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Cause-specific Mortality in Patients Treated for Alcohol Use Disorders in State-Run Services in Novosibirsk, Russia

Yaroslav Shamsutdinov[1], Maria Neufeld[2,3], Jürgen Rehm[4-9]

[1]Medical Statistics Department, Novosibirsk State Regional Narcological Dispensary, Novosibirsk, Russia
[2]Institute of Clinical Psychology and Psychotherapy, Technische Universitat Dresden, Dresden, Germany
[3]Institute for Mental Health Policy Research, Centre for Addiction and Mental Health, Toronto, Canada
[4]Centre for Addiction and Mental Health, Toronto, Canada
[5]Institute of Clinical Psychology and Psychotherapy, Technische Universitat Dresden, Dresden, Germany
[6]Institute for Mental Health Policy Research, Centre for Addiction and Mental Health, Toronto, Canada
[7]Campbell Family Mental Health Research Institute, Centre for Addiction and Mental Health, Toronto, Canada
[8]Dalla Lana School of Public Health, University of Toronto, Toronto, Canada
[9]Department of Psychiatry, Faculty of Medicine, University of Toronto, Toronto, Canada

Abstract

Aims: To analyze disparities in age at death and cause-specific mortality in a sample of patients registered with alcohol use disorders (AUDs) in state-run addiction treatment centers in Novosibirsk, Russia.

Methods: Database: 92,269 deaths recorded by medical facilities in Novosibirsk between 2000 and 2010, comprising cause of death (per *ICD-10*), sex, and date of birth and death. Average age at death and proportion of cause-specific deaths were compared between patients (n =1,762) treated for AUDs as a primary diagnosis and the general population, the latter derived from deaths recorded by all medical facilities.

Results: The average age at death was significantly lower ($p < .001$) in patients compared with the general population; men lived, on average, 8.4 years fewer; for women, this difference was 19.7 years. The pronounced gender gap in age at death in the general population (12.7 years) disappeared in the patient sample. They incurred proportionally more deaths because of infectious diseases, injuries, poisonings, diseases of the digestive system, and certain cardiovascular diseases such as cardiomyopathies. They incurred proportionally fewer deaths due to chronic ischemic heart disease, myocardial infarction, cerebrovascular diseases, and neoplasms.

Conclusions: Compared to the general population, cause-specific mortality in AUD patients was high in categories largely contributing to a premature death. Specific measures including screenings for alcohol problems in primary health care and early interventions to reduce level of drinking should be a priority.

Alcohol use is a major risk factor for burden of disease and injury (GBD 2016 Risk Factors Collaborators, 2017; World Health Organization, 2014). Alcohol use disorders (AUDs), defined as the continued use of alcohol despite clinically significant distress or impairment and comprising “harmful use of alcohol” and “alcohol dependence” as different severity levels in the *International Classification of Disease, 10th Revision (ICD-10*) (World Health Organization, 1994), contribute markedly to this burden (Rehm et al., 2014; Rehm, Shield, Gmel, Rehm, & Frick, 2013; World Health Organization, 2014). For instance, in the European Union, in 2004, alcohol dependence, the most severely disabling of AUDs, was estimated to account for 62% of all burden from alcohol use (Rehm et al., 2013).

For Russia, alcohol-attributable mortality is among the highest in Europe and globally (Shield, Rylett, & Rehm, 2016; World Health Organization, 2014), but to our knowledge, there are no similar estimates on how much alcohol-attributable mortality was associated with AUDs. The high mortality in Russia has been linked to particularly harmful binge drinking patterns (Leon et al., 1997; Leon et al., 2007; Nemtsov, 2002, 2011; Rehm et al., 2007). However, Russian binges in many cases are far beyond the usual definition of binge drinking of six or more standard drinks in one setting (Gmel, Rehm, & Kuntsche, 2003). The so-called “zapoi,” a distinctive drinking pattern typically found in Russia, is defined as continuous drunkenness lasting at least two days, during which the person is

Correspondence: Maria Neufeld, Technische Universitat Dresden – Institute of Clinical Psychology and Psychotherapy, Chemnitzer Str. 46, Dresden 01062, Germany. Phone: +4368181577456, Email: Neufeld.maria@gmail.com
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completely withdrawn from normal social life (Leon et al., 2007; Nemtsov, 2005). *Zapoi* is more pronounced in people with AUDs, and, in particular, in lower socio-economic strata (Neufeld, Wittchen, & Rehm, 2017; Tomkins et al., 2007).

