Suicide Attempts and Their Interrelation With the Economic Crisis in Chania, Greece:

A Time-Series Analysis of the Period 2008–2015

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ABSTRACT

Background: Greece has been in the grip of a severe economic crisis since 2008. It is well known that suicide attempts and actual suicides increase during periods of recession and austerity. The main aim of this study was to examine the economic crisis in relation to recorded suicide attempts in Chania, Greece, from 2008 to 2015, also taking unemployment rates into consideration.

Methods: During the research period from January 1, 2008, to December 31, 2015, 436 suicide attempts (females: n = 305 and males: n = 131) were recorded in the archives of the General Hospital of Chania. The data collected, analyzed, and used in the present study were from the archives of the emergency outpatient unit of the hospital. The unemployment data are from the Hellenic Statistical Authority.

Results: The rate of suicide attempts peaked in 2012 and remained relatively high until 2015. The most common suicide attempt method was poisoning by medication, with a percentage of 74.4%. In addition, the most prominent stressors related to the suicide attempts were family problems and relationship problems between couples: 40.2%. There was a statistically significant relationship between suicide attempts and unemployment rates (adjusted *RR*: 1.08; 95% CI, 1.07–1.09).

Conclusions: Severe economic crisis seems to increase the rates of suicide attempts. The need for more detailed investigation is essential to provide insight into this global problem.

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The economic crisis of 2008 has had a global effect on countries worldwide, with social, psychological, and political consequences.[1,2] Greece, compared with all other European countries, has been considerably more affected by the economic crisis[3] to the point that it is considered to have experienced the most serious and multifaceted financial crisis in its history.[4] In particular, although the national debt began to increase in 2006,[5] the economic recession was well established in Greece 2 years later.[4,6–8] Greece asked for financial support from the International Monetary Fund in 2010 by accepting a list of policy reforms[9] in an attempt to achieve economic stability and return fiscal policy to a sustainable level.[10] The economic survey of the Organization for Economic Cooperation and Development[11] revealed that unemployment rates and poverty (covering one-third of the population) were drastically increased, whereas life satisfaction rates were sharply decreased. Austerity measures included pension cuts, increased taxes, income reductions, and stricter criteria for taking out loans and making housing loan repayments.[12] One part of the reforms was a drastic reduction in hospital and pharmaceutical expenditure,[13,14] approximately 30% from 2009 to 2011.[1] During this long period of crisis, the physical and mental health of Greek citizens was observed to have been detrimentally affected and to have deteriorated.[15]

Since 2008, unemployment rates have tripled in Greece.[16–18] Antonakakis and Collins[19] found through their research that a 1% decrease in government expenditure leads to a 0.3% increase in overall suicide rates in Greece. On one hand, most suicides appeared to be related to both the economic crisis and unemployment.[6,20] On the other hand, suicide attempts were shown to be associated with family problems and relationship problems between couples.[6,20] Moreover, in the category of sex, males have been shown to commit most acts of suicide, mainly due to the financial crisis.[21–24] According to the literature,[16,21,22,25] there are age and sex differences concerning risk factors for suicide. Even though there are several recorded risk factors, the actual suicide crisis cannot be fully recorded.[25]

During the past few decades, unemployment, which has peaked in Greece, is a good a predictor of suicide in males, as is the active fear of unemployment.[26–28] Additionally, single women or women who have been diagnosed with a physical illness appear to be in a high-risk group for future suicide attempts.[26–28] Although a major depressive disorder is not in and of itself a suicide risk indicator, when factors such as age, race, sex, warning signs, and substance abuse are considered, it can be a strong suicide predictor.[25,29] The purpose of this study was to calculate the rate of suicide attempts in Chania, Crete, Greece, from 2008 to 2015 as they were recorded in the archives of the emergency outpatient unit of the General Hospital of Chania and investigate the relationship

Clinical Points

- The combination of seasonality and psychiatric illnesses must be taken under consideration as a contributor to suicidality.
- During the medical interview, staff must be persistent in pursuing factors that contributed to any suicide attempt.
- Risk factors for suicide should be seriously considered but not used as the only severity criteria.

between suicide attempts and factors such as unemployment, sex, reported stressors, and the suicide methods used.

