



Post-Traumatic Stress Disorder among Internally Displaced Women in Sana'a City, Yemen

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ABSTRACT

Background Internally displaced persons (IDPs) often experience forced migration, loss of home and livelihood, and disruption of social networks. Women in these settings are more vulnerable to post-traumatic stress disorder (PTSD), which adversely affects their mental health. This study aimed to estimate the prevalence of PTSD and examine its distribution by sociodemographic, household, and food insecurity factors among internally displaced women in Sana'a, Yemen.

Methods: A cross-sectional study was conducted among 420 internally displaced women residing in Sana'a City. Participants were selected using systematic random sampling. Data were collected through face-to-face interviews conducted in the participants' homes using a structured questionnaire. The Harvard Trauma Questionnaire (HTQ) was used to assess PTSD. Data were entered into Microsoft Excel and exported to Stata for further analysis. Categorical variables were summarized using proportions, and variables were described using standard deviations. Statistical significance was set at $P < 0.05$.

Results: The prevalence of PTSD among internally displaced women was 15.9%. It was significantly higher among women with chronic illnesses (29.0% vs. 13.0%, $p = 0.002$), women whose husbands had primary or secondary education compared with university education (20.0% and 17.6% vs. 6.7%, $p = 0.024$), those displaced for ≤ 5 years (23.9% vs. 12.1%, $p = 0.002$), and women experiencing severe food insecurity (17.4% vs. 7.0%, $p = 0.048$).

Conclusion: This study highlights a substantial burden of prevalence of PTSD among internally displaced women in Sana'a City, Yemen. Internally displaced women are highly vulnerable to PTSD owing to overlapping health, economic, and displacement-related stressors. Integrated interventions addressing mental health, chronic illness care, livelihood support, and food security are urgently needed to reduce the psychological burden on these individuals.

ARTICLE INFO

Keywords:

post-traumatic stress disorder, PTSD, internally displaced women, Yemen.

Article History:

Received: 26-September-2025,

Revised: 4-January-2026,

Accepted: 26-March-2026,

Published: 28-April-2026.

INTRODUCTION

Internal displacement is one of the most pressing humanitarian challenges worldwide. Population displacement is strongly associated with a range of mental health disorders, particularly post-traumatic stress disorder (PTSD) among affected populations [1]. The World Health Organization estimates that approximately 22% of individuals living in conflict-affected settings experience mental disorders at any given time [2]. Women and children constitute the majority of the internally displaced persons

(IDPs) globally. By the end of 2022, an estimated 35.8 million women and girls were living in situations of internal displacement due to conflict, violence, and disasters [3].

PTSD is a chronic psychiatric disorder that can significantly impair the quality of life and impose substantial economic and social burdens. Exposure to traumatic stressors is the primary precipitating factor for the development of PTSD [4]. Evidence suggests that elevated levels of PTSD and depression may persist for many

years following a displacement. For example, studies of North Korean refugees residing in South Korea have reported high levels of mental health problems, particularly depression, with prevalence estimates ranging from 31% to 54% [5].

In the Middle East, a substantial proportion of forcibly displaced populations originate from Muslim-majority countries such as Afghanistan (2.7 million displaced), Syria (6.7 million), and Iraq (3.1 million) [6]. Since the onset of the Syrian conflict in 2011, millions of Syrians have been displaced, and many have sought refuge in neighboring countries. Refugees residing in Lebanon have experienced substantial psychosocial distress, including high levels of depression, anxiety, and PTSD [7]. Recent studies have reported that the prevalence of depression and PTSD among displaced Syrians in Lebanon exceeded 27% and 43%, respectively [8].

