ORIGINAL ARTICLE

UDC: 616.89-008.441.44:616-036.22
https://doi.org/10.2298/VSP150924304N

Sociodemographic characteristics as suicide risk factors in Belgrade, the capital of Serbia

Socio-demografske karakteristike kao faktori rizika od samoubistva u Beogradu, Srbija

Gordana Nikolić-Balkoski*†, Ljubica Leposavić*†

University of Belgrade, *Faculty of Medicine, Belgrade, Serbia; Clinical Center Serbia, †Psychiatric Clinic, Belgrade, Serbia

Abstract

Background/Aim. Suicide and self-inflicted injuries are one of the leading causes of injury-related deaths worldwide. The aim of this work was to investigate sociodemographic characteristics as a risk factor for suicide. The investigation covered the period from 1997 to 2011 on the territory of the capital of Serbia, the city of Belgrade. **Methods**. The data was taken from the index books of suicides committed in the city of Belgrade, held at the Institute of Informatics and Statistics. Statistical analysis was done by using the crude specific rate. The variability of the rate was estimated by computing a confidence interval. **Results**. The average suicide rate in the observed period was 9.88. The suicide rate has shown a regular decline until 2005, and since then, a mild growth was observed (the highest in 2000, the lowest in 2004). The results of our study pointed out the following sociodemographic profile as a risk factor for suicide: male with uncompleted elementary school who lives in a suburban community, aged 66 and over. Suicides were usually realized in the area of residence during the day, in late spring, and hanging was the most frequent method of suicide. **Conclusion.** Preventive public health measures should be implemented focusing on typical socio-demographic profile. Prospective studies should include more variables in order to identify more risk factors for suicide and suicidal behavior. To achieve this goal, a serious national strategy for recording suicide and suicide prevention would have to be developed.

Key words:
suicide; serbia; socioeconomic factors; demography; risk factors.

Apstrakt

Uvod/Cilj. Širom sveta samoubistvo i samopovređivanje jedni su od vodećih uzroka smrti. Cilj ovog rada je bio da se ispitaju sociodemografske karakteristike kao faktori rizika od samoubistva. Istraživanje je obuhvatilo period od 1997. do 2011. godine i teritoriju Beograda, glavnog grada Srbije. **Metode**. Podaci su uzeti iz sveski registra samoubistva Instituta za informatiku i statistiku grada Beograda. Statističkom analizom obuhvaćena je stopa samoubistava (učestalost u odnosu na 100,000 stanovnika), a njen varijabilitet procenjen je na osnovu izračunatog intervala poverenja. **Rezultati**. Prosečna stopa samoubistava u posmatranom periodu bila je 9.88. Stopa samoubistava pokazuje pravilan pad do 2005. godine, i od tada blag rast (najviša stopa bila je 2000. godine, a najniža 2004. godine). Rezultati našeg istraživanja ukazali su na sledeći sociodemografski profil kao faktor rizika za samoubistvo: muškarac sa nedovršenom osnovnom školom koji živi u predgrađu, starosti 66 godina i više. Samoubistva su se najčešće dešavala u oblasti stanovanja tokom dana, u kasno proleće, a vešanje je bio češći način samoubistva. **Zaključak**. U okviru preventivnih mera trebalo bi usmeriti posebnu pažnju na dobijeni sociodemografski profil potencijalnih samoubica. Buduće studije sa više varijabli suzile bi, a ujedno i obogatile sociodemografski profil karakterističan za samoubistvo i samoubilačko ponašanje. Da bi se ovo postiglo potrebno je da se napravi i razvije obiljna nacionalna strategija prevencije i registracije suicida.

Ključne reči:
samoubistvo; srbija; socioekonomski faktori; demografija; faktori rizika.

