

Social determinants associated with suicidality, depression, anxiety and post-traumatic stress in adolescents after the earthquake 2016 in Ecuador

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Abstract

Background

The Ecuadorian earthquake in April 16th was the second strongest and deadliest in 2016 worldwide, with approximately one million people affected. In this paper, we analyze the psychological impact and the relationship between mental health events and various social determinants related to the earthquake, nine months after the event.

Methods

We conducted an analytical cross-sectional study, applying anonymous surveys to 319 adolescents 13-19 years old. Suicidal tendency, depression, anxiety and post-traumatic stress (PTSD) were evaluated via the Child PTSD Symptom Scale (CPSS), Spence Children's Anxiety Scale, Okasha Suicidality Scale, and the Center for Epidemiologic Studies Depression Scale (CES-D) in addition to an adapted seven-questions survey aimed for measuring social determinants related to the earthquake.

Results

We found a high prevalence of suicidal ideations and behavior, posttraumatic stress, depression and anxiety compared to international studies. Even though adolescents currently living in shelters had higher levels of anxiety, their suicidal tendency was significantly lower than those living in their own home or in the home of relatives. Finally, social determinants are not associated with suicidality and mental health events, with the exception of economic damage suffered by the family.

Conclusions

High levels of depression, post-traumatic stress and anxiety in high school students, especially in those who have suffered serious economic damage, may possibly be due to factors inherent to the political and social conditions in this area.

Background

On April 16, 2016 (16A) Ecuador suffered one of the strongest earthquakes in its history, with a magnitude of 7.8 on the Richter scale, which resulted in 663 fatalities, approximately 30,000 people evicted and about a million people indirectly affected (1).

Witnessing a natural disaster is an experience that moves deeply, and it is natural and even functional to respond immediately with anxiety and stress. These reactions, which at the beginning appear to be normal, can become a serious mental health problem when the level of stress and anxiety experienced at the beginning does not decrease over time (2). While most people are resilient to the impact of an event of this severity, about 30% of those affected develop mental disorders (3,4). According to these investigations, the most vulnerable group for the psychological impact of the disaster corresponds to young people from developing countries. There is much evidence that many adolescents who experience a natural catastrophe develop symptoms of posttraumatic stress (5), depressive disorders (6) and anxiety (7).

Post-traumatic Stress Disorder (PTSD) according to the American Psychological Association appears after a traumatic experience—the threat or experience of injury or death of one's own or of a very close person— and lasts for a period greater than thirty days (8). On the contrary, anxiety disorders are fears that may, in some cases, be directly caused by a traumatic event, but they do not necessarily have to be associated with an experience like this. The most common anxious disorders after a catastrophe or disaster experience are generalized anxiety disorder and panic disorder (9). In addition to posttraumatic stress and anxiety, depression is another common psychological disorder in adolescents as a result of cataclysm (10). Some of the factors that are associated with emotional stress in the population depend on the perception of external help, especially for those victims who are evicted and placed in temporary shelters, because the concern about an unfair distribution of resources, causes discomfort and additional stress in the community (11).

Natural disasters and suicide

The influence of a natural disaster on the suicide of the affected population is a topic discussed by various researchers (12–15). While some research finds a reduction in suicide rates in the first months up to two years after the disaster (16,17), other studies affirm an increase in suicide deaths (13,18).

There are some determinants that can explain the increase or decrease in suicidal behavior of the population in regions hit by natural disasters such as: the severity of the disaster, social cohesion among affected people and the support received by the regional or national government and international NGO(19,20). Kölves indicate that, in addition, the period of study after the disaster is essential(12). In this sense, Pasnau and Fawzy differentiate the following stages: honeymoon, disappointment and reorganization; According to these authors, in the first emotional phase after the earthquake - called the honeymoon phase - which usually begins after the first shock and can last for days or months, suicidal behaviors in the population tend to decrease, to increase later in the subsequent phases(21).

In addition, although the population as a whole is affected by a natural disaster, WHO insists on the concern for especially vulnerable groups such as adolescents, because of their dependency relationship with adults and its specific state of development (9). This age group, being socially and economically dependent on its family and due to its conflictive period of life, has a special risk for the development of psychological disorders and suicidal tendencies after a natural disaster (22). As for the earthquake in Ecuador, although the province of Manabí received the greatest impact in relation to human and material losses, Esmeraldas province also reported injuries and significant damage to buildings and infrastructure. The most affected canton in the latter province is Muisne, where the highest number of injured and destroyed or affected buildings were registered (1) and where was located the epicenter of several

aftershocks greater than 6.0 on the Richter scale, between April and July 2016 (1) and where, according to Garcia's reports, on October 16th 2016, six months after the earthquake, 7,000 refugees were still registered in official shelters. For the affected population, the time taken to rebuild implies the persistence of enormous emotional and socioeconomic stress.

