

Research paper

Suicide in Serbia

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ABSTRACT

Background: Suicide remains a significant public health problem worldwide. The aim of this study was to assess the mortality trend of suicide in Serbia for the years 1991–2014.

Methods: Data on persons who died of suicide and self-inflicted injury (site codes E950–E959 revision 9 and X60–X84 revision 10 of the International Classification of Diseases to classify death, injury and cause of death) were obtained from the Statistical Office of the Republic of Serbia. The age standardized rate was calculated by direct method (per 100,000 persons, using Segi's World population as standard population). Average annual percentage change (AAPC) with the corresponding 95% confidence interval (CI) was computed for trend using the joinpoint regression analysis.

Results: Total 33,930 (24,016 men and 9914 women) suicide deaths occurred in Serbia during the observed period, with the average annual age-standardized mortality rate being 12.7 per 100,000 inhabitants (19.5 per 100,000 in men and 6.7 per 100,000 in women). Suicide mortality in all age groups was higher among men than women. In both genders, suicide rates were highest in the oldest age group. Significantly decreased trend in suicide mortality was recorded continuously from 1991 to 2014 (AAPC = −1.9%, 95%CI −2.2 to −1.6). The most frequently used suicide method in both genders was hanging, strangulation or suffocation with 61.2% of all suicides. Changes in mortality rates were significant both for suicide by firearms, air guns and explosives (AAPC = −1.5% (AAPC = −1.5% in men and −3.1%–3.1% in women) and for suicide by hanging, strangulation, and suffocation (AAPC = −1.2% (AAPC = −1.2% in men and −3.0%–3.0% in women). In men, nonsignificant increase in suicide by firearms, air guns and explosives observed during the period 1991–1997 (by +6.1% per year) was followed by a significant decrease until 2014 (by −3.1% per year). The significantly increased mortality in suicide by firearms, air guns, and explosives was observed in older men (aged 40–69 years and 80 years and over).

Limitations: The low rate of autopsies in Serbia, as well as the accuracy, reliability and comparability of the suicide mortality data is always a question.

Conclusions: Downward trend in suicide mortality occurred in Serbia in last two decades. However, suicide rates are still very high in Serbia compared with the rates of suicides in developed countries. Particularly worrisome is the increase in mortality in older men, especially due to firearm suicides, air rifles, and explosives. Thus, additional efforts in the prevention of suicide are very important.

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1. Introduction

Suicide remains a significant public health problem worldwide (World Health Organization, 2002, 2014; Levi et al., 2003a). According to the World Health Organization (WHO) 2000–2012 estimates, over 800,000 people die due to suicide every year (accounts for 1.4% of all deaths), making it the 15th leading cause of death in both genders together (World Health Organization, 2014).

