

PROFESSIONAL PAPER

# Trends in Suicide Mortality in the Federation of Bosnia and Herzegovina - 2010-2020

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<sup>1</sup>Institute for Public Health of FB&H, Sarajevo, Bosnia and Herzegovina

<sup>2</sup>Institute for Health and Food Safety Zenica, Institute for Public Health, Zenica, Bosnia and Herzegovina

<sup>3</sup>College of Public Health Lowell G. Battershell University Distinguished Chair,<sup>4</sup> Occupational and Environmental Health University of Iowa, Iowa, USA

**Corresponding author:** Seila Cilovic-Lagarija. MD. Institute for Public Health FB&H. Phone: +387 33 564 625. Fax: +387 33 564 601. E-mail: seila.cilovic@gmail.com. ORCID ID: <https://www.orcid.org/0000-0003-2663-3044>.

Seila Cilovic-Lagarija<sup>1</sup>, Nino Hasanica<sup>2</sup>, Sanjin Musa<sup>1</sup>, Corinne Peek-Asa<sup>3,4</sup>

## ABSTRACT

**Background:** Suicide is a major public health problem, with far-reaching social, emotional and economic consequences. Suicide rates are high in all age groups are particularly high in all age groups but are one of the major causes of death among younger age groups, yielding substantial years of premature life lost. Preventing suicide is one of the major mental health challenges in the world, **Objective:** The aim of this study was to estimate the number and rates of suicide deaths in the Federation of Bosnia and Herzegovina (FB&H), and describe suicide characteristics by sex, age, method of suicide over the period of 2010 to 2020. **Methods:** This is a retrospective population-based study from the period 2010 - 2020. Data were from the FB&H mortality register, Institute for Statistics FB&H. Data on deaths by cause of death are given according to the 10<sup>th</sup> edition of the International Statistical Classification of Diseases, Injuries and Causes of Death. Suicide data were presented rates by three age group, total number, male and female, crude rates, age-specific death rates and suicide mechanism by age and gender. **Results:** The total number of suicides increased until 2017 to a peak of 201, then decreased to 157 for 2020. Males comprised over 70% of the suicide deaths. Over half of suicides were among those aged 30 - 64 and nearly one third among those 65 and above. However, the greatest increases were among youth aged 15 to 29, which grew from 2% to 9% of suicides over the study period. The most common mechanisms for suicide were for hanging and firearms, both most common among males. Poisoning was the most common mechanism among females. **Conclusion:** Understanding age and mechanism trends over time will help prioritize prevention strategies. Focus on mental health systems needs to ensure equal access to high-quality services in community based settings. For responses to this challenge to be effective, a comprehensive multisectoral suicide prevention strategy is needed.

**Keywords:** suicide, suicide mechanism, suicide mortality.

## 1. BACKGROUND

Suicide is a major public health problem, with far-reaching social, emotional and economic consequences. There are approximately 800,000 suicides a year worldwide, and it is estimated that at least six people are directly affected by each suicide death (1), with additional far-reaching impact on the workforce and communities. Suicide rates are particularly high in all age groups but are one of the major causes of death among younger age groups, yielding substantial years of premature life lost (2). Preventing suicide is one of the major mental health challenges in the world (3).

The factors contributing to suicide and its prevention are complex and not fully understood. There is increasing evidence that the media can play a significant role in either enhancing or weakening suicide prevention efforts (1). The media may provide useful educational information about suicide or may spread misinformation, and some evidence indicates that widespread publicity of suicide events among famous people may impact others to attempt suicide (1). Sedgwick and colleagues found an association between problematic use of social media and internet in terms of cyberbullying and suicide attempts in young people (4, 5). A few studies attempted to use image-based social media as intervention tools, but the results were mainly exploratory (6).

