

Are Trends in Alcohol Consumption and Cause-Specific Mortality in Russia Between 1990 and 2017 the Result of Alcohol Policy Measures?

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ABSTRACT. Objective: The purpose of this study was to analyze trends in alcohol consumption and mortality and their association with alcohol control measures in Russia between 1990 and 2017. **Method:** Analysis of trends for all-cause mortality and alcohol-related mortality, life expectancy, and total adult per capita alcohol consumption and their relationship were conducted. A narrative literature review of alcohol control policies since 1990 was done. **Results:** Corresponding trends of alcohol consumption and all-cause mortality and cause-specific mortality were observed for the analyzed period. Steep increases in consumption and mortality occurred in 1991–1994 and in 1998–2002, and a continuous decline was observed since 2003. Trends in alcohol consumption

were also closely mirrored by trends in life expectancy. These dynamics seem to be affected by economic trends and alcohol control policies, which were increasingly implemented over the observation period, even though some measures remained vague. **Conclusions:** A combination of several factors seems to be at play to explain alcohol consumption and mortality trends: the general economic situation, the availability and affordability of alcohol, and the changing patterns of alcohol consumption. Alcohol control measures seem to have had a positive impact on decreasing alcohol consumption and mortality insofar as they have reinforced the existing economic trends. (*J. Stud. Alcohol Drugs*, 80, 489–498, 2019)

LARGE FLUCTUATIONS IN ADULT MORTALITY rates have been observed in Russia since the late 1980s, which seem to be closely associated with fluctuations in adult per capita alcohol consumption levels (Leon et al., 1997; Nemtsov, 2011; Neufeld & Rehm, 2013; Shkolnikov et al., 1998). As several epidemiological studies of different methodology concluded, this association may result from a causal impact of alcohol use; in other words, alcohol use has been established as one of the main contributors, if not the main contributor, to Russian mortality (Leon et al., 2007, 2009; Nemtsov, 2002; Rehm et al., 2007; Zaridze et al., 2009, 2014).

There have been three major declines of alcohol consumption and mortality in Russia over the last 30 years, each of them unprecedented in their speed and steepness (Nemtsov, 2011). Although the first decline was mainly caused by the anti-alcohol campaign in 1985–1987 and lasted only until its

end (Bhattacharya et al., 2013; Shkolnikov & Nemtsov, 1997), the second decline lasted from 1995 to 1998, and the third decline started in 2004 and still seems to be ongoing (Grigoriev & Andreev, 2015; Nemtsov, 2011). This contribution will analyze trends in adult per capita alcohol consumption in general, including the above-mentioned declines and their relation to all-cause mortality and cause-specific mortality for the period 1990–2017. It will also discuss the possible impact of the alcohol policies on the observed trends and different explanations for these trends.

Method

Analysis of trends in overall mortality and cause-specific mortality were based on data from the Russian Fertility and Mortality Database (RusFMD) of the Center for Demographic Research at the New Economic School (Center for Demographic Research, 2018).

Alcohol use is causally linked to many disease and injury categories; more than 40 three-digit codes from the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10)*; World Health Organization, 1992) are fully attributable to alcohol, with the most important causes of death being partially attributable to alcohol, such as cancers, injuries, cardiovascular, gastrointes-

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tinal, and infectious diseases (for an overview on causal relations of alcohol use, see Rehm et al., 2017). However, the RusFMD does not provide detailed data for each three-digit ICD-10 code separately, and various items are summarized in aggregated cause-of-death categories, as, for instance, in the case of “suicide and self-inflicted injury: X60–X84.”

This makes a more nuanced analysis impossible. Moreover, major changes in the cause-of-death classification system took place during the analyzed period, which might have induced inconsistency in trends. The Soviet Classification was used until 1998, followed by different versions of the Russian Abridged Classification based on ICD-10, the first of which was introduced in 1999, changing again in 2006 and 2011 (for more information on the reconstruction of a coherent data series for Russia, see Danilova, 2018).

For our analysis of mortality, we have included data on death causes obviously related to alcohol, such as alcohol poisoning, alcoholic psychosis, chronic alcoholism, alcoholic liver disease, alcoholic cardiomyopathy, alcohol-induced chronic pancreatitis, and degeneration of the nervous system due to alcohol (for the latter three, data were only available since 2006). In addition, data on suicides and homicides were retrieved since fluctuations in these death rates are closely associated with alcohol consumption in Russia (Pridemore, 2002, 2004; Pridemore & Chamlin, 2006; Pridemore et al., 2013).

Mortality data were retrieved in the form of sex-specific rates per million per age group and were standardized using the estimated mid-year population of 2017 as a standard, which was also provided by the database.

Data on sex-specific life expectancy were retrieved from the Russian Statistical Service (Gks.ru, 2018). Total alcohol per capita consumption, including unrecorded alcohol (alcohol that is not registered and taxed by the government but consumed as a beverage), was estimated using a special method, developed by the first author (Nemtsov, 1998, 2011; for a detailed description, see the Web Appendix). (The Web Appendix appears as an online-only addendum to the article on the journal’s website.) Furthermore, pure alcohol from beer was calculated on the basis of official beer sales retrieved from the Russian Statistical Service (Gks.ru, 2018) and added to the calculated amount since our underlying hypotheses were that (a) the amount of fatal alcohol poisonings with beer were negligible and beer therefore was barely reflected in the relationship of intoxicated deaths, and (b) the amount of unrecorded beer (either home-brewed, counterfeit, or smuggled beer) was negligible in Russia.