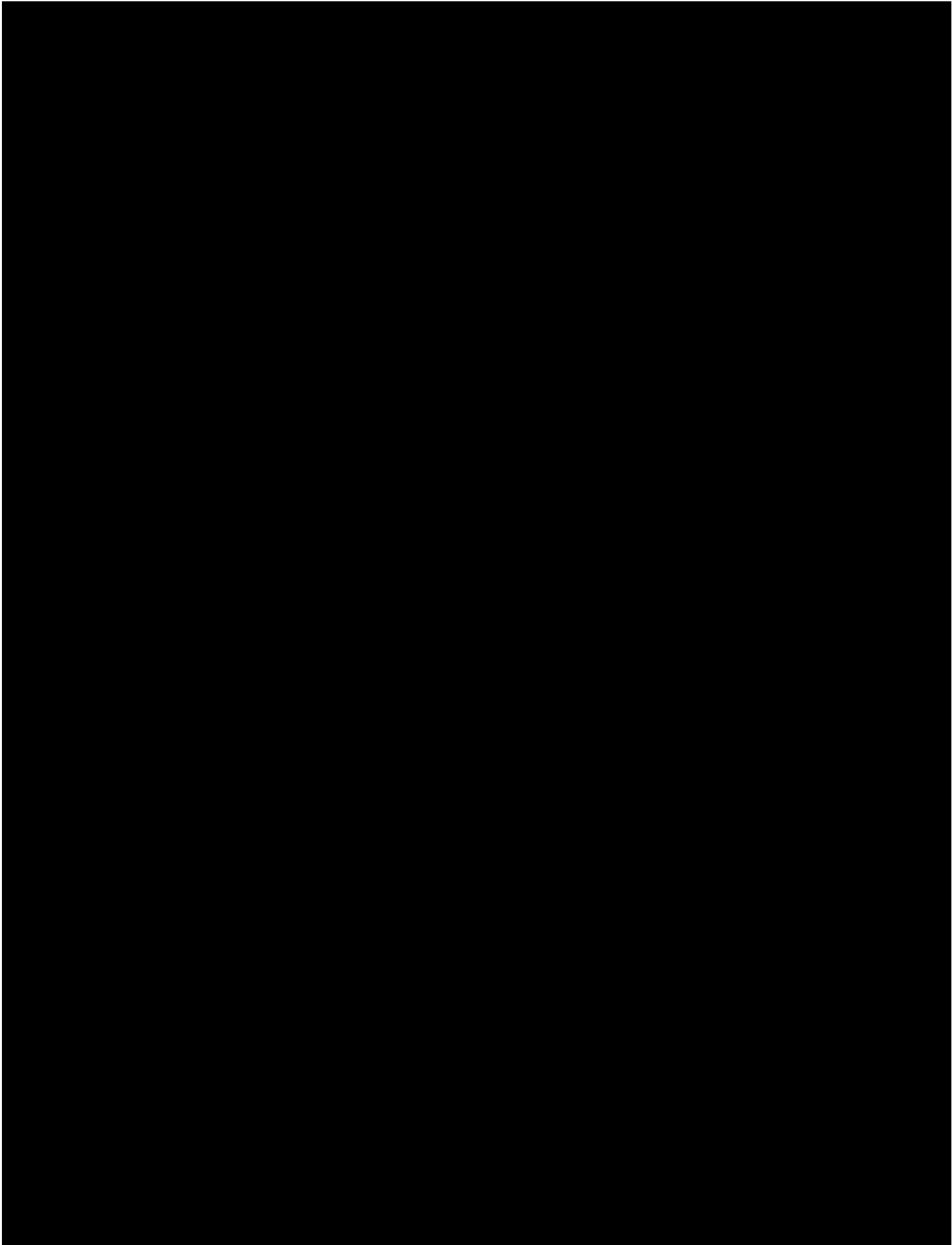
The global annual suicide death rate was 11.4 per 100,000 persons in 2012 (World Health Organization, 2015). The

predominance of the suicide mortality rates among males in regard to females was constant (World Health Organization, 2015). Rates of suicide are highest in people aged 70 years and over. But, in some countries (India, Mexico) the suicide rates among young people aged 15–29 years were higher than in other age groups, especially in women.

Overall suicide mortality trend declined in many Western countries in the last decades (Levi et al., 2003a). But, in the United States of America mortality rates for suicide rose substantially over the past decade (Rockett et al., 2012). Despite a decline in suicide mortality in the past decade, the countries of former Eastern Bloc still have one of the highest suicide rates in the world (Rihmer et al., 2013). In some Eastern European countries (Belarus, Russia) suicide mortality trend is still increased (Levi et al., 2003b). The