Suicide risk has been associated with psychological stress, financial stress, and low access to resources, which suggests a possible mechanism for high suicide rates in low or middle income countries. However, most of the research on suicide as tied to these stressors comes from studies examining dif-

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		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total		153	139	137	129	150	132	181	201	197	165	157
male		115 (75.2%)	104 (74.8%)	99 (72.3%)	97 (75.25%)	114 (75.0%)	99 (75.0%)	126 (69.6%)	147 (73.1%)	148 (75.1%)	120 (72.27%)	124 (78.0%)
female		38 (24.8%)	35 (25.2%)	38 (27.7%)	32 (24.8%)	36 (25.0%)	33 (25.0%)	55 (30.4%)	54 (26.8%)	49 (24.9%)	45 (27.3%)	33(21.0%)
Age group	15-29	3 (1.96%)	9 (6.5%)	7 (5.1%)	13 (10.0%)	5 (3.3%)	9 (6.8%)	8 (4.4%)	11 (5.5%)	10 (5.0%)	14 (8.5%)	11(7.0%)
	30-64	83 (54.2%)	68 (48.9%)	90 (65.7%)	81 (62.8%)	95 (63.3%)	65 (49.2%)	96 (53.0%)	106 (52.7%)	103 (52.2%)	96 (58.2%)	79(50.3%)
	65+	67 (43.8%)	62 (44.6%)	40 (29.2%)	35 (27.1%)	50 (33.3%)	58 (43.9%)	77 (42.5%)	84 (41.8%)	84 (42.6%)	55 (33.3%)	67(42.7%)
Rates by age group	15-29	0,63	1,9	1,5	2,7	1,1	2,0	1,8	2,5	2,3	3,3	2,6
	30-64	7,7	6,2	8,2	7,4	8,6	5,9	8,7	9,6	9,3	8,7	7,2
	65+	24,2	22,3	14,1	12,1	16,8	19,1	24,7	26,2	25,3	16,1	18,8
Leading mechanism suicide by years	Hanging (X70)	87 (56.9%)	75 (53.9%)	77 (56.2%)	78 (60.4%)	84 (56.0%)	74 (56.0%)	100 (55.2%)	115 (57.2%)	104 (52.8%)	92 (55.7%)	71(45.2%)
	Firearms (X72,X73 i X 74)	25 (16.3%)	23 (16.5%)	15 (10.9%)	15 (11.6%)	20 (13.3%)	16 (12.1%)	28 (15.4%)	30 (14.9%)	37 (18.8%)	25 (15.1%)	31(19.7%)
	Jumping X80	9 (5.8%)	6 (4.3%)	5 (3.6%)	8 (6.2%)	6 (4.0%)	10 (7.6%)	13 (7.2%)	10 (4.9%)	12 (6.1%)	15 (9.1%)	11(7.0%)
	Self-harm in an unspecified manner X84	9 (5.8%)	16 (11.5%)	15 (10.9%)	12 (9.3%)	13 (8.6%)	6 (4.5%)	10 (5.5%)	8 (3.9%)	10 (5.0%)	3 (1.8%)	3(1.9%)
	Poisoning X60-X69	10 (6.5%)	9 (6.5%)	11 (8.0%)	8 (6.2%)	15 (10%)	18 (13.6%)	14 (7.7%)	15 (7.5%)	12 (6.1%)	12 (7.3%)	21(13.3%)
	Drowning X71	5 (3.3%)	1 (0.7%)	6 (4,4%)	4 (3.1%)	6 (4.0%)	3 (2.3%)	8 (4.4%)	9 (4.5%)	13 (6.6%)	8 (4.8%)	11(7.0%)

**Table 1. Number and percent of suicides by sex, age group, rates per 100.000 and mechanism, by year**

ferences within populations of high income countries. For example, studies in Australia suggest a strong association of lower income levels with elevated psychological distress (7). In the European Union, more than 400,000 individuals are homeless, and this vulnerable population has higher rates of suicide and unintentional injuries (8).

Many factors have been identified in individuals who commit suicides or have attempted suicide, and among them availability of a firearm, financial difficulties and loss of employment (9). Again, most of these studies are in high income countries, although many emerging risk factors are concentrated in low and middle income countries. For example, it is estimated that about 30% of global suicides result from pesticide poisoning, most of which occurs in rural agricultural areas in low- and middle-income countries. Other common methods of suicide are hanging and firearms (10, 11).