In Yemen, more than seven years of armed conflict have resulted in widespread displacement of the population. Approximately 4.3 million people remain internally displaced across the country [9]. Women and children account for nearly three-quarters of the internally displaced population, and approximately one in four displaced households is headed by women [10]. At the same time, Yemen's health system is facing severe challenges and is widely considered to be on the verge of collapse [11]. Of an estimated national population of approximately 30 million, millions required medical care in 2020, and the demand for health services was expected to increase further in 2021. However, only approximately half of the healthcare facilities remain fully operational, and many of these facilities lack qualified health personnel, essential medicines, and critical medical supplies such as masks, gloves, and oxygen [12].

Under these conditions, women in Yemen face particularly severe vulnerabilities. Reports indicate that gender-based violence increased by 76% during the first five months of the conflict, with 2,447 documented cases of women being killed or injured in the same period. During the same period, more than two million people were internally displaced, of whom approximately 75% were women and children forced to leave their homes [13].

Given these circumstances, understanding the mental health burden among internally displaced women is essential for informing humanitarian and public-health interventions. Therefore, this study aimed to estimate the prevalence of PTSD and examine its distribution according to sociodemographic characteristics, household factors, and food insecurity among internally displaced women in Sana'a, Yemen.

MATERIALS AND METHODS

STUDY DESIGN AND SETTING

A descriptive cross-sectional study was conducted in August 2023 among internally displaced women residing in Sana'a, Yemen. Sana'a City hosts a large proportion of internally displaced persons in northern Yemen because of its relative stability compared to other regions of the country. Consequently, it has become a major destination for individuals and families displaced by ongoing conflicts and insecurity.

STUDY POPULATION

The study population consisted of internally displaced women registered with the Supreme Council for the Management and Coordination of Humanitarian Affairs (SCMCHA) in Sana'a City during the study period. Women who met the eligibility criteria were invited to participate in the study.

Women were eligible for inclusion if they had been internally displaced due to conflict or war, were aged 18 years or older, resided within the defined geographical area of the study, were able to respond to the interview questions, and were listed in the local authority registration records. Women were excluded if they were not internally displaced, were younger than 18 years, had severe pre-existing mental disorders or cognitive impairments that prevented meaningful participation, or declined to participate in the study.

SAMPLE SIZE AND SAMPLING TECHNIQUE

The sample size was calculated using a single population proportion formula. Assuming a 95% confidence level, 80% statistical power, a significance level of 0.05, and an anticipated PTSD prevalence of 50% among women in Yemen (to maximize the required sample size in the absence of reliable prior estimates), the minimum sample size was calculated as 384 participants. After accounting for a potential 10% non-response rate, the sample size was increased to 427 and subsequently rounded to 430 women.

A sampling frame consisting of 22,360 internally displaced households in Sana'a was obtained from the SCMCHA database. A systematic random sampling technique was used to select households, with the household as the primary sampling unit. To achieve the target sample size, a sampling interval (K) of 52 was calculated by dividing the total number of households by the required sample size (22,360/430). The first household was selected randomly, and every 52nd household thereafter was included in the study.

Within each selected household, one eligible woman aged ≥ 18 years was invited to participate. Data collection continued until the target number of participants was reached. Of the 430 women invited to participate, 10 declined, resulting in a final sample of 420.



DATA COLLECTION

Data were collected through face-to-face interviews using a structured questionnaire administered by the researcher. The questionnaire included sections addressing women's and husbands' characteristics, household characteristics, mental health indicators, and food security status. Participants were asked to report their experiences and feelings during the 30 days before the interview.

DATA QUALITY ASSURANCE

A pilot study was conducted prior to the main data collection in the same study setting, involving 30 women who met the inclusion criteria. A pilot study was conducted to assess the clarity and applicability of the questionnaire, evaluate its validity and reliability, estimate the duration of the interviews, and identify potential logistical issues in the data collection process. Participants included in the pilot study were excluded from the final analyses.

