

A STATISTICAL ANALYSIS OF THE EFFECTS ON SURVIVORS OF THE 1999 EARTHQUAKE IN TURKEY

VEYSEL YILMAZ

Osmangazi University, Eskisehir -Turkey

In the 17 August 1999 Kocaeli Earthquake about 20,000 people died and 3,000,000 were affected either directly or indirectly. A survey of earthquake victims in Kocaeli and Adapazari (two cities in North-Western Turkey) was conducted 8 months after this major earthquake to find out its physically and psychologically destructive effects. For this purpose a questionnaire containing 25 questions was given to 800 people in Kocaeli and Adapazari where the most destruction and greatest number of deaths occurred. Results indicate that changes in expectations from life after an earthquake are highly correlated with gender, marital status, and education level.

Since the Kocaeli earthquake occurred at 3.00 a.m., while most of the people were indoors, the result was a tragedy, causing 17,255 deaths, injury to 23,781, and damage to 626 schools, 47 health facilities, 283,240 private homes and 41,164 places of work, according to formal statistics (<http://www.akv.org.tr/en/report1.htm>). In fact, it is estimated that the mortality rate was, unfortunately, even higher than this figure.

Veysel Yilmaz, Associate Professor of the Statistics Department, Science and Literature Faculty, Osmangazi University, Eskisehir-Turkey.

The author thanks everyone for their cooperation. Special thanks to Mr. Dursun Ali ^a ahin, Governor of the disaster region, for permission to conduct the research and generous support given, to Bülent ^a ener, Kenan Kasap, İlçen Koçkaya and Hande Cidal, students at the Osmangazi University Statistics Department, for arranging for the questionnaire to be carried out, and to everyone who got involved in this investigation.

Appreciation is also due to reviewers including: Mehmet Ecevit, PhD, Department of Sociology, Middle East Technical University, Inonu Bulvari, Ankara, Turkey; Email: <ecevitm@metu.edu.tr>. Prof. Hüseyin Tatlıdil, Hacettepe Üniversitesi, Fen Fakültesi, İstatistik Bölümü, Beytepe kampüsü, Ankara, Turkey; Email: <tatlidil@hacettepe.edu.tr>

Keywords: Kocaeli earthquake, earthquake victims, expectations, first thoughts after the earthquake, statistical analysis.

Please address all correspondence and reprint requests to: Dr. Veysel Yılmaz, Statistics Department, Science and Literature Faculty, Osmangazi University, Eskisehir-Turkey. Phone: 00 90 222 229 0297; Fax: 00 90 222 239 3578; Email:<vyilmaz@ogu.edu.tr>

Most of the countries established on active fault lines have already faced, and will continue to face, destructive natural disasters such as earthquakes. Besides destroying the socioeconomic substructure in societies, earthquakes cause psychological effects which last for years. There have been many studies investigating the psychological states of victims of natural disasters, such as earthquakes (Armen et al., 2000; Bland et al., 1997; Cardeña & Spiegel, 1989; Ecevit & Kasapoğlu, 2002; Fukuda, Morimoto, Mure, & Maruyama, 1999; Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994; Goenjian et al., 1994; Karanci & Rüstemli, 1995; Kowalski & Kalayjian, 2001; Lopez-Vazquez & Marvan, 2003; Najarian, Goenjian, Pelcovitz, Mandel, & Najarian, 1996; Rüstemli, Karanci & Nuray, 1999; Sharan, Chaudhary, Kavathecar, & Saxena, 1996; Yilmaz & Gürbüz, 2002).

According to investigations, victims are likely to experience five psychological phases after a disaster: an initial impact phase (increased anxiety and fears), an heroic phase (the survivors help each other to deal with the catastrophe), a honeymoon phase (experiences of joy and happiness at having survived), a disillusionment phase (increased resentment and frustration at officials and agencies) and a reconstruction phase (this phase is characterized by thoughts and plans for reconstruction and acceptance of the need to assume responsibility for personal problems).

A survey was compiled for the statistical analysis of the psychological effects of the Kocaeli earthquake. In the questionnaire, besides the demographic questions, there were questions such as the type of the building the people were in at the moment of the earthquake, the state of the building they live in after the earthquake, whether they left the building or not, their relationships with their close neighborhood, the changes between the spouses after the earthquake, the changes in their expectations from life after the earthquake, their reactions to the subsequent shocks, whether or not they had psychological assistance and whether or not they lost any of their relatives.

METHOD

The first survey sheet was compiled on January 28, 2000. The pilot investigation on the reliability of the questionnaire was performed on 50 workers who were working at Kartonsan. Then the questionnaire was distributed in Kocaeli during the period April 15-18, 2000 to 490 earthquake victims: 250 from Mehmetçik tent town, 100 from Yahya Kaptan tent town and 140 from Değirmendere Barracks. In Adapazari the questionnaire was given to 310 earthquake victims, 200 of them were from Atsa Prefabs and 110 of them were from Sakarya workers' barracks. The victims were selected using a stratified sampling method.