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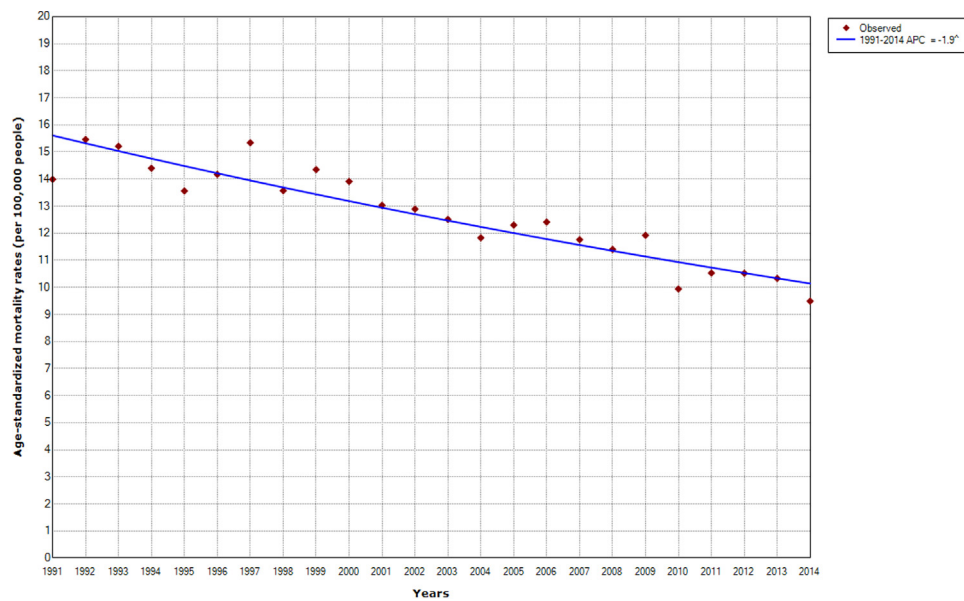


Fig. 1. Joinpoint regression analysis of suicide mortality in Serbia (excluding the Autonomous Province of Kosovo and Metohia), in the period 1991–2014. * Statistically significant trend; APC=Average Percentage Change.

Table 1

Suicide mortality in Serbia (excluding the Autonomous Province of Kosovo and Metohia), by gender, in the period 1991–2014.

Men				Women		
Year	N	Crude rate	ASR	N	Crude rate	ASR
1991	1016	27.3	21.0	456	11.8	7.8
1992	1105	29.7	22.6	534	13.7	9.1
1993	1072	28.8	22.2	547	14.0	9.0
1994	1046	28.1	21.2	480	12.3	8.3
1995	992	26.6	20.2	434	11.1	7.7
1996	1025	27.5	21.0	459	11.8	8.0
1997	1117	30.1	22.6	505	13.0	8.7
1998	1015	27.5	20.4	445	11.5	7.5
1999	1092	29.8	21.7	480	12.4	7.8
2000	1072	28.1	21.0	474	12.3	7.5
2001	1026	28.9	20.2	417	10.8	6.6
2002	1053	28.9	20.4	396	10.3	6.1
2003	998	27.4	19.7	383	10.0	6.0
2004	979	27.0	19.6	367	9.6	5.9
2005	1010	27.9	18.8	432	11.3	6.6
2006	1022	28.4	19.1	422	11.1	6.3
2007	969	27.0	18.2	385	10.2	5.9
2008	903	25.3	17.2	387	10.2	6.2
2009	1000	28.1	18.6	376	10.0	5.9
2010	905	25.4	16.2	304	8.1	4.3
2011	909	25.8	16.4	347	9.3	5.2
2012	932	26.6	16.9	311	8.4	4.6
2013	901	25.8	16.5	296	8.1	4.7
2014	857	24.7	15.3	277	7.6	4.2
Total	24,016	27.5	19.5	9914	10.8	6.7

ASR – Age Standardized Rate (per 100,000 persons, using Segi's World standard population).

approximately 3 times higher in men than in women (19.5 per 100,000 men and 6.7 per 100,000 women).

Suicide mortality significantly decreased in both males (by -1.5% per year, 95%CI -1.7 to -1.2) and females (by -3.0% per year, 95%CI -2.6 to -1.6) (Fig. 2). Among males, the suicide mortality rates were relatively stable for 1991 through 2000, and then decreased significantly by 2.1% per year until 2014. According to comparability test, suicide mortality trends in men and women were not parallel (final selected model rejected parallelism, $p < 0.05$).