Given the situation described, this research aims to determine the prevalence of suicidal tendencies of the adolescent student population in Muisne, nine months after the earthquake. In the same way, we aim to measure the prevalence of mental health events such as depression, anxiety and post-traumatic stress. It is also interesting to know if the prevalence of suicidal tendencies and the prevalence of depression, anxiety and PTSD varies among adolescents according to social determinants such as prolonged stay in shelters and physical, material and economic damages suffered due to the earthquake.

Methods

Study designs

An analytical cross-sectional study was conducted with a sample of 300 students in three Muisne secondary education institutions (parish characterized by its special impact on the earthquake and subsequent aftershocks).

Settings

This study was completed in Muisne during the month of January until February in 2017. Muisne is a beach town located an hour and a half from the capital of the province of Esmeraldas in Ecuador, South America. It is a small town with approximate 8 kilometers in length and 300 meters wide during low tide. It has an estimated population of 28,047 with a gender distribution very similar to the rest of the country (50.03% women and 49.97% men).

Participants

The participants were men and women between the ages of 13 and 19, with an average of 16.07 (SD = 1.91), corresponding a 48.1% of the sample to men and 51.9% to women. Of the total student sample, 55% had been found on the island side of Muisne during the earthquake, 27% were located on the mainland of Muisne parish and the remaining 17% in some other part of Ecuador.

Eligibility criteria

The questionnaire was delivered to young women and men from 13 to 19 years old who were attending high school during 2017. All the subjects that voluntarily agreed with the informed consent and authorized their participation were included.

Variables

Socio-demographic variables such as age, sex, place of origin and level of education were analyzed, as well as the variables of interest regarding Post-traumatic Stress Disorder, anxiety, depression and suicidal risk.

Post-traumatic Stress Disorder Symptoms

The Child PTSD Symptom Scale (CPSS) was created based on previous studies (24–27), to assess the presence of PTSD symptoms in children and adolescents between 8 and 18 years in terms of the last two weeks.

In the present study, we used the Spanish version translated by the Chilean researchers Bustos, Rincón and Aedo, instrument validated in 2009 and adapted to the Ecuadorian context and the situation (28). The answers may vary from: 0 (never or only once), 1 (occasionally), 2 (half the time) and 3 (almost always). For the present study, the 17 items of its original version were used. The possible scores vary from 0 to 51 and the cut-off point was established at 24 points (24). The scale showed high internal consistency and good test-retest reliability in its original version (24) as in the Chilean adaptation (28).

Anxiety

The Spence Children's Anxiety Scale, (SCAS) was used to evaluate the presence of different anxiety disorders among children and adolescents (29). The SCAS provides a description of the severity of specific anxiety symptoms for both children and young adolescents (30) and is characterized by measuring the specifications of anxiety disorders in children and adolescents. For this work, a validated version in Spanish was taken (31,32), with proven reliability and validity (33,34)

The use of this scale was specified in the selection of three subscales made up of 21 items, which are related to the types of anxiety directly linked to natural disasters. The internal consistency of the mentioned subscales varies from 0.81 (panic attacks) to 0.75 (separation anxiety) and 0.67 (generalized anxiety); Cronbach's alpha for the total scale is 0.89. Since there is no cut-off point for these three subscales in this study, the degree of affectation was determined considering the deviation from the average that in the present case was 35 points.

Prevalence of depression

The Center for Epidemiologic Studies Depression Scale (CES-D) scale was designed to determine prevalence of depression in adolescents and adults in a general population (35). The inventory evaluates the presence of twenty depressive symptoms during the last week, with a response format of: No day = 0, one to three days = 1, four to six days = 2 and every day = 3.

The scale has been validated in Mexican and Chilean students (36), Colombians (37) (32) and Peruvians (38), with a good result in terms of reliability and validity. In the present study, the translation of Grupo Lisis was taken as a reference, being a version used in Ecuadorian adolescents previously, and with adequate psychometric properties; presents a Cronbach's alpha of 0.81

Suicidal risk

The Okasha Suicidality Scale was created by Okasha et al in 1981 and was used to determine the risk of committing suicide within this community (39). This scale measures suicide risk and consists of 4 items: 1. Have you ever thought that life is not worth it? 2. Have you ever wanted to be dead? 3. Have you ever thought about ending your life? 4. Have you attempted suicide?

