

## Population Drinking and Suicide Trends: A Cross-Country Comparison

Y. E. Razvodovsky

Grodno State Medical University, 80 Gorky Street, Grodno, Belarus

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**Background:** *The Slavic countries of the former Soviet Union (fSU) Russia, Belarus and Ukraine retain one of the highest suicide rates in the world, despite a gradual decline over the past decade.*

**Aims:** *The present study aims to analyze whether population drinking is able to explain the dramatic fluctuations in suicide mortality in Russia, Belarus and Ukraine from the late Soviet to post-Soviet period.*

**Method:** *Trends in sex-specific suicide rates and alcohol sales per capita from 1980 to 2010 in Russia Belarus and Ukraine were analyzed employing a Spearman's rank-order correlation analysis.*

**Results:** *The estimates based on the Soviet data suggest a strong association between alcohol sales and suicide rates in Russia, Belarus and Ukraine. At the same time, the relationship between alcohol sales and suicide rates was negative in the post-Soviet period.*

**Conclusion:** *The findings from present study suggest that the suicide mortality fluctuations in Russia, Belarus and Ukraine in the Soviet period were attributable to alcohol. Alternatively, alcohol can not fully explain the fluctuations in the suicide mortality observed in these countries in the Soviet period. Similar regional pattern of suicide trends do not support the hypothesis that alcohol control policy was responsible for the decline in Russian suicide mortality during recent decade.*

**Keywords:** alcohol sales, suicide rates, Russia, Belarus, Ukraine, 1980-2010

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### 1. BACKGROUND

The Slavic countries of the former Soviet Union Russia, Belarus and Ukraine retain one of the highest suicide rates in the world, despite a gradual decline over the past decade (1,2). The reason of high suicide mortality in fSU countries is not fully understood. A number of variables, including socioeconomic factors, religious and biological background should be considered (1-6). The developments in suicide mortality in fSU countries have been particularly dramatic in connection with the societal processes of the last decades including the period of reforms known as "perestroika" and the collapse of the Soviet Union (4,5). The dramatic fluctuations in suicide mortality in fSU over the past decades have been widely discussed in the scientific literature and are still relatively unexplored (5,6,7).

Accumulated evidence suggests that the mixture of high rate of distilled spirits consumption and binge drinking pattern is a major contributor to the suicide mortality burden in fSU countries (8-13). Recent case-control study indicated that hazardous drinking substantially increases the risk of suicide among working-age Russian males, with nearly half of all suicides attributed to this drinking pattern (14). Aggregate-level studies also reveal an association between population level drinking and suicide rates in Russia and Belarus (9,15-22). Furthermore, evidence of the time series association dates back over a century for the Tsarist era and continues through the Soviet and post-Soviet period (23). However, several studies did not confirm an association between alcohol consumption and suicide rates in the post-Soviet period (6,24).

Cross-country comparative studies may be particularly useful to test the hypothesis that social structure and macroeconomic differences across countries affect the suicide rates. The Slavic countries of the fSU Russia, Belarus and Ukraine share a longer common history and experienced similar socioeconomic development during the Soviet period (6,25). The marked similarities in socioeconomic and mortality trends in the countries during the Soviet period contrast with their notable divergence after the collapse of the Soviet Union in 1991 (26). In comparative perspective, the developmental path in Belarus has been somewhat different to that seen in Russia and Ukraine in the post-Soviet period. There has been less emphasis on economic reform in Belarus, with many aspects

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of the command economy being retained, as witnessed by the low level of privatization (25). By contrast, Russia and Ukraine has chosen more radical forms of economic transformations, which have led to massive privatization campaigns (26).

### 2. OBJECTIVES

The present study aims to analyze whether population drinking is able to explain the dramatic fluctuations in suicide mortality in Russia, Belarus and Ukraine from the late Soviet to post-Soviet period. More specifically, this study focuses on a comparative analysis of sex-specific suicide rates and alcohol sales per capita in these countries between 1980 and 2010.

