



A 16-Year Retrospective Study Examining Socio-Demographic Factors among Suicide Decedents in Bolu Province, Northwestern Turkey

Taskin Ozdes^{a*}, Zerrin Erkol^b, Erdem Hosukler^c, Tolga Turan^d, Veyis Gundogdu^e, Emel Kurtoglu Ozdes^f

^aDepartment of Forensic Medicine, Kırklareli University, Faculty of Medicine, Kırklareli, Turkey

^{b,c,d}Department of Forensic Medicine, Abant İzzet Baysal University, Faculty of Medicine, Bolu, Turkey

^eMinistry of Justice, Aydın Branch of the Council of Forensic Medicine, Aydın, Turkey

^fDepartment of Nursing, Istanbul Galata University, Faculty of Health Sciences, Istanbul, Turkey

^aEmail: tozdes@gmail.com, ^bEmail: zerrinerkol@gmail.com, ^cEmail: erdemhsklr@hotmail.com

^dEmail: tolga.turan.91@gmail.com, ^eEmail: v.gundogdu.1012@gmail.com, ^fEmail: ekurtoglu0022@gmail.com

Abstract

This study aimed to examine the socio-demographic features of completed suicides in Bolu province, northwestern Turkey, between 2003 and 2019, using corpse examinations and autopsy reports to provide epidemiological data with a view to helping prevent suicidal behavior. Of the 108 suicides examined, males accounted for 84.3%, and females accounted for 15.7%. The suicide rate was the highest in the 25–34 age groups and among those of an unknown marital status. Suicide in an unknown location in the group aged 24 years and below was significantly higher than among age groups, while the workplace was significantly higher in those aged 35–64 years. In both genders, the home and its surroundings comprised the leading location of the suicide event, with an unknown location found to be significantly higher in males. The most common suicide method was identified as hanging, with no statistically significant difference between demographic groups with respect to method, and the highest suicide rate was observed in 2016–2019. With regard to time of year, winter was found to be significantly higher among those aged 24–34 years, whereas those aged 65 years and above were likelier to die in spring or summer ($p=0.014$).

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* Corresponding author.

Several risk factors were identified, most of which could be detected and resolved before the suicidal act. Studies such as this are extremely valuable for their contribution to preventing suicide by identifying such risk factors.

Keywords: suicide; completed suicide; forensic autopsy; demographic factors; suicide methods; Turkey.

1. Introduction

Suicide is a major global public health concern and causes more deaths than war and the most common cancers. Although suicide is one of the leading causes of preventable deaths, on average, 800,000 people die by suicide each year [1].

The definition of suicide has been controversial in the literature, with “suicidal tendency,” “suicidal attempt,” and “completed suicide” being suggested when using suicide-related terminology in studies, particularly those examining suicide rates and related factors [2]. Several factors are known to cause a person to commit suicide. These can be categorized as individual factors (mental illness, substance addiction, genetic propensity, etc.), relational factors (family problems, natural disasters, migration, wars, etc.), and societal factors (religious and cultural differences, easy access to suicide means, inability to access health care, etc.), and it is rare for suicide to have a single cause [3].

The distribution of suicide rates shows differences between countries and by age, gender, method, and completion [1]. Medical and legal concerns and the diagnostic, reporting, and recording processes of suicide also have a major influence on suicide rates [4]. The World Health Organization, which evaluates and reports suicide rates by gender, age, and the low-, moderate-, or high-income status of each country, reports a low rate of completed suicide in Turkey [1].