The first three items have a 0 to 3 format as a response option (never, almost never, sometimes, many times). In the present study a fifth item was added: Have you made any plans to take your life?, since the plan plays an important role for the assessment of suicide risk (40).

The original scale was translated into Spanish and validated by Salvo et al. (Except, Melipillán and Castro, 2009) in a teenage population in Chile with an internal consistency of 0.89. The cut-off point for the subscale of suicidal ideations, to identify people with high suicidal tendencies, was set at 5 points (41).

Social determinants

An adapted seven-questions survey based on the study conducted by Díaz, Quintana and Vogel was used to explore the social determinants around the earthquake (23). The questionnaire contained seven items that were intended to identify the social determinants that might be linked to suicide after an earthquake. The questions were intended to explore the timeline related to the earthquake, the degree of damage in houses and the consecutive economic losses, the current housing and the housing just after the earthquake, the physical damages and life losses affecting themselves and their relatives and the psychological support (if any) that was available just after the disaster.

Data source

The data for this study was obtained through the use of five instruments to explore the entire context of the children affected by the natural disaster and their responses.

Bias

In this study we try to include all adolescents who voluntarily decided to participate, so we could avoid selection bias. In turn, the use of 5 validated surveys of closed questions will allow us to reduce the risk of inferring the opinions of the participants. Finally, we have considered the subsequent analysis of the data to try to avoid design bias to the maximum.

Study Size

A non-probabilistic sampling design was used in three schools in Muisne, Ecuador. A convenience sample was obtained because of their convenient accessibility within the town, the open-doors attitude from the schools' authorities and the researcher experience working in the area.

Statistic analysis

The Student's t-test was used to compare the means obtained in the measured scales (suicidal tendency and other mental health events between the samples) between the samples according to the presence or absence of different social determinants mentioned above. For this, each of the social determinants was dichotomized according to their presence (0 if the damage has been slight or nonexistent and 1 if it has been serious). To contrast the dichotomized variables with the demographic variables (gender and age), the Pearson Chi-square test was used. The SPSS version 22 program was used for the calculations.

Results

General Results

The total sample consisted of 319 participants, from 3 different schools. The participants were between the ages of 13 and 19, with an average of 16.07 (SD = 1.91), corresponding to 48.1% of the sample to men and 51.9% to women. Of the total student sample, 55% had been found on the island side of Muisne during the earthquake, 27% were located on the mainland of Muisne parish and the remaining 17% in some other part of Ecuador.

Emotional Evaluation

Table 1 shows several descriptive statistical data such as: sample size, mean values, standard deviation, significance level (alpha value) and internal consistency for each of the main variables collected in this study: suicidal tendency, depression, post-traumatic stress disorder symptoms and anxiety.

Table 1
Descriptive statistics

Variable	n	Mean	SD	α	Potential	Real	Asymmetry
Suicidal tendency	255	2.78	3.11	0.83	0-15	0-12	1.03
Depression	283	20.03	9.39	0.79	0-60	2-49	0.45
PTSD	301	19.37	10.10	0.85	0-51	0-44	0.25
Anxiety	287	23.84	11.01	0.89	0-63	1-60	0.31

Suicidal tendency

Less than a half of the students who participated, indicated that they had never had suicidal ideations. Around 30% declared that during the last nine months they thought sometimes or many times that life is not worth it and wished they were dead. Also, 20% thought sometimes or many times about ending their lives, and 13% on several occasions have made concrete plans to commit suicide.

Suicide attempts

Regarding suicide attempts, 205 adolescents (65%) indicated that they had never attempted suicide, while 23 (7%) claimed to have tried once, 12 (4%) twice, 8 (3%) three times and 4 (1%) four or more times. Is important to remark that there was a high number of absence of answers to this question, because 21% (n = 65) refused to answer it.

On the other hand, female adolescents suffered from significantly higher levels of suicidal ideations than men, being the most frequent expression in them the "desire to be dead", with almost 60% of adolescent girls who claim to have wished sometimes during the last nine months being dead, compared to 44% of boys. In addition, 40% (women) and 34% (men) of the participants indicated that they had ever thought that life is not worth it. In the same way, one in five men claimed to have thought about ending their lives, compared to around 43% of female adolescents.

