

# Post traumatic stress disorder among adults in the aftermath of 2011 Van-Ercis earthquake in Turkey

*2011 yılı Van-Erciş depremi sonrası yetişkinlerde travma sonrası stres bozukluğu*

Mehmet Hamid Boztas<sup>1</sup>, Ahmet Tamer Aker<sup>2</sup>, Kerim Munir<sup>3</sup>, Feyza Çelik<sup>4</sup>, Adem Aydın<sup>5</sup>, Umut Karasu<sup>6</sup>, Elif Aktan Mutlu<sup>7</sup>

<sup>1</sup>Assoc. Prof., Abant İzzet Baysal University, Department of Psychiatry, Bolu, Turkey <https://orcid.org/0000-0001-6541-0666>

<sup>2</sup>Prof., Bilgi University, Department of Psychiatry, Istanbul, Turkey <https://orcid.org/0000-0001-5579-3552>

<sup>3</sup>M.D., Harvard University, Children's Hospital, Department of Child and Adolescent Psychiatry, USA <https://orcid.org/0000-0002-2404-1806>

<sup>4</sup>M.D., Dumlupınar University, Research and Training Hospital, Kutahya, Turkey <https://orcid.org/0000-0003-2128-3014>

<sup>5</sup>Assoc. Prof., Necmettin Erbakan University, Department of Psychiatry, Konya, Turkey <https://orcid.org/0000-0003-3687-6832>

<sup>6</sup>M.D., Community Mental Health Center, Balıkesir, Turkey

<sup>7</sup>M.D., Bursa State Hospita, Bursa, Turkey <https://orcid.org/0000-0002-0889-1421>

## SUMMARY

**Objective:** The aims of the study were to: (i) screen for PTSD among subjects older than 15 years old living in the Ercis-Van region nine months after the earthquake; and (ii) examine the socio-demographic, clinical and trauma-related factors of PTSD diagnosis. **Method:** At the time of the earthquakes, the population of Ercis-Van region was 1,050,000. We selected 1498 participants in these areas: 996 from Van and 502 from Ercis, centers using a stratified sampling frame (Kish design). Demographic information, trauma related experiences and past psychiatric history was obtained via socio-demographic survey. The PTSD module of the Composite International Diagnostic Interview (CIDI), along with depression, dysthymia, social anxiety disorder, obsessive compulsive disorder, generalized anxiety disorder structured interview modules were used to directly elicit clinical information. **Results:** We found that PTSD was prevalent 35.5% among Van earthquake survivors. Analysis of binary Logistic regression showed risk factors, which included some trauma related losses, pre and post traumatic experiences. These risk factors are being female, having depression, lossing any family members or relatives, being unemployed, having serious familial conflicts, severe financial loss, and temporary relocation. **Discussion:** Our results indicate that in addition to being women, having depression, trauma related losses, like previous traumatic experiences, some pre and post traumatic risk factors are important for development of PTSD. Therefore, after the traumatic event, community based interventions should be structured based on these pre and post disaster risk factors.

**Key Words:** Traumatic Stress, Community Psychiatry, Mental Health

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## ÖZET

**Amaç:** Bu çalışmanın amaçları; (i) Van Depreminden dokuz ay sonra Van-Erciş bölgesinde yaşayan 15 yaş üstü bireylerde Travma Sonrası Stres Bozukluğunu taramak ve (ii) Travma Sonrası Stres Bozukluğu tanısını yordayabilecek sosyodemografik, klinik ve travmayla ilişkili etmenleri gözden geçirmektir. **Yöntem:** Deprem sırasında Van ve Erciş bölgelerinde 1,050,000 kişi yaşamakta idi. Araştırmaya tabakalar dırılmış örneklemle (Kish Metodu) Van'dan 996, Erciş'ten 502 kişi alınmıştır. Sosyodemografik veri formu aracılığıyla demografik bilgiler, travmayla ilişkili deneyimler ve geçmiş psikiyatrik öykü elde edilmiştir. Klinik bilgiler için Uluslararası Bileşik Tanı Görüşmesi Composite International Diagnostic Interview (CIDI) nin TSSB, depresyon, distimi, sosyal anksiyete bozukluğu, obsesif kompulsif bozukluk ve yaygın anksiyete bozukluğu modülleri kullanılmıştır.  **Bulgular:** Van depremi sonrasında deprem mağdurlarında TSSB oranını %35.5 olarak bulduk. Binary Lojistik regresyon analizi travmayla ilişkili , travma öncesi ve sonrası kimi etmenleri TSSB için risk faktörü olarak göstermiştir. Bu faktörler kadın olmak, depresyonda olmak, aile üyelerini veya bir yakını kaybetmek, ciddi sağlık ve barınma sorunları yaşamak, işsiz olmak, aile içi ciddi çatışmaların varlığı, ciddi finansal zorluk, geçici yer değiştirmedir. **Sonuç:** Araştırmamızın sonuçları depresyon, kadın cinsiyet, travmayla ilişkili kayıplar yaşamaya ek olarak geçmiş travmatik deneyimler gibi travma öncesi ve sonrası kişide oluşan risk faktörlerinin TSSB gelişimde önemli olduğunu göstermiştir. Bu nedenle travma sonrası topluma dayalı çalışmalar afet öncesi ve sonrası risk faktörlerine dayandırılarak yapılandırılmalıdır.