While there are many studies on the excess mortality risk of AUDs (Roerecke & Rehm, 2013), comparatively little is known on cause-specific mortality, and most of these studies are quite dated, and none of them are from Russia (Roerecke & Rehm, 2014).

This study explores the structure of cause-specific mortality in the Russian city of Novosibirsk for the period 2000 to 2010, comparing the proportion of cause-specific deaths in a sample of patients treated for AUDs in state-run alcohol and drug treatment services (in Russian terminology: "narcological" services) with the proportion of deaths in the general population, operationalized by all deaths recorded in all medical faculties. It will contribute to filling the gap in knowledge for causes of death linked to AUDs in Russia, not only allowing comparisons with causes of death with the general population in Russia, but also with other jurisdictions. The results will have to be interpreted not only as the contribution of AUDs, but also as the impact of the specific form of drinking by patients treated in Russian state-run narcology services, who are predominantly from lower socio-economic strata (Neufeld et al., 2017).

Methods

Study setting and materials

The study is based on data collected in Novosibirsk, a large industrial city located in West Siberia. For the study period of 2000–2010, the average population of Novosibirsk was 1,411,326, making it the third-largest city of the Russian Federation and the most populous city of Asian Russia (Federal State Statistics Service, 2017). Novosibirsk can be viewed as a typical Russian city in terms of alcohol drinking patterns, mortality, and the existing health infrastructure, including the provision of specialized medical care.

The initial study materials consisted of a data set based on death certificates for 92,269 deaths recorded by the Medical Information and Economic Center (MIEC) between 2000 and 2010 (from 2004 onward, data were recorded by the Medical Information Analytical Center [MIAC]). Specifically, the data comprised the full *ICD-10* diagnostic cause of death, sex, and date of birth and death. These data were provided by the MIAC to the first author of this study to help update the data bank of the narcological service of Novosibirsk by removing deceased patients from the service's database. The study was approved by the ethics committee of the Novosibirsk State Medical Academy.

The state-run narcological services are part of the Russian psychiatric services and offer specialized addiction treatment. They provide free alcohol and drug treatment (detoxification, rehabilitation, and follow-up outpatient monitoring) to Russian citizens according to the special protocols established by the Ministry of Health. Patients have to be officially registered and monitored within the system, which can negatively affect their employment situation and/or lead to general discrimination (Bobrova et al., 2006).

In the city of Novosibirsk, there are six narcological service facilities (the so-called "dispensaries"), composed of inpatients as well as patients from ambulatory clinics, while in the Novosibirsk region, the narcological services can be found in the form of specialized narcological departments or offices in the hospitals of the municipalities. The average number of patients with alcohol dependence in Novosibirsk registered within the narcological services during the study period of 2000–2010 was 15,259; the number of patients registered with drug dependence was 9,833 (Department of Medical Statistics at the Novosibirsk Regional Clinical Narcological Dispensary, 2017).

While the data are not a complete census of deaths in the city of Novosibirsk for the decade examined, the marginal distribution of causes of death are quite similar to the regional distribution (see Table 1).

Table 1

Cause-specific mortality fractions in the sample compared with mortality fractions reported by the Novosibirsk Regional Statistical Office for the period 2000–2010

Cause-specific mortality	Analyzed database of the MIAC (in %)	Regional Statistical Office* (in %)	Percentage Difference
Cardiovascular diseases (I00–I99)	54.3	54.6	0.55%
Malignant neoplasms (C00–C97)	15.7	15.9	1.27%
Diseases of the respiratory system (J00–J99)	3.1	3.0	3.28%
Diseases of the digestive system (K00–K93)	3.6	3.8	5.41%
Injury, poisoning, and certain other consequences of external causes (S00-T98)	11.9	13.3	11.11%
Certain infectious and parasitic diseases (A00-B99)	2.7	2.7	0.0%

Note. The distributions of cause-of-death categories (database vs. regional statistical office) did not differ significantly (Chi-square [df = 5] = 0.165; p = .995).