Turkey is a country in the upper-middle income group and is located between East and West in terms of its social, economic, psychological, cultural, and historical features. It also displays features of both developed and developing countries [1]. It is important to monitor the suicide rate trends and analyze the data for Turkey closely to predict specific tendencies regarding suicide within regions and to contribute to both national and international suicide epidemiology [5]. All potential suicide cases are treated as judicial cases in Turkey; if the prosecutor considers it necessary, a case can be referred for forensic medical analysis, with an autopsy and forensic investigation performed to determine whether the death occurred as a result of suicide [6,7]. Consequently, Turkey has very reliable national suicide death records. However, while the Turkish Statistical Institute (TUIK) stated that 3476 people (male: 2684; female: 792) completed suicide in 2019, with a crude suicide rate of 4.21 per 100,000 (TUIK 2-2), according to the World Health Organization’s publication *Suicide Worldwide in 2019*, 2003 people (male: 1486; female: 517) completed suicide in Turkey, a crude suicide rate of 2.4 per 100,000. It has not been possible to explain the difference between these figures because the databases used by the World Health Organization could not be accessed [1,4]. Although both figures indicate that the completed suicide rate is low, it has been gradually increasing in recent years (at a rate of 1 per 100,000 per decade) [4,5]. Moreover, the method of suicide can also change over time and should be closely monitored [9].

Every study investigating at-risk groups and connecting such groups with the socio-demographic characteristics of the population will contribute to preventing suicide and lowering the suicide rate.

This study aimed to examine the socio-demographic features of completed suicides in Bolu province, northwestern Turkey, between 2003 and 2019 using corpse examinations and autopsy reports for epidemiological data in order to help prevent suicidal behavior.

2. Methods

We examined forensic reports of corpse examinations and autopsy reports of deaths that took place in Bolu province between January 1, 2003, and December 31, 2019; 108 cases of completed suicides were included.

Our statistical evaluation used the place of death, whether an autopsy was conducted, and psychological background as parameters while taking into consideration the age, sex, marital status, location and manner of death, and whether the person was hospitalized.

Ethical permission was obtained from the Ethics Committee of Bolu Abant İzzet Baysal University, Faculty of Medicine, to carry out the study.

The data were analyzed using IBM SPSS Statistics 17.0 (IBM Corporation, Armonk, NY, USA). We employed Kolmogorov-Smirnov and Levene tests to assess, respectively, whether the continuous variables had a near-normal distribution and whether the assumption of the homogeneity of variances was met. The descriptive statistics for the continuous variables are reported in average \pm standard deviation format, while the categorical variables are displayed with case numbers and percentages. The significance of the difference between the groups in terms of mean age was examined using the Kruskal–Wallis test. Where the Kruskal–Wallis test results indicated significance, the Dunn–Bonferroni test was used to identify the group(s) causing the difference. In cases where at least one categorical variable in a row or a column had multiple values, that is, if at least one-quarter of the cells in the RxC cross table had an expected frequency of less than 5, then that categorical variable was examined via the likelihood ratio test; otherwise, we utilized Pearson's χ^2 test. In the 2x2 cross tables where sub-analyses were performed, if the expected frequency in at least one-quarter of the cells was below 5, the categorical data was evaluated by Fisher's exact test, while the continuity-corrected χ^2 test was used in cases where the expected frequency was between 5 and 25. Otherwise, we employed Pearson's χ^2 test. The results are considered statistically significant at $p < 0.05$.

3. Results

Of the 108 suicides recorded during the study period, 91 (84.3%) involved males, and 17 (15.7%) involved females.

The suicide rate was the highest in the 25–34 age group and in the victims with an unknown marital status (42.6%). Most of the suicidal decedents did not have a diagnosed psychiatric disease. The demographic features of the cases are shown in Table 1.

Table 1: Demographic features of cases.

	n=108
Age (years)	41.3±20.9
<i>Age interval (years)</i>	13–93
Age groups	
<i>14 and below</i>	1 (0.9%)
<i>15–24</i>	26 (24.1%)
<i>25–34</i>	29 (26.9%)
<i>35–44</i>	14 (12.9%)
<i>45–54</i>	12 (11.1%)
<i>55–64</i>	6 (5.6%)
<i>65 and above</i>	20 (18.5%)
Gender	
<i>Male</i>	91 (84.3%)
<i>Female</i>	17 (15.7%)
Marital status	
<i>Married</i>	36 (33.3%)
<i>Single</i>	20 (18.5%)
<i>Widow</i>	6 (5.6%)
<i>Unknown</i>	46 (42.6%)
Diagnosed psychiatric disease	
<i>Yes</i>	37 (34.3%)
<i>No</i>	71 (65.7%)

When we compared the findings, the home and surroundings comprised the most common location for the act (58.3%), hanging was the leading suicide method (49%), fall was the most common season (29.6%), and highest suicide rate was observed between 2016 and 2019 (Table 2).