There were also obvious gender differences in suicide plans and the number of suicide attempts during the last nine months. While the data indicate that 27% of women had made plans at some time, only 15% of men declared the same. Regarding previous suicide attempts, 20% of women reported having tried at least once to take their own lives, compared to only 9% of men.

Depression prevalence

Table 2 reports the prevalence of depression, posttraumatic stress and suicidal tendency for the total sample considering their age and gender. The prevalence of depression and post-traumatic stress is high, since approximately one third of the participants appear to be affected by at least one of these alterations. In addition, it is observed that women have significantly higher scores in the four variables compared to men.

Table 2
Prevalence of depression, anxiety, post-traumatic stress and suicidal tendency in the total sample and by age groups.

	Gender			χ^2	Age			χ^2
	Total (n = 300)	Men (n = 144)	Women (n = 156)		13–14 years (n = 76)	15–16 years (n = 86)	17–19 years (n = 138)	
Depression > 24)	28.5%	19.9%	36.1%	9.37**	32.9%	33.7%	23.9%	2.64 n.s.
Anxiety (> 35)	15.2%	6%	21.8%	15.14***	13.2%	18.6%	15.6%	1.14 n.s.
PTSD (> 24)	33,2%	23.8%	42.2	10.97***	28.9%	37.2%	34.8%	1.42 n.s.
Suicidal tendency (> 5)	18.2%	11.9%	17.5%	8.01***	19,7%	24.4%	14.5%	0.67 n.s.

Table 3 reports the ANOVA results of the effect that various social determinants resulting from the earthquake have on the suicidal tendency of adolescents: depression, anxiety and post-traumatic stress. It is noteworthy that shelter accommodation (official or unofficial) has no effect on mental health events in the first stage after disaster.

Table 3
Social determinants and risk factors in relation to mental health events

	Depression		PTSD		Anxiety		Suicidal tendency	
	Mean ± SD	P	Mean ± SD	p	Mean ± SD	p	Mean ± SD	p
Accommodation after earthquake								
Home	20.65 ± 9.28	0.202	19,32 ± 10.52	0.888	23.14 ± 11.40	0.156	3.02 ± 3.21	0.129
Shelter	19.13 ± 9.63		19,50 ± 9.47		25.07 ± 10.37		2.40 ± 2.95	
Current accommodation								
Home	19.71 ± 9.11	0.089	18.91 ± 10.12	0.056	23.20 ± 10.99	0.017	2.90 ± 3.22	0.019
Shelter	22.72 ± 11.27		22.33 ± 9.67		27.84 ± 10.58		1.84 ± 1.93	
Damages on family housing and properties								
Severe damage	19.92 ± 9.18	0.671	19.11 ± 10.36	0.383	23.11 ± 11.27	0.082	2.82 ± 3.14	0.840
None or small	20.46 ± 9.89		20.28 ± 9.31		25.57 ± 10.20		2.73 ± 3.08	
Economic damage								
None or small	18.86 ± 8.94	0.000	17.98 ± 9.86	0.000	22.78 ± 10.92	0.001	2.78 ± 3.08	0.762
Job loss	24.10 ± 9.92		24.30 ± 9.38		27.65 ± 10.49		2.64 ± 3.25	
Physical damages and severity								
None or minor	19.78 ± 9.21	0.143	19.07 ± 9.83	0.161	23.51 ± 10.75	0.094	2.73 ± 3.10	0.354
Serious or death	22.78 ± 11.03		22.76 ± 12.46		27.36 ± 13.17		3.42 ± 3.27	
Psychological help or counseling received								
No help	19.69 ± 9.07	0.294	19.16 ± 10.00	0.408	23.84 ± 11.28	0.923	2.74 ± 3.13	0.549
At least once	20.92 ± 9.73		20.17 ± 10.26		23.97 ± 10.61		2.99 ± 3.10	

Discussion

We have found a high prevalence of suicidal ideations, plans and attempts in adolescents in Muisne, and important differences are distinguished in terms of their frequency between men and women.

Regarding suicide attempts, 15% of adolescents indicated that they attempted suicide (21% of women and 9% of men). These are higher figures in comparison with those reported in other investigations. Most studies report a low percent varying in a range between 4–7% (12). However, a study conducted in India after a cyclone confirms the prevalence of similar suicide attempts such as those found at 12.6% (42). The highest numbers of suicide attempts in the Ecuadorian sample and in the population of India are possibly related to both being regions with high rates of consummate suicide (43), even before the natural disaster suffered by these countries. There could, therefore, be an underlying socio-cultural trend and perception of suicidal behavior that together with an additional stressful event (natural disaster) leads to a high number of attempts.

