A study of school-aged girls in Sudan in 2020 revealed a significant difference in the effect of age on psychosomatic illness; however, this study did not evaluate depression as a separate disorder and only included girls [25]. Another study in Sudan among the general population of girls revealed a significant difference between age and depression among girls, where older girls had a higher prevalence [26]. However, this could also be explained by older people having a better understanding or perception of age and a false increase in reporting depressive symptoms due to the use of a self-assessed questionnaire. There has been a reported increase in depression with age when self-assessed questionnaires and scales are used, but when depression is assessed through clinical methods, there is no increase with age [37].

There was a significant difference between residents and those who developed MDD, similar to the findings of previous studies. [38] The highest percentage of patients with severe depression were in conflict areas, with almost one-third of them experiencing severe depression. This is followed by the internally displaced and the externally displaced categories. More than one-third of the adolescents who were internally displaced or in conflict areas had suicidal ideation almost daily. However, it is important to consider that depression among the population could be due to experiences that occurred after displacement, such as displacement, or preexisting reasons, such as financial issues. Socioeconomic issues are common among internally displaced people. In Bosnia, it was found that most of the people who were refugees or asylum seekers abroad had a better financial situation than those who were internally displaced. [39] Another example is in Syria, where refugees reported having a better financial situation than those who were internally displaced. [38] However, in that same study, refugees had a greater chance of developing MDD. (OR = 0.56) [40].

Losing a family member or being exposed to injury were also significantly associated with depression. Almost one-third of those who were exposed to such experiences had severe MDD compared to less than 20% of those who were not. Witnessing of war events was previously associated with MDD in previous studies [41, 42]. In Uganda, witnessing violence and death were found to be independent predictors of anxiety and depression even years after the war [34]. However, in Gaza, there was no significant relationship between the frequency of certain events and depression, including the loss of relatives [28]. Another reason for the increase could be disability caused by injury. In Sri Lanka, having any form of disability was a significant predictor of depression among adults after war [29]. There was a significant difference between suicidal ideation and self-harm intentions; however, both percentages were approximately one-third of the population.

The results of this study should be interpreted in light of several limitations. This study was conducted using a Google form that was distributed online using a convenience sample due to safety issues. There was difficulty in reaching certain people, such as those who were still in conflict zones and those who had internet connectivity and electricity problems. This was a cross-sectional study, and conducting a longitudinal study will help in understanding the long-term effects

as well as the impact of displacement on depression. This study did not consider many war experiences, such as sexual assault and rape, which can clearly contribute to the mental health of adolescents. In addition, more information should be obtained regarding suicidal ideations as well as a deeper dive into suicidal planning and attempts. Finally, a more clinical approach towards evaluating the depressive symptoms of adolescents would help confirm the results and exclude any overrepresentation caused by self-report questionnaires.

5 Conclusion

These findings clearly indicate that two-thirds of Sudanese children and adolescents are affected by major depressive disorder. Traumatic experiences, missing people or their loved ones, death, and current residence had adverse effects on adolescents and children who had been in an army conflict area, which affected their ability to recover or rebuild their lives. In addition, the prevalence of suicidal ideation or thoughts was very high, which is a critical finding that needs rapid evaluation and management. The research showed an increase in the incidence of MDD, which can be a mental disorder that the participants suffer from.

Future research with a larger sample size, interviews with participants, probability sampling, and screening for other mental illnesses is necessary. The government and non-governmental organizations should urgently develop and implement comprehensive mental health programs tailored to the needs of Sudanese children and adolescents. These programs should include widespread screening for depression and other mental illnesses in schools and communities, followed by accessible and culturally sensitive counseling and psychiatric services. Training local health workers and educators to recognize and address mental health issues can enhance early intervention efforts. Additionally, creating safe spaces and support groups for children and families affected by trauma can provide crucial emotional support. Collaborating with international organizations to secure funding and resources will further strengthen these initiatives, ensuring a coordinated and effective response to the mental health crisis.

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Data availability The data are available upon reasonable request; please contact the corresponding author for the data.

Declarations

Ethics approval and consent to participate The study followed the Declaration of Helsinki and ethical approval was obtained from the Port Sudan Military Hospital Research Ethics Committee. The participants and their parents were informed about the details of the research. Informed consent was obtained in the questionnaire from the participants' parents, and all the responses were kept completely confidential and used only for the purpose of the research.

Consent for publication Not applicable.

Competing interests The authors declare that they have no competing interests.

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