*Calculated mean for the period 2000–2010, %

Data processing and analyses

Of the 92,269 people listed in the MIAC database, 2,760 persons were registered patients at the narcological dispensary in Novosibirsk, 1,762 were diagnosed with primary AUDs, 908 were diagnosed with primary drug use disorders and 90 were diagnosed with disorders due to multiple drug use and use of other psychoactive substances.

For this study we have focused specifically on the 1,762 patients with AUDs. In order to compare the cause-specific mortality fractions of this group with the mortality structure of the general population, these 1,762 cases were removed from the general population group and constitute the control group in our analyses. The other 998 narcological patients whose primary diagnosis was not an AUD remained in the large group, as we did not want to create any biases by completely removing drug users from the population control group. In the second step, all people younger than 11 years of age at death were removed from the general population control group, as the youngest person in the alcohol patients group was 11 years old. The resulting final general population control group consisted of 46,611 non-patient males and 43,567 non-patient females (10+ years old at death), while the AUD patient group consisted of 1,522 males and 240 females. The dataset included dates of birth and death for each individual, which were used to calculate age at death for individuals of the two groups, accordingly.

In order to assess statistical differences in age at death between the men and women in both groups, a Student's *t*-test was performed. For the main analysis, we chose the measure of cause-specific mortality fractions, which per definition must result in a sum of 100% in each of the two groups. This meant that we looked at proportions of the two groups and analyzed which causes of death were more common in the patient group than the control group. To conduct this analysis, disease-category-specific rates of dying were construed by sex and group (patients vs. control), and disease and sex-specific proportional mortality ratios (PMRs) and their confidence intervals were calculated (Dean, Sullivan, & Soe, 2013). These ratios denote the relative risk of dying from a specific cause of death as an AUD patient compared to the general population. For instance, the PMR of 2.04 in Table 3 for tuberculosis in men indicated that among male patients, this particular cause of death is twice as frequent as in the nonpatient male population.

Results

The average age at death in the general population control sample was 60.5 and 73.2 years for men and women, respectively, which was significantly higher than the patient groups, with 52.1 and 53.6 years for men and women, respectively; for both genders, the differences were statistically significant ($p < .001$). The gender gap in age at death for the general population control sample was 12.7 years and significant ($p < .001$), while the gender gap in the patients' group was 1.5 years and not statically significant ($p = .089$). For an overview, see Table 2.

Table 2

Comparison average age at death of registered patients with AUDs and the population control group

	Sex	*n*	Average age at death (in years)	Age group (years)	Males *n* (percentage distribution)	Females *n* (percentage distribution)
Population control group	M	46,611	60.53	> 30	3,021 (6.5%)	766 (1.8%)
	F	42,567	73.23	30 – >40	3,533 (7.6%)	985 (2.3%)
				40 – >50	5,721 (12.3%)	1,989 (4.7%)
				50 – >60	8,468 (18.2%)	3,682 (8.6%)
				60 – >75	15,596 (33.5%)	11,561 (27.2%)
				75 +	10,272 (22%)	23,584 (55.4%)
Patient group	M	1,522	52.09	> 30	83 (5.5%)	15 (6.3%)
	F	240	53.56	30 – >40	140 (9.2%)	14 (5.8%)
				40 – >50	394 (25.9%)	68 (28.3%)
				50 – >60	509 (33.4%)	64 (26.7%)
				60 – >75	360 (23.7%)	69 (28.8%)
				75 +	36 (2.4%)	10 (4.2%)