We found that one third of adolescents have symptoms of PTSD and exceed the cut-off point of the instrument used. This proportion is higher than those reported in the study by Díaz et al (23), which was conducted with adolescents of similar ages in regions affected by a tsunami in Chile (33% compared to 20%). The prevalence of post-traumatic stress is probably related to the severity of the traumatizing event, as Muisne students report a greater degree of physical damage (severe injuries and family losses) and property damage than Chilean adolescents. Therefore, the impact of the disaster may explain a greater impact on the mental health of the students.

Regarding the levels of depression (29%) and anxiety (15%) found, they differ slightly from those reported in the above mentioned study by Díaz et al. (23), with 30% and 14% respectively. Different studies carried out in other regions of the world yield figures comparable to those of Muisne. Thus, three studies that studied the prevalence of depression in groups of adolescents between 6 and 12 months after an earthquake show a prevalence of 31% in Turkey (44) and between 25–37% in China (45,46). Regarding anxiety, the data seem discordant with prevalences of 17% (47) to 40% in China (46), compared to 15% in this study.

Social determinants and their relationship with suicidal tendency, depression, anxiety and post-traumatic stress

Some social determinants such as physical damage or loss of family members, damage to property or other material losses, accommodation in shelters, and economic losses in the family, and their relationship with mental health events were evaluated in the present study.

Although similar percentages to our findings are reported in a study with adolescents in the city of Concepción (Chile) after the telluric movement of 8.8 (23) in regard to economic losses, property damage was much more widespread in the present case (30%) compared to that occurred in Chile (14%), as well as physical damages to family members (6–3.3%) and family losses (2.4% in Muisne vs. 1% in the Chilean case).

Only the adolescents who were living longer than nine months in temporal shelters had significantly higher levels of anxiety compared to those living in their own or relatives' homes. After spending several months in shelters, the risk of developing anxiety disorders is high(48). Uncertainty in young adults generates chronic stress which activates our basic instincts for survival(49). In this situation, the frontal cortex, the amygdala, the hypothalamus and the suprarenal glands are responsible for producing heightened effects in cortisol and adrenaline(50). These are directly linked to physical and cognitive symptoms which lead to anxiety disorders. However, because of constant peer and social support possibly depressive disorders were reduced.

On the other hand, the suicidal tendency of adolescents currently living in shelters was significantly lower than those living in their own home or in the home of relatives. In addition, there are no significant differences between the level of depression and post-traumatic stress when comparing the type of accommodation after the earthquake or at the time in which the study was performed.

These factors can be considered as social determinants that possibly explain the high prevalence of emotional disturbances in our studied population. When measuring the relationship between social determinants and mental health events of adolescents, contradictory results were obtained. On the one hand, this study shows that large economic (or job) losses in the family are associated with higher levels of depression, anxiety and post-traumatic stress; but at the same time, it cannot be demonstrated that there are significantly higher suicidal tendencies in our sample. This result contrasts with that obtained by Kar (51) in a study with those affected by a cyclone in India, where one of the best predictors for high suicidality was job loss and other psychosocial factors. In this sense, the loss of work or business can be considered as a risk factors for a suicidal tendency, only in those directly affected, but not in those indirectly affected, that is the family; however, this rule cannot be extended to high levels of depression, anxiety and PTSD.

There was no statistically significant differences in any of the mental health factors related to housing damage, physical damage and even the death of close relatives. The loss of home, the stay in shelters and the physical damages or even the death of relatives, are associated with mental health events (including the suicidal tendency), but this relationship is not statistically significant except for the young people staying in shelters, in which high levels of anxiety are found. This result partially confirms those described in previous studies in Turkey and Taiwan (52,53) in which the damage or loss of the property was positively related to depression and suicidal ideation.

Our results demonstrated that the levels of depression, anxiety and post-traumatic stress of adolescents whose parents have had a serious economic loss or even job loss, are significantly higher than those who have not suffered economic losses (or those were temporary). Our shows clearly that the suicidal tendency is not higher in students whose families have had greater economic losses, despite the fact that scores on depression, anxiety and post-traumatic stress turn out to be much higher.