Introduction

Suicide and self-inflicted injuries are one of the leading causes of injury-related deaths worldwide. There are an estimated 10–20 million attempted suicides each year [1, 2]. A 2002 report by the World Health Organization (WHO) states that nearly a million people take their own lives every year which is more than those killed in war [3]. WHO figures show that suicide takes place somewhere in the world every 40 seconds. In the last 45 years suicide rates have increased

Correspondence to: Gordana Nikolić-Balkoski, Clinical Center Serbia, Pasterova 2, 11 000 Belgrade, Serbia. E-mail: balkoski@sbb.rs, gordana.nikolic@kcs.ac.rs

by 60% worldwide. Suicide is among the three leading causes of death among people aged 15–44 in some countries, and the second leading cause of death in the 10–24 years age group. Mortality from suicide constitutes a significant public health problem. Data from the USA indicates that reported suicide is almost 40% higher than homicide. However, much more public attention in that country focuses on homicide than on suicide [4]. Keeping in mind the aforementioned data, an important task for researchers and public health officials is to seek effective intervention strategies for suicide prevention. Nordentoft [5] describes two preventive interventions: universal, directed toward the entire population, and selective, geared toward individuals who are at greater risk to suicidal behavior. Suicidal risk factors can be estimated from different points of view, as suicide is a complex phenomenon involving psychological, social, biological, cultural and environmental factors.

Belgrade is the capital of Serbia with 1,576 124 citizens, 747,854 males and 828,270 females, according to the 2002 census. There are 17 municipalities in the city.

The aim of this work was to investigate the sociodemographic characteristics as a selective risk factor for suicide. Our investigation covered the period from 1997 to 2011 (except 2009) on the territory of the capital of Serbia, the city of Belgrade. Data was only available for this period. There was no statistical data available about this, and all information included were unprocessed data.

Methods

The data was taken from the index books of suicides committed in the city of Belgrade, held at the Institute of Informatics and Statistics. The information was limited, and included the recording of nine variables: name, sex, time and date of death, date of birth, place of residence (district and address), city area (central/suburban) and municipality of the suicide, education, profession and cause of death [method of suicide including International Statistical Classification od Diseases – 10th revision (ICD-10 code)]. For statistical analysis we used a crude specific rate, as it is easily computed based on the number of suicides per 100,000 members of the population. The variability of the rate was estimated by computing a confidence interval.

Results

In the observed fifteen-year period 2,181 people took their own lives in Belgrade. Annual suicide rates from 1997 until 2011, as well as the average suicide rate for that period are shown in Table 1.

The average suicide rate in the observed period was 9.88. The highest suicide rate was recorded in the year 2000 while the lowest one in 2004. The suicide rate showed a regular decline until 2005, and since then - a mild growth. The suicide rate in the last year of the period observed (2011) was almost the same as in the period ten years before (2002).

The distribution of the average suicide rate by gender showed that for the observed fifteen year period, the average male and female suicide rates were 14.20, and 5.97, respectively. Data analysis pointed out that the average male to female suicide rate ratio was 2.41.

The highest suicide rate was in late spring (May and June), and the lowest one in winter (December and February), which is shown in (Figure 1) below.

It was appropriate to classify persons who committed suicide into five age groups with an age interval of 15 years. The first group consisted of persons younger than 20, and the last group of persons older than 65. The age structure of people who committed suicide is shown in Figure 2 .

Data analysis pointed out that the average rate for a specific age group started at 1.02 (in the age group under 20) and gradually increases up to 21.02 (in the age group over 66).

For the purpose of this study we used four educational categories (based on years of completed school): 1- less than eight years of education, 2- eight years of education, 3- twelve years of education and 4- sixteen or more years of education. The average fifteen-year suicide rates by educational structure of persons who commited suicide are shown in Table 2.

Table 1

Annual suicide rate (1997–2011)

Year of committed suicide	Rates per 100,000 inhabitans	95% confidence interval for rates	
		upper limit	lower limit
1997	12.69	14.45	10.93
1998	11.42	13.09	9.75
1999	12.37	14.11	10.64
2000	14.40	16.28	12.53
2001	11.48	13.16	9.81
2002	10.85	12.48	9.22
2003	7.42	8.77	6.08
2004	6.79	8.08	5.50
2005	6.85	8.14	5.56
2006	7.74	9.11	6.37
2007	7.80	9.18	6.42
2008	9.07	10.56	7.59
2010	9.33	10.83	7.82
2011	10.15	11.72	8.58
Average	9.88	11.44	8.33

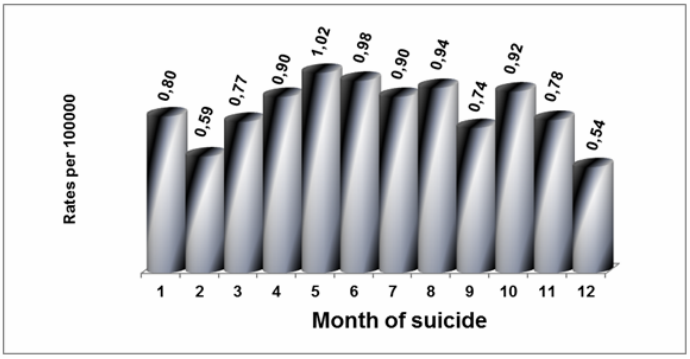

Fig. 1 – Month of suicide – average suicide rate (1997–2011).