The final data were based on information from 721 respondents because 79 people did not respond to the questionnaire. The survey revealed that 16% ($n = 117$) of respondents had survived under rubble for a certain time. The other 84% ($n = 605$) had left their home but had not been buried under rubble. During the investigations the chi-square test method was used first to learn what kind of differences there were in the life expectations of the group who had survived under rubble compared with the group that had not experienced this. Then Multinomial Logistic Regression analysis was used to examine the rate of effects of their demographic characteristics, their expectations of life, their first thoughts at the moment of earthquake and their reactions to the subsequent shocks. Demographic characteristics of the respondents are given in Table 1.

TABLE 1
DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (N=721)

	<i>n</i>	%
Age		
-30	300	42
30-45	257	36
45+	164	22
Educational Level		
Unable to read and write	26	3
Can read and write	42	6
Primary school	218	30
Secondary School	300	42
University	135	19
Gender		
Female	393	55
Male	328	45

FINDINGS AND DISCUSSION

Earthquake victims were asked these questions. “What kind of changes occurred in your life expectations after the earthquake? (E)”, “What were your first thoughts after the earthquake? (F)”, “What were your reactions during the subsequent shocks? (R)” Results by the respondents’ gender are given in Table 2. To have survived for a certain time under rubble affected their life perspective and expectations.

TABLE 2
RESPONSES TO THE QUESTIONS E, F AND R AND THEIR PERCENTAGE BY GENDER (N=721)

	<i>N</i>		<i>%</i>	
	Female	Male	Female	Male
Expectations (E)				
1 - Their expectations about future are less now	123	92	57	43
2 - Their priority has changed	121	102	54	46
3 - Daily issues are not important	113	85	57	43
4 - There is no difference	36	49	42	58
First thoughts after the earthquake (F)				
1 - How much I love my family	123	69	64	36
2 - Life is nothing	151	134	53	47
3 - I'm ignorant	99	101	48	52
4 - Fear, and life is too short	26	24	52	48
What were your reactions during the subsequent shocks (R)				
1 - I was in panic	141	65	68	32
2 - I left the room as soon as possible	135	142	49	51
3 - I was not able to move	93	69	57	43
4 - I had no reaction	25	52	32	68

With this investigation, at first, the chi-square test analysis was performed to learn whether or not the responses given to E, F, and R change according to the demographic characteristic of the individual related to having survived under rubble. Results are given in Table 3. Table 3 indicates that while the response for E does not change for survivors who had not had to survive under rubble, it changes for those who survived under rubble as per gender. To survive under rubble for a certain time made some differences to the women's and men's life expectations. After being pulled alive from the rubble, while women's priority change rate is 22%, this rate is 78% for men. While the women say that daily life is simple and unimportant with a rate of 85%, the rate for the men is 15%. Psychological assistance, loss and educational status created important differences for the survivors who had not been buried under rubble in response E. For the same question, age and gender are meaningful factors to create important differences for the survivors who had been buried under rubble. Thirty-three percent of survivors who had not been buried under rubble and who said that their expectations from life were reduced stated that they had been given psychological assistance. Seventy-seven percent of them did not receive psychological assistance. The same rates for survivors who had been buried under rubble are 50% and 50%, respectively. While the life expectation change rate for survivors who had not been buried under rubble and who received psychological assistance is 17%, it is 83% for those who did not receive

psychological assistance. These rates are composed of 56% and 44% for people pulled out alive after the earthquake. Thirty-five percent of people who had neither survived under rubble nor received psychological assistance said that their expectations of the future had decreased. This rate for survivors who have been buried under rubble but who had not received psychological assistance is about 52%. Forty-two percent of victims who had graduated from primary education, and 14% of college/university graduated victims were among the survivors who had not been buried under rubble who said that their expectations from life had reduced. These rates are 52% and 18% for primary and college/university graduated victims who had survived under rubble respectively. Marital status and gender for F for R, respectively, created differences in responses both from those who had survived under rubble and those who had not been buried under rubble. Among the victims whose first thoughts were of their families, the rates are shared between women and men with 63% and 37%, respectively. Survivors who had been buried under rubble and who had first thoughts of fear and that life is too short consist of women (71%) and men (29%). Among the victims who panicked during the aftershocks women's rate is 65% and men's rate is 35%. The rate of victims who received psychological assistance and who panicked during the aftershocks is 19%, and of those who panicked but had not received psychological assistance it is 81%. Findings obtained from other questionnaires' results are summarized below.