STUDY VARIABLES

The primary outcome variable of this study was PTSD. The secondary variables included the characteristics of women, husbands, household conditions, and household food security. Women's age was categorized into three groups: 18–29, 30–39, and 40 years or older. Educational attainment among women was classified as no formal education, primary education, secondary education, or university-level education. Employment status was categorized as working or not working, with working defined as engagement in either formal employment or informal income-generating activities, such as small-scale trading or running a home-based business. Women who reported having been diagnosed by a medical professional with chronic conditions, including heart disease, hypertension, diabetes, chronic obstructive pulmonary disease, or kidney disease, were classified as having a chronic disease. Husbands' educational levels were categorized as primary, secondary, or university education, while their occupations were classified as employed, daily wage laborer, or unemployed. Household characteristics included the sex of the household head (male or female), type of housing (flat or independent house versus tent), and duration of displacement, categorized as five years or less or more than five years [14].

MEASUREMENT TOOLS

PTSD symptoms were assessed using the Harvard Trauma Questionnaire, developed by Harvard University. This instrument is widely used as a screening tool for trauma-related emotional distress in conflict-affected populations. Participants were asked to indicate the ex-

tent to which they had experienced symptoms related to emotional distress in the 12 months preceding the interview. These symptoms included crying, inability to enjoy life, fatigue, and thoughts of ending one's life.

The PTSD symptom scale consists of 16 items scored on a four-point Likert scale ranging from 1 (not at all) to 4 (extremely). A mean score of 2.5 or higher across the items was used as the cutoff point to indicate probable PTSD [15].

Household food insecurity was assessed using the Household Food Insecurity Access Scale developed by the United States Agency for International Development through the Food and Nutrition Technical Assistance (FANTA) project. This instrument has been validated and applied in Yemen [16]. The scale consists of nine questions assessing food insecurity experiences during the preceding 30 days. Responses were scored according to the frequency of occurrence: 0 for never, 1 for rarely, 2 for sometimes, and 3 for often [17].

DATA ANALYSIS

Data were analyzed using Stata version 16. Descriptive statistics were used to summarize the participant characteristics, and categorical variables were presented as proportions. Bivariate analysis was conducted to assess the associations between independent variables and PTSD using the chi-square test for independence.

ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the Department of Community Medicine, Faculty of Medicine, Sana'a University, and the Ethical Committee of Sana'a University (reference number: 2025 (6) 1; approved on September 1, 2025).

Verbal informed consent was obtained from all participants before the interview. Participants were informed about the objectives and significance of the study and assured that their participation was voluntary. They were also informed that they had the right to decline participation or withdraw from the study at any time, without any consequences.

RESULTS

CHARACTERISTICS OF STUDY PARTICIPANTS

A total of 430 internally displaced women were approached for participation, of whom 420 consented and completed the interview, resulting in a response rate of 97.6%.

Overall, 42.5% of women were aged 18–29 years. Regarding educational attainment, nearly half of the participants (45.5%) had completed primary education. The majority of women (61.2%) reported being engaged in income-generating activities, while 14.8% reported hav-

ing at least one chronic illness.

Regarding husbands' characteristics, slightly more than half (51.4%) had attained secondary education. In terms of employment, 55.9% of husbands worked as daily wage laborers. Household characteristics indicated that 51.9% of households were headed by women, while 48.1% were headed by men. Most participants (85.2%) reported living in flats or independent homes. Household size was relatively large, with 40.2% of families consisting of seven or more members.

The duration of displacement was prolonged for a large proportion of participants; 67.1% reported being displaced for more than five years, while 32.9% had experienced displacement for five years or less. Food insecurity was highly prevalent, with 86.4% of households classified as severely food insecure (Table 1).

PREVALENCE OF PTSD;

The overall prevalence of PTSD among internally displaced women was 15.9%, with notable variation across sociodemographic, household, and health-related factors. Although age and women's education were not significantly associated with PTSD, prevalence ranged from 12.4% among those aged 18–29 years to 18.9% among those aged 40–49 years, and from 13.3% among university-educated women to 20.7% among women with no formal education. Similarly, women's occupation showed no significant difference, with 16.7% of working women and 14.7% of housewives affected.

