

Epidemiological Features of Suicides in Osijek County, Croatia, from 1986 to 2000

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ABSTRACT

Suicide is a devastating tragedy associated with social, cultural and psychological factors. It takes approximately 1,060 lives in the Republic of Croatia each year. We retrospectively reviewed all cases referred to in the Registrar office and Police Department at Osijek County from 1986 to 2000. The cases of suicide totaled 1,017. All of the cases were analyzed as to age, gender, marital status, occupation, place and time of suicide and method of suicide. The suicide rate for the entire population of the County averaged 20.5/100,000 inhabitants per annum. The age of the suicides ranged from 15 to 92. The male to female ratio was 2.1:1. The highest suicide incidence was among the age groups from 55 to 64 (19.27%), followed by age group from 45 to 54 (16.12 %). The lowest suicide incidence was among the age group <19 (3.4%). The incidence in the group 85> years was also low (2.06%). The suicide was frequent among people who live alone: single, widowed, divorced (47.29%). Eighty percent of victims were found in surroundings familiar to them. These included various premises of their residences. The retired, the laborers and the unemployed (67.36%) were predominant among suicide victims. The most common methods of suicide were hanging (43%), followed by firearms (24%). No correlation was found with the day of the week or the month of the year. The study showed a slightly increased rate of suicide, from 21 cases at the beginning of the investigation (in 1986) to 22.3/100,000 population fifteen years later (in 2000).

Key words: *suicide, epidemiology, forensic pathology, psychiatry.*

Introduction

Suicide patterns and rates differ in various populations and cultures. The incidence of suicides varies with European areas. Suicide rates are permanently higher in Eastern and Northern Europe than in the Mediterranean area. Lithuania, Latvia, Russian Federation, Estonia, Hungary and Belarus are countries with the highest risk. Albania, Greece, Malta and Italy are among low-risk countries in Europe^{1–6} (Table 1).

It is a well-known fact that former Yugoslav republic differed significantly in suicide rate. The highest rate was in Slovenia, followed by the province of Vojvodina, and then Croatia. The lowest rate was in the province of Kosovo, in Macedonia, Montenegro and Bosnia-Herzegovina⁷ (Table 2).

In the Republic of Croatia there have been on the average 1060 suicides per year in the last fifteen years (1986–2000).

Croatian regions also differed in the suicide rate. The higher incidence was recorded in the north and then in the south of the country (the city of Zagreb 22, Osijek County 21, Split County 18, Istria 13 per 100,000 residents⁸).

It has been noticed that the developing countries have a lower suicide rate, possibly because of a lower level of environmental stress factor⁹.

In traditional societies threats to personal identity cluster around marriage, childbirth and initiation into adulthood, with the risk of suicide peaking at a relatively young age and declining thereafter. In modern industrial countries, in contrast, where achievement-oriented psychological careers prevail, events that may undermine the self-concept typically appear at later stages of the life-course and thus the likelihood of suicide generally rises with age⁶.

An important trend in a number of industrialized countries over the last several decades has been a sharp increase in the risk of suicide among the young people. It seems that economic deprivation and the breakdown of the traditional family structures are generally thought to be the most important factors^{10–12}.

In contrast to the upward trend in young suicides, old people also become more prone to suicide in some countries like Italy, Hungary, Germany and Japan^{4,6,13,14}. The increase of the old generation in populations with many social and health problems associated with the elderly could be a risk factor leading to a rise of suicide rate among them.

In wartime suicide rates were usually in decrease because of the possibility of expressing aggression in a socially desirable way, but in the post-war period many real and perceived stress factors could be a reason of the rise of the suicide rate⁷.

A study was undertaken to determine whether there is any association between combat trauma and risk of post-service suicide among Vietnam veterans. The results revealed an increasing risk of suicide with increased occurrence of combat trauma, the highest relative risk being observed for those veterans who were wounded more than once and hospitalized for a wound. In comparison with the US male general population, the veterans hospitalized because of a combat wound or because they were wounded more than once had a significantly increased risk of suicide¹⁵.