The significant decrease in suicide rates in females was observed in all age groups with twenty years and over (Table 2). Among 20–29 years old males, the suicide rates significantly increased by $+3.5\%$ per year from 1991 to 1997, then significantly declined by -5.5% per year until 2004, and then showed non-significant contrasting trends until 2014. There was one joinpoint in mortality trend for suicide among men aged 70–79 years: the suicide rates decreased by -1.2% per year for 1991 through 2007, and then decreased dramatically by -13.0% per year until 2014. The trend of suicide was stable in middle-aged men (aged 40–59 years).

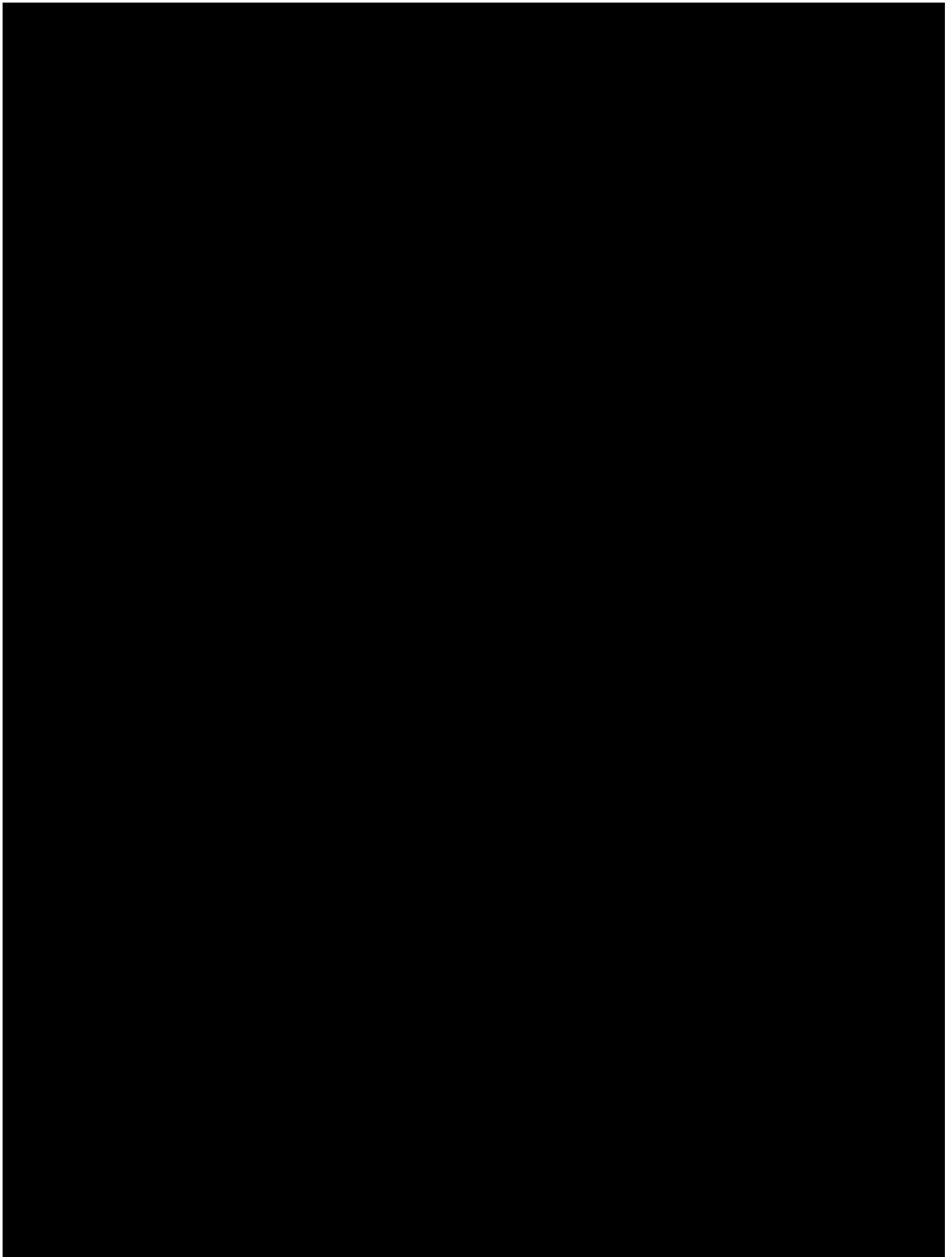
Figs 3–4 show the method-specific suicide trends by gender. Among men, mortality rates decreased significantly both for suicide by firearms, air guns and explosives (by -1.5% per year, 95%CI -2.4 to -0.5), and for suicide by hanging, strangulation, and suffocation (by -1.2% per year, 95%CI -1.5 to -0.9). In men, non-statistically significant increase in suicide by firearms, air guns and explosives observed during the period 1991–1997 (by $+6.1\%$ per year) was followed by a significant decrease until 2014 (by -3.1% per year). Women showed a similar significant reduction both in mortality by hanging, strangulation, and suffocation (by -3.0% , 95%CI -3.5 to -2.4) and mortality by firearms, air guns and explosives (-3.1% , 95%CI -5.1 to -1.1). According to comparability test, mortality trends by suicide methods in men differed significantly from mortality trends in women (final selected model rejected parallelism, $p < 0.05$).