The authors hypothesized that (1) there would be no correlation between suicide attempts and unemployment rates in Crete, (2) suicide attempts of psychotic syndrome patients would occur more often due to seasonality, and (3) seasonality would be related to male suicide attempts.

METHODS

The archives of the emergency outpatient unit from January 1, 2008, to December 31, 2015, were examined to identify cases of suicide attempts. Suicide attempts were registered by the medical staff on the basis of patient or family reports. An unstructured interview was given by the medical staff to patients and family to understand the risk factors and the context in which every incident had occurred. In this study, we isolated the number of incidents recorded as deliberate self-harm, commonly known as a parasuicide behavior. Deliberate self-harm includes intentional self-poisoning or self-injury (such as cutting); irrespective of the apparent purpose of the act, self-poisoning is the most common form of deliberate self-harm.[30] Furthermore, *deliberate self-harm* is defined as the intentional injuring of one's own body with no apparent suicidal intent.[31] We used the data published by the Hellenic Statistical Authority[17,32] concerning the unemployment rates in Crete to explore the correlation between unemployment and suicide attempts.

Statistical Analysis

Parameters are presented as mean ± SD for continuous variables and n (%) for frequencies. Bivariate comparisons were performed with the nonparametric Mann-Whitney *U* test for continuous variables and Pearson χ^2 or Fisher exact test (when less than 5 subjects were expected in a cell) for categorical variables (Monte-Carlo correction).

Multivariate generalized linear models with log link, Poisson distribution, and a robust variance estimator[33] were used to estimate relative risks (*RR*s) and 95% confidence intervals (CIs) for the associations between the number of suicide attempts and the adjustments. The set of variables selected for adjustment were sex, age group, stressors of suicide attempt, method of attempted suicide, history of suicide attempts, and Cretan unemployment rates.

All hypothesis testing was conducted assuming a .05 significance level and a 2-sided alternative hypothesis. Data analysis was performed with IBM SPSS version V22.0 software.

RESULTS

The search of the archives identified 436 recorded suicide attempts between 2008 and 2015, including 305 female suicide attempts (70%) and 131 male suicide attempts (30%). Recorded suicide attempts in Chania peaked in 2012 and remained relatively high until 2015 (Figure 1). Overall, an upward trend of suicide rates was observed between 2008 and 2015, reaching a peak in 2012 with 68 suicide attempts. A significant reduction was recorded in 2011, with a total of only 39 suicide attempts, 18 fewer attempts than the previous year (2010). As presented in Figure 1, male attempts seem to be relatively stable during the years 2008–2015 in comparison with those of females, whose distribution reached a peak in 2012 (49 attempts) and remained consistently higher in comparison to 2008. However, we were unable to record all suicide attempts due to the lack of data for 2009. One part of our sample (n = 69, 15.8%) contained people with ≥ 1 prior attempts (repeat attempters): 49 females and 20 males.

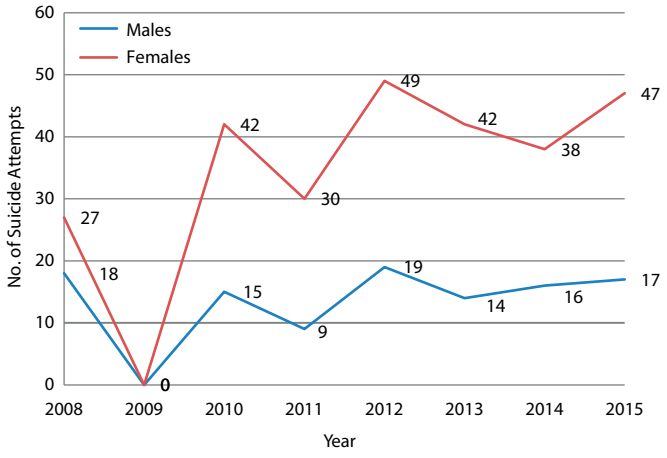
Moreover, the variable of age for suicide attempters was examined in 4 different age groups (< 23, 23–33, > 33–46, > 46 years) to further explore the differences between age and sex (Table 1). There was no significant age difference between males (36.7 ± 17.7) and females (36.7 ± 16.5). As shown in Table 1, suicide attempts reached a peak in the age group > 33–46 years for females at 27.5%. In addition, males reached a peak in the age group 23–33 years, with a percentage of 31.5%. There was no significant statistical difference in age distribution of suicide attempters between males and females ($P = .096$).