Among the women who had graduated from secondary education, and who had not experienced a similar earthquake before, expectations from life decreased. For primary education graduates who had not experienced a similar earthquake before, their life and priorities changed, daily life became simple and unimportant. For those who can only read and write who had experienced a similar earthquake before, daily life became simple and unimportant. For college or university graduated men, expectations and priorities either changed little or did not change at all. The group that could not read or write did not make many interpretations about the subject. The first thoughts of married people especially were about their families. Single people, or divorcees, firstly experienced fear and complained about the meaninglessness of life. Men generally thought after the quake that they were too ignorant. Among those who lost their spouses in the quake the most prominent thought was fear and the meaninglessness of life. Most of the women who had not experienced a similar earthquake before, panicked during the aftershocks; some of them were petrified, and few of them left the buildings. Most of the men who had not experienced a similar earthquake before, left the buildings during the aftershocks, or were not affected – and very few of them panicked. Those who had not experienced a similar earthquake before generally did not leave the buildings during the aftershocks; they were either not affected or petrified.

TABLE 3
CHI-SQUARE RESULTS FOR E, F AND R

	Victims not under rubble ($n=605$)		
	<i>E</i> $\chi^2(df, P)$	<i>F</i> $\chi^2(df, P)$	<i>R</i> $\chi^2(df, P)$
Gender	6.33 (3, 0.096)	8.55 (3, 0.036)*	22.65 (3, 0.000)**
Psychological Assistance	13.48 (3, 0.004)**	3.48 (3, 0.322)	1.8 (3, 0.615)
Loss	15.05 (3, 0.002)**	1.27 (3, 0.735)	7.49 (3, 0.058)
Marital Status	14.39 (9, 0.109)	126.84 (9, 0.000)***	12.34 (9, 0.192)
Education Level	21.09 (9, 0.012)*	43.94 (9, 0.000)***	1.17 (9, 0.086)
Age	8.07 (6, 0.0233)	53.93 (6, 0.000)***	6.49 (6, 0.371)
	Victims under rubble ($n=117$)		
Gender	14.44 (3,0.002)**	1.63 (3, 0.653)	12.99 (3, 0.005)**
Psychological Assistance	3.5 (3, 0.321)	0.64 (3, 0.88)	7.63 (3, 0.054)
Loss	8.52 (3, 0.037)	1.9 (3, 0.593)	0.64 (3, 0.887)
Marital Status	12.51 (6, 0.052)	19.4 (6, 0.004)**	2.04 (6, 0.673)
Education Level	4.16 (6, 0.65)	6.7 (6, 0.349)	4.03 (6, 0.673)
Age	12.73 (6, 0.048)*	8.87 (6, 0.181)	8.06 (6, 0.233)

* $p < 0.05$; ** $p < 0.001$; *** $p < 0.001$

According to Multinomial Logistic Regression results of E, F and R, education level, ($\chi^2 = 23.62$, $df = 12$, $p = 0.023$), loss ($\chi^2 = 9.77$, $df = 3$, $p = 0.021$) and psychological assistance ($\chi^2 = 8.28$, $df = 3$, $p = 0.041$) were found meaningful statistical data effects for E; education level ($\chi^2 = 23.31$, $df = 12$, $p = 0.025$), age ($\chi^2 = 13.25$, $df = 6$, $p = 0.039$) and marital status ($\chi^2 = 126.29$, $df = 9$, $p = 0.000$) were found meaningful statistical data effects for F; gender ($\chi^2 = 29.64$, $df = 3$, $p = 0.000$) and damage situation of building ($\chi^2 = 23.61$, $df = 12$, $p = 0.023$) were found meaningful statistical data effects for R. Multinomial logistic regression analysis revealed that victims who had losses reduced their life expectations 2.6 times more than did those who had no losses during the earthquake. People with secondary education thought that life was meaningless with a rate of 11 times greater than the highly educated people and women had panicked 4 times more than had men.

CONCLUSION

Our findings are consistent with the earlier findings of Karanci and Rüstemli (1995). Karanci and Rüstemli reported high rates of “phobic anxiety” amongst all

those interviewed ($N = 461$). The earthquake emotionally affected nearly all of the survivors. Fear and panic were the most common effects. About a quarter of the sample studied experienced worry about family members, feelings that life was meaningless, and sadness about the dead and injured. The majority of the survivors stated that these emotional problems still distressed them after sixteen months.

Our research indicated that the severity of this earthquake created extremely high death and injury rates, and many survivors have been left homeless. Many people get very angry because they feel buildings were constructed poorly; people also get angry because they feel that the government did not take appropriate preparatory actions or undertake effective relief measures. Survivors felt intense helplessness because they could hear people who were trapped call for help but they were unable to rescue them from the rubble. Because of the severity of this disaster, it is estimated that its long-term consequences will affect a large percentage of survivors. According to statistical analysis, this major earthquake had important effects on women, on people with low education and on those who did not receive psychological assistance – and especially on those who survived under rubble for a certain time. In conclusion, it was found that Turkey was not ready for an earthquake of such magnitude. The amount and type of shelter, and social and psychological assistance provided for the survivors were not sufficient. Only 25% of the victims were provided with psychological assistance, but it is obvious that all victims who had spent some time buried under rubble should be provided with additional social and psychological assistance.

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