The significantly increased mortality in suicide by firearms, air guns, and explosives was observed in older men (aged 40–69 years and 80 years and over) (Table 3).

4. Discussion

4.1. Main findings

Suicides in Serbia kill about 1500 people annually. Serbian males kill themselves about three times more often than do females. The most frequently used suicide methods in both genders were hanging, strangling or suffocation. Overall suicide mortality has undergone a significant decline in the last two decades. The above mortality rates place Serbia among the countries with the



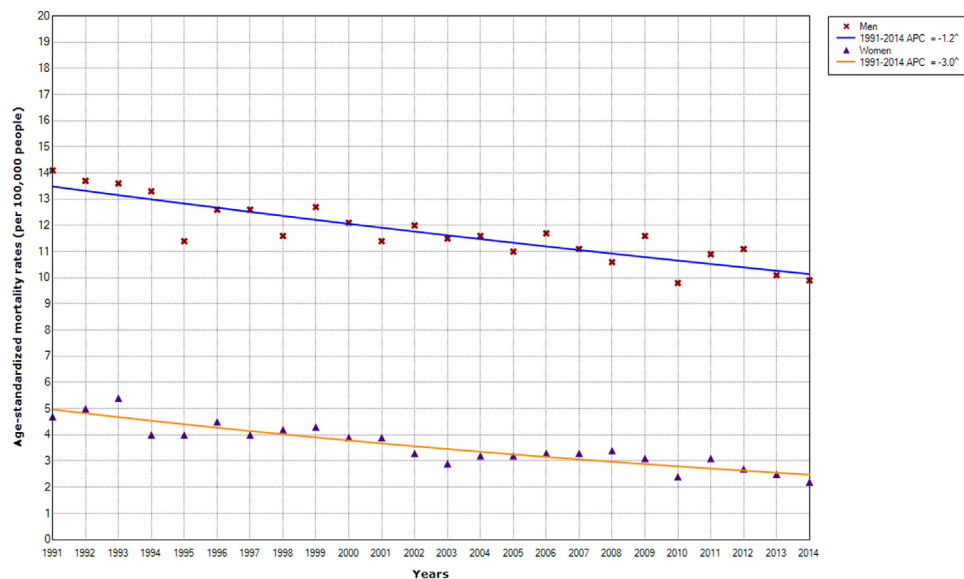


Fig. 3. Joinpoint regression analysis of mortality for suicide by hanging, strangulation, and suffocation in Serbia (excluding the Autonomous Province of Kosovo and Metohia), by gender, in the period 1991–2014. * Statistically significant trend; APC=Average Percentage Change.

transition period since 1980s (Pray et al., 2013). It should be noted that some differences in suicide mortality rates around the world may be attributed to the quality of mortality statistics which varies by country and the possible bias in reporting deaths by suicide (Levi et al., 2003a; World Health Organization, 2014).

