

Earthquakes in El Salvador: A Descriptive Study of Health Concerns in a Rural Community and the Clinical Implications, Part III Mental Health and Psychosocial Effects

By: Joanna C. Woerschling and [Audrey E. Snyder](#)

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Abstract:

Background: In 2001, the mountain town of San Sebastian, El Salvador experienced a series of earthquakes that affected the livelihood of its people. **Methods:** A convenience sample of 100 households of 594 inhabitants of San Sebastian and the surrounding rural farming areas was completed. One study participant for each household was evaluated for mental health and psychosocial changes after the earthquakes. The participant's questionnaire was used to investigate the relationship between physical health, access to health care, housing, food and water, and the occurrence of negative mental health markers six months after the disasters.

Results: Findings indicate that the majority (67%) of respondents experienced 6 or more mental health complaints. Risk factors associated with multiple negative mental health symptoms included change in household income and loss of job, a new illness or a new injury in the household, reliance on healthcare services since the earthquake, and managing a chronic illness.

Conclusion: Findings indicate a need for rapid, acute mental health screening with at-risk groups and the need to educate the entire community regarding what medical and mental health treatments are available to reduce barriers to treatment and increase public awareness.

Keywords: El Salvador | mental health | psychosocial impact of earthquakes

Article:

Throughout history earthquakes have been known to have psychological effects on their victims.¹ Major earthquakes can produce mass casualties, widespread property damage, and disruption to essential community functions. The ability to recover after an earthquake is affected by a number of variables that include the needs of the population, the number and types of resources available and the degree of infrastructure damage. Injuries and illness (both physical and emotional) are commonly seen after widespread destruction and healthcare providers are challenged to mobilize resources, access victims, and intervene effectively. Unfortunately, earthquakes often affect regions of the world that lack adequate resources and have a limited ability to respond to mass casualties.

Earthquakes are caused by the release of stored energy that is suddenly converted to movement. The energy vibrations, referred to as seismic waves, travel outward in all directions. The size of

the earthquake is measured by the maximum heights of the seismic waves at a distance of 100 kilometers from the epicenter and is reported in magnitude (i.e., an estimate of the energy released) on the Richter scale. A magnitude 6 or greater earthquake is associated with buildings moving off their foundation, and structural damage like walls collapsing. An earthquake of magnitude 7 on the Richter scale leaves few masonry or framed structures standing, lines of sight and roads completely damaged, and objects thrown into the air.²

In January and February 2001, El Salvador experienced two major earthquakes of the magnitude 7.6 and 6.6, respectively, on the Richter scale.³ The first earthquake was located off the Pacific Coast 75 Km from the town of Usulután, El Salvador.³ The second earthquake was located 30 Km southeast of San Salvador, the capital city of El Salvador. By February 21, 2001, the National Emergency Committee reported 944 dead, 5,565 injured, and a total of 1,364,190 people affected by the first earthquake. The second earthquake resulted in 315 deaths, 3,399 injuries, and 252,622 victims.³

Due to El Salvador's geography, natural disasters such as earthquakes and floods have often caused heavy loss of life and property. Salvadorans faced a civil war that lasted from 1979 to 1992 that killed 80,000 people, half of whom were civilians.⁴ The war left 70,000 seriously injured and displaced one fifth of the nation's population from their homes.² The conflict was notorious for human rights violations, and the healthcare repercussions continued to impact daily life into 2001.⁵ At the end of the war, only 20% of the rural population had direct access to healthcare.⁶ Rural populations were faced with marked differences from urban populations in poverty levels, land distribution, and basic sanitation.⁶ In 1995, only 17% of rural households had access to running water as opposed to 80% of urban households.⁷

The Pan American Health Organization (PAHO) estimated that over 20% of El Salvador's population affected by the earthquakes required some type of mental health assistance from psychologists or psychiatrists.⁸ Seven centers were established for social workers, psychologists, psychiatrists, and nurses to visit the homes of affected populations and provide consultations to those in need.⁸ Unfortunately, the mental health professionals were not able to access the people in San Sebastián, and they did not receive the mental health resources made available to other regions.

Table 1. Risk factors reportedly associated with developing mental health changes after a disaster.

<p>Personal: Female gender and advanced age.^{17, 18, 23, 24} Loss of a loved one Involvement in the aid or rescue of a disaster:^{17, 18, 23, 24, 25} Previous traumatic experience, History of mental illness Lower education^{23, 24, 28}</p> <p>Property: Damage to housing Quality of the housing Loss of resources and location before and after the earthquakes.^{23, 24, 26, 27, 28, 29, 30, 31, 32, 33}</p>

Six months after the earthquakes, a group of investigators visited San Sebastian to do a community health assessment that included mental health questions. The purpose of the assessment was to 1) identify variables that affected the victims' mental health following a disaster and 2) identify commonly reported complaints (referred to as markers) of mental health changes associated with a disaster. The goal of the study was to provide local health officials information to develop an accurate mental health-screening tool for their community. Table 1 provides a list of risk factors known to affect emotional health after different forms of disasters.