### 3. METHODS

The data on gender-specific suicide rates (per 100.000 of the population) were taken from the WHO mortality database. The data on per capita alcohol sales (in liters of pure alcohol) are taken from the National Statistical Committees. The data were broken into two periods (from 1980 to 1991 and from 1992 to 2010) to determine whether the link between alcohol sales and suicide rates has altered in the post-Soviet period. To examine the relation between changes in alcohol sales and suicide rates across the study period a Spearman's rank-order correlation analysis was performed using the statistical package "Statistica".

### 4. RESULTS

The average male suicide rates figure for Russia, Belarus and Ukraine was  $53.3 \pm 10.3$ ,  $45.8 \pm 9.5$  and  $38.0 \pm 6.0$ , while the average female suicide rates was  $9.5 \pm 1.5$ ,  $7.6 \pm 0.7$  and  $6.8 \pm 1.0$  per 100.000 respectively. Since the early 1980s, male and female suicide mortality in these countries has undergone sharp fluctuations (Fig. 1,2).

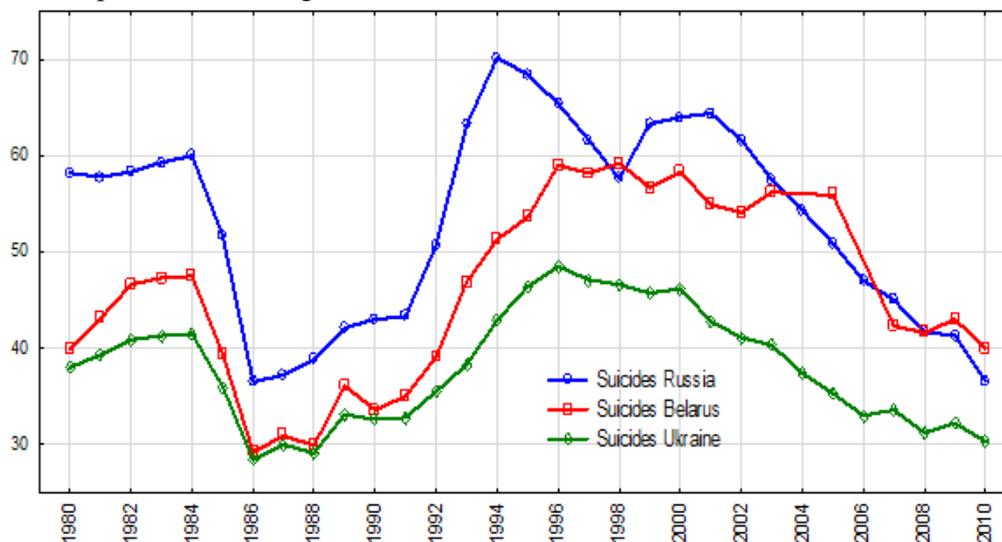


Figure 1. Trends in male suicide rates in Russia, Belarus and Ukraine between 1980 and 2010