With exception of some countries (Japan, Spain), mortality from suicide in developed countries has been in decline since 1980s in both genders (Levi et al., 2003a). But, recent increasing trend in the United States of America (Rockett et al., 2012) contrasts with favorable trends in Eastern European countries, Australia and China since 2000s (Pray et al., 2013; Zhang et al., 2014). Further, an increase in suicide mortality is shown in some developing countries (such as South Korea, India) (Reddy, 2010). A recent national study conducted in Ireland reported rising suicide rates during 2011 and 2012 (Corcoran et al., 2015) and showed a significant positive association between the 2008 global profound economic recession and elevated suicide risk at national level. Similarly, after 2007 there was a noticeable increase in suicide

rates among Italian men involved in the labor force (Pompili et al., 2014). But, our study showed a decline in overall suicide mortality for men aged 20–29 years during 2007–2010 and a substantial decline for men aged 70–79 years during 2007–2014. The decreasing suicide mortality trend in Serbia must be interpreted with caution. One possible explanation for the lack of increase in the mortality rates from suicide over the last few years at the national level, especially regarding the 2008 global recession, may be the fact that during the previous 24 years Serbian population was continuously in extremely difficult circumstances, such as the civil wars and the dissolution of the former Yugoslavia in the 1990s, sanctions in 1992 and the collapse of the economy in 1993, NATO bombing in 1999, democratic socio economic changes in 2000, global financial crisis and the Kosovo's unilateral declaration of independence in 2008 (Government of the Republic of Serbia, 2015). Some of assumed suicide risk factors (unemployment rate, alcohol use, etc.) are still highly present in the population of Serbia (Ministry of Health, Republic of Serbia, 2007). In 2006 in Serbia