Methods

Design

A convenience sample of 100 households including 594 inhabitants of San Sebastian was obtained from the local Red Cross and local government public health clinic. One study participant from each household was evaluated for mental health and psychosocial changes after the earthquakes. Investigators, with the help of Red Cross translators, interviewed participants to identify variables and symptoms.

Sample

The criteria for inclusion in the study were residents of the town of San Sebastian or rural farming areas around the town, and 18 years of age or older when interviewed.

Assessment tool

The mental health evaluation tool consisted of 10 questions that were part of a larger 32-question survey that evaluated general living conditions before and after the earthquakes. The general survey covered healthcare, access to care, housing, food and water, sanitation, psychosocial traits, and mental health. Some general survey results were previously reported.^{9,10} The mental health questions were structured to reflect general symptoms of Section A and B of the General Depressive Disorders and General Anxiety Disorder of the Diagnostic Statistical Manual of Mental Health Disorders.^{11,12,13}

The assessment form was created with the advice of community health experts in Charlottesville, Virginia at the University of Virginia. In addition, disaster assessment and management tools from the American Red Cross¹⁴ and the Pan American Health Organization¹⁵ were reviewed. Physicians and local leaders of the San Sebastian Red Cross helped to revise the tool to include relevant linguistic and cultural considerations.

Survey process

The principal investigator and a team of sub investigators certified by the University of Virginia's Human Investigational Committee (HIC #9606) collected the assessment data. All assessment forms used during interviews were translated and administered in Spanish with the

help of local Red Cross volunteers. The study coordinators used formal observation and interviewing as their data collection techniques.

Data analysis

The descriptive statistics were compiled with the 'Statistical Package for the Social Sciences (SPSS)' for data collection.¹⁶ A combination of nominal, ordinal, and interval measurements categorized frequencies within the results. A chi-squared test of independence was also used to identify statistical significance between individual respondent variables throughout the disaster assessment and the presence of six or more negative health markers.⁹

Results

Demographics

The majority of subjects (n = 59) lived in the rural areas surrounding San Sebastian while the others (n = 41) were residents of the town. Location differences were not found to be statistically significant for increased instances of positive mental markers. Of respondents, 30% were males and 70% were females. The mean age of the participants was 45 years and ranged between 18 and 86 years of age. Of respondents, 54% were married, 24% were single, 1% were divorced, 12% cohabitating, 10% were widows. Age and gender were not found to be independently statistically significant variables.

Variables that affected mental health after the earthquakes

Income, jobs, education

Investigators evaluated how the earthquakes affected income, jobs, and education and if the changes were associated with significant emotional health changes, (i.e., defined as having 6 or more mental health markers and listed in Table 2). Of the respondents, 38% reported a change in income after the earthquakes, 21% reported a loss of jobs after the earthquakes, and 66% reported a change in access to education. Of individual respondents, the average years of education were five and ranged from 0-16 (13-16 being university level). Table 2 provides a list of post-earthquake psychosocial variables found to be statistically significant with 6 or more negative mental health markers. Other factors, such as change in access to education, lack of sufficient medical supplies, or change in access to health care, lack of communication, uninhabitable home, having to leave a home due to damage or loss of access to food or water, were not found to have a statistically significant effect.

Changes in health status

Participants that encountered new injuries, new illness, or changes in their ability to manage a chronic illness had more markers.

Table 2. Variables associated with negative mental health markers and their significance: percentage of participants who reported the variable and statistical significance of variable being associated with mental health markers.

Variable	Significance
If a respondent reported Personal change	Percent more likely to have greater than 6 negative mental health markers (statistical significance):
1. the presence of a new illness in their household	1. 44.4% ($\chi^2 = 4.52, df = 1, P = .034$)
2. a new injury in their household	2. 68.4% ($\chi^2 = 8.21, df = 1, P = .004$)
3. a change in ability to manage a chronic illness	3. 67.8% ($\chi^2 = 5.25, df = 1, P = .022$)
4. the need to utilize healthcare services after the earthquake	4. 54.2% ($\chi^2 = 4.55, df = 1, P = .033$)
Economic change	
1. changes in household income	1. 68.4% ($\chi^2 = 8.03, df = 1, P = .005$)
2. loss of jobs	2. 72.8% ($\chi^2 = 4.54, df = 1, P = .033$)

Baseline status

A self-reported baseline mental health history was obtained to determine the presence of negative mental health markers in the community. There was a small number of participants who reported tobacco use (9%), alcohol use (7%) domestic violence in the home (7%), psychiatric ailment (4%), and illicit drug use (3%). The frequency of mental health and psychosocial variables between urban and rural participant sectors of the population were not found to be statistically significant.

Markers of mental health status

The investigators considered a respondent to have significant mental health changes if they developed 6 or more negative mental health markers that were present continuously for two weeks or more after the earthquakes. (See table 3).

Table 3. Symptoms reported by 100 participants evaluated by mental health assessment after the earthquakes in El Salvador in 2001.