A narrative review on government activities in the field of alcohol policy for the period 2000–2017 was based on key literature in the field (Khaltourina & Korotayev, 2015; Kolosnitsyna et al., 2014; Levintova, 2007; Nemtsov & Shelygin, 2014; Neufeld & Rehm, 2013, 2018a; Pridemore et al., 2014; Pshizova & Bublikova, 2015; Radaev, 2015; Skorobogatov, 2014). Additional information on alcohol-

related legislation was retrieved from the ConsultantPlus online reference system (Consultant.ru, 2018) and the official website of the State Alcohol Regulation Service (Rosalkoregulirovanie, 2018).

Results

Trends in all-cause mortality and cause-specific mortality for 1980–2017

The standardized death rates (SDRs) for all causes and all ages per 100,000 demonstrated large fluctuations during the period 1980–2003 with a steady decline since 2003, as presented in Figure 1, along with substantial trend changes in mortality due to alcohol poisonings, suicides, homicides, chronic alcoholism, and alcoholic psychoses. A different pattern is observed for alcoholic liver mortality; rates were fluctuating for the period 1985–1998, steeply increasing between 1998 and 2006, and generally decreasing since 2006 with small increases in 2008, 2010, and 2014. SDRs in alcohol-induced chronic pancreatitis, alcoholic cardiomyopathy, and degeneration of nervous system due to alcohol (all categories recorded since 2006) demonstrated a general decline, although the latter category showed a slight increase for the period 2014–2016. An overview of the total and cause-specific rates is presented in Table 1.

Beginning in 1989, total mortality and cause-specific mortality were steeply rising for both sexes, followed by a decline in 1995–1998, and a renewed increase since 1998 (Center for Demographic Research, 2018). Total mortality started to decrease in 2003 for women and 2004 for men, and has dropped between 2002 and 2017 by 34% for women and by 40% between 2003 and 2017 for men. The same changes were observed in fluctuations of mortality rates of the analyzed alcohol-related causes of death (with the exception of alcoholic liver disease).

Alcoholic psychoses and homicide mortality in women started to decrease in 2002 and dropped between 2001 and 2017 by 83% and 80%, respectively. The decrease in female fatal alcohol poisonings started in 2003 and resulted in a decline of 78% between 2002 and 2017. The trend reversal in male mortality due to homicides took place in 2003, with rates dropping by 80% between 2002 and 2017, whereas alcohol poisonings and alcoholic psychoses mortality rates had been decreasing since 2004, and declined between 2003 and 2017 by 74% and 79%, respectively. For other relevant causes of deaths, such as alcoholic liver disease or suicides, trends can be obtained from Table 1.

Trends in life expectancy

Corresponding trends in life expectancy for each sex were observed for the same period and are presented in Table W1 of the Web Appendix. Life expectancy was fluctuating

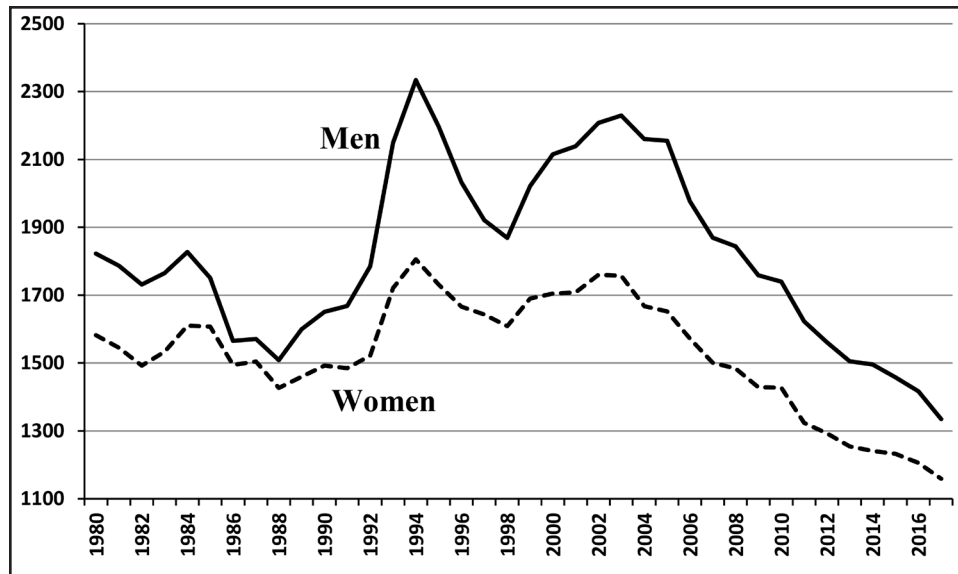


FIGURE 1. Standardized mortality rates for all causes of deaths per 100,000 for men (solid line) and women (dashed line). Source: Russian Fertility and Mortality Database (RusFMD), Center for Demographic Research, New Economic School.

tuating at the level of 61–62 years for men and 73 years for women between 1980 and 1984, was demonstrating a small increase for both sexes between 1985 and 1987, was declining between 1990 and 1994, was increasing until 1998, and then was dropping again until 2003. Beginning in 2004, life expectancy began to rise again and has reached the starting level from 1980 for women in 2006 and for men in 2007. Compared with 1980, life expectancy at birth in 2017 was 6.1 years higher for men and 4.7 years higher for women.