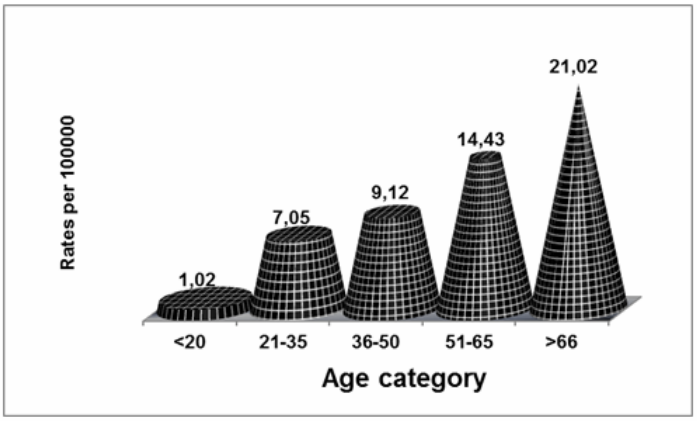

Fig. 2 – Age of suicide – average suicide rate (1997–2011).

Table 2

Educational structure – average suicide rate (1997–2011)

Educational structure (years of school completed)	Rate per 100,000 inhabitants	95% confidence interval for rates	
		upper limit	lower limit
< 8	0.158	0.271	0.045
8	0.078	0.108	0.048
12	0.077	0.098	0.056
≥ 16	0.034	0.056	0.013

The greatest number of Belgrade inhabitants who committed suicide had completed secondary school, but the highest suicide rate (0.158) was in the lowest educational group (less than eight years of education).

Table 3 shows the average fifteen-year suicide rate related to the area in which the subjects lived, as well as to the area where suicide occured (central city area or suburban municipality).

The average fifteen-year suicide rate was higher in suburban municipalities.

The highest number of suicides occurred in the most populated municipalities of the city. The highest number of suicides occurred on the territory of the central city municipality, Savski venac, but the average fifteen year suicide rate was higher in suburban municipalities.

Considering the time of suicide (day, evening, morning), the average fifteen-year suicide rate was the highest during the day (3.72), and the lowest during the night and early morning (1.76).

Table 3

Area of residence and suicide rate (1997–2011)

Area of residence/suicide	Rate per 100,000 inhabitants	95% confidence interval	
		upper limit	lower limit
Residence			
central city area	8.73	10.37	7.10
suburban area	14.41	18.59	10.23
Suicide			
central city area	8.94	10.59	7.29
suburban area	13.64	17.71	9.57

Considering the methods of suicide, hanging, drowning and suffocation (ICD-10 code: X 70) were the most frequently chosen ones – 30.2%. Other frequent methods in order of frequency were: suicide by unspecified means (ICD-10 code: X 84) – 26.5%, jumping from a high place (ICD-10 code: X 80) – 4.4% and firearms (ICD-10 code: X 74) – 4.4%.

Discussion

Last years have been a period of great changes, as well as significant and serious social turmoil when the people of Serbia have experienced the consequences of economic blockade, the NATO intervention, social transformation and economic crisis. The people have lived, and still do, in a state of prolonged stress which has become their reality, a part of everyday life [6]. All of these may become the reason for suicide.

In the observed fifteen-year period 2,181 people committed suicide. The average suicide rate since 1997 until 2011 was 9.88. The highest suicide rate was in 2000 (14.40), which is not surprising if we bear in mind the NATO intervention in the preceding year. Suicide rates showed a regular decline till 2004, and a mild growth since then. Comparing suicide rates in Belgrade and Serbia, we can see that the year 2000 was the one with the highest suicide rate, both in the whole country and its capital. However, the trend from that time was different: in Serbia suicide rates showed a regular decline [7, 8], and mild growth in Belgrade. It is not easy to interpret this data because analysis of these trends demands knowledge and availability of various different variables which were not available to us. The average fifteen-year suicide rate in Belgrade (9.88) was below the suicide rate for the world as a whole (11.6), and for Serbia (18.8) [9].