In contrast, several factors were significantly associated with PTSD. Women with a chronic illnesses had a markedly higher prevalence of PTSD (29%) compared with those without chronic conditions (13.7%; $P = 0.002$). Husband's education also showed a significant association, with higher prevalence among women whose husbands had only primary education (20%) compared with those whose husbands had a university degree (6.7%; $P = 0.024$). Duration of displacement was another important factor: women displaced for five years or less reported PTSD at a prevalence of 23.9%, while those displaced for more than five years had a prevalence of 12.1% ($P = 0.002$). Household food insecurity was also associated with PTSD, with 17.4% of women in severely food-insecure households affected compared with 7% in mildly or moderately food-insecure households ($P = 0.048$). No statistically significant associations were observed with husbands' occupation, sex of the household head, type of housing, or family size (Table 2).

DISCUSSION

In this study, the overall prevalence of PTSD among internally displaced women in Sana'a City was 15.9%, reflecting a substantial mental health burden. This estimate is consistent with findings from other conflict-affected

settings in Africa and the Middle East, where PTSD prevalence among IDPs typically ranges from 10% to over 40%, depending on context and measurement tools [18].

Studies conducted in Somalia and Ethiopia have similarly documented high levels of PTSD among displaced populations, underscoring the profound psychological impact of conflict and forced migration [19]. Unlike some reports from Somalia and Sudan, this study did not identify a significant association between women's age and PTSD, despite evidence suggesting that cumulative exposure to traumatic events often increases with age [20].

The absence of significant associations between PTSD and women's education or employment status suggests that displacement-related stressors may outweigh potential protective effects of socioeconomic factors. This finding aligns with previous research indicating that trauma exposure is a stronger determinant of PTSD risk than education or employment [21].

Chronic illness was strongly associated with PTSD in our study, with affected women exhibiting more than double the prevalence compared with those without chronic conditions. This observation is supported by prior studies demonstrating that poor physical health exacerbates psychological vulnerability among displaced women, with chronic conditions such as diabetes and hypertension linked to higher levels of stress, inflammation, and trauma-related symptoms [22]. These findings underscore the interconnection between physical and mental health in displaced populations.

Husband's education was also significantly associated with PTSD, with higher prevalence observed among women whose husbands had only primary education. Lower household educational attainment often corresponds with reduced economic resources and limited access to coping mechanisms, thereby increasing vulnerability to psychological distress. Similar associations have been reported among IDPs in Ethiopia and Somaliland [23].

Although female-headed households and tent dwellers exhibited slightly higher PTSD prevalence, these associations were not statistically significant. Nevertheless, evidence from Iraq and South Darfur suggests that unstable shelter conditions and female-headed households may increase exposure to stressors and reduce access to support networks [24].

Duration of displacement demonstrated a strong relationship with PTSD. Women displaced for five years or less had almost twice the prevalence of PTSD compared to those displaced for longer periods. This finding is consistent with evidence indicating that the initial years of displacement represent a particularly unstable period characterized by uncertainty, loss of home, and inadequate support systems [25]. Over time, some displaced populations may gradually adapt or establish more stable living arrangements, which may mitigate psychological



Table 1. Socio-demographic Characteristics among internally displaced women in Sana'a City, Yemen, n=420

Variables	Number	Percent
Woman's age (year)		
18-29	178	42.5
30-39	151	36.0
≥40	90	21.5
Woman's education		
No education	82	19.5
Primary	191	45.5
Secondary	117	27.9
University	30	7.1
Occupation of woman		
House wife	163	38.8
Work	257	61.2
Woman had chronic disease		
No	358	85.2
Yes	62	14.8
Husband's education		
Primary	115	27.4
Secondary	216	51.4
University	89	21.2
Occupation of Husband		
Employed	28	6.7
Daily wages	235	55.9
Unemployed	157	37.4
Sex of head of household		
Male	202	48.1
Female	218	51.9
Type of house		
Flat/independent house	358	85.2
Tent	62	14.8
Family size		
≤ 4	79	18.8
5	63	15.0
6	109	26.0
≥ 7	169	40.2
Duration of displacement		
≤ 5 years	138	32.9
> 5 years	282	67.1
Household food insecurity level		
Mild/moderate food insecure	57	13.6
Severe food insecure	363	86.4