Trends in total alcohol consumption since 1990, including unrecorded alcohol

Estimated total per capita consumption of pure alcohol, including alcohol from unrecorded sources and official retail sales of alcohol, is presented in Table 2. Trends in estimated total alcohol consumption and official alcohol sales strongly correspond with the observed shifts of mortality; along with the declining mortality rates, there was also a general decline of alcohol consumption (both recorded and not). According to our estimates, total per capita alcohol consumption started to increase between 1991 and 1994, then dropped in 1995–1998, and was increasing again between 1999 and 2002–2003. Beginning with 2004, a prolonged downward trend was observed, lasting until 2013, when the consumption level eventually stabilized at 14.1 liters per capita. A small increase was observed in 2014, followed by a decrease the following years. According to the analyzed beer sales, beer consumption was strongly increasing since 1998 and seems to be declining since 2007–2008 (for beverage consumption patterns, see Figure W4 of the Web Appendix).

Alcohol policies since 1990 (for details and sources/ references, see the Web Appendix)

At the beginning of the 1990s, the state increasingly loosened its control over alcohol production and sale—the Gorbachev anti-alcohol legislation was officially repealed in summer 1990, state control of alcohol prices was abandoned in spring 1992, and the state’s monopoly on alcohol production and sale was abolished a few months later. As a result, independent legal and illegal alcohol markets developed quickly.

In the following years, the government made a number of attempts to restore its control over the alcohol market, mainly relying on licensing and quotation procedures (for a full policy timeline of the years 1990–2017, see Table W4 of the Web Appendix). Introduction of the Federal Laws on advertising and state control over production and turnover of alcoholic products from 1995 were important legislation in this regard, but there was no enforcement to many of their directives. Various decrees were issued during this period, mainly to prevent the spread of illegal alcohol, seemingly without success. Likewise, core measures such as raising excise duties on alcohol could not be implemented. Moreover, large volumes of alcohol were imported tax free from other countries up until 1998, following special deals between the government and public associations, which were considered to be charities and therefore paid no tax (some prominent examples were the National Sports Fund or the Russian Orthodox Church, which was also known for importing tobacco on a large scale as “humanitarian aid”).

Beginning in the 2000s, the Russian government started to actively interfere in the alcohol market. In spring 2000,

TABLE 1. Standardized mortality per 100,000 for men and women between 1990 and 2017