Table 2: Features of completed suicides.

	n=108
Location of event	
<i>Home and surroundings</i>	63 (58.3%)
<i>Workplace</i>	8 (7.5%)
<i>Street</i>	5 (4.6%)
<i>Prison</i>	5 (4.6%)
<i>Other</i>	12 (11.1%)
<i>Unknown</i>	15 (13.9%)
Method of suicide	
<i>Firearms</i>	30 (27.8%)
<i>Hanging</i>	53 (49.0%)
<i>Drugs or chemical substances</i>	10 (9.3%)
<i>Jumping from a height</i>	10 (9.3%)
<i>Use of sharp objects</i>	5 (4.6%)
Years	
<i>2010 and before</i>	37 (34.3%)
<i>2011–2015</i>	33 (30.5%)
<i>2016–2019</i>	38 (35.2%)
Seasons	
<i>Spring</i>	30 (27.8%)
<i>Summer</i>	27 (25.0%)
<i>Fall</i>	32 (29.6%)
<i>Winter</i>	19 (17.6%)

There was a statistically significant difference between the age groups in terms of the location ($p < 0.05$). The use

of an “unknown” location for the act was significantly higher for the group aged 24 years and below than for other age groups, while the workplace was significantly higher in those aged 35–64 years. For both genders, the home and surroundings comprised the leading location, although the use of an unknown location was found to be significantly higher in males ($p < 0.05$). There was no statistically significant difference in location with respect to marital status. When the subjects’ psychiatric backgrounds were evaluated, the home and surroundings had a significantly higher rate for all victims than other locations, but the score for an unknown location was significantly higher for those with no diagnosed psychiatric disease ($p < 0.05$) (Table 3).

Table 3: Demographic features of cases with respect to location.

	Home & surroundings	Workplace	Street	Prison	Other	Unknown	P-value
Age (years)	43.2±21.3	41.9±11.4	49.4±31.9	36.0±10.6	35.0±16.9	36.9±24.7	0.364†
Age group							0.032‡
<i>24 and below</i>	13 (20.6%)	0 (0.0%)	2 (40.0%)	0 (0.0%)	5 (41.7%)	7 (46.7%) ^A	
<i>25–34</i>	17 (27.0%)	3 (37.5%)	0 (0.0%)	3 (60.0%)	3 (25.0%)	3 (20.0%)	
<i>35–64</i>	20 (31.8%)	5 (62.5%) ^A	1 (20.0%)	2 (40.0%)	2 (16.7%)	2 (13.3%) ^A	
<i>65 and above</i>	13 (20.6%)	0 (0.0%)	2 (40.0%)	0 (0.0%)	2 (16.7%)	3 (20.0%)	
Gender							0.003‡
<i>Male</i>	47 (74.6%) ^B	8 (100.0%)	4 (80.0%)	5 (100.0%)	12 (100.0%)	15 (100.0%) ^B	
<i>Female</i>	16 (25.4%) ^B	0 (0.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%) ^B	
Marital Status							0.071‡
<i>Married</i>	23 (36.5%)	5 (62.5%)	2 (40.0%)	0 (0.0%)	3 (25.0%)	3 (20.0%)	
<i>Single</i>	15 (23.8%)	0 (0.0%)	1 (20.0%)	0 (0.0%)	1 (8.3%)	3 (20.0%)	
<i>Widow</i>	5 (7.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (8.3%)	0 (0.0%)	
<i>Unknown</i>	20 (31.8%)	3 (37.5%)	2 (40.0%)	5 (100.0%)	7 (58.3%)	9 (60.0%)	
Diagnosed psychiatric disease							0.010‡
<i>Yes</i>	23 (36.5%) ^B	4 (50.0%) ^A	3 (60.0%) ^C	4 (80.0%) ^{D,E}	2 (16.7%) ^D	1 (6.7%) ^{A,B,C,E}	
<i>No</i>	40 (63.5%) ^B	4 (50.0%) ^A	2 (40.0%) ^C	1 (20.0%) ^{D,E}	10 (83.3%) ^D	14 (93.3%) ^{A,B,C,E}	