Table 2. Prevalence of PTSD among displaced women in Sana'a City, by sociodemographic, household, and food insecurity, n =420

Characteristics	Total participants	PTSD		P. Value
		Yes		
Woman's age (year)		Number	% percent	
18-29	178	22	12.4	0.218
30-39	151	28	18.5	
40 – 49	90	17	18.9	
Woman's education				
No education	82	17	20.7	0.612
Primary	191	29	15.2	
Secondary	117	17	14.5	
University	30	4	13.3	
Occupation of woman				
House wife	163	24	14.7	0.584
Work	257	43	16.7	
Women had chronic disease				
No	358	49	13.7	0.002
Yes	62	18	29	
Husband's education				
Primary	115	23	20	0.024
Secondary	216	38	17.6	
University	89	6	6.7	
Occupation of husband				
Employed	28	6	21.4	0.209
Daily wages	235	31	13.2	
Unemployed	157	30	19.1	
Sex of head of household				
Male	202	28	13.9	0.26
Female	218	39	17.9	
Type of house				
Flat/independent house	358	57	15.9	0.967
Tent	62	10	16.1	
Family size				
≤ 4	79	18	22.8	0.295
5	63	10	15.9	
6	109	14	12.8	
≥ 7	169	25	14.8	
Duration of displacement				
≤5 years	138	33	23.9	0.002
> 5 years	282	34	12.1	
Household food insecurity level				
Mild/moderate food insecure	57	4	7.0	0.048
Severe food insecure	363	63	17.4	



distress [26].

Household food insecurity was also associated with PTSD, reflecting the broader relationship between unmet basic needs and psychological distress among IDPs [27]. Women experiencing severe food shortages may face ongoing traumatic stressors that exacerbate mental health symptoms, highlighting the importance of addressing food security in interventions targeting displaced populations.

LIMITATIONS

This study has several limitations inherent to cross-sectional research. PTSD symptoms were self-reported based on experiences over the past 30 days, which introduces the possibility of recall bias. Additionally, prevalence estimates reflect a single point in time and may not capture changes in mental health status over the course of displacement. Despite these limitations, the study has notable strengths. Data were collected under challenging circumstances using a systematic random sampling approach, enhancing representativeness and generalizability to internally displaced women in Sana'a City and comparable settings. Moreover, the use of a standardized HTQ cut-off score of 2.5 improves the reliability of PTSD estimates and reduces the risk of overestimation due to recall bias.

CONCLUSION

This study demonstrates a substantial prevalence of PTSD among internally displaced women in Sana'a City, Yemen. The findings indicate that PTSD is influenced by a combination of chronic illness, socioeconomic vulnerability, food insecurity, and the instability associated with early displacement. These results underscore the urgent need for integrated mental health and social protection programs tailored to the unique needs of displaced women. Interventions that strengthen access to mental health services, address chronic disease management, and enhance food security are likely to improve overall well-being and resilience among internally displaced populations.

ACKNOWLEDGMENTS

The authors acknowledge all participants enrolled in this study. We would also like to thank the head of supreme council for humanitarian Affairs **Mrs Abdullah Al-Nomi**, who allow me to collect the data and fill out the questionnaires without any difficulties.

CONFLICT OF INTEREST

No conflict of interest is associated with this work.

AUTHOR CONTRIBUTIONS

Wedad Mohammed Salah, the main investigator and prepare the manuscript as part of a master degree in the department of public health. – Prof :Yahya Raja'a, the main supervisor, contributed to the manuscript design and review of the final draft. Assist Prof Mansour Al-Taj, co-supervisor and also review the final draft of the manuscript.

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