Year	All causes		Alcohol poisonings		Alcoholic liver disease		Alcohol-induced pancreatitis		Alcoholic cardiomyopathy		Degeneration of nervous system		Chronic alcoholism		Alcoholic psychoses ^a		Homicides		Suicides ^b	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1980	1,822.5	1,582.3	45.3	10.6	1.8	0.4	—	—	—	—	—	—	4.7	1.0	0.87	0.08	20.5	7.9	67.1	15.8
1981	1,786.6	1,545.0	40.0	9.5	1.5	0.4	—	—	—	—	—	—	5.4	1.2	0.78	0.08	20.5	7.7	67.0	15.2
1982	1,731.3	1,492.3	37.5	9.0	1.3	0.3	—	—	—	—	—	—	4.8	1.1	0.70	0.08	19.8	7.8	67.5	15.2
1983	1,764.7	1,533.0	36.8	9.4	1.3	0.3	—	—	—	—	—	—	4.6	1.0	0.67	0.04	18.3	7.4	69.5	16.1
1984	1,827.7	1,610.5	37.4	9.7	1.4	0.4	—	—	—	—	—	—	4.9	1.2	0.66	0.06	17.4	7.1	73.1	16.7
1985	1,751.2	1,607.5	31.0	8.2	1.2	0.3	—	—	—	—	—	—	4.3	1.0	0.47	0.06	16.1	6.7	60.0	14.5
1986	1,565.7	1,494.7	17.9	4.3	0.6	0.2	—	—	—	—	—	—	2.1	0.4	0.11	0.01	11.3	4.7	42.5	13.2
1987	1,570.9	1,504.3	15.5	3.6	0.5	0.1	—	—	—	—	—	—	1.6	0.4	0.13	0.02	12.1	4.9	43.3	13.1
1988	1,508.3	1,426.7	14.8	3.5	0.4	0.1	—	—	—	—	—	—	1.3	0.3	0.13	0.02	15.6	5.4	44.3	13.2
1989	1,599.9	1,459.4	17.0	3.9	0.5	0.1	—	—	—	—	—	—	1.6	0.4	0.12	0.02	21.1	6.3	49.0	12.8
1990	1,650.5	1,492.2	21.0	4.8	0.5	0.1	—	—	—	—	—	—	2.3	0.4	0.13	0.01	24.1	7.0	49.8	12.9
1991	1,668.6	1,484.8	21.6	4.8	0.5	0.1	—	—	—	—	—	—	2.1	0.4	0.19	0.02	25.9	7.2	50.1	12.3
1992	1,785.5	1,522.0	33.6	7.5	0.6	0.2	—	—	—	—	—	—	2.9	0.6	0.24	0.02	39.4	10.6	59.1	13.1
1993	2,148.9	1,720.8	57.1	14.3	1.3	0.4	—	—	—	—	—	—	7.4	1.9	0.74	0.08	52.4	14.7	73.7	14.5
1994	2,334.0	1,805.7	68.6	18.2	2.7	0.9	—	—	—	—	—	—	13.3	3.3	1.14	0.12	55.9	15.6	82.0	14.9
1995	2,197.3	1,731.5	54.0	13.9	3.1	1.1	—	—	—	—	—	—	14.0	3.5	1.05	0.12	52.6	14.7	79.2	15.1
1996	2,032.4	1,666.1	43.6	11.2	2.4	0.8	—	—	—	—	—	—	8.8	2.0	0.66	0.09	44.8	13.1	75.4	13.7
1997	1,921.3	1,643.3	34.4	9.0	2.2	0.7	—	—	—	—	—	—	5.7	1.3	0.47	0.08	40.2	11.8	70.8	13.4
1998	1,868.7	1,608.5	32.0	8.2	2.1	0.7	—	—	—	—	—	—	4.5	1.0	0.50	0.07	38.0	11.4	66.0	12.6
1999	2,021.3	1,690.4	36.2	9.7	3.6	1.3	—	—	—	—	—	—	4.4	1.2	0.72	0.11	43.1	13.3	72.7	13.7
2000	2,115.3	1,704.7	44.9	11.9	5.4	2.3	—	—	—	—	—	—	5.5	1.4	1.07	0.20	46.7	13.9	72.8	12.5
2001	2,139.2	1,708.0	49.6	13.5	7.2	3.3	—	—	—	—	—	—	6.2	1.7	1.41	0.24	48.8	14.4	73.0	12.3
2002	2,207.5	1,760.3	53.5	15.0	9.5	4.6	—	—	—	—	—	—	7.1	1.9	1.49	0.18	51.0	14.3	69.7	12.2
2003	2,229.5	1,757.1	54.3	14.5	11.6	5.9	—	—	—	—	—	—	7.0	1.9	1.51	0.20	47.7	13.7	65.5	11.3
2004	2,160.2	1,667.8	51.1	13.6	13.2	6.9	—	—	—	—	—	—	6.5	1.9	1.19	0.18	44.6	12.7	61.7	10.9
2005	2,155.1	1,652.4	49.3	12.6	15.2	8.1	—	—	—	—	—	—	6.4	1.8	1.26	0.19	40.5	11.6	57.6	9.9
2006	1,976.9	1,572.3	39.5	10.2	14.2	7.3	0.50	0.15	39.3	11.9	3.97	1.00	5.6	1.6	0.93	0.14	32.7	9.5	53.1	9.6
2007	1,869.5	1,500.8	30.3	7.7	13.1	6.7	0.51	0.17	34.0	9.6	3.40	0.87	5.2	1.5	0.86	0.14	28.9	8.1	50.5	9.7
2008	1,844.1	1,484.2	28.9	7.1	13.8	7.1	0.44	0.14	34.9	10.4	3.55	0.87	5.6	1.6	0.80	0.12	27.0	7.4	46.8	9.1
2009	1,758.8	1,428.7	25.5	6.6	13.2	6.5	0.43	0.11	31.4	8.8	3.48	0.82	4.8	1.5	0.72	0.07	24.1	7.0	46.1	8.4
2010	1,740.0	1,427.7	22.6	6.0	13.8	6.8	0.54	0.13	30.9	9.0	3.61	1.01	5.1	1.6	0.68	0.10	21.3	6.2	41.0	7.5
2011	1,622.7	1,323.4	19.4	4.9	12.8	6.1	0.42	0.11	26.8	7.7	3.24	0.79	4.0	1.1	0.59	0.07	19.1	5.2	37.8	7.3
2012	1,560.9	1,292.6	18.2	4.4	11.6	5.7	0.37	0.11	23.7	6.9	2.83	0.68	—	—	0.54	0.09	17.5	4.8	35.8	7.1
2013	1,504.8	1,254.3	17.4	4.1	11.0	5.2	0.39	0.11	22.3	6.0	2.60	0.61	—	—	0.56	0.06	16.4	4.4	35.2	6.4
2014	1,495.7	1,241.3	18.5	4.2	12.1	5.9	0.42	0.12	22.4	6.3	3.06	0.74	—	—	4.00	1.08	14.6	4.1	32.6	6.0
2015	1,457.9	1,232.3	17.9	4.1	12.1	5.9	0.45	0.11	21.8	6.4	3.61	0.89	—	—	0.45	0.06	13.3	3.8	30.6	5.8
2016	1,416.8	1,206.2	16.4	3.7	11.1	5.6	0.39	0.11	21.3	5.8	3.62	0.98	—	—	0.42	0.04	11.7	3.3	28.1	5.0
2017	1,335.0	1,159.4	14.3	3.3	9.0	4.5	0.31	0.09	17.4	4.9	3.42	0.94	—	—	0.32	0.04	10.0	2.9	24.6	4.4

Notes: Sources: Russian Fertility and Mortality Database (RusFMD), Center for Demographic Research, New Economic School. M = male; F = female. ^aThe 2014 data for alcoholic psychoses mortality contain obvious errors, which most likely occurred during the process of data collection. The Federal State Statistics Service reports other indices for this year, which fit the general picture. ^bThe *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (ICD-10) code X65 "Intentional self-poisoning by and exposure to alcohol" is no longer included in this category since 2013.

the State Unitary Enterprise "Rosspirtprom" was formed, bringing more than 200 spirit producers and about 60% of the alcohol market under the government's control. "Rosspirtprom" was thoroughly investigated in 2002 to check the effectiveness of the enterprise and flow of payments to the federal budget, and structural changes took place following the investigation.