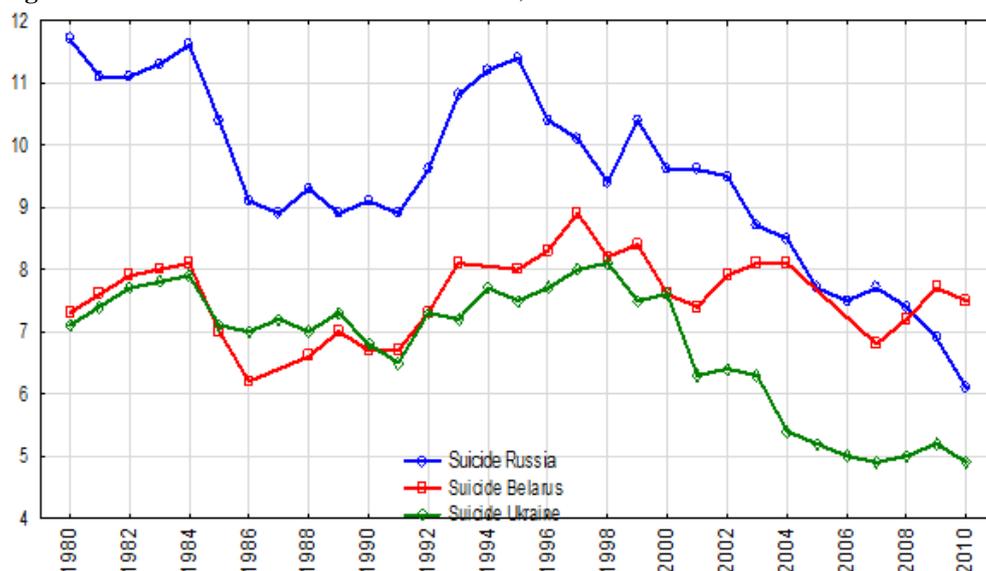


Figure 2. Trends in female suicide rates in Russia, Belarus and Ukraine between 1980 and 2010.

In general, the gender-specific temporal pattern of suicide mortality fluctuations was similar for three countries: sharp decrease in the mid of 1980s, dramatic increase in the first half of 1990s followed by a decline. While the trends in suicide mortality have been similar in three countries during the Soviet period, there was market discrepancy after the collapse of the Soviet Union. In Russia male suicide rates jumped dramatically between 1991 and 1994. There was also a spike in suicide mortality between 1999 and 2001 in Russia. In Belarus and Ukraine, male suicide rates increased dramatically between 1991 and 1996 and then started to decrease. The comparative analysis of long-term evolution of suicide rates suggests that in the 1980s the rates were considerably lower in Belarus and Ukraine than in Russia, but this gap practically disappeared in most recent years. It should be also emphasized that suicide mortality in Russia and Ukraine reached its lowest point for the entire period in 2010.

It is important to point out that the pattern of suicide mortality for men and women was not uniform. Suicide rates dropped more sharply for male than for female during the anti-alcohol campaign. Further, the rates of suicide increased for both sexes during the transition, but it appears those males were more adversely affected during this period. In general, the male suicide rate tends to fluctuate across time series to a much greater extent than the female rate.

The average per capita alcohol sales figure for Russia, Belarus and Ukraine was  $8.0 \pm 1.9$ ,  $8.6 \pm 2.2$  and  $5.9 \pm 1.8$  litres per capita respectively. The temporal pattern of alcohol sales per capita in all countries was similar across the Soviet period (Fig. 3).



**Figure 3.** Trends in alcohol sales per capita in Russia, Belarus and Ukraine between 1980 and 2010.

As can be seen, the alcohol sales decreased slightly in the early 1980s, and then decreased dramatically between 1984 and 1987. After the collapse of the Soviet Union, recorded alcohol consumption in Russia rose sharply between 1992 and 1995, decreased substantially in 1996, increased steadily up to 2007, and then started to decrease. In the post-Soviet Belarus alcohol sales increased steadily with several oscillations up to 2005, then jumped dramatically, and since 2011 started to decrease. In the post-Soviet Ukraine alcohol sales decreased markedly between 1991 and 1996, increased dramatically between 1996 and 2008, and then started to decline.

The graphical evidence suggests that in the Soviet period, the gender-specific temporal pattern of suicide rates fits closely with changes in alcohol sales per capita in all countries (Fig. 1,2,3). By contrast, there was significant discrepancy between these trends in the post-Soviet period. The outcomes of the Spearman's correlation analysis are presented in Table 1. The estimates based on the Soviet data suggest a strong association between alcohol sales and suicide rates in Russia, Belarus and Ukraine for both sexes. At the same time, the relationship between alcohol sales and suicide rates was negative in the post-Soviet period.