Negative mental health marker	Percentage reporting
having thoughts of death	85
feeling sad or depressed	82
increase in stress	77
losing energy or feeling more tired	72
trouble concentrating	69
trouble sleeping	68
losing interest in daily activities	66
losing weight	50
change in appetite	36
gaining weight due to increase in appetite	11
Frequency of multiple mental health complaints	
Frequencies	Negative Health Markers
0 to 2 markers	10
3 to 5 markers	23
6 or more markers	67

The psychological symptoms were placed in classifications of 0 to 2 complaints, 3 to 5 complaints and 6 or more complaints. This method allowed researchers to measure which respondents had multiple symptoms that would put them at a greater risk for a psychiatric disease. Of the respondents evaluated, 10% reported 0 to 2 symptoms, while 23% had 3 to 5 symptoms and 67% had 6 or more symptoms.

Discussion

Participants described how poor road conditions limited the normal travel routes and decreased their ability to access primary needs, such as food and water. Initially obtaining sufficient food and water took precedence over other problems. As time progressed, psychosocial and mental health stressors grew in precedence.

Variables that affected mental health after the earthquakes

Demographics, age and gender

This study did not find that gender or age characteristics were significant for mental health markers. Other studies^{17, 18} have found women in dependent roles in society were at risk for emotional repercussions following a disaster. However, in Salvadoran culture, many women tend not to be as dependent because they are housekeepers and have other cooperative forms of income, such as textile work or bread making within the home. The population lost only one community member to the earthquakes, and thus the threat of losing a male provider was less severe.

Income, jobs, education

Study results found loss of income and change of job to be factors consistent with increased mental health markers. Many respondents reported working family members having to stay home to provide for their families because they were unable to make the commute to local businesses or factories near the capital. Also, many Salvadorans expressed concern over the recent change in currency from the *colone* to the United States dollar, causing inflation in prices.¹⁹

Changes in housing

Housing variables were not statistically significant factors in this study and may be related to the lower standard of housing that existed before the earthquakes. Many families lived without running water or with a cracked roof on a regular basis. Unless the homes were completely uninhabitable, the participants viewed the damage as something that needed repair but not an acute change in livelihood. Many respondents felt that the immediate temporary housing provided by the government was an additional room for their home.

Changes in health status

The report of a new injury, new illness, utilizing healthcare resources, and the inability to manage chronic illness were significant independent variables. Table 2 lists the significance of health status changes in relation to the occurrence of the number of negative mental health markers.

The local Red Cross reported that directly after the disaster, multiple patients presented with vague physical symptoms. National health officials saw physical reactions such as digestive problems, excess or lack of appetite, palpitations, and skin conditions that they related to the stress of the disasters.⁸ During the study, investigators observed respondents crying or visibly shaken during the interview as they recounted the destruction of the earthquakes.

Substance abuse

The incidence of illicit drug use and increase in alcohol use were not statistically significant; however, overall baseline prevalence was extremely low and influenced by cultural standards. Although certain members of the Salvadoran community were known for heavy drinking, these individuals were homeless and therefore not included in the study. Study participants stated that they could not feed their families or afford to live in their homes if they consumed mass amounts of alcohol. One or two drinks per week and moderate consumption on holidays were the only responses noted. Community leaders such as priests, the mayor, and other leaders of local organizations frowned on alcohol and illicit drug use. Although no specific mental health services were available within the town, there was an active Alcoholics Anonymous chapter present.

Other factors

As many as 4,500 aftershocks (i.e., smaller vibrations felt after the earthquakes) were reported during the 5 weeks following the first earthquake.²⁰ Because 2 large earthquakes had occurred close together in January and February, the aftershocks created anxiety for residents who were afraid of more earthquakes.

The newspaper and television media provided graphic coverage of the earthquakes and bodies of dead victims to homes throughout the region.²¹ Although the disaster had only one local casualty, many family members were anxious if they did not know the health of their loved ones and friends in other parts of the country.

Limitations of study

The investigators traveled internationally to study this population and could not conduct a pilot study because of time and safety limitations. When necessary Red Cross members accompanied study teams to aid with language translation. The use of interpreters could have caused the participants to alter their answers, especially with sensitive questions regarding domestic abuse, psychiatric ailments, alcohol or illicit drug use. The populations studied do not reflect the actual community because children under the age of 18 were not included, and there was a larger representation of rural participants in this study.

Summary

Victims of two major earthquakes in El Salvador were surveyed to determine what variables contributed to mental health changes and what markers could be used to identify negative changes. The investigators found that participants still had emotional reactions 6 months after the earthquakes and identified variables that were associated with a higher incidence of negative mental health markers. Red Cross and Unidad de Salud members were encouraged to contact national organizations to utilize national resources and official training resources and to learn standards for mental illness diagnosis and treatment. For instance, the Salvadoran Red Cross with support from the Federation and the American, French and Italian Red Cross Societies created a mental health program less than a month after the earthquakes, that provided psycho-social support for 12,000 victims over six *departamentos* (provinces).²²

This assessment may be used to identify an at-risk group for post-traumatic stress, anxiety, or depression and to allow rapid initial and intermediate assessment for mental health. Further diagnosis and treatment should be made by a trained healthcare professional in the community. The presence of negative mental health markers following a disaster event is influenced by the culture's view on mental illness and local treatment standards.^{23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33}

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