In 2005/2006, a series of substantial amendments to the Federal Law N 171 were implemented, aimed at an extensive restructuring of the alcohol market (for an overview of the number of amendments to the Federal Law, see Table W5 of the Web Appendix). First, new excise stamps were introduced to prevent counterfeiting. Second, the Unified State Automated Information System (EGAIS) was

introduced to collect and monitor data on the volumes of produced alcohol, including the use of raw materials and leftovers. Third, new obligatory additives for the denaturing of nonbeverage alcohol were introduced, and the use of old additives was forbidden to prevent the misuse of surrogate alcohol. Fourth, the minimum authorized capital for ethyl alcohol and liquor producers was substantially raised—a measure that pushed many small and medium manufacturers out of the market.

Implementation difficulties, such as the shortage of new excise stamps and technical deficits of EGAIS, caused serious delays in logistics, and a shortage of alcoholic beverages (mostly distilled spirits) was observed in summer 2006. The situation was further exacerbated by the ban on wine imports

TABLE 2. Total estimated per capita alcohol consumption for the population age 15 and older and official sales of pure alcohol (in liters)

Year	Official sales of pure alcohol per capita (Rosstat)	Alcohol added from beer	Total alcohol per capita consumption (15+ with beer) ^a
1980	10.5	0.0	19.6
1981	10.2	0.0	17.4
1982	10.1	0.0	18.2
1983	10.3	0.0	18.3
1984	10.5	0.0	18.8
1985	8.8	0.0	17.8
1986	5.2	0.0	15.2
1987	3.9	0.0	13.6
1988	4.4	0.0	14.0
1989	5.3	0.0	15.6
1990	5.6	0.0	16.5
1991	5.6	0.0	16.1
1992	5.0	0.0	18.5
1993	5.9	0.0	21.7
1994	6.8	0.0	23.6
1995	9.4	0.0	21.0
1996	7.3	0.0	19.2
1997	7.6	0.0	17.5
1998	7.6	0.2	17.2
1999	7.8	0.3	17.9
2000	8.0	0.5	19.4
2001	8.2	0.8	20.4
2002	8.6	1.1	21.0
2003	9.1	1.2	21.2
2004	9.2	1.4	21.0
2005	9.3	1.6	20.4
2006	9.4	1.9	19.3
2007	9.7	2.3	18.4
2008	9.6	2.3	18.1
2009	9.1	2.0	17.3
2010	8.9	1.9	16.6
2011	8.9	1.9	16.2
2012	9.2	1.9	16.0
2013	8.5	1.8	15.5
2014	7.6	1.6	15.9
2015	6.8	1.5	15.0
2016	6.6	1.4	14.6

^aOfficial sales of pure alcohol per capita as reported by the Federal State Statistics Service (Rosstat) are calculated for all age groups, whereas total per capita consumption is estimated for those age ≥ 15 . Sources: Gks.ru, 2018; Levintova, 2007; Nemtsov, 1998, 2011 (for a detailed description, see the Web Appendix).

from Georgia and Moldova and that many alcohol producers could no longer stay in business because of the new requirements (Grigoriev & Andreev, 2015; Levintova, 2007; Khaltourina & Korotayev, 2015; Neufeld & Rehm, 2013).

In late 2008, the Federal Service for Alcohol Market Regulation (“Rosalkogolregulirovaniye”) was formed with the mission to develop and implement alcohol policies. In 2009, the government published a report on the current situation of alcohol consumption in Russia, as well as a strategy paper to reduce alcohol consumption and harms on a population level. Beginning in 2010, the minimal price on vodka and spirits has been raised gradually each year (with the exception of 2015, on minimal price development see Figure W2 of the Web Appendix).

In 2011/2012, further amendments to the Federal Law N 171 were implemented, this time targeting individual consumers. Restrictions imposed on the sale and consumption of alcoholic beverages prohibited public drinking, advertising of alcohol on television and the internet, and the sale of alcoholic beverages between 11 P.M. and 8 A.M., as well the sale of alcoholic beverages in kiosks (with the exception of beer, the kiosk sale of which has been prohibited since 2013).

Beginning in 2014/2015, the trend toward stricter alcohol control policies was partially reversed. In 2014, advertising for beer and domestic wine was partially permitted again (for details, see Table W2 of the Web Appendix). In February 2015, the minimal vodka price did not increase for the first time since 2010; however, on the contrary, it decreased. At the same time, the Federal Service for Alcohol Market Regulation proposed an anti-alcohol campaign concept and the implementation of the EGAIS system for the wholesale and retail sale of alcoholic beverages for 2016. In 2016, EGAIS was finally implemented as planned and the Federal Service for Alcohol Market Regulation was subordinated to the Ministry of Finance, while the minimal vodka price was increased again. Also, in 2016, the Ministry of Industry and Trade and the Ministry of Economic Development suggested decreasing the level of excise duties and lowering the minimal prices as measures to prevent consumption of cheaper unrecorded alcohol.