Analysis of Stressors of Suicide Attempts

Information about stressors for each suicide attempt was obtained from 395 individuals; 41 of them (9.5%) were unable to give all of the necessary clinical information due to poor communication caused by their physical condition at the time. The most common suicide stressor was family relationship problems (n = 89, 22.5%), followed by relationship problems in couples (n = 77, 19.4%), secondary benefit* (n = 43, 10.8%), economic problems (n = 37, 9.3%), and depression (n = 26, 6.5%). Other causes included psychotic syndrome, interpersonal problems, alcohol abuse, chronic physical illness, substance abuse, and unknown cause. Family problems and relationship problems in couples represented 39.4% of stressors in the recorded attempts. Furthermore, there were significant sex differences among suicide attempters ($P = .001$). Females reported family relationship problems and relationship problems between couples more often than males (Table 1), while males reported relationship problems between couples and secondary benefit more often than females. A χ^2 analysis revealed a significant difference between the

*Personal benefit that the individual seeks to achieve through suicide attempt.

Figure 1. Frequency of Suicide Attempts by Sex in Chania, Crete, Greece (2008–2015)[a]



[a]Data were missing for 2009 and were excluded from the analysis.

Table 1. Comparison by Sex for Age Groups, Stressors of Suicide Attempts, Suicide Method, History of Suicide Attempts, and Unemployment Rate

Variable	Male (n = 111)	Female (n = 284)	*P* Value
Age group, n (%)			.096*
< 23 y	26 (23.4)	65 (22.9)	
23–33 y	35 (31.5)	67 (23.6)	
> 33–46 y	18 (16.2)	78 (27.5)	
> 46 y	32 (28.8)	74 (26.1)	
Stressors of suicide attempts, n (%)			.004**
Secondary benefit	17 (15.3)	26 (9.2)	
Depression (history)	6 (5.4)	20 (7.0)	
Family relationship problems	14 (12.6)	75 (26.4)	
Couple relationship problems	19 (17.1)	58 (20.4)	
Economic problems	13 (11.7)	24 (8.5)	
Other causes	31 (27.9)	43 (15.1)	
Unknown causes	11 (9.9)	38 (13.4)	
Suicide attempt method, n (%)			< .001**
Poisoning by medication	51 (45.9)	243 (85.6)	
Sharp object	37 (33.3)	18 (6.3)	
Other	23 (20.7)	23 (8.1)	
History of suicide attempts, n (%)			.996
Yes	18 (16.2)	46 (16.2)	
No	93 (83.8)	238 (83.8)	
Total unemployment rate (mean ± SD)	19.86 ± 7.6	20.78 ± 7.0	.331
Cretan unemployment rate (mean ± SD)	17.65 ± 7.0	18.55 ± 6.4	.175

*Statistically significant differences at $P < .05$ based on Mann-Whitney *U* test for 2 independent samples and χ^2 of Pearson test or Fisher exact test with Monte-Carlo correction.
**$P < .10$.

stressors of each suicide attempt ($\chi^2_6 = 18.942$, $P = .004$). Additionally, no suicide attempt due to substance abuse was recorded for women.

Similarly, Mak et al[34] found that a significant stressor concerning family issues (41.5%) and issues between couples (65.4%) was associated with suicide attempts. Furthermore, Wu et al[35] found analogous results connecting a large proportion of attempters with stressors concerning family problems and relationship problems in couples. In our study, an equal proportion for males related to unemployment and financial problems was found, confirming the results of Wu and colleagues.[35] The results of the study by Overholser et al[36] showed that financial problems and unemployment stress were closely associated with interpersonal crises that led to depression or drug abuse and, in the end, to suicide.