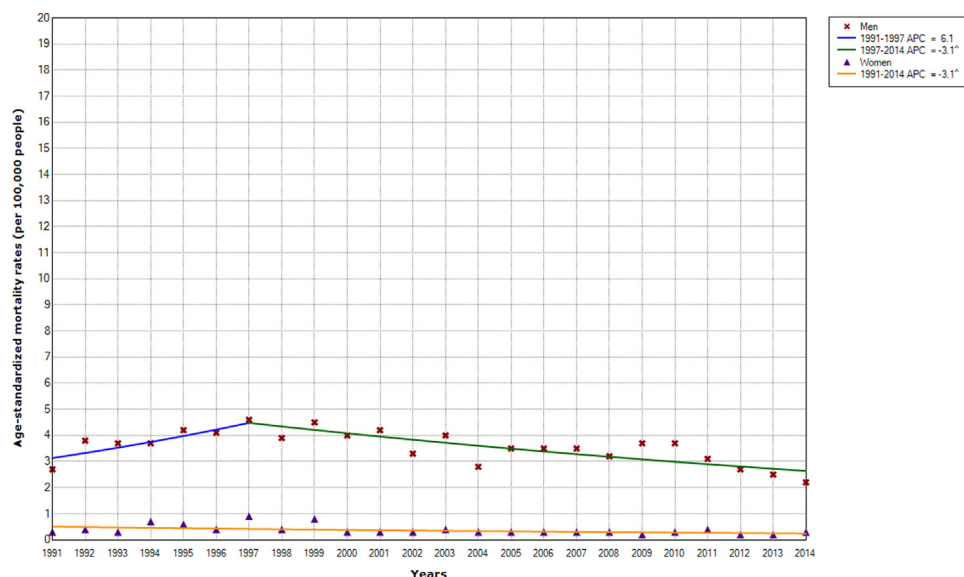
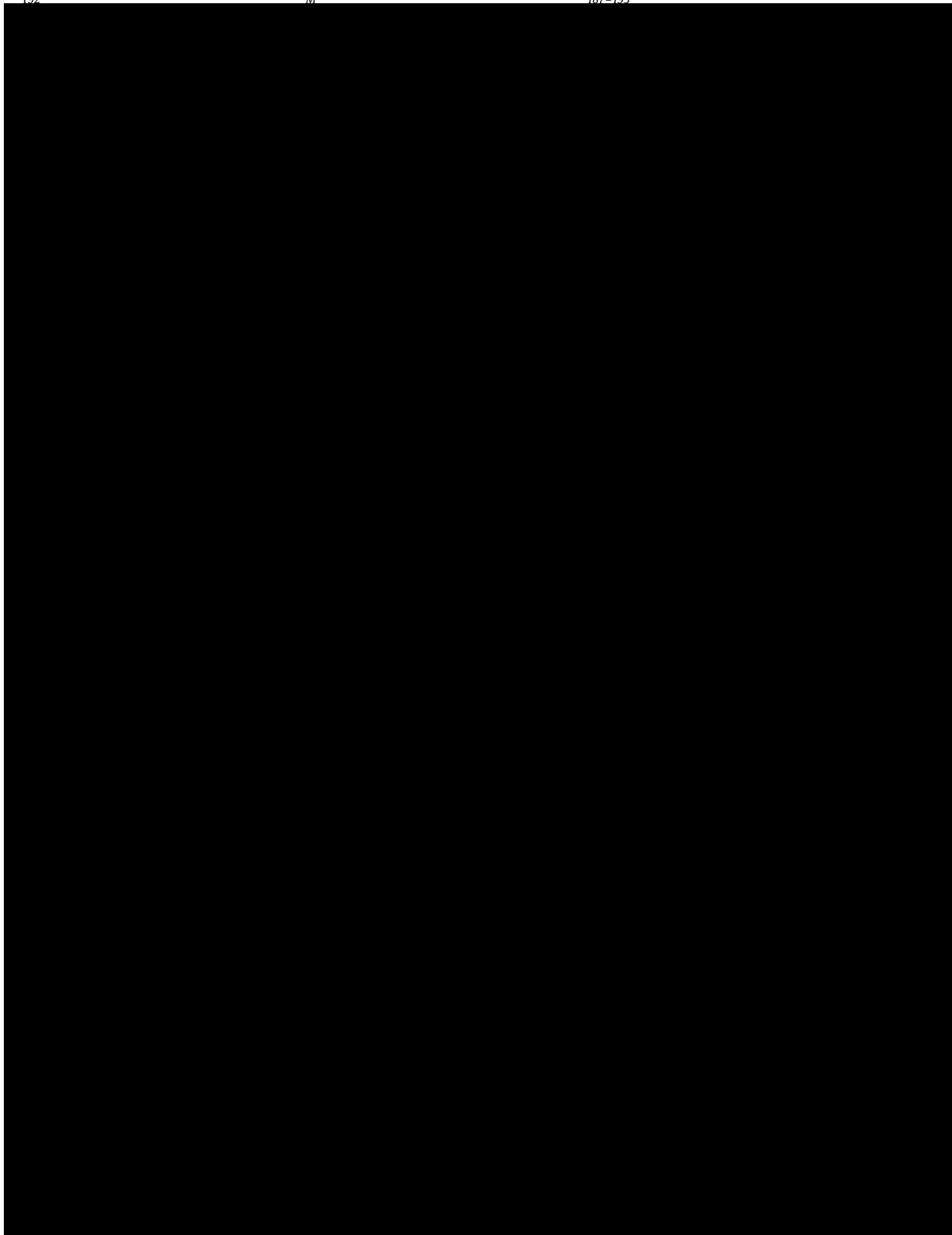


Fig. 4. Joinpoint regression analysis of mortality for suicide by firearms, air guns, and explosives in Serbia (excluding the Autonomous Province of Kosovo and Metohia), by gender, in the period 1991–2014. * Statistically significant trend; APC=Average Percentage Change.



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