In 2017, new amendments to the Federal Law N 171 were introduced restricting the sale and advertising of alcohol-containing cosmetic products, which are often misused as surrogate alcohol. Also, the Criminal Code was complemented by two new articles, which introduced harsher penalties for the production and sale of illegal alcoholic products and the forging of excise stamps.

Relationship between alcohol consumption and life expectancy

The outlined trends in alcohol consumption and mortality provide strong evidence that Russian mortality rates and consumption of alcohol (both recorded and unrecorded) are closely linked in a way that an increase of alcohol consumption appears to be mirrored by a decline in overall life expectancy (Nemtsov, 2016).

These opposing trends are presented in Figure 2 and can be described by an overall correlation of -0.91 over the period 1990–2016 (95% CI [-0.96, -0.82]; $t[35] = 12.5$, $p < .00001$); correlations below -0.90 remained, if two periods up to 2003, and thereafter were analyzed separately. However, it should be noted that this observed pattern is largely driven by the strong relationship between fatal accidental poisonings and overall mortality; therefore, Figure 2 reflects mainly the relationship between hazardous drinking and mortality, and if the underlying mechanisms are weakening, the overall relationship will be less associated.

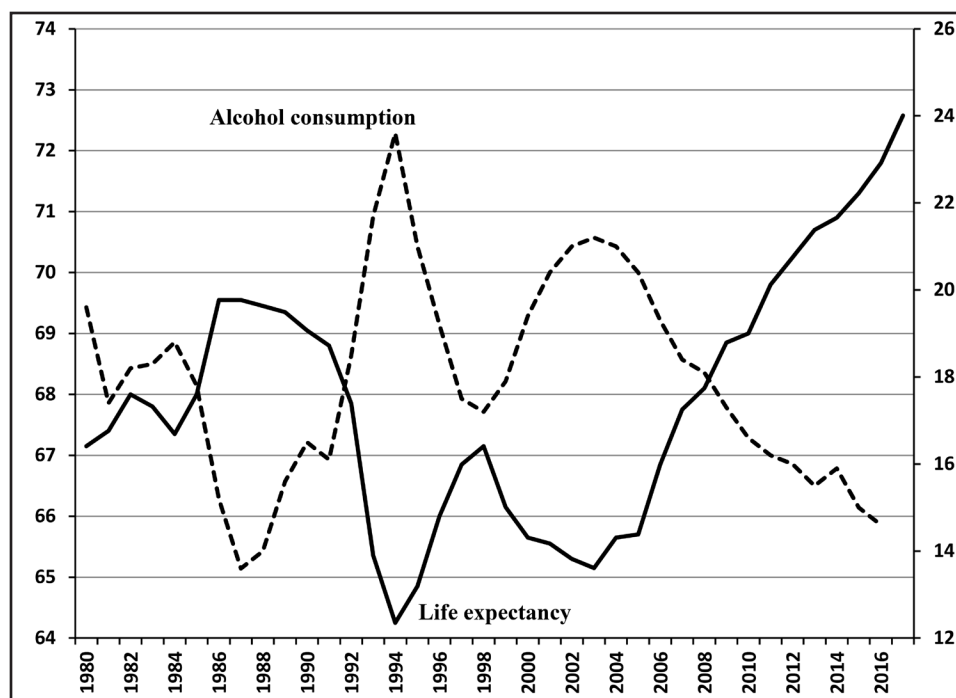


FIGURE 2. Relationship between per capita alcohol consumption and life expectancy. *Solid line* = life expectancy (both sexes). *Dashed line* = total alcohol consumption 15+. Source: Nemtsov (2015) and Nemtsov and Shelygin (2014).

Discussion

There are different explanations of the role of alcohol policy on consumption and alcohol-attributable mortality in Russia. The first explanation stresses the role of the economy and more generally the role of economic processes shaping consumption and harm: (De Goeij et al., 2015; Dubanowicz & Lemmens, 2015; Room et al., 2015); i.e., the economic situation is seen as determining levels of alcohol consumption and, subsequently, mortality rates. There are a number of different pathways postulated for these developments, which cannot all be discussed in this article. However, we want to introduce one explanation: Shkolnikov and colleagues (e.g. Shkolnikov et al., 1998) presented a theory, according to which marked negative abrupt changes in the economy would create psychological stress leading to increased mortality mediated in part by the adverse health effects of excessive alcohol consumption.

The population's purchasing power and the real prices of alcohol are seen as the main determinants of alcohol consumption levels and thus, indirectly of the mortality rates. The state regulations of the alcohol market are also analyzed from the perspective of political economy, where they represent important state revenue, and thus the fiscal realities of a country determine policies. Following this explanation, the Federal Service for Alcohol Market Regulation is the product of the government's fiscal policy in this area, which is later subordinated to the Ministry of Finance.

In this explanation, the three major declines of these two indicators in Russia (Figure 3) can all be linked to the general economic and sociopolitical situation of the country. The first sharp decline followed the Soviet anti-alcohol campaign of 1985, which was introduced not only to improve the population's health but also to initiate economic recovery of the run-down state. The production increase of illegal alcohol had led to a dramatic fall in the real price of vodka at the beginning of the 1990s, which in turn resulted in a sharp increase in alcohol consumption and mortality with a peak in 1994 (Nemtsov, 2011; Treisman, 2010).