The religion, among other socio-cultural factors, can also influence the suicide pattern. In Buddhism there are no strong sanctions against suicides. Conversely, the Catholics and the Islamists strongly forbid suicide¹⁶. In Eastern societies the individuals that felt they had brought shame upon themselves or their

TABLE 1
 SUICIDE RATE PER 100,000 INHABITANTS IN EUROPEAN COUNTRIES

Country	Year	Males	Females
Europe	average	30.0	8.2
Eastern Europe	average	38.8	9.4
Belarus	1995	55.7	9.4
Bulgaria	1994	25.3	9.7
Czech Republic	1993	28.1	9.5
Hungary	1994	55.5	16.8
Poland	1994	24.7	4.5
Republic of Moldova	1994	29.5	7.6
Romania	1992	18.5	4.9
Russian Federation	1994	74.1	13.3
Ukraine	1992	38.2	9.2
Northern Europe	average	36.7	9.1
Denmark	1995	24.1	11.3
Estonia	1996	64.6	14.2
Finland	1995	43.4	11.8
Iceland	1994	15.8	3.0
Ireland	1995	17.4	4.1
Latvia	1994	71.4	14.1
Lithuania	1994	81.9	13.4
Norway	1994	17.7	6.9
Sweden	1996	20.0	8.5
United Kingdom	1996	11.0	3.3
Southern Europe	average	16.0	4.8
Albania	1993	2.9	1.7
Croatia	1994	34.6	11.7
Greece	1995	5.9	1.2
Italy	1996	9.6	3.2
Malta	1994	6.6	1.6
Portugal	1994	12.3	3.4
Slovenia	1995	45.1	12.6
Spain	1992	11.0	3.4
Western Europe	average	28.6	9.6
Austria	1996	34.2	10.7
Belgium	1993	37.3	11.9
France	1995	30.4	10.8
Germany	1996	21.8	8.3
Luxembourg	1994	30.8	6.3
Netherlands	1995	16.2	8.0
Switzerland	1995	29.5	11.1

TABLE 2
 SUICIDE RATE PER 100,000 INHABITANTS
 IN FORMER YUGOSLAV REPUBLICS /
 PROVINCES IN THE YEAR 1990

Republic/province	Rate
Kosovo	0.4
Macedonia	7
Montenegro	11.9
Bosnia and Hercegovina	12.1
Serbia (total)	14.1
Croatia	22.1
Vojvodina	27.4
Slovenia	36.3

families would often resort to suicide or hara-kiri to restore their family honor. Because of these beliefs, Eastern culture accepted suicide as a respectable manner of death. Western societies have a more negative view of suicide, with a tendency to see those who kill themselves as selfish cowards looking for easy solutions to their problems¹².

Croatia has gone through an intensive social and political turmoil in the last fifteen years (from 1986 to 2000). The movement for independence from Yugoslavia culminated in overt war in 1991. After its political recognition in 1992, the country started its social and economic transition from socialism into market economy. The Osijek County in the far east of the country was hit most painfully by war and after that by its devastating consequences. In the recent time an economic recession produced a rapid rise in unemployment rate and social unsafety in the community.

This paper was therefore designed to investigate the socio-demographic features of suicide victims and the groups that were particularly affected in this east Croatian county.

Materials and Methods

In Croatia the official mortality statistics are based on cause of death certificates collected by the Registrar office department of the Ministry of the interior.

At the death scene the cause of death is determined by any doctor (usually a general practitioner) who examines the body. Some deaths may be evaluated by the doctor as non-suspicious suicides leading to a direct issue of a death certificate without medico-legal investigation. Only when this doctor considers the death suspicious, that is potentially resulting from homicide, a medico-legal autopsy is required by the District attorney. In this case the cause and manner of death are determined by a medical examiner following a complete autopsy.

All cause-of-death certificates from the Registrar office and police record of suicide victims from 1986 to 2000 were reviewed in the County of Osijek.

The following data were registered in each case: gender, age, method of suicide, marital status, suicide location and time of death (day, month, year).

The data concerning the general population were collected from the National bureau of statistics. The 1991 census was a basis for the calculation of suicides rates. The available data were analyzed by descriptive statistics.

Results

Population statistics

According to the 1991 census the County of Osijek had 331,979 residents consisting of 160,135 males and 171,844 females. The female proportion was 52%. Up to the age of 55 to 60 there was approximately an equal number of males and females. The female proportion rose gradually to the age 75 and above, where

the female/male ratio was 2.2:1. In the population of Osijek County 19.8% were below the age of 15; between 15 and 64 there were 68.8% and above the age of 65 there were 11.6% of residents ¹⁷.

Suicide rate

In the Osijek County there were 1,017 suicides in the period of fifteen years (1986–2000). There were 693 male and 324 female victims. Male/female ratio was 2.1:1. The average general suicide rate during the investigating period was 20.5/100,000 residents per annum. The lowest rate was 13.9 and the highest rate was 27.1/100,000 residents.