Bosnia and Herzegovina (B&H) is a middle income country that experiences many of the known risk factors for suicide, as well as experiences with war and economic challenges (12).

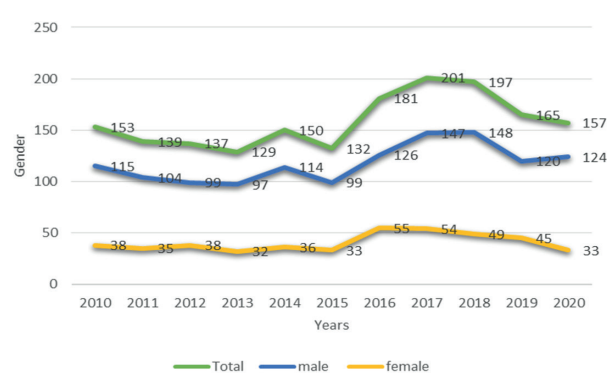
Much can be done to prevent suicide and suicide attempts at the individual, community and national levels. Worldwide, 28 countries have developed national suicide prevention strategies, and 60 countries have well-organized suicide registration and data (13). In the WHO Mental Health Action Plan 2013-2020, WHO member states committed themselves to achieving the global goal of reducing suicide rates by 10% by 2020 (13). Underlying these efforts is data that documents the incidence and burden of suicides.

## 2. OBJECTIVE

The aim of this study is to estimate rates of suicide death in the Federation of Bosnia and Herzegovina (FB&H), to profile characteristics of suicides by sex, age, method of suicide, and the year, and to examine time trends in suicide mechanism by age.

## 3. MATERIAL AND METHODS

This is a retrospective population-based study of suicide deaths from the years 2010-2020. Data for the



**Graph 1. Number of suicide by sex**

present study were from the Federation of Bosnia and Herzegovina (FB&H) mortality register, which was established in 1999. FB&H is an entity within the state of Bosnia and Herzegovina (B&H) with about 2.2 million inhabitants (2013 census). FB&H and Republika Srpska (the second entity within B&H) have separate public health systems, including statistics. Information for the Republika Srpska is not included in this study.

Mortality data, including all suicides, are collected by Federal law and follow a clearly defined set of institutional commitments, administrative forms, and protocols for collection and sharing of data. Mortality data were obtained through a data use agreement with the Institute for Statistics of FB&H, which provides public health data to eligible research institutions. Certificates of death were the source of mortality data, which is the oldest system of collecting health data and still the most reliable source of health statistics and indicators for public health surveillance. Mortality data provides the most important indicators for the evaluation and comparison of health status at the local, national and international level. Suicide deaths were identified using codes from the 10th edition of the International Statistical Classification of Diseases, Injuries and Causes of Death, which are mandated as part of the death certificate.

Mortality suicide data were organized into three age groups: 15-29, 30-64 and 65+. Suicide data examining trends from 2010 through 2020 were presented through

rates, total number and percentage, male and female, crude rates, age-specific death rates and suicide mechanism by age and gender (number and percentage).

#### 4. RESULTS

The total number of suicides decreased from 153 to 129 in 2013, increased from 2013 to a peak of 201 in 2017, then decreased to 157 by 2020 (Table 1, Graph 1). Over the study period from 2010 to 2020, suicides increased 7.3%. Males comprised 70% - 75% of suicides in each year, and the rate of male suicides was 2.5 times that of females. Trends over time were similar for males and females.

Individuals aged 30-64 comprised the highest proportion of suicides each year, ranging from 49% in 2011 to 63% in 2014. Suicides among those aged 65 and above ranged from 27% in 2013 to 44% in 2010 and over the time period generally decreased in proportion. Suicides among youth aged 15 to 29 comprised the lowest percentage of suicides, ranging from 2% in 2010 to 10% in 2013, but this age group had the highest increase over the study period at almost a 78% increase. The suicide rates per age group were highest in 65+, reaching highest value in 2017 with 26.2/100,000 and increasing rate in 2020 with 18.8/100,000. In the same year 2017, the highest reported suicide rate was in 30-64 age group with 9.6/100,000. In 15-29 age group, increasing trend