Between 1995 and 1998, the extreme impoverishment of the population following the "shock therapy" of the new market reforms resulted in the second historic decline in alcohol consumption and mortality. In addition, alcohol-attributable mortality was high in the preceding years, affecting in particular the people with the highest consumption levels (Rehm et al., 2018). The Russian financial crisis of 1998 caused household income growth, and as a result its purchasing power grew in the aftermath because of the fall of the ruble exchange rate and balances of payments, the general economic recovery, and production and gross domestic product based on power purchasing parity (GDP PPP) (see Figure W1 of the Web Appendix). This also had an impact on drinking levels and mortality, since vodka and other alcohol have become affordable once again.

The third historic decline of alcohol consumption and mortality began in 2003. It lasted until now and can be

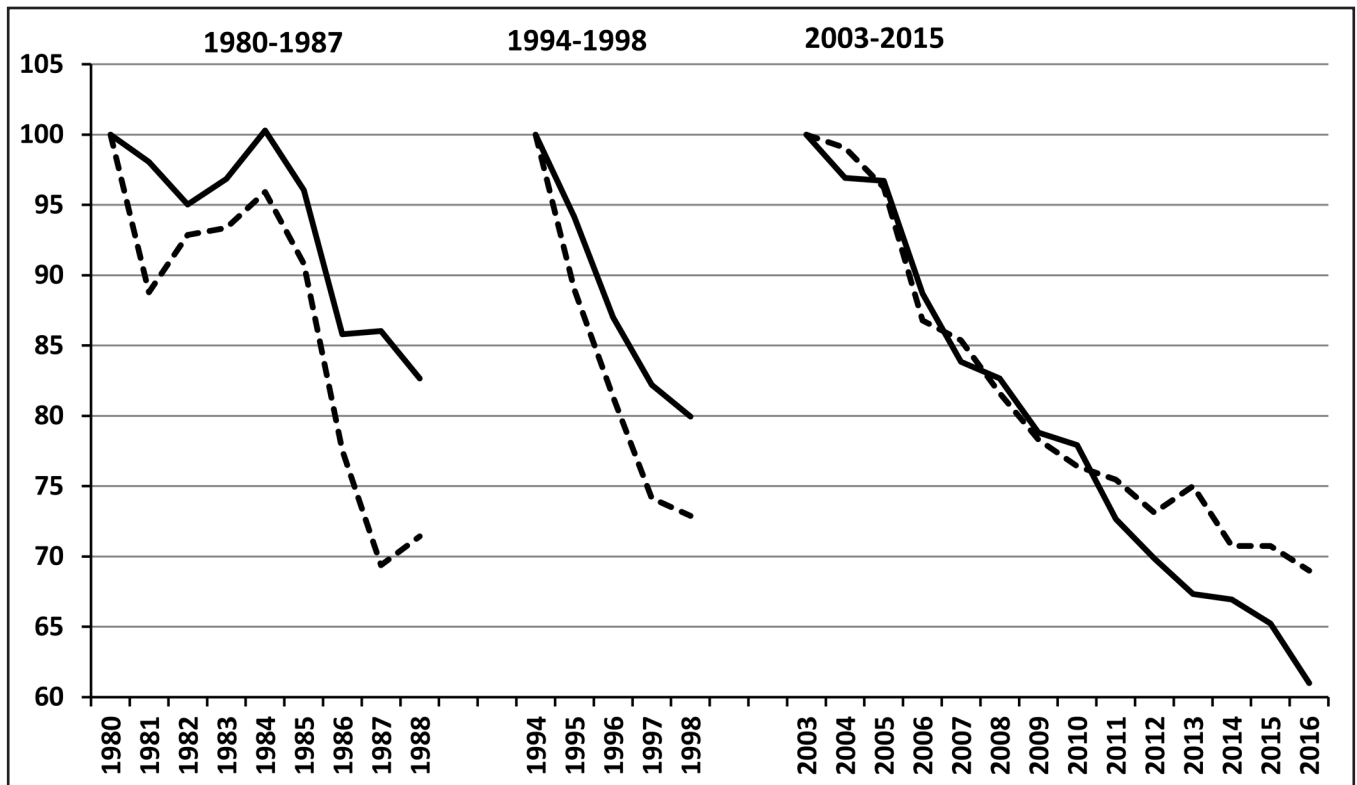


FIGURE 3. Changes in the standardized mortality rate of men (*solid line*) and alcohol consumption (*dashed line*) for the periods 1980–1987, 1994–1998, and 2003–2016. Indicators 1980, 1994, and 2003 are taken as 100%. Source: Nemtsov (2015).

associated with the government's increasing pressure on the alcohol market aiming at revenues for the state budget, soaring alcohol prices, and the general disorganization of the alcohol market and the disruption of product flows following the increasing state interventions since 2000 (see Table W2 of the Web Appendix).

A second explanation acknowledges the role of economic factors but does not consider them as the main determinant of alcohol consumption levels and mortality rates. Rather, there are many other factors at play, and in this environment alcohol control policies can be effective. According to this explanation, different specific alcohol policies and known harm reduction measures, such as limitations of alcohol availability, seemed to have had an impact on alcohol consumption and subsequently mortality as well. In this theory, it is also acknowledged that alcohol consumption is only one of several factors affecting mortality.