Average male specific suicide rate was 28.8 ranging from 16.9 to 36.2/100,000 males. Female specific suicide rate averaged 12.6, with lowest rate of 4.1 and the highest 19.8/100,000 females (Table 3).

Age and gender specific rates

The average age of suicides was 50, but they ranged from 15 to 92 years of age.

Males specific suicide rate by age groups manifested one peak (29.8/ 100,000) in the young (25–34) population and then there was an upward trend toward the elderly which culminated at 65 and older men (98.8/100,000). A double male suicide rate and the shrinking of the male population after 65 years of age could influence this. Female specific suicide rate by age groups showed a continual tendency toward elderly women (Table 4).

Time of suicide

Suicides were evenly distributed over the days of the week. There were no seasonal variations in suicide but the lowest number of cases was in January and the highest in July.

TABLE 3
SUICIDE IN OSIJEK COUNTY FROM 1986 TO 2000

Year	Males		Females		Males and females
	N	Rate/100,000	N	Rate/100,000	Rate/100,000
1986	48	29.97	21	12.22	20.79
1987	50	31.22	27	15.71	23.20
1988	51	31.84	24	13.96	22.60
1989	42	26.22	32	18.62	22.30
1990	35	21.85	17	9.89	15.67
1991	47	29.35	7	4.07	16.27
1992	57	35.59	13	7.56	21.09
1993	42	26.22	25	14.54	20.19
1994	50	31.22	14	8.14	19.28
1995	27	16.86	19	11.05	13.86
1996	37	23.10	18	10.47	16.57
1997	56	34.97	34	19.78	27.12
1998	44	27.47	28	16.29	21.69
1999	49	30.59	29	16.87	23.50
2000	58	36.21	16	9.31	22.30
Total	693		324		

TABLE 4
SUICIDE RATE PER 100,000 INHABITANTS BY AGE GROUP

Age group	Males	Females	Males	Females	Males	Females
	Rate		Average number of suicides		Population in 1991	
15–24	17.73	9.80	4.13	2.20	23,284	22,442
25–34	29.75	6.35	7.73	1.60	25,976	25,170
35–44	28.91	10.46	7.33	2.53	25,361	24,170
45–54	37.85	17.82	7.33	3.60	19,364	20,194
55–64	43.31	21.59	8.13	4.93	18,774	22,830
65≥	98.89	29.42	11.53	6.66	11,659	22,635

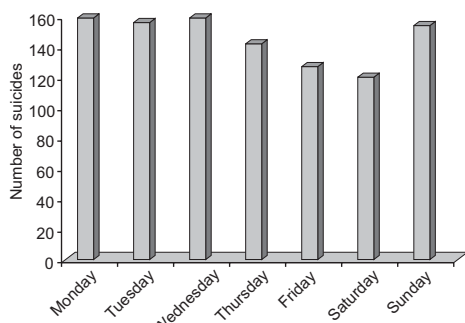


Fig. 1. Day of week.

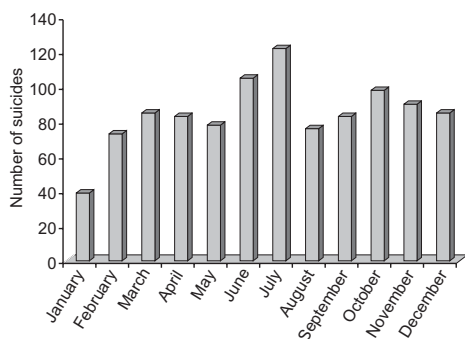


Fig. 2. Seasonal variations.

Occupation of victims

The largest proportion of suicides occurred among the retired, the workers and the unemployed constituting together 2/3 of victims (Table 5).

Marital status

Married persons frequently commit suicides (46.71%), but people who were single, widowed and divorced (47.29%) prevailed among suicide victims (Table 6).

Suicide location

In total, 80% individuals were found in their own home. All other places were rare. The second frequent location chosen for suicide was outside the home (8.16%) and the third near river (4.72%). In rare cases a suicide would decide to jump into a well.