Note: † Kruskal–Wallis test; ‡ Likelihood ratio test; ^A Difference between workplace and unknown location is statistically significant ($p < 0.05$); ^B Difference between the home and surroundings and unknown location is statistically significant ($p < 0.05$); ^C Difference between the street and unknown location is statistically significant ($p = 0.032$); ^D Difference between prison and other location is statistically significant ($p = 0.028$); ^E Difference between prison and unknown location is statistically significant ($p = 0.005$).

The most common suicide method was identified as hanging. There was no statistically significant difference between the demographic groups with respect to method (Table 4).

Table 4: Demographic features with respect to method.

	Firearms	Hanging	Chemicals	Jumping from height	Sharp objects	p-value
Age groups						0.291‡
<i>24 and below</i>	9 (30.0%)	14 (26.4%)	1 (10.0%)	3 (30.0%)	0 (0.0%)	
<i>25–34</i>	10 (33.3%)	15 (28.3%)	2 (20.0%)	1 (10.0%)	1 (20.0%)	
<i>35–64</i>	7 (23.3%)	12 (22.6%)	6 (60.0%)	5 (50.0%)	2 (40.0%)	
<i>65 and above</i>	4 (13.3%)	12 (22.6%)	1 (10.0%)	1 (10.0%)	2 (40.0%)	
Gender						0.070‡
<i>Male</i>	28 (93.3%)	45 (84.9%)	7 (70.0%)	6 (60.0%)	5 (100.0%)	
<i>Female</i>	2 (6.7%)	8 (15.1%)	3 (30.0%)	4 (40.0%)	0 (0.0%)	
Marital status						0.506‡
<i>Married</i>	7 (23.3%)	21 (39.6%)	5 (50.0%)	3 (30.0%)	0 (0.0%)	
<i>Single</i>	7 (23.3%)	8 (15.1%)	1 (10.0%)	3 (30.0%)	1 (20.0%)	
<i>Widow</i>	2 (6.7%)	2 (3.8%)	1 (10.0%)	0 (0.0%)	1 (20.0%)	
<i>Unknown</i>	14 (46.7%)	22 (41.5%)	3 (30.0%)	4 (40.0%)	3 (60.0%)	
Diagnosed psychiatric disease						0.281‡
<i>Yes</i>	8 (26.7%)	16 (30.2%)	6 (60.0%)	5 (50.0%)	2 (40.0%)	
<i>No</i>	22 (73.3%)	37 (69.8%)	4 (40.0%)	5 (50.0%)	3 (60.0%)	

† Kruskal–Wallis test, ‡ Likelihood ratio test.

When we compared the demographic characteristics with respect to the time period, no significant difference was detected, although the highest suicide rate was observed between 2016 and 2019 (Table 5).

Table 5: Demographic features with respect to period.

	2010 and before	2011–2015	2016–2019	p-value
Age (years)	41.6±21.5	38.7±15.6	43.2±24.4	0.990†
Age groups				0.346‡
<i>24 and below</i>	10 (27.0%)	6 (18.2%)	11 (28.9%)	
<i>25–34</i>	11 (29.8%)	10 (30.3%)	8 (21.1%)	
<i>35–64</i>	8 (21.6%)	14 (42.4%)	10 (26.3%)	
<i>65 and above</i>	8 (21.6%)	3 (9.1%)	9 (23.7%)	
Gender				0.148‡
<i>Male</i>	28 (75.7%)	28 (84.8%)	35 (92.1%)	
<i>Female</i>	9 (24.3%)	5 (15.2%)	3 (7.9%)	
Marital status				0.191¶
<i>Married</i>	16 (43.2%)	9 (27.3%)	11 (28.9%)	
<i>Single</i>	5 (13.6%)	6 (18.2%)	9 (23.7%)	
<i>Widow</i>	0 (0.0%)	4 (12.1%)	2 (5.3%)	
<i>Unknown</i>	16 (43.2%)	14 (42.4%)	16 (42.1%)	
Diagnosed psychiatric disease				0.566‡
<i>Yes</i>	15 (40.5%)	11 (33.3%)	11 (28.9%)	
<i>No</i>	22 (59.5%)	22 (66.7%)	27 (71.1%)	