Ratios of the proportions of cause-specific deaths to all deaths in state-registered patients compared with the same proportion within the control group are displayed in Table 3. Almost all cause-specific ratios were substantial, with confidence intervals excluding 1, but some of the comparisons could not be performed due to the small sample size of the female patient group. There were three major groups of causes of death that comprised the majority of the two samples and where we observed significant differences between the patient group and the control group. The first group was the broad category of neoplasms (*ICD-10* code: C00–D49) encompassing different types of cancer. The proportional mortality ratio from neoplasms was 39% lower for male patients and 68% lower for female patients. The second group was the large category of diseases of the circulatory system (*ICD-10* code: I00–99), which made up 54.3% of the all-cause mortality of the entire sample and is the biggest contributor to overall mortality in Russia. The ratio for type of mortality was 18% lower in male and 34% lower in female patients. Within this group, a thorough analysis of the different categories revealed that PMR due to acute ischemic heart disease with non-myocardial infarction mortality was 2.7 times higher for male and 6.2 times higher for female patients. Also, PMRs for cardiomyopathies were 1.5 and 6.8 times higher for the patient group for men and women, respectively, with higher ratios for alcoholic cardiomyopathies: 4.2 and 11.3 for male and female patients, respectively. The ratio for acute myocardial infarction, on the other hand, was 66% lower in male and 89% in female patients, along with cerebrovascular disease mortality, which was 59% and 72% lower in male and female patients, respectively.

The third major mortality group was mortality due to injury, poisoning, and certain other consequences of external causes (*ICD-10* code: S00–T98), where ratios were 1.6 times higher for males and 4.6 times for females in the patient group. Ratios for fatal alcohol poisonings were 3 times higher in men and 13.3 times higher in women of the patient group compared with the general population. The ratio of asphyxiation was slightly higher for the male patients (1.1 times the risk) but considerably higher for female patients (3.3 times the risk) than in the nonpatient group. The ratio of death due to hypothermia and extreme cold was also 2.2 times higher in male patients and 4.5 times higher in female patients.

Other notable differences were observed in proportional mortality ratios due to infectious diseases (1.9 times higher for male and 6.7 times higher for female patients), which was mainly caused by different ratios for tuberculosis mortality (2 times higher for men and 7.3 times for women, respectively) and for digestive diseases (1.9 times higher for male and 2.1 for female patients); for details see Table 3.

Table 3

Risk ratios of cause-specific death in registered patients with AUDs

Mortality Category (*ICD-10* Code)	Sex	*n* Control Group (11+)	*n* Patient Group	Proportional Mortality Ratio	95% CI
Certain infectious and parasitic diseases (A00–B99)	M	1,912	120	1.92	1.61–2.30
	F	422	16	6.73	4.15– 10.9
Tuberculosis (A15–A19)	M	1,743	116	2.04	1.70–2.44
	F	341	14	7.28	4.33–12.24
Human immunodeficiency virus [HIV] disease (B20–24)	M	64	3	1.44	0.45–4.56
	F	7	0	0	0
Neoplasms (C00–D49)	M	7,701	152	0.61	0.52–0.70
	F	6,727	12	0.32	0.18–0.55
Mental and behavioral disorders (F00–99)	M	32	7	6.67	2.96–15.15
	F	12	1	14.8	1.93–113.2
Disorders due to use of alcohol (F10)	M	16	7	13.4	5.52–32.52
	F	3	1	59.12	6.17–566.3
Diseases of the nervous system (G00–99)	M	225	17	2.31	1.42–3.78
	F	190	2	1.87	0.47–7.48
Degeneration of nervous system due to alcohol (G31.2)	M	48	10	6.38	3.23–12.59
	F	20	0	0	0
Diseases of the circulatory system (I00–99)	M	20,991	563	0.82	0.77–0.88
	F	28,283	105	0.66	0.57–0.76
Ischemic heart diseases [IHD] (I20–I25)	M	10,730	352	1.01	0.92–1.1
	F	10,696	61	1.01	0.81–1.26
Acute myocardial infarction (I20–23)	M	1,351	15	0.34	0.21–0.56
	F	1,557	1	0.11	0.02–0.81
Non–myocardial infarction acute IHD (I24)	M	172	86	2.67	1.58–4.51
	F	15	3	6.19	1.97–19.42
Chronic IHD (I25)	M	9,570	323	1.03	0.94–1.14
	F	9,621	57	1.05	0.84–1.3
Cardiomyopathy [without ACM] (I42)	M	223	11	1.51	0.83–2.78
	F	131	5	6.77	2.8–16.4
Alcoholic cardiomyopathy [ACM] (I42.6)	M	529	157	4.23	3.33– 5.37
	F	73	10	11.3	6.04–21.14
Other forms of heart disease (I30–52)	M	1,056	92	2.67	2.17–3.28
	F	565	17	5.34	3.35–8.5
Cerebrovascular diseases (I60–69)	M	7,847	106	0.41	0.34–0.5
	F	15,197	24	0.28	0.19–0.41
Diseases of the respiratory system (J00–99)	M	1,889	72	1.17	0.93–1.47
	F	835	10	2.12	1.15– 3.91
Diseases of the digestive system (K00–95)	M	1,774	110	1.9	1.58–2.29
	F	1435	23	2.84	1.92– 4.21
Diseases of liver (K70–K77)	M	897	70	2.39	1.88–3.03
	F	676	19	4.99	3.22–7.72
Alcoholic liver disease (K70–K70.4, K70.9)	M	174	14	2.46	1.43–4.24
	F	119	1	1.49	0.21–10.62
Pancreatic disease (K85–86)	M	194	16	2.53	1.52–4.19
	F	120	0	0	0