TABLE 5
OCCUPATION OF SUICIDE VICTIMS (N=1,017)

	N	%
Retired	407	40.02
Worker	176	17.31
Unemployed	102	10.03
Soldier	78	7.67
Farmer	54	5.31
Tradesman	52	5.11
Highly educated	44	4.33
Scholar	30	2.95
Clerk	22	2.16
Policeman	22	2.16
Student	20	1.97
Unknown	10	0.98

TABLE 6
MARITAL STATUS OF SUICIDE VICTIMS

	Males	Females	Total	%
Married	337	138	475	46.71
Single	198	48	246	24.19
Widowed	65	94	159	15.63
Divorced	49	27	76	7.47
Unknown	44	17	61	6.00
Total	693	324	1,017	100.00

Suicide methods

The method of choice for suicide was hanging (43%), after that suicides preferred firearms (24%) and then poisoning, mostly by organic phosphates (11%) when the suicide occurred in a rural community. There were fifty (5%) suicides committed by hand grenade. Soldiers and war veterans were exclusive victims. Suicides committed by means of a sharp object and jumping under a train were the rarest methods.

Suicide reason

Suicide motives are difficult issues for study, partly because the victim is dead. Police report of suicide cases revealed that about 33% of victims had mental problems which were classified as psychiatric disturbances. Somatic diseases were recorded in 19% of suicides. In other cases the crux of the problem was not solved.

Discussion

Suicide has been the second cause of violent death (constituting 25–30%) in the last fifteen years (1986 to 2000) in Osijek County. The proportion of suicide in unnatural deaths dropped to 12% only in the year 1991. The war was the cause of many civilian and military casualties from artillery and gunshot wounds, which

explains a lower proportion of suicide in that year.

The average general suicide rate was 20.5/100,000 inhabitants of the County, although it was beginning to show a slight increase towards the end of the investigated period. It correlated with the average suicide rate (23/100,000) for the whole country in the same period⁸.

During the war the males showed a greater inclination than women to take their own lives. In this period (1991) they committed suicide seven times more frequently than women. But it is necessary to point out that a significant population of women temporarily left the region during military activities. Female suicide rate (M/F; 1.5 to 1.7:1) came closer to male suicide rate in the period of resignation (1997, 1998). It was reflected in a generally low suicide rate (16.0) during combat activities in contrast to the highest rate of 27.1 in the post-war period (Table 3).

A similar phenomenon was recorded in other countries which were engaged in military activities, like nearby Yugoslavia where suicide culminated in 1994 and the Eastern province of Saudi Arabia after the Gulf War in 1991^{7,16}. The previous reports also pointed to peaks in the suicide rates during the period of economic recession and social strains that followed the World War I¹⁸.

In overall population of the County women (52%) outnumbered men but otherwise male suicide rate was higher than female (M:F = 2.1:1). This ratio is in accordance with those reported in other studies: 2:1 in Zagreb, 2.1:1 in Paris, 1.7:1 in London, 1.6:1 in Oslo, but lower than in Norway 4.6:1, Saudi Arabia 4.5:1 and South Carolina 3.9:1^{1,16,19–23}.

The male specific suicide rate showed a peak between 25 to 34 years of age and then a trend toward elderly men. A high specific male suicide rate among the elderly could be explained by shortened life expectancy and reduced population of men aged 65 and older (doubly reduced in comparison to women's counterpart population). As the male suicide rate was more than double in comparison with the female, this had a dangerous effect on the already shrunken male population. A similar trend was observed in other studies of suicide victims^{4,6}.

The retired and the laborers were predominant (57%) among suicide victims. This is a reflection of the social status in a community where the number of retired people equals the number of the employed. Among pensioners there is a substantial proportion of young adult war veterans with mental post-war problems who are prone to suicide ideation.

Laborers are exposed stressful working condition, unsafeness for certain jobs, low income at the time of actual economic recession. An analysis of the relationship between the suicide rate and the socio-economic status of suicide victims who were employed at the time of death pointed that highest rates were for general laborers, farm laborers, service workers and the lowest for educated professional technical, administrative, managerial and clerical workers. The unemployed and the retired usually manifested higher rates of suicide than the employed²⁴.

Concerning the marital status our findings confirm what other reports have previously shown: suicides are common among the people who live alone¹.

Eighty percent of victims were found in surroundings familiar to them, those in which they probably felt most comfortable and to which they had easiest access. These included various premises within their residence. Only a small part of victims used a less private location including an open field, parks, rivers, workplace, and railway tracks. It is well-known by experience that the more familiar the setting, the greater the possibility for the victim to acquire the necessary implements within a short time, presumably before he or she has a further chance to reconsider their decision¹².