The analyzed data suggest that—besides economy—two additional key factors seem to have had an important impact on mortality trends in Russia since 2003/2004. The first key factor is the changing drinking pattern and the switch from vodka to beer, most importantly in consumers younger than age 40 (Kueng & Yakovlev, 2014; also see Figure W3 of the Web Appendix).

Different than vodka, beer consumption does not lead to an increased risk of fatal alcohol poisonings and alcoholic

psychoses (alcoholic delirium). For the period 2003–2014, beer consumption increased by 1.09 liter per capita, whereas the consumption of distilled spirits decreased by 2.75 liters (referring to recorded consumption only) (Neufeld & Rehm, 2013). However, beginning in 2008, the rise of beer consumption has been stopped because of different administrative measures such as the anti-beer campaign of the Chief State Sanitary doctor of Russia (see Table W2 of the Web Appendix), as well as different activities of the vodka lobby. Subsequently, vodka remains the most consumed beverage in today's Russia.

In addition, the introduction of the new obligatory additives for the denaturing of nonbeverage alcohol in 2006 might have decreased unrecorded consumption and influenced drinking patterns and subsequently mortality as well. Several studies have demonstrated that unrecorded alcohol in Russia mostly comprises highly concentrated spirits, with nonbeverage alcohol providing a cheap source of ethanol (McKee et al., 2005; Neufeld et al., 2016; Rehm et al., 2014). These products are typically consumed in a way that can be characterized as hazardous drinking, which has been causally linked to higher mortality risk (Leon et al., 2007; Tomkins et al., 2012). Last, some of the changes in mortality from external causes may be attributable to changes in coding, as the unspecific category increased (see also Andreev et al., 2015).

The second key policy factor partly independent of the economic situation is alcohol availability and the growing state control thereof through measures such as expanding restrictions on alcohol sale hours and locations as well as the raising of minimum alcohol prices and excise duties. However, the effectiveness of these measures cannot be properly analyzed in the absence of the level of enforcement, and a large number of violations of these legislations were documented (Nemtsov, 2009; Neufeld et al., 2016, 2017).

Still, the general coincidence between the introduction of alcohol-regulation measures (including EGAIS) and the observed changes in the alcohol market and the decreases in all-cause mortality and alcohol-related mortality suggest a causal link (Nemtsov, 2011; Neufeld & Rehm, 2013). Further, state-orchestrated pressure on the alcohol market seems to have initiated a stable decline of both mortality and consumption since then, although the mortality trends of alcoholic psychoses and alcohol poisonings, important indicators of alcohol consumption, are flattening out since 2011. In 2014, male mortality (because of alcohol poisonings) increased for the first time since 2003, along with alcohol consumption. However, both indicators have been declining since 2014. Other mortality rates, including all-cause mortality, were still dropping for the male population, whereas no substantial declines were observed for women.

Finally, although levels of alcohol consumption have been closely linked to mortality and other burden of disease (and thus life expectancy), there are other factors affecting Russian mortality. The link between alcohol consumption and disease burden seems to have been weakening in recent years (Grigoriev et al., 2014; Shkolnikov et al., 2013).

Conclusion

A combination of several factors—the general economic situation and associated factors such as stress, the availability of alcohol, and the changing patterns of alcohol—seems to have influenced recent trends in alcohol consumption and mortality.

Analyzed data suggest that economic factors need to be taken into consideration because they may affect both levels of alcohol consumption and mortality. Therefore, the 2014 increase in alcohol poisoning deaths might be the result of declining beer consumption in favor of illegal spirits resulting from the rising beer prices against the backdrop of the Russian economic crisis of 2014 and declining consumer wealth.

The importance of alcohol policies seems to have been overemphasized because of the chaotic and inconsistent natures of their implementation and the economic reasons behind them. The state's severe pressure on the alcohol market on the one hand, and its contradicting legislations on the other hand, are rather ambiguous and create an impression that current alcohol control policies are aiming at state

revenues from alcohol sales rather than following a unified long-term strategy of alcohol-related harm reduction in the broader population. The temporary cessation of the planned alcohol price increase in 2015 and the discussions of increasing availability of recorded alcohol products in 2016 seem to corroborate this impression. Measures addressing unrecorded alcohol consumption also remain inconsistent (Neufeld & Rehm, 2018b).

The 2005–2006 legislation aimed at reducing illegal alcohol production, but lack of enforcement allowed for a further flourishing of some of the illegal and semi-legal unrecorded alcohol market segments (Neufeld & Rehm, 2018a). Also, the economic importance of revenues from alcohol to the Russian state became once again apparent when The Federal Service for Alcohol Market Regulation was subordinated to the Ministry of Finance in January 2016, subsequently transferring the responsibility of alcohol policy development to the Ministry.

Although alcohol policy measures since 2000 seemingly followed the economic interests of the government rather than a unified strategy for reducing excessive alcohol consumption and related harms, these activities do appear to have had a positive impact on mortality trends.

Conflict of Interest Statement

We have no conflict of interest to declare. Maria Neufeld has received funding via the DAAD (Deutscher Akademischer Austauschdienst) and the Rosa Luxemburg Foundation from the budget of the Ministry of Education and Research in Germany.

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