Mortality Category (*ICD-10* Code)	Sex	*n* Control Group (11+)	*n* Patient Group	Proportional Mortality Ratio	95% CI
Injury, poisoning, and certain other consequences of external causes (S00–T98)	M	7,940	420	1.62	1.49–1.76
	F	2,336	60	4.56	3.65–5.69
Injuries to the head, neck, and thorax, multiple and unspecified regions (S00–S29, T00–T14)	M	3,095	154	1.52	1.31–1.78
	F	983	17	3.07	1.93–4.87
Toxic effect of alcohol (T51.0–T51.9)	M	979	97	3.03	2.48–3.72
	F	294	22	13.27	8.77–20.08
Toxic effect of ethanol (T51.0)	M	714	71	3.05	2.34–3.87
	F	206	14	12.05	7.12–20.4
Toxic effect of methanol (T51.1)	M	10	1	3.06	0.39–23.91
	F	4	0	0	0
Asphyxiation (T71)	M	1,499	53	1.08	0.83–1.4
	F	327	6	3.25	1.47–7.22
Hypothermia, reduced temperature, and exposure to excessive natural cold (T68–69, X31)	M	405	29	2.19	1.51–3.19
	F	119	3	4.47	1.43–13.96
External causes (V00–Y98)	M	22	3	4.18	1.25–13.94
	F	12	0	0	0

The separate category of external-causes mortality (*ICD-10* code: V00–Y98) was composed of too few individuals to calculate PMRs for females, but the ratio for males revealed a more than fourfold higher risk for male patients compared with the general population of males.

The highest ratios were observed, as expected, in mortality due to AUDs, which was 13.4 times higher in male and 59.1 times higher in female patients. However, for the latter PMRs the confidence intervals were too broad to be significantly different from 1.

Discussion

The analyzed data demonstrate that individuals who were officially diagnosed with alcohol dependence in the Russian narcological system died, on average, markedly earlier than the individuals from the general population group; male patients died more than 8 years earlier (at an average age of 53 years), and female patients almost 20 years earlier (at an average age of 54). This gap in mean age at death was smaller than the gender gap in life expectancy reported by a European study for Denmark, Finland, and Sweden, which found that people hospitalized with AUD have an average life expectancy of 47–53 years (men) and 50–58 years (women) and die 24–28 years earlier than people in the general population (Westman et al., 2015). The difference, however, may be explained by the fact that we could not calculate life expectancy as such, but only the mean age at death of both samples, which is not the same. Moreover, life expectancy in the general population in Russia is much shorter than in the three studied countries; for men it is at least 10–15 years shorter, and for women at least 6–8 years shorter (Institute of Health Metrics and Evaluation, 2017). Life expectancy in Russia in the general population has been shown to be markedly impacted by high alcohol consumption even for those who do not qualify for an AUD (Nemtsov, 2011; Shield et al., 2016).

The average age at death observed in patients in our sample might be overestimated, since the sample was composed of only patients from the city of Novosibirsk, and individuals from urban areas have a longer life expectancy than the rural population of Russia (Federal State Statistics Service, 2017). Moreover, existing research on alcohol consumption in rural areas of Russia suggest that people living in the countryside exhibited more problematic drinking behaviors in terms of drinking large volumes of cheap home-distilled spirits (Zaigraev, 2004) and might therefore be more vulnerable to developing AUDs (Nemtsov, 2011).