**Table 1.** *Estimated effects of alcohol sales on suicide rates*

		1980-1991		1992-2010	
		r	p	r	p
Russia	male	0.90	0.000	-0.58	0.012
	female	0.88	0.000	-0.59	0.009
Belarus	male	0.78	0.003	-0.27	0.297
	female	0.73	0.011	-0.40	0.123
Ukraine	male	0.85	0.000	-0.95	0.000
	female	0.45	0.117	-0.90	0.000

**5. DISCUSSION**

According to the results of present analysis there was a positive and statistically significant effect of per capita alcohol sales on gender-specific suicide rates in Russia, Belarus and Ukraine in the Soviet period. The magnitude of this effect was similar for male and female in Russia and Belarus and somewhat less evident for female in Ukraine. These results replicate previous findings that suggested a close link between alcohol and suicide at the aggregate level (9-13).

Natural experiments, such as sudden and large changes in alcohol consumption level, provide an opportunity to test the efficacy of policy attempts to reduce the rate of alcohol-related problems in the population. Gorbachev’s anti-alcohol campaign in the 1985-1988 is the most well-known natural experiment in the field of alcohol policy. The campaign restricted hours of alcohol sales, increased the price of alcohol, implemented purchase quotas, imposed tougher legal sanctions on home production (27). It seems obvious that sudden decline in suicide rates between 1985-88 appears to be entirely due to anti-alcohol campaign.

The collapse of the Soviet Union in 1991 was followed by socioeconomic crisis, which had devastating consequences on population physical and mental health across the region (27-29). The post-Soviet transition has had a dramatic impact on suicide mortality, which is often referred as an indicator of psychosocial distress (4). One possible explanation behind marked discrepancy in suicide trends during the post-Soviet period lies in the economic strategies that countries used. The cross-country evidence suggests that male suicide rates in the fSU are strongly related to the state of the macro economy (3). Rapid mass privatization and increased unemployment rate was suggested as the major determinant of the mortality crisis in Russia in the early 1990s (26). The association between macroeconomic instability, unemployment and suicides is well established (4). A recent study in 27 European and 27 non-European countries reported an association between the magnitude of rises in unemployment and increases in suicide rates (30). Similarly, a cross-sectional time-series analysis of a panel data from 13 countries of the former Soviet bloc between 1990 and 2008 indicated that variables measuring economic integration and regulation, such as unemployment and GDP per capita, significantly impacted on suicide rates (24).

There is, however, evidence that an increase in suicide rates during economic crisis is not inevitable. For example, the economic crisis in the former Soviet Baltic republics in 2008 has not been accompanied by an increase in suicide mortality (31). Furthermore, in his cross-sectional study Makinen (3) highlighted that the economic changes do not correlate significantly with changes in suicide rates in the Eastern Bloc countries. Alternatively, population drinking retained its position as a predictor of suicide rates even after the socioeconomic variables were included in the model. It should be emphasized, that the magnitude of suicide mortality fluctuations during transition was similar in Russia and Belarus, despite the differences in the pace of economic reforms. At the same time, there was significant discrepancy between suicide trends in Russia and Ukraine, despite the similarity in the pace of economic reforms. This evidence suggests that rapid mass privatization, increase unemployment and psychosocial distress do not provide a sufficient explanation for cross-country differences in suicide trends during the transition to the post-communism.

A spike in suicide mortality in Russia between 1999 and 2001 might be explained by the financial crisis and a worsening economic situation in 1998. Alternatively, rise in suicide rates from 1998 may be associated with the increase in affordability of alcohol because of the drop in the price of vodka relative to those of other goods (27).

One of the most interesting features of suicide mortality trends in the fSU countries in the early-1990s and after the financial crisis in 1998 is the gender difference in spite of the fact that men and women share the same socio-economic circumstances. It seems that males were most vulnerable to the stressful experience resulting from abrupt socioeconomic changes, unemployment and impoverishment. This disproportionately affects the working-age male population because their work and family roles rendered them more vulnerable to socioeconomic disruption (6). This evidence is consistent with a greater increase in suicide rates in men than in women seen in many European and American countries after the 2008 global economic crisis (30). Remarkably, the 2008 global economic crisis does not seem to have had a significant impact on suicide rates in the fSU countries.