**Anahtar Sözcükler:** Travma Sonrası Stres Bozukluğu, Toplum Psikiyatrisi, Ruhsal Sağlık

## INTRODUCTION

A magnitude of 7.2 (on the Richter scale) earthquake struck Van-Ercis region in Eastern Turkey on October 23, 2011, followed by a second earthquake, magnitude 5.6 (on the Richter scale), on November 9, 2011(1). A total of 644 person lost their lives, 252 were pulled alive from the debris and a total of 1,966 persons were injured. The disaster was particularly devastating because it struck a region that is beset by gender, ethnic, language and socioeconomic disparities. Education level is low, unemployment and poverty are very high in the Van-Ercis region. According to TIS, in 2008, Gross value added is 3419\$ in Mus, Hakkari, Bitlis, Van region. Mean Gross value added is 9384\$ in the country. Van had 17.2% unemployment rate in 2010, which is third highest rate in all Turkey. Illiterate rate of women is nearly twofold higher in Van compare to mean illiterate rate of women in Turkey (18.6%/9.5%) (2). Most of the women and elderly speak only in their native Kurdish language (3).

Although post-traumatic stress disorder (PTSD) is the most frequently studied mental health condition following disasters (4), reports of its prevalence vary and range from 2% to 87% (5,6,7,8,9,10,11). Such variations are related to factors involving differences in the magnitude of the exposure, quality of buildings, timing of the event, as well as assessment of PTSD outcomes with respect to the diagnostic instruments used, proximity of the assessments to the time passed from the event and social and cultural conditions salient for the population. Studies show that disaster exposure variables, such as death and/or injury of family members (12), severe residential damage have been associated with occurrence of PTSD. Several studies have shown that PTSD is related with severe damage of housing (13,14,15) and death of family members (13,16).

It is of interest that the prevalence rates for PTSD from Turkey, as well as Armenia and Iran, have consistently been higher than other countries. For instance, prevalence of PTSD found 39% to 63% among survivors of the Marmara earthquake in 1999 (17,18). The reported prevalence rates for

Yerevan earthquake in Armenia, and the Bam earthquake in Iran (12) were nearly twice as higher than figures reported from China and Taiwan (4, 5,19).

Factors such as poverty, lower levels of perceived support, gender, physical illness and other factors affect rate of PTSD and other psychiatric disorders after disasters (12,17,20,21,22). Post-disaster period affects mental status of the victims and longer periods of recovery increases PTSD symptoms via second traumatization process (12,23). Parental response, migration, distance between home and earthquake epicenter, prior personal or family history of a mental health disorder, loss of family members or close friends are other important risk factors (17, 18, 24, 25).

There have been inconsistent reports on risk factors for PTSD after an earthquake. Six months after the earthquake, Kadak and associates found that prevalence of severe PTSD was almost 40 percent among child and adolescents in high school students. (26) Another study also found high prevalence of PTSD symptoms in a population based study using clinical scales in same region (27). Some reports stated that women are under increased risk of having PTSD and depression (20, 28, 29, 30). There are no PTSD studies using structured interview that evaluate pre and post disaster risk factors and its relations with population that lived in disaster area after Van earthquake.

The aim of the present study is to investigate prevalence of PTSD and associated risk factors in a large community sample in eastern Turkey after the Van earthquake. The aims of the study were to: (i) screen for PTSD with among subjects older than 15 years living in the Ercis-Van region nine months after the earthquake; and (ii) examine the socio-demographic, clinical and trauma-related predictors of PTSD diagnosis.