It should be noted that we have not found any significant differences in the age of death of the male and female patients in our sample, meaning that, for Russia, the gender gap in mortality has disappeared in this group in terms of the average age at death.

The distribution of cause-specific mortality in AUD patients differed from the mortality structure in the general population, mainly because of the prevailing external causes of death (injuries, poisonings, and hypothermia), infectious diseases, and certain known alcohol-attributable diseases of the circulatory system such as alcoholic cardiomyopathy, cardiomyopathy, certain forms of ischemic heart diseases (non-myocardial infarction acute ischemic heart disease, chronic ischemic heart disease) and other forms of heart diseases (for an overview of alcohol-attributable disease categories and deaths see Rehm et al. [2017a]; Schwarzinger, Thiébaut, Baillot, Mallet, and Rehm [2018]). AUD patients died proportionally less often from circulatory diseases and cancer, which are the most common causes of death in the general population (myocardial infarction; cerebrovascular diseases), but in turn died more often from causes of death specifically linked to premature deaths, such as all categories of injury and external causes. In addition, there are some specific fully alcohol-attributable disease categories, such as alcoholic cardiomyopathy, alcoholic liver disease, alcohol poisoning, or AUDs (see Rehmet al. [2017a] for an overview). The Russian levels of mortality from alcohol poisoning (Zaridze et al., 2009) and alcoholic cardiomyopathy (Manthey, Imtiaz, Neufeld, Rylett, & Rehm, 2017; Rehm, Hasan, Imtiaz, & Neufeld, 2017b) are among the highest, if not the highest, globally.

It should be emphasized that the patient group represents a special population of AUD patients. Since all other treatment options are relatively costly in Russia, patients admitted to the state-run services are typically of lower social strata. Moreover, they are typically in later stages of their alcohol dependence, characterized by hazardous drinking patterns such as *zapoi* (Neufeld et al., 2017), which are causally linked to higher mortality risk (Tomkins et al., 2007).

Considering the premature mortality risk, screening for problematic alcohol use and AUDs in primary health care institutions is strongly advised as a form of prevention. Early, less-stigmatizing interventions and low-threshold measures to identify risky alcohol consumption and potential AUDs are strongly recommended to reduce the risk of developing more severe alcohol problems and dependence and accompanying health, social, and psychological problems.

Limitations

Unfortunately, due to the restrictions of the original data, several limitations to our study arose. Due to the described sampling procedure we do not have any further data than the data detailed above on the representativeness of control group. The distribution of external causes of deaths as reported by MIAC differs from the data reported by Regional Statistical Office, revealing a difference of more than 11%. We believe that this difference might come from the fact that the MIAC dataset had very few entries for the code "V00-Y99: external causes of morbidity," which were more likely coded as the category "S00-T88: injury, poisoning, and certain other consequences of external causes." This might have biased the calculated proportions. Also, as we have only analyzed proportions, no statement can be made about absolute levels of mortality among the narcology-registered deaths in the absence of a population denominator.

Furthermore, we do not have any other parameters beyond the analyzed age, sex, assigned *ICD-10* diagnosis as cause of death, and history of registration within the Novosibirsk narcology system. This means that 1) we might not know if a person who has moved from another jurisdiction was previously registered there with an AUD and therefore might have been wrongly assigned to the control group; 2) we could not compare other crucial parameters of the two groups, such as socioeconomic status or drinking patterns. Hence, we cannot make any specific statements on the definitive pathways leading to the cause-specific mortality observed in the AUD patients.

Also, as already mentioned above, our study focused on the urban population of Novosibirsk only and does not allow for any conclusions to be drawn on how cause-specific mortality might look for AUD patients in the entire region of Novosibirsk, including other settlements and, most importantly, the rural population.

References

Bobrova, N., Rhodes, T., Power, R., Alcorn, R., Neifeld, E., Krasiukov, N., . . . Maksimova, S. (2006). Barriers to accessing drug treatment in Russia: A qualitative study among injecting drug users in two cities. *Drug and Alcohol Dependence, 82*(Suppl 1), S57–S63.