With regard to time of year, winter was found to be significantly higher in the 24–34 age group than other seasons, whereas suicides in those aged 65 years and above were found to occur significantly higher in spring or

summer (p=0.014). In addition, the suicide rate for those who were married was significantly higher for both genders in the spring (p=0.051) (Table 6).

Table 6: Demographic features with respect to season.

	Spring	Summer	Fall	Winter	p-value
Age (years)	45.5±23.4 ^A	49.3±23.5 ^{B,C}	34.2±14.4 ^{A,B}	35.2±17.4 ^C	0.037†
Age groups					0.014‡
<i>24 and below</i>	8 (26.7%)	5 (18.5%)	10 (31.3%)	4 (21.1%)	
<i>25–34</i>	8 (26.7%)	3 (11.2%) ^C	9 (28.1%)	9 (47.3%) ^C	
<i>35–64</i>	5 (16.7%)	10 (37.0%)	12 (37.5%)	5 (26.3%)	
<i>65 and above</i>	9 (30.0%) ^A	9 (33.3%) ^{B,C}	1 (3.1%) ^{A,B}	1 (5.3%) ^C	
Gender					0.175¶
<i>Male</i>	26 (86.7%)	19 (70.4%)	29 (90.6%)	17 (89.5%)	
<i>Female</i>	4 (13.3%)	8 (29.6%)	3 (9.4%)	2 (10.5%)	
Marital Status					0.051¶
<i>Married</i>	13 (43.3%) ^D	11 (40.7%)	10 (31.3%)	2 (10.5%) ^D	
<i>Single</i>	6 (20.0%)	3 (11.2%)	9 (28.1%)	2 (10.5%)	
<i>Widow</i>	0 (0.0%)	1 (3.7%)	2 (6.2%)	3 (15.8%)	
<i>Unknown</i>	11 (36.7%)	12 (44.4%)	11 (34.4%)	12 (63.2%)	
Diagnosed psychiatric disease					0.859‡
<i>Yes</i>	11 (36.7%)	10 (37.0%)	9 (28.1%)	7 (36.8%)	
<i>No</i>	19 (63.3%)	17 (63.0%)	23 (71.9%)	12 (63.2%)	

4. Discussion

Suicide is one of the leading causes of death and a serious global health issue. Therefore, it is crucial that risk factors be identified to help prevent it.

The World Health Organization collects and presents data for age-standardized suicide rates and crude suicide rates for countries [1]. According to the data, rates for completed suicide are lower in Turkey than in Western countries and higher in males than in females, similar to countries where Muslims predominantly live. However, the rate has been gradually increasing in recent years and seems to be a major concern [10, 12]. Since Turkey is located between the West and East in terms of its social, economic, religious, and cultural features and is in the upper-middle income group, it is useful to closely monitor its suicide rates and trends in order to contribute not only to national but also international suicide epidemiology [5]. In Turkey, the TUIK has been collecting suicide data since 1974 in relation to gender, age, marital status, occupation, and education level, location and time, dependents, and motives via forms completed by gendarmerie and security officers. In Turkey, the highest suicide rate was in the Aegean Sea Region in 2019, followed by the Eastern Anatolia Region [13]. However, suicide rates in Eastern and Northern Turkey have been slowly increasing. According to the TUIK, 13 suicides (male, 10; female: 3) occurred in Bolu province, northwestern Turkey, and the rates seem to be lower than many other locations not only in 2019 but also in the preceding years [8].