## METHOD

### Participants and study background

### Study Population Characteristics

At the time of the earthquakes the population of Ercis-Van region was 1,050,000. The overall population demographics with respect to ethnicity and primary language were not known as data is not collected by the National Institute of Statistics. The study sample was selected from the population of the two most highly affected centers in Ercis and Van, with populations of 500,000 residents in each town center, respectively. These included all 28 districts and 11 temporary shelters in the Van center and in the Ercis center as the most severely affected areas. We selected 1498 participants in these areas: 996 from Van and 502 from Ercis, centers using a stratified sampling frame (Kish design). Households were selected randomly in the district. All participants were 15 years and older. Written informed consent was obtained from all participants and the study was approved by the research ethics committee based at the Kocaeli University.

### Measures

The demographic information obtained consisted of each subject's age, gender, level of education and employment status. Trauma-related experiences assessed included the impact of the earthquake, e.g., economic losses, temporary relocation, loss of family member(s), initial difficulty in finding shelter immediately following the earthquake. The survey also inquired about psychiatric history and prior traumatic experience (e.g., witnessing death, suicide, fire, blast). The PTSD module of the Composite International Diagnostic Interview (CIDI), along with depression, dysthymia, social anxiety disorder, obsessive compulsive disorder, generalized anxiety disorder structured interview modules were used to directly elicit clinical information. This study used part of Van earthquake effect on mental health data sets. Another research paper about all psychiatric diagnosis has been planned to use in this data set.

### Procedure

The survey teams included local staff of the provincial Ministry of Health in Ercis and Van districts comprised of social workers, psychologist and graduate students in psychology. The research team underwent a 3-day training workshop program con-

ducted by two senior PhD level psychology staff at the Kocaeli University Psychological Trauma and Disaster Studies Unit. Overall, of the 1710 persons contacted, 212 refused to participate with a response rate of 87.7%. All interviews were carried out in a private place for privacy. Two trained experienced mental health workers gave supervision on a day-to-day basis. Research teams consisted of bilingual (Turkish-Kurdish) individuals, who were familiar with local cultural rules and customs. All data obtaining process took nearly three months.

We assessed the PTSD diagnosis if the participant had fear or desperation, 2 or more arousal symptoms, 3 or more avoidance symptoms, 1 or more re-experiencing symptoms and if the duration of the symptoms was longer than one month.

### Data Analysis

Descriptive analyses were performed for demographic variables, trauma-related indicators, and PTSD symptoms, using  $\chi^2$  and t-test to evaluate differences between the two groups (PTSD and others). SPSS 22.0 software was used to perform the statistical analysis. Bivariate logistic regression analysis was used to assess risk factors for presence of PTSD diagnosis. Odds ratios (OR) stated and in this analysis all statistically significant p-values reported were at  $<0.05$ .

### RESULTS

The demographic characteristics, clinical and trauma-related features of the PTSD group and the non-PTSD group are presented in Table 1. We try to describe PTSD symptoms in Van province after the earthquakes in Table 2.

More than 88 % of PTSD symptoms were longer than one month. We examined PTSD symptoms according to DSM IV, frequency of each symptom is displayed in Table 2. The PTSD prevalence was 35.5%. Sociodemographic features, event-related features and other factors were evaluated in this study for PTSD diagnosis. Gender, depression, serious health problem, shelter problem, physical disability, unemployment, serious financial prob-

**Table 1.** Sociodemographic and clinical factors associated with PTSD

Variables	PTSD				Non PTSD				Comparison		
	M	SD	N	%	M	SD	N	%	?2/t	df	p
Age	35.99	14,10	532	35,50	34,93	12,31	966	64,50	1,44	1496	0,15
<b>Gender</b>											
Female			392	40,0			588	60,0	24.903	1	0.001*
Male			140	27,0			378	73,0			
<b>Education</b>											
At least primary school			324	60.9			567	58.8	3.955	2	0.138
Middle school and high school			147	27.6			251	26.0			
College			61	11.5			146	15.2			
<b>Languge</b>											
Turkish			256	37,3			430	62,7	18.09	2	0.001*
Kurdish			124	27,8			322	72,2			
Both			151	41,4			214	58,6			
<b>Unemployment</b>											
Yes			267	40,3			396	59,7	12.304	1	0.001*
No			251	31,45			547	68,55			
<b>Psychiatric disorder history in family</b>											
Yes			56	50,00			56	50,00	10,463	1	0,001*
No			440	34,70			828	65,30			

\*p&lt;0.05

lem, conflict in family, new member in shelter, spouse with mental health problem, witnessing fire and explosion, witnessing suicide, history of temporary relocation, loss in family, history of psychiatric disorder in family were correlated with PTSD diagnosis (Table 3 ).