Availability of means is an important factor in determining the method of choice for committing suicide. The means for hanging are readily available to everyone, and it is quite easy to arrange a ligature out of most materials at hand. In addition, hanging is one of the most lethal methods of suicide¹⁶. In the present study, hanging was the commonest (43%) method used by both genders. Hanging was also reported to be more acceptable in a study of suicide in Zagreb and it is increasingly used among young adult males in the U.K.^{19, 25, 26}. Firearms were the second (24%) common suicide method. But, suicide committed by gunshot wounding differed significantly ($p < 0.005$) in comparison with suicide by hanging in the period of study. The most probable explanation is the ease of acquiring such weapons in the war and post-war milieu. Availability of firearms produced proportionally more suicidal gunshot wounds in relation to hanging during the war and in the post-war period.

Suicide motives are difficult issues to analyze, partly because the victim is dead. Although we are not in possession of exact data, we can state that suicide

victims rarely leave notes. These are estimated to be found in only 15% cases. A common reaction by family and friends is one of disbelief. However, experience taught us that the burden of illness, neglect and loneliness induced suicidal ideation in the elderly. Dysfunctional family dynamics is often thought to be a powerful stress factor or negative influence that compels the young victims to commit suicide¹². One of the categories of interest to us was victims' mental health history. Mental problems were recorded in 33 % of our suicide victims. Police investigators did not specify it but we concluded that depression was the main factor. Depression was a well-known risk factor as was shown in other studies with a proportion of 20% to more than 50% of suicide victims^{12,20,26}.

Conclusions

This study shows that Osijek County with suicide rate of 20.5/100,000 inhabit-

ants is among high-risk European areas but still lower than the countries with the highest risk. Specific male suicide rate (28.8/100,000) was lower and the female rate (12.6/100,000) was higher than the data for Croatia show. The general rate of suicides manifested a slight increase from 21 in 1986 to 22.3/100,000 inhabitants at the end of the study, in 2000. This increase maybe related to stress as well as to other social and economic changes within the community following the war and the subsequent period of transition. The peaks of suicide incidence were found in the population from 45 to 64 years of age. The present study also shows that hanging is the commonest method chosen for suicide. Firearms have become the second preferable choice due to the increased availability and accessibility of these devastating weapons in many homes. In the post-war milieu suicide by explosive devices and hand grenades have become a new method, unobserved before.

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EPIDEMIOŠKE OSOBITOSTI SUICIDA U OSIJEČKO-BARANJSKOJ ŽUPANIJI, HRVATSKA, OD 1986. DO 2000. GODINE

S A Ž E T A K

Samoubojstvo je tragičan događaj koji se povezuje sa socijalnim, kulturnim i psihološkim čimbenicima. Oko 1060 osoba godišnje se ubije u Republici Hrvatskoj. Retrospektivno su istraženi podaci o samoubojstvima, prijavljenim i registriranim u matičnom uredu i Policijskoj upravi Osječko-baranjske županije od 1986. do 2000. godine. Ukupno se u tom periodu dogodilo 1017 samoubojstava. Suicidi su analizirani s obzirom na dob, spol, bračni status, zanimanje samoubojica, mjesto i vrijeme i način izvršenja. Stopa samoubojstva je bila prosječno 20,5/100.000 stanovnika županije godišnje. Dob samoubojica se kretala od 15 do 92 godine života. Muški suicidi su se odnosili prema ženskim 2,1:1. Najviša incidencija suicida je bila u dobnim skupinama od 55 do 64 godine (19,27%), i zatim u skupini od 45 do 54 godine (16,12%). Najniža incidencija suicida je bila u dobnj skupini <19 godina (3,4%). Incidencija suicida je također bila niska u dobnj skupini 85>godina (2,06%). Samoubojstva su bila česta među osamljenim osobama; samcima, udovcima, rastavljenim (47,29%). Osamdeset posto žrtava je pronađeno u prostorima gdje svakodnevno borave. To su bile različite prostorije u njihovim prebivalištima. Umirovljenici, radnici i nezaposleni (67,36%) su bili pretežne žrtve suicida. Najučestaliji načini izvršenja suicida su bili vješanjem (43%) i zatim vatrenim oružjem (24%). Samoubojstva se nisu događala posebno češće u nekom danu tjedna ili mjesecu u godini. Istraživanje je otkrilo porast stope suicida od 21 na početku perioda (u 1986.) do 22.3/100.000 stanovnika petnaest godina kasnije (u 2000.).