The finding from this study that the suicide rate for males is higher than for females is in line with the literature (Table 1). Several studies have reported that men have a higher risk of suicide than females [4,13,14,17]. However, attempted suicides have been found to be higher among women (1). Gender differences related to

suicide have not been explained, but the high rate of suicide, particularly completed suicide, may be related to alcohol abuse, the use of lethal methods, and a higher propensity for violence [13]. Interestingly, the crude completed suicide rate for young women (<30 years old) is higher than for males in cities in which the equality index is low [18].

In the study period, suicides were most frequently observed in the 25–34 (n=29, 26.9%) age group of both genders, followed by the 15–24 (n=26, 24.1%) and the 65 years and above (n=20, 18.5%) age groups (Table 1). Because the study group was small in number, we were unable to determine the distribution of the most frequent ages for males and females separately. However, previous studies have reported conflicting results. For instance, Goceoglu and colleagues [16] reported that suicides are more common in the 20–44 age range, whereas Kartal and colleagues [17] reported that suicides were most common in men younger than 24 and in females older than 65, whereas Yildiz and colleagues [14] identified the 18–40 age group as having the highest suicide rate, with no statistically significant difference between male and female rates in the distribution based on age. Another study identified people aged 75 and older as having the highest suicide rate, possibly due to issues related to physical and mental problems, with the rate for females being significantly higher than that for males in the 15–24 age group; domestic problems, disease, and several issues specific to the young were considered to be possible underlying causes [13]. By contrast, Goktas and colleagues [6] reported that suicides were most frequent in the 25–44 age group in males and the 15–24 age group in females.

Marital status has also been found to have a distinctive effect on suicide rates in the literature. The suicide rate was reported to be high among the divorced, widowed, and those who are single/unable to marry, with a higher rate among men than women [4, 13, 19].; this may be related to men's social isolation and lower social adaptively [20]. By contrast, Goceoglu and colleagues [16] reported that married people have a high risk regardless of gender. In line with that study, we found higher suicide rates in married people when compared to the single/divorced individuals. In the study group, those of an unknown marital status had the highest rate of suicide (Table 1).

Individual and familial factors, such as psychiatric/mental disorders, living alone, unemployment, financial problems, relational problems, and a lack of social support, have been assumed to be the most common reasons for suicide [1,14,16,21,24]. These factors had different distributions with respect to gender, age, and geographic region. For instance, illness was the most common reason for suicide in elderly people of both genders, but marital conflict was the second most common reason among women, whereas financial difficulties was the second most common reason among men [25]. In Eastern Turkey, family problems were identified as the leading cause of suicide in young women, whereas psychiatric problems were the main cause among men [23,26]. The relationship between psychiatric/mental illness and suicide has been identified so frequently in previous studies that in-depth social studies on the causes of suicide and the application of effective psychological autopsy methods in completed suicides are definitely required [15, 27]. For instance, family and social support have been reported to reduce the risk of suicide, although Khan and colleagues [28] found that half of the victims in their study lived with their family. It is therefore important to evaluate in detail the significance of important life events, such as domestic triggers, relationship problems, and abuse [15]. The rate of urbanization, which affects internal and external migration arising from social, cultural, geographical, and

political factors, has also been shown to be strongly connected to the underlying causes of suicide [13].

Attention needs to be given to the role of unknown causes in completed suicides. Taktak [22] reported that unknown causes accounted for 46.76% of completed suicides between 2004 and 2019 in Turkey. In the present study, the data were collected using autopsy and forensic corpse examination reports, with the result that the identification of the causes was restricted. Only diagnosed psychiatric disease was included in the demographic features; the number of those with psychiatric disorders was significantly higher than those without (Table 1). However, there is no recorded information regarding other causes, such as illness, family issues, economic problems, business failure, emotional relations, or educational failure, which are stated in the TUIK data.

In the present study, the home and surroundings comprised the most common location for the suicidal act (Table 3). However, an unknown location was significantly higher for the age group 24 and below when compared to other age groups, while the workplace was significantly higher for those aged 35–64. Our findings were in line with previous studies from various cities in Turkey, which have reported the home and its surroundings as the most common location of suicide [13,14,29].