In the observed fifteen-year period 1,487 males and 694 females committed suicide and this is just under twice as many male suicides as there were female ones. Keeping in mind that by the 2002 census, Belgrade had rather a greater number of female than male citizens; the male to female suicide ratio is 2 to 1. The male average suicide rate was 14.20 and the female average suicide rate is 5.97. Data analysis pointed out that the male to female average suicidal rate ratio was 2.41:1. It is similar to male/female average suicidal rate ratio in Serbia [10] and in the capital of neighbor country Montenegro [11]. Data from literature shows that there is a relatively constant predominance of male suicide rates over female ones: 3.2 : 1 in 1951, 3.6 : 1 in 1995 and 3.9 : 1 in 2002 [12, 13]. There is only one exception (China), where suicide rates in females are consistently higher than suicide rates in males [14]. Comparing male to female suicide rates in Belgrade with those in the world, one can see that male to female suicide rates in Belgrade are lower than in the rest of the world.

The highest suicide rate is expected in the spring and late autumn. The idea that suicide is more common during the winter holidays (including Christmas in the northern hemisphere) is actually a myth generally reinforced by media coverage associating suicide with the holiday season. A study examining the relationship between suicide attempts and major public holidays in Europe [15] reported that there were fewer suicide attempts before Christmas and 40% more attempts after Christmas than expected. The lower suicide rate in February (0.59) in our study can be explained by the fact that February is the shortest month of the year. The smallest suicide rate in December (0.54), may be the consequence of strong family relations in our society (family gatherings during the holidays). The USA National Center for Health Statistics found suicide drop during winter months and peak during spring and early summer. A report from 20 Organization for Economic Cooperation and Development (OECD) countries [16], investigating the hypothesis that sunshine exposure may trigger suicidal behavior, suggested that suicides followed a seasonal pattern with a dominant peak during the month in which daylight was longest. Our results are similar to the above mentioned: the highest suicide rate was in late spring - May (1.02) and June (0.98).

Suicide risk has been historically considered to increase with age, in older men having been identified as the group of highest risk [17]. This was so in our investigation: the average rate for a specific age group started at 1.02 (in the age group under 20) and gradually increased up to 21.02 (in the age group over 66). The youngest citizen who committed suicide was 13 years old, and the oldest one was 101.

The greatest number of Belgrade citizens who committed suicide had completed secondary school. Twelve year education is not a risk factor for suicide because the population with secondary school education is numerically high in the city (669,927). The highest suicide rate (0.158) was in the lowest educational category (less than eight year education).

The municipalities in which the greatest number of suicides was recorded are also the most densely populated municipalities in the city. Suburban municipalities had a higher suicide rate than central city areas, considering both the area of residence (14.41) and the area of suicide (13.64). It is interesting that the highest (absolute) number of suicides was seen in a small central city municipality, Savski venac. This may be because the big central city hospital, where people who attempt or commit suicide are admitted, is situated in this area (thus the hospital might be registered as a place of death).

When considering the time of suicide (day, evening, morning), the average fifteen-year suicide rate was the highest during the day. The fact that the highest suicide rate (3.72) was registered during the day might not be accurate, as it may refer to the time when the body was found.

This study found that suicide by hanging was the most predominant method of suicide in Belgrade (30.2%) in the period 1997–2011. A study of suicide methods in 16 countries participating in the "European Alliance Against Depression" [18] project had the same result – hanging, as the most frequent method of suicide. Although hanging as a simple method of suicide is the most common one in many countries worldwide [19], there is a considerable international variability. A study of suicide methods in a large number of cases in Japan and the United States [20] revealed that Japan had a very high proportion of hanging (70.4% of males and 35.6% of females), while this proportion was much lower in the United States (18.2% of males and 16.2% of females). Jumping from a high place and using firearms take third and fourth

place as suicide methods both in Belgrade (this study) and in Europe [18].

Conclusion

The aim of this work was to investigate the sociodemographic characteristics as a selective risk factor for suicide. The results of our study point out the following sociodemographic profile as a risk factor for suicide: a male, aged 66 and over, uncompleted elementary school, living in a suburban community, committing suicide in the area of residence during the day in late spring by hanging as the most frequent method of suicide.