Leading mechanism suicide	Total	Sex N(%)		Age Group N(%)		
		Male	Female	15-29	30-64	65+
Total number of suicide	1741	1293	448	100	962	679
Hanging (X70)	957	745 (77.8%)	212 (22.1%)	56(5.85)	524 (54.7%)	377 (39.4%)
Firearms (X72,X73 i X 74)	265	251 (94.7%)	14 (5.3%)	13 (4.9%)	142 (53.6%)	110 (41.5%)
Poisoning X60-X69	145	56 (38.6%)	89 (61.4%)	7 (4.8%)	88 (60.7%)	50 (34.5%)
Jumping X80	105	67 (64.0%)	38 (36.2%)	11 (10.5%)	55 (52.4%)	39 (37.1%)
Self-harm in an unspecified manner X84	105	68 (64.7%)	37 (35.2%)	4 (3.8%)	59 (56.2%)	42 (40.0%)

Table 2. Suicide mechanism by age and gender (%), 2010-2020

was recored in the last few years, with highest suicide rate in 2019 with 3.3/100,000 (Table 1).

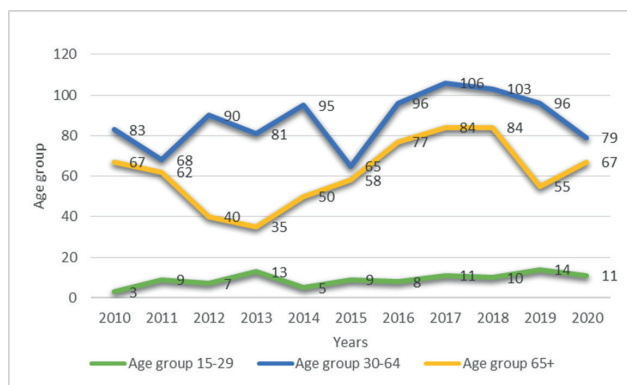
The most common mechanism for suicide in the FB&H was by hanging (45.2% in 2020), followed by firearms (19.7% in 2020) (Table 1). Trends in mechanism of suicide did not vary over the study period. However, mechanism did vary by sex and age (Table 2). The largest difference in mechanism by sex was for firearms, among which 94.7% of firearm suicides were among males and only 5.3% among females. Males were also over-represented in hanging, with 77.8% among males and 22.1% among females. For both jumping and unspecific mechanisms, males comprised about two-thirds and females one third. Poisoning was also a common cause of suicide and the only mechanism that was more frequent among females, with 61.4% of poisonings by females and by males 38.6%. For each mechanism, approximately 50 – 55% were among those aged 30 – 64; 38% to 41% among those aged 65 and above, and 4% to 10% among youth aged 15-29.

Overall, between 5.8 and 9.1 residents per 100,000 commit suicide each year (Graph 3). The suicide rate was lowest at 5.8/100,000 per inhabitants in 2013 and 2015, and highest at 9.1 in 2017. Male suicide rates ranged from 8.8 in 2015 to 13.6 in 2017, and female rates ranged from 2.8 in 2013 to 4.9 in 2017. Each year, male rates were up to 2.5 times those of females.

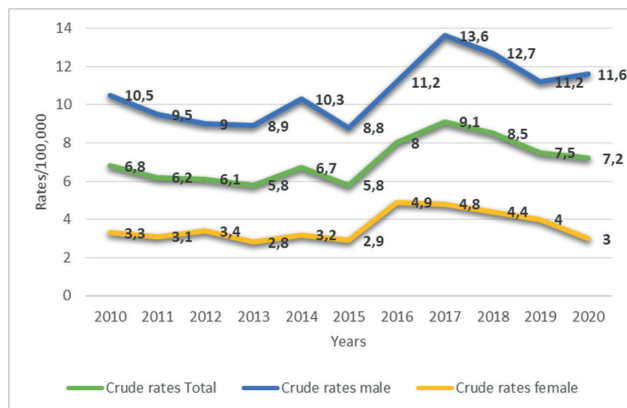
#### 5. DISCUSSION

Mortality data are essential for the development of population-level health status indicators, which are a critical component in setting and benchmarking health priorities at the national level (1). We report among the first data from the FB&H to examine suicide trends, which are increasing globally and garnering attention as a public health priority. The rate of suicide in 2019 was 7.5 per 100,000 residents, which was slightly lower than the worldwide estimated rate of 10.5 (800,000 suicide among 7.6 billion people). However, B&H is on the higher end of the global range of suicide by country, which ranges from as low as under 5 per 100,000 to over 30 per 100,000 (14).