Since 2001, Russia has experienced steep decline in suicide mortality rates. What is unclear, however, is whether this trend is simply the latest phase in a continuing cycle of fluctuations that have characterized suicide mortality in Russia over the past three decades, or whether there are new features that mark a break from the past. Several experts hypothesized that the reduction in the number of suicide deaths during the last decade might be attributed to the implementation of the alcohol policy reforms in 2006, which increased government control over the alcohol market (32,33). In a recent study Predimore et al. (34) took advantage of this natural experiment to assess the impact on suicide mortality of a suite of Russian alcohol policies. They revealed that the alcohol policy in Russia led to a 9% reduction in male suicide mortality, meaning the policy was responsible for saving 4000 male lives annually that would otherwise have been lost to suicide.

There is, however, some doubts that recent decline in suicide rates in Russia is fully attributable to the alcohol control measures, since downward trend in suicide rate started before the implementation of the alcohol policy reforms. It might be especially true, since specific alcohol control measures were not implemented in Belarus and Ukraine during recent decade. An alternative explanation might be that the decline in Russian suicide mortality is simply following a regional pattern that happened to coincide with the implementation of alcohol control measures. The downward trend in the suicide mortality in the fSU countries over the past decade can be attributed to the macro economic stabilization.

Before concluding, we should address the potential limitations of this study. In particular, we relied on official alcohol sales data as a proxy measure for trends in alcohol consumption across the period. However, statistics on recorded alcohol consumption suffer from a high degree of uncertainty, especially in the post-Soviet period (35,36). The three countries largely share the same experiences with statistics before the collapse of the Soviet Union. The central statistical agencies of newly independent republics continued the traditional Soviet method of alcohol sales data collections. At the same time, the abolishment of the state alcohol monopoly and the appearance of private retail trade outlets during the period of transition made such data collection more difficult and the resulting alcohol statistics less reliable (27). Furthermore, unrecorded consumption of alcohol was commonplace in Russia, Belarus and Ukraine throughout the study period, especially in the mid-1990s, when a considerable proportion of vodka came from illicit sources (36). In comparative perspective, Ukraine has the largest share of unrecorded alcohol in total alcohol consumption (36). It has been estimated that unrecorded alcohol makes up two-third of overall alcohol consumption in this country (37). The amount of recorded consumption as a proportion of total consumption in Ukraine has decreased dramatically during the period of transition. According to estimates by the Ukrainian Alcohol and Drug Information Centre recorded alcohol consumption ranged between 6.3 litres in 1980 and 2.0 in 1994, while corresponding figures for unrecorded consumption of alcohol were 5.0 and 9.5 litres per capita (38). An uncertainty about the actual alcohol consumption figures has contributed to the debates on the role of alcohol in the suicide mortality crisis in the fSU republics in the 1990s. Further, there may also have been potential problems with the suicide mortality data. In general, the quality of violent mortality statistic in countries of the former Soviet Union is sufficient for making cross-country comparisons (25). There was, however, sharp increase of deaths classified as injury with undetermined intent in Russia and Belarus following the collapse of the Soviet Union (39). Substantial misclassification of suicides is likely to have distorted the time series association between population drinking and suicide rates in the post-Soviet period.

In conclusion, the findings from present study suggest that the suicide mortality fluctuations in Russia, Belarus and Ukraine in the Soviet period were attributable to alcohol. Alternatively, alcohol can not fully explain the fluctuations in the suicide mortality observed in these countries in the Soviet

period. Similar regional pattern of suicide trends do not support the hypothesis that alcohol control policy was responsible for the decline in Russian suicide mortality during recent decade. Further monitoring of suicide mortality trends in the former Soviet countries and detailed comparisons with earlier developments in other countries remain a priority for future research.

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