Methods Employed in Suicide Attempts

To further explore the differences by statistical analysis, we created 3 categories with objective differences. The first and most common category was medication poisoning, followed by injury with a sharp object. Other methods were regrouped as "other suicide methods," and those included firearm injuries, attempted hangings, drowning, and a combination of methods. The most common suicide method was medication poisoning (males: n = 51, 45.9% and females: n = 243, 85.6%), with a total proportion of 74.4% for all attempts. There is a noticeable differentiation in suicide methods between males and females. On the one hand, females were shown to attempt suicide by medication poisoning more often than males. On the other hand, males were shown to injure themselves with sharp objects more often than females ($\chi^2_2 = 69.5$, $P \leq .001$). There also was a significant difference between methods of suicide ($\chi^2_6 = 18.9$, $P = .004$).

Unemployment Rate and Suicide Attempts

After excluding the attempts for 2009 due to the lack of data, the results remained essentially the same as the original analysis (data not shown). We used log-Poisson regression model analysis to explore if the unemployment rate (increase) provides a greater rate of suicide attempts. According to our research, the Cretan unemployment rate increased the risk of suicide attempts by 8% (adjusted *RR*: 1.08; 95% CI, 1.07–1.09; Table 2) after adjustments for age, sex, stressors of suicide attempts, suicide attempt methods, and history of suicide attempts.

Seasonality and Suicide Attempts

A total of 31 suicide attempts in Chania (20 women and 11 men), consisting of 48.3% of attempters with psychotic syndrome, were made during the spring. In addition, 25 of 64 violent suicide attempts occurred during the spring months.

Seasonality of suicide attempts is more prominent in men than in women, as witnessed by spring suicide attempts: males: 40.4% and females: 27.9%. Likewise, a high proportion of suicide attempts in Chania took place during the spring (29.6%) and summer (27.0%) periods.

DISCUSSION

Our first hypothesis that there would be no correlation between suicide attempts and unemployment rates in Crete was not confirmed, as we found that

Table 2. Poisson Regression Results With Frequency of Suicide Attempts as Dependent Variable

Variable	No. of Suicide Attempts		*P* Value
	RR	95% CI	
Age group			
< 23 y	Reference category		
23–33 y	1.01	0.88–1.15	.925
> 33–46 y	0.98	0.85–1.13	.791
> 46 y	1.02	0.89–1.18	.749
Sex			
Male	Reference category		
Female	1.01	0.90–1.13	.901
Stressors of suicide attempts			
Secondary benefit	Reference category		
Depression (history)	0.91	0.73–1.14	.397
Family relationship problems	0.96	0.81–1.13	.648
Couple relationship problems	0.97	0.81–1.15	.730
Economic problems	0.91	0.74–1.11	.341
Other causes	0.98	0.84–1.17	.888
Unknown causes	0.92	0.75–1.12	.411
Suicide attempt method			
Poisoning by medication	Reference category		
Sharp object	0.98	0.84, 1.14	.766
Other	1.03	0.88, 1.21	.741
History of suicide attempts			
No	Reference category		
Yes	0.99	0.87–1.13	.952
Cretan unemployment rate	1.08	1.07–1.09	< .001*

*Statistically significant differences at $P < .05$.

unemployment in Crete appears to be a relative risk factor in relation to attempts to commit suicide. Suicide attempts seem to correspond with unemployment rates in 8% of the cases for the years of our research.

Our second hypothesis that suicide attempts of psychotic syndrome patients would more often occur due to seasonality was confirmed. Researchers[37] have shown that, especially in the southern hemisphere, seasonality is closely associated with the triggering of mood disorders and the performance on depression qualitative measurement tests. Our results also agree with the research of Reutfors et al[38] in which it is shown that suicide attempts that take place in the spring are more often connected with psychiatric disorders, as well as with violent suicide methods. Christodoulou et al[39] claim that while suicidal behavior is connected with temperature increases in spring and early summer, this pattern also tends to be present more during times of economic decline as well. Also, the effects of exposure to the sun have been shown to be associated with violent suicides by men, in contrast to exposure to rainfall and humidity. According to the literature,[40] the rise of daily temperature is associated with a depressive mood.

Our third hypothesis that seasonality would be related to male suicide attempts was also confirmed. Despite that suicides and suicide attempts have been shown to be related to seasonal variation,[41,42] according to Ajdacic-Gross et al,[43] these results are under debate due to the effect of diminishing sizes.