In B&H, the lowest number of suicides was for those between the ages of 5 and 14 and for those aged 70 and over. Although youth suicides were the lowest in number, this population experienced the highest increase during the study period. The suicide rate between the ages of 15-49, which represent the highest ages of reproduction and work productivity, are particularly im-



Graph 2. Number of suicide by age group



Graph 3. Crude rate 2010-2020 (male, female and total)

portant for both the health and economy of B&H. B&H experiences an increase in the number of suicides with age, indicating that programs that focus on the health of the elderly are indicated (10).

Few studies of suicide in this region are available for comparison. In Croatia, in the Krapina-Zagorje County in the period 2007-2017, the average suicide rate was 31.02/100,000 population, with a suicide ratio for women and men of 1 to 4. The average age of suicides was 55 years, and the most common suicide mechanism was hanging for both sexes (69.9%) (15). We found a slightly lower average age, although the sex ratio and mechanisms were similar in B&H and in this Croatian region.

There are differences in suicidal behavior between the sexes: death is a more common outcome among men, as opposed to women (16). Trends in suicide rates by sex are important because evaluations of suicide prevention programs using different approaches (school-based, community-based, healthcare-based) may indicate a larger impact on women (16). In meta-analyses, females presented a higher risk of suicide attempts, and males for suicide death (17), which may be related to some extent by the choice of mechanism, as firearms and hanging, both more common among men, are more lethal means than poisoning, which is the most common mechanism among women (17). Common risk factors of suicidal behaviors for both genders are previous mental or substance abuse disorder and exposure to interpersonal violence (17).

Studies have found that married men, unlike married women, are more likely to commit suicide with a firearm, and unmarried men by hanging (18). Men, but also women, with previous depressive episodes are more likely to commit suicide by hanging. Men with a history of chemical abuse were more likely to commit suicide by poisoning, as opposed to women (18). Social networks show good potential for forming anonymous groups and forums to support people at risk of committing suicide (19).

This study has several limitations. Suicides are undercounted in most countries, and are likely also undercounted in FB&H because suicides on the death certificate may be coded as unknown intent due to stigma or concern about the family. A high proportion of the suicides that were identified in this study did not have a specific code for mechanism. Data from death certificates does not have information about the risk factors or circumstances related to the suicide, although this information would be highly beneficial to inform design of prevention strategies. Statistics on suicide rates for the whole country are limited or non-existent, as incidence rates are not standardly reported by the Ministries of Health. (10). Caution is necessary, so it is needed that adequate epidemiological data for specific groups be used in prevention messages developing (20).

Suicides can, at least partially, be prevented by restricting access to means of suicide, by training primary care health workers and address the way this is reported by the media (21).

For responses to this challenge to be effective, a comprehensive multisectoral suicide prevention strategy is needed (22). Although this study does address the incidence of suicide the COVID-19 pandemic, it is important to note that there is evidence that the pandemic affected the occurrence of fear (18%) and depression (36%) related to age, gender, and occupation, and it could be a predictor of suicide in the general population in B&H (23).

## 6. CONCLUSION

Trends indicated that suicides are increasing for all age groups, in particular those aged 15-29. Focused suicide prevention strategies will need to address specific types of suicide (e.g. firearm safety), and prevention activities will need to be appropriate for different age groups. Understanding age and mechanism trends over time will help prioritize prevention strategies, which will be especially needed in post-pandemic years.

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- **Conflict of interest:** The authors declare that they have no conflict of interest.
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