Binary logistic regression was conducted to assess whether the fifteen predictor variables, gender, depression, serious health problems, shelter problem, physical disability, unemployment, serious financial problem, conflict in family, new member in shelter, spouse with mental health problem, witnessing fire and explosion, witnessing suicide, history of temporary relocation, loss in family, history of psychiatric disorder in family significantly predicted whether or not participants giving PTSD diagnosis ( $\chi^2 = 0.168$  and  $p < 0.05$ ). When all fifteen predictor variables are considered together, they significantly predict whether or not having PTSD diagnosis,  $\chi^2 = 157.132$   $df = 15$ ,  $N = 1498$ ,  $p < .001$ . Table 4 presents the odds ratios, which suggest that the odds of estimating correctly who are having depression, being women, serious financial loss, loss of close family member, serious intra familyal conflict, temporary relocation, predicted having PTSD.

## DISCUSSION

This study is one of the few studies which assessed the related factors of PTSD based on structured

interview after a devastating earthquake in (Van-Erciş) in Turkey. This study has the earliest assessment time to date among those studies. Van is a city located in the east region of Turkey where unemployment is more common, and the population is less educated, also they have experienced different types of traumatic events (recurrent earthquakes, armed conflict etc.) in the past years (2,3). In addition to the previous serious life events, related with the earthquake, population confronted different types of stressors, such as unexpected death of relatives, relocation after the earthquake, and economical loss (21,22,29). Our study shows that the rate of PTSD was 35.5% approximately nine months after the 2011 Van earthquake. This was compatible with the previous studies conducted in the same region, which reported a PTSD rate of 40% among adolescents in high schools and adult populations (26, 27). Another study conducted in the same region shows a higher rate of PTSD symptoms and hopelessness among community based samples (27). They only assessed earthquake related trauma but did not assess other type of previous trauma history in their study. Our study has tried to analyze pre and posttraumatic events in community based samples. One other study assessed relocation effect among Van earthquake survivors and they found relocation increased PTSD occurrence similar to our results (29). PTSD rates reported in these studies after the 2011 Van earthquake are higher than having any kind of mental disorder rate (17.2%) in Turkish Mental Health Profile (31) and similar to other earthquake studies in Turkey

**Table 2** PTSD symptoms on CIDI

PTSD ITEMS	N	%
<b>B. Re-experience</b>		
B1. Intrusive recollections of the earthquake	1084	80.7
B2. Repeating nightmares of the earthquake	846	63.3
B3. Acting as if earthquake were recurring	995	74.7
B4. Feeling worse when reminded of earthquake	1042	78.5
B5. Reactivity to earthquake reminders	706	52.9
1 or more re-experience symptoms (a score of 6 or more)	1138	76
<b>C. Avoidance and numbing</b>		
C1. Efforts to avoid thoughts or feelings associated with the earthquake	664	51.8
C2. Efforts to avoid activities that arouse recollections of the earthquake	557	43.8
C3. Shows amnesia of the earthquake	463	36.2
C4. Diminished interest participation in activities	473	37.4
C5. Detachment or estrangement from others	470	36.4
C6. Restricted range of affects	413	32.1
C7. Sense of foreshortened future	541	42.5
3 or more avoidance symptoms (a score of 15 or more)	790	52.7
<b>D. Arousal</b>		
D1. Difficulty falling or staying asleep	723	55
D2. Irritability or anger	693	53.4
D3. Difficulty concentrating	657	51.1
D4. Hypervigilance	928	71.7
D5. Exaggerated startle response	783	61.9
2 or more arousal symptoms (a score of 10 or more)	1028	61.7

(6,7,8,9,10,11,17,18) These results suggest that PTSD is prevalent among Van earthquake survivors.