In accord with the published literature, our findings reveal a higher occurrence of females attempting suicide: males:females = 1:2.55. The research carried out by Fountoulakis et al,[6] which took place in Thessaloniki, Greece, between 2000 and 2012, found an increased occurrence of suicide attempts among females: males:females = 1:2.42. The most common suicide attempt method was medication poisoning (94.25%), with 919 suicide attempts. Similar results were found by Parra Uribe et al[44] in Spain. In their research, the suicide attempt ratio of males to females was 1:1.64, and the most common method of suicide attempt was medication poisoning (314 suicide attempts, 84.4%). A higher ratio was also found in Poland by Tsirigotis et al[45]; the ratio of male to female suicide attempters was 1:3.45. In research conducted in Taiwan by Wu et al,[35] the male to female suicide attempt ratio was 1:3.15. In 2 other research articles,[35,45] the most common suicide attempt method was medication poisoning, with 42.3% of 143 and 76.1% of 357 suicide attempt cases, respectively. In conclusion, medication poisoning seems to be the most common suicide method.[6]

Female predominance in suicide attempts is known as the "gender paradox." Women are twice as likely as men to experience major depressive disorder, which is widely associated with suicide attempts.[45] Females appear to present with physical and mental illnesses more often in comparison with males[6] and are more likely to ask for professional help than males.[21] In our research, the depression ratio of male to female suicide attempters was 1:3.33. Additionally, males usually consider the need for help a weakness that is socially constructed to be more feminine, so they avoid asking for it. Moreover, the economic crisis has been connected with a reduction in the availability of professional help, probably because of financial vulnerability,[45–47] especially as overall government expenditure on health care in Greece has decreased by 66%[48] during the period of crisis.

Even though we approached each patient in clinical practice from a phenomenologic perspective, we regrouped stressors for statistical analysis in 10 different groups along with the unknown stressor category. A large proportion (40.2%) of the reported stressors of suicide attempts were found within the context of family problems and relationship problems between couples. Despite the fact that the economic unbalance is well established in Greece, the economic stressors in suicide attempts were relatively low (9.3%), as was reported by the suicide attempters in their interview with the medical staff.

A result of the economic adjustment of the new financial doctrine was a 26% cutback in the expenses of public hospitals from the beginning of the economic crisis until 2011.[16] Despite the severe financial reductions in the public health sector, evidence shows that the measure was not refined enough and was merely intended to be part of a quick fiscal adjustment.[49] In this era of high recession and increasing unemployment rates, which are closely connected with a rise in mental disorders and suicide,[50] cuts in the health sector should not be implemented. Health care staff, psychiatrists, psychologists, and social workers should continue to be employed in a sufficient number to deal with the increase in mental health issues. In addition, health care staff should be well aware of recognizable risk factors that

exist among suicide attempters.[26] Greece has been facing a significant increase in suicide rates since 2009, which would have been deemed a highly unlikely occurrence on the basis of preceding years when the rates of suicide were some of the lowest in the world. Suicide rates in Greece increased by 40%, and suicide attempt rates increased accordingly. It is notable that the majority of suicide attempts are mostly linked with mood disorders during the same time.[51,52] Thus, organized action must be carried out to address the results of this financial phenomenon that recently has been experienced in many countries.

Limitations

Some limitations were observed while the study was being conducted. This research was a retrospective study with the relevant restrictions of the data included. The lack of registration data from 2009 was another limitation. Also, the interview given by medical staff to patients was not "constructed" and did not provide us with complete information about unemployment status or marital status, which are widely associated with suicide attempts. An actual recording of the unemployment rates in the area of Chania could not be obtained, and the overall unemployment data from the area of Crete was used instead. There also were some missing variables due to the physical state of some of the attempters, leading to poor communication between patients and medical staff. It was not possible to complete the missing variables in another time period due to the workload of the psychiatric clinic.

Future Research

Overall, we suggest that future research should include a structured interview or suicide attempt protocol with a greater range that incorporates variables that may affect the occurrence of suicide attempts. Ideally, such variables would initially be the collection of a family history, the examination of the patient's psychopathology, history of prior suicide attempts, and, possibly, employment status, along with the apparent fear of unemployment and drop in social status.

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