On the other hand, it is suggestive that the adolescents who remained until January 2017 in the shelters showed higher levels of post-traumatic stress, depression and anxiety, but at the same time, lower suicidal tendencies than those who continued to live at home. This apparent contradiction is explained in a longitudinal investigation conducted before and after Hurricane Katrina in the United States (54). Although significantly higher prevalence of depression, anxiety and post-traumatic stress were found in the sample after the hurricane, suicidal ideation was lower compared to the measurement taken before the disaster. Additionally, some mediating factors were measured, and it was found that spiritual growth and an improvement in personal relationships (experiences framed during the disaster) probably reduced suicidal ideations (45). In the same line, Yu et al. measured suicidal ideations in adolescents before and after an earthquake in China, with lower prevalence (10.6%) after the event as compared to the initially reported level (19.3%), probably as a result of post-traumatic increase as suggested by these authors.

It is tempting to speculate that the prolonged experience in shelters stimulates the spiritual growth in adolescents, since even being victims of these adverse circumstances and suffering high levels of depression, anxiety and PTSD, the relationship with the other affected and helping volunteers may work as a factor of protection against suicidal ideations and attempts.

In turn, the economic damage or loss of work of parents seems to directly impact family life, affecting hope and favourable perspectives for their future, leading to emotional disturbances and psychological disorders.

High levels of depression, post-traumatic stress and anxiety in high school students in this area, especially in those who have suffered serious economic damage, may also possibly be due to factors inherent to the political and social conditions in this area.

During the reconstruction phase (9 months after the disaster) the population generally goes through a period marked by disappointment and hopelessness, especially if there is a perception that the government is favoring other areas or that reconstruction materials are being distributed unfairly. However, this circumstance has not been addressed in this paper although there are abundant references in the media.

Conclusions

High levels of depression, post-traumatic stress and anxiety in high school students, especially in those who have suffered serious economic damage, may possibly be due to factors inherent to the political and social conditions in this area.

In turn, the economic damage or loss of work of parents seems to directly impact family life, affecting hope and favourable perspectives for their future, leading to emotional disturbances and psychological disorders. Whereas the prolonged experience in shelters may be a stressful experience, it also possible stimulates the spiritual growth in adolescents, and may work as a factor of protection against suicidal ideations and attempts.

Limitations

It is necessary to mention the transverse character of this investigation as much as it does not allow causal inferences between the variables. Also, the prevalence of mental health events prior to the earthquake is unknown, so it is not possible to make comparisons with pre-disaster prevalence. Studies on the prevalence of suicidal ideations and attempts in adolescents before the earthquake in Muisne are scarce or nonexistent, however some previous studies indicate that adolescents in Ecuador in general have high levels of depression, ideation and suicidal attempts (Author, 2012) ; Jaramillo, 2009; Author, 2018).

In general, the methodology used involves other difficulties, since the collection of data through questionnaires can lead to reading and comprehension errors, and consequently the the results must be interpreted with some caution.

Finally, for logistical reasons, this study was carried out at the end of the school year, which could be understood as a time of high intellectual stress for high school students, so this factor may have influenced their mental health.

Abbreviations

PTSD: post-traumatic stress

CPSS: Child PTSD Symptom

NGO: Non governmental organization

SCAS: The Spence Children's Anxiety Scale

CES-D: The Center for Epidemiologic Studies Depression Scale

ANOVA: Analysis of variance

Declarations

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee on Human Beings of the San Francisco University of Quito with authorization number 2016-176PG. **Written** informed consents were given to the parents of minor students during class hours, and to seniors on the same day of the evaluation. The meaning of the investigation was explained, and their participation was invited anonymously and voluntarily, resulting in a 50% participation. Subsequently, the questionnaires were distributed on paper, and during its completion the main author of the study remained in place with the intention of resolving any doubt or difficulties.

Consent for publication

Written informed consents were given to the parents of minor students during class hours, and to seniors on the same day of the evaluation. **Availability of data and material:**

All data by including sensitive information are not publicly available, however, under a rational requirement, the data can be shared by writing a request to the following email: remgerstner@gmail.com

Competing interests

The authors declare that they have no competing interests

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Author contributions

RG and FLL designed the methodology and gathered the information from the earthquake affected zones. Both of the authors are responsible for the acquisition of data, the analysis and its interpretation. Both drafted the Spanish version of the manuscript. EV was responsible for developing a database in XLS format, transforme it to CVS and designing the tables. JDG and GV provided a deep review of the entire manuscript and collaborated with the discussion section. Finally, EOP was in charge of translating the entire project into English, complete the analysis and elaborate the final draft of the manuscript. All authors read and approved the final version of this manuscript.

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Figures



Figure 1

An entire building that collapsed during the earthquake and left 6 families without a home and Photo

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