Risk factors for developing PTSD were having depression, being women, serious financial loss, losing of close family member, serious intra familial conflict, history of relocation. That might be related to more prominent expression of fear and emotions in females compared to males (20,27,31). Expression of feeling and fear are restricted in many cultures especially for men. This pattern may even be more prominent in Eastern Anatolia when compared with more industrialized and better educated Western parts of Turkey. Gender difference cannot be explained by culture alone, same is found in the west of Turkey and in other countries as well. There are some gender-based features that may affect mental health after the earthquake. Firstly, after the disaster, especially in earlier time period, women were more affected than man in chaotic conditions as seen in table 1. Secondly, some cultural factors may prevent men to express fear (15, 20). Women's increased tendency to mental disorder might be related to biological differences, lower socio-economic status in the society and different attribution styles (20). As one may see TIS report, women in Van have less education and high

poverty level that affect on high PTSD rate (2). Also depression and anxiety disorder level in women population higher than men population. Many studies show that women are prone to have fear based disorders such as PTSD (32). Sensitivity to stressful and traumatic life experiences, emotional reactivity, hormonal differences, higher activation in limbic and attention related brain structures may be responsible for these differences (32).

Some studies reported that older people are more vulnerable to psychological distress after the trauma, possibly as they may have less resources to cope with negative effects of disasters (28). We didn't find any relation between PTSD and age. In Eastern Turkey, lack of resources, poverty and unemployment is very common and it is not specific to elderly people.

Loss of family members was associated with PTSD diagnosis (19). PTSD group is much more likely to lose a family member (parent, sibling or brother/sister). Degree of loss in the disaster and risk of developing PTSD has a dose response relation (33). Recent earthquakes research showed that intense fear and perceived life threat were two key risk factors for mental disorders, including PTSD

**Table 3.** Correlations between PTSD, earthquake related problems and clinical factors

	PTSD	New member in shelter	Spouse with psychiatric disorder	Witnessing suicide	Temporary relocation	Severe health problem	Shelter problem	Disability	Unemployment	Severe financial loss	trafamilial conflict	Loss in family	Gender	Depression
PTSD	r 1													
New member in shelter	r ,056*	1												
	p ,032													
Spouse with psychiatric disorder	r ,060*	,078**	1											
	p ,021	,003												
Witnessing suicide	r ,051*	,084**	,165**	1										
	p ,050	,001	,000											
Temporary relocation	r ,163**	,079**	,077**	,126**	1									
	p ,000	,003	,003	,000										
Severe health problem	r ,112**	-,015	,135**	,067*	,060*	1								
	p ,000	,563	,000	,010	,023									
Shelter problem	r ,081**	,042	,081**	-,018	-,001	,154**	1							
	p ,002	,108	,002	,486	,979	,000								
Disability	r ,067*	-,001	,083**	,069**	,028	,140**	,107**	1						
	p ,010	,984	,001	,008	,288	,000	,000							
Unemployment	r ,092**	,041	,070**	,069**	,004	,177**	,211**	,061*	1					
	p ,000	,122	,007	,008	,886	,000	,021	,021						
Severe financial loss	r ,150**	,116**	,110**	,057*	,159**	,162**	,313**	,031	,216**	1				
	p ,000	,000	,000	,027	,000	,000	,000	,229	,000					
Intra familial conflict	r ,142**	,058*	,196**	,073**	,191**	,129**	,086**	,011	,139**	,100**	1			
	p ,000	,025	,000	,005	,000	,000	,001	,672	,000	,000				
Loss in family	r ,146**	,005	-,014	,001	,007	,111**	,076**	-,013	,060*	,148**	,019	1		
	p ,000	,861	,593	,985	,797	,000	,004	,622	,022	,000	,460			
Gender	r -,129**	-,004	,016	-,038	-,077**	-,052*	-,068**	-,010	-,045	-,020	-,087**	,051*	1	
	p ,000	,888	,539	,139	,003	,045	,009	,709	,083	,448	,001	,048		
Depression	r ,209**	,008	,086**	,001	,078**	,075**	,071*	,031	,145**	,093**	,212**	,076**	-,111**	1
	p ,000	,782	,002	,980	,004	,007	,010	,271	,000	,001	,000	,006	,000	

after the earthquake (16,17,26,34,35,36,37,38,39). Witnessing some trauma-related event or loss of any family member may lead to more intense fear reactions and perceived life threat.