It is easy for a well-organized country to measure mortality, including injury mortality. However, diagnosing suicide also includes determining the component of intent, which makes it more difficult to obtain unequivocal statistical data. There is also a need for wide standardization of routine suicide data. In our investigation we answered the question related to the sociodemographic risk factors that provoke suicide. Available data was limited. Prospective studies should include more variables, such as the presence of mental or somatic illness, origin, marital status etc. which means that this data should be recorded. To achieve this, a serious national strategy for recording suicide rate and suicide prevention should be developed.

REFERENCES

1. *Stone D, Chishti P, Roulston C.* Final report of the European review of suicide and violence epidemiology (EUROSAVE) project. 2002. Available from: www.euro-save.net
2. *Chishti P, Stone D, Corcoran P, Williamson E, Petridou E.* Suicide mortality in the European Union. Eur J Public Health 2003; 13(2): 108−14.
3. *Reddy MS.* Suicide Incidence and Epidemiology. Indian J Psychol Med 2010; 23(2): 77−82.
4. *Kutcher S.* Chehil: Suicide risk management: A manualfor health professionals. Oxford: Blackwell; 2007.
5. *Nordentoft M.* Prevention of suicide and attempted suicide in Denmark. Epidemiological studies of suicide and intervention studies in selected risk groups. Dan Med Bull 2007; 54(4): 306−69.
6. *Nikolic-Balkoski G, Pavlicevic V, Jasovic-Gasic M, Leposavić L, Milovanović S, Lasković N.* Suicide in the capital of Serbia and Montenegro in the period 1997-2004-sex differences. Psychiatr Danub 2006; 18(1−2): 48−54.
7. *Dedic G, Gordana DJ, Panic M, Milivoje P.* Suicide prevention program in the Army of Serbia and Montenegro. Mil Med 2007; 172(5): 551−5.
8. *Selakovic-Bursic S, Haramic E, Leenaars AA.* The Balkan Piedmont: Male suicide rates pre-war, wartime, and post-war in Serbia and Montenegro. Arch Suicide Res 2006; 10(3): 225−38.
9. *Värnik P.* Suicide in the world. Int J Environ Res Public Health 2012; 9(3): 760−71.
10. *Dedić G.* Gender differences in suicide in Serbia within the period 2006-2010. Vojnosanit Pregl 2014; 71(3): 265−70.
11. *Injav-Stevovoic L, Jasovic-Gasic M, Vukovic O, Pekovic M, Terzic N.* Gender differences in relation to suicide committed in the capital of Montenegro (Podgorica) in the period 2000-2006. Psychiatr Danub 2011; 23(1): 45−52.
12. *Bertolote JM, Fleischmann A.* A global perspective in the epidemiology of suicide. Suicidologi 2002; 7(2): 6−8.
13. *Diekstra RF, Gulbinat W.* The epidemiology of suicidal behaviour: a review of three continents. World Health Stat Q 1993; 46(1): 52−68.
14. *Phillips MR, Yhang Y.* Suicide rates in China 1995-99. Lancet 2002; 359(9309): 835−40.
15. *Jessen G, Jensen BF, Arensman E, Bille-Brahe U, Crepet P, De Leo D,* et al. Attempted suicide and major public holidays in Europe: findings from the WHO/EURO Multicentre Study on Parasuicide. Acta Psychiatr Scand 1999; 99(6): 412−8.
16. *Petridou E, Papadopoulos FC, Frangakis CE, Skalkidou A, Trichopoulos D.* A role of sunshine in the triggering of suicide. Epidemiology 2002; 13(1): 106−9.
17. *Pitman A, Krysinska K, Osborn D, King M.* Suicide in young men. Lancet 2012; 379(9834): 2383−92.
18. *Värnik A, Kõlves K, van der Feltz-Cornelis CM, Marusic A, Oskarsson H, Palmer A,* et al. Suicide methods in Europe: A gender-specific analysis of countries participating in the "European Alliance Against Depression". J Epidemiol Community Health 2008; 62(6): 545−51.
19. *Lester D.* Change in the methods used for suicide in 16 countries from 1960-1980. Acta Psychiatr Scand 1990; 81(3): 260−1.
20. *Ojima T, Nakamura Y, Detels R.* Comparative study about methods of suicide between Japan and the United States. J Epidemiol 2004; 14(6): 187−92.

Received on September 24, 2015.
Revised on April 28, 2016.
Accepted on May 6, 2016.
Online First October, 2016