In this study, hanging was the most common method of suicide in both genders (Table 4), in line with the literature [4,13,17,24]. Nevertheless, we did not find a significant difference with respect to gender, age group, or marital status, as the size of the study group was small. In one of the largest studies, by Taktak and colleagues [22] hanging was the leading method, and the crude rate for suicide by hanging was higher among males than females, although there was a two-fold increase among females and an approximate six-fold increase among males over 33 years in Istanbul, the largest province of Turkey. After hanging, poisoning with chemicals in females and firearms were significantly more common methods among females [4,6,14,24]. The distribution of method among age groups has also been studied and trends identified. Yildiz and colleagues [14] reported a significant difference in the distribution of firearm use by age, with more than half of cases accounted for by those aged 18–40 years. In another study, elderly people (65 years and above) of both genders were found to prefer hanging as the most common suicide method, followed by firearms [30]. For males, an increase was noted across all ages in jumping from a height and, particularly in males 65 and over, in the use of firearms. In addition, the use of firearms among females was shown to have increased among those under 15 years and those aged 25–44 [6].

It is obvious that the rate of suicide has been increasing across all ages and genders, both in Turkey and globally. It is possible that major psychological/social/economic events could account for some trends in the data. Therefore, in the present study, we examined the distribution of features in three separate time periods to account for major crisis events in Turkey and in Bolu province. The period prior to 2010 represented Turkey's middle-upper economic welfare period, 2011–2015 included the peak of the economic crisis, and 2016–2019 included strike (coup attempt). Although we did not find a significant difference between the intervals with respect to the features of suicidal events, most probably owing to the high socioeconomic development level and a lack of extreme variations in the population or local personality traits, studies from other provinces, such as Denizli, have reported substantial increases in cases in 2009–2010 due to unemployment (Table 5) [8]. Strike also had a huge negative effect on the psychological/social/economic lives of the population (particularly

conservative Muslims) and on internal migration in Turkey; familial support and religious and cultural beliefs may have prevented an increase in suicide rates.

On the other hand, studies have shown that suicide rates in both hemispheres reach their peak in spring and summer and their low point in winter [17,26,31]. Although it has been claimed that suicides do not differ according to gender in terms of season [32], Taktak [22] reported a higher seasonal effect for females than males. In this study, we found a significantly higher suicide rate in the 25–34 age group in winter, while the rate among those aged 65 years and above was significantly higher in the spring and summer. In addition, a significantly higher rate was found for married victims in spring (Table 6).

It is also worth noting that for countries where Muslims predominantly reside, the month of Ramadan has a substantial effect on suicide rates, with a clear decline noticeable. The 33-year retrospective study by Taktak and colleagues [33] indicated that there was a statistically significant lower incidence of suicides during Ramadan, probably reflecting a positive spiritual influence of this period on Muslims.

5. Strengths and Limitations

The major limitation of the study is the number of suicide cases—108 between 2003 and 2019—most probably due to the socio-demographic status of Bolu province. Nevertheless, we reported several statistically significant relationships. Another limitation was the lack of detail regarding possible causes due to relatives' responses and technical problems.

This study has implication for future research. The data include extensive information in terms of the population over a 16-year evaluation period and contain adequate criteria to contribute to the epidemiology of completed suicides. We strongly hope that future studies will clarify the issues that remain to be elucidated.

6. Conclusion

Suicide is a growing global public health problem. Several risk factors have been identified, most of which can be detected and resolved before the suicidal act.

Therefore, studies on the predictive factors and social/psychological/economic features of suicide are extremely valuable to help prevent suicide. However, the prevention and treatment of suicidal behavior require not only extensive work by security and health officials but also the education of every individual; comprehensive cooperation between patients, families, relatives, and community, health, and non-health professionals; and integrative management, including medical, psychological, traditional, emotional/mental, and behavioral therapies.

7. Conflict of interest

The authors have no conflicts of interest to declare.

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