Using Turkish as the only language was significantly associated with PTSD in our study. It can be argued that, individuals speaking only Turkish were more likely to be related to government officers (i.e. they were not locals), therefore, they had lesser access to resources than local people in the region in terms of social support, which in turn lead to more prominent secondary stressors. This region is also a disparities zone, people generally work in unwanted conditions compare to other part of the country. Non-local people also may perceive disaster is another punishment (2,3). Past psychiatric disorder, psychiatric disorder in the family, suicide history and psychiatric disorder of spouse were much more common in the PTSD group when compared with the non-PTSD group. Some of these factors were found to be associated with PTSD in previous studies (34, 36, 38, 39). Both PTSD and Major Depression share same risk factors. These are

female gender, lower education, loss of friends and relatives. But depression is much more prevalent in individuals with loss of a family member and past psychiatric disorders (9,17,36, 38,39). Our results showed having MD was a probable predictor of PTSD. Other probable predictors were loss of any relatives, temporary relocation history, and female gender. There are several studies that focused on PTSD symptoms and associated features, yielding conflicting results. Possible reasons for inconsistencies may include sample size; assessment time and methods for PTSD, such as face-to-face structured interview or self-report surveys; and cultural and social differences. A study which reported 34.4% PTSD prevalence rate among tsunami survivors after two years of the event, used face to face structured clinical interview (37). Our results were similar to this study but we reported our results only 9 months after the earthquake. Former studies from previous Turkey earthquakes show different rates depending on their sample selection, assessment time, methods (25,26,27,38,39). Because of sample selection and non-structured clinical assessment methods, these results may not be generalized the

**Table 4:** Results of binary logistic regression on PTSD

Variable	Beta	SE	Odds ratio	p
Gender	-,519	,127	,595	,000
Depression	,215	,048	1,240	,000
Severe health problem	,190	,132	1,209	,152
Shelter problem	,058	,129	1,059	,656
Disability	,496	,282	1,642	,078
Unemployment	,105	,128	1,110	,414
Severe financial loss	,311	,129	1,365	,016
Intra familial conflict	,462	,219	1,587	,035
New member in shelter	,337	,314	1,400	,283
Spouse with psychiatric disorder	-,020	,409	,981	,962
Witnessing fire or explosion	,358	,402	1,430	,374
Witnessing suicide	,303	,813	1,354	,709
Temporary relocation	,638	,151	1,893	,000
Loosing family member/ relative	,657	,136	1,929	,000
Psychiatric disorder in family	,353	,232	1,424	,130

\*p<0.05

population. Onder et al found a PTSD rate of 11.7 % three years after 1999 Marmara earthquake (16). PTSD rates decrease in time and Eastern and Western regions of Turkey have different social features. Our results were detected relatively closer time to the earthquake. PTSD rate is higher after the disaster and decrease as time passes. If we consider our irritability symptoms lower rate compare to other PTSD symptoms, time might affect fear response.

Resilience mechanisms are very important to prevent PTSD. These mechanisms are not only related with individuals but also affected by social and cultural characteristics. After the earthquake, the entire Turkey, as a country, tried to help the region. This process may be considered as social capital process (9,40,41). Same mechanism was seen after the Marmara earthquake both in the national and international level (42). After the 1999 Marmara earthquake, many support mechanisms were established at both national and international level to get rid of the unhealthy consequences of the earthquake.

### Limitations

There are some limitations in that study;

1)We assessed people who continued to live in the earthquake area (container cities and city). So, we assessed relocated people who came back after the disaster but didn't assess the relocated ones who

didn't come back after the disaster.

2)We assessed people cross sectional and found some risk factors for being PTSD, so longitudinal studies are required for assessment of alleged predictive factors.

3) We took and analyzed self reported information. Self reported information is not excellent for reliability and validity. In that time, there is no enough objective data set resources which is general problem in disaster zones in many studies.

In summary, this study reported prevalence and risk factors of PTSD among adults nine months after experiencing the 2011 Van earthquake. The results showed that PTSD was approximately three fold higher compared to the regular statistical rates. We observed specific pattern of demographic, clinical and event related features about earthquake in addition to some different regional differences. Especially, previous trauma related factors; severe trauma related effect, gender, and having depression may be important in that disaster area. Specific care and mental health intervention should be provided according to these factors.

Correspondence address: Assoc. Prof. Mehmet Hamid Boztas, Izzet Baysal University, Department of Psychiatry, Bolu, Turkey  
boztashamid@hotmail.com

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