Dean, A. G., Sullivan, K. M., & Soe, M. M. (Producer). (04/19/2017). *OpenEpi: Open source epidemiologic statistics for public health*. Retrieved from www.OpenEpi.com

Department of Medical Statistics at the Novosibirsk Regional Clinical Narcological Dispensary. (2017). *Department of Medical Statistics at the Novosibirsk Regional Clinical Narcological Dispensary*. (04/10/2017). Retrieved from www.nond.mznso.ru

Federal State Statistics Service (Producer). (2017, April 27). *Federal state statistics service of the Russian Federation (Rosstat).* Retrieved from www.gks.ru/

GBD 2016 Risk Factors Collaborators. (2017). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet, 390*(10100), 1345–1422. doi:10.1016/S0140-6736(17)32366-8

Gmel, G., Rehm, J., & Kuntsche, E. (2003). Binge drinking in Europe: definitions, epidemiology, and consequences. *Sucht, 49*(2), 105–116.

Institute of Health Metrics and Evaluation (Producer). (2017). *Global Burden of Disease Study 2015: Life expectancy, all-cause and cause-specific mortality* 1980-2015. Retrieved from http://ghdx.healthdata.org/record/global-burden-disease-study-2015-gbd-2015-life-expectancy-all-cause-and-cause-specific

Leon, D. A., Chenet, L., Shkolnikov, V., Zakharov, S., Shapiro, J., Rakhmanova, G., . . . McKee, M. (1997). Huge variation in Russian mortality rates 1984-1994: Artefact, alcohol, or what? *Lancet, 350*(9075), 383–388.

Leon, D. A., Saburova, L., Tomkins, S., Andreev, E., Kiryanov, N., McKee, M., & Shkolnikov, V. M. (2007). Hazardous alcohol drinking and premature mortality in Russia: A population based case-control study. *Lancet, 369*(9578), 2001–2009.

Manthey, J., Imtiaz, S., Neufeld, J., Rylett, M., & Rehm, J. (2017). Quantifying the global contribution of alcohol consumption to cardiomyopathy. *Population Health Metrics, 15*(1), 20.

Nemtsov, A. V. (2002). Alcohol-related harm losses in Russia in the 1980s and 1990s. *Addiction, 97*, 1413–1425.

Nemtsov, A. V. (2005). Russia: Alcohol yesterday and today. *Addiction, 100*(2), 146–149.

Nemtsov, A. V. (2011). *A contemporary history of alcohol in Russia*. Stockholm, Sweden: Södertörns högskola.

Neufeld, M., Wittchen, H. U., & Rehm, J. (2017). Drinking patterns and harm of unrecorded alcohol in Russia: A qualitative interview study. *Addiction Research & Theory, 25*(4), 310–317.

Rehm, J., Dawson, D., Frick, U., Gmel, G., Roerecke, M., Shield, K. D., & Grant, B. (2014). Burden of disease associated with alcohol use disorders in the United States. *Alcoholism: Clinical & Experimental Research, 38*(4), 1068–1077. doi:10.1111/acer.12331

Rehm, J., Gmel, G. E., Gmel, G., Hasan, O. S. M., Imtiaz, S., Popova, S., . . . Shuper, P. A. (2017a). The relationship between different dimensions of alcohol use and the burden of disease - An update. *Addiction, 112*(6), 968–1001. doi:10.1111/add.13757

Rehm, J., Hasan, O. S. M., Imtiaz, S., & Neufeld, M. (2017b). Quantifying the contribution of alcohol to cardiomyopathy: A systematic review. *Alcohol, 61*, 9–15. doi:10.1016/j.alcohol.2017.01.011

Rehm, J., Shield, K. D., Gmel, G., Rehm, M. X., & Frick, U. (2013). Modeling the impact of alcohol dependence on mortality burden and the effect of available treatment interventions in the European Union. *European Neuropsychopharmacology, 23*(2), 89–97. doi:10.1016/j.euroneuro.2012.08.001

Rehm, J., Sulkowska, U., Manczuk, M., Boffetta, P., Powles, J., Popova, S., & Zatonski, W. (2007). Alcohol accounts for a high proportion of premature mortality in central and eastern Europe. *International Journal of Epidemiology, 36*, 458–467. doi:10.1093/ije/dyl294

Roerecke, M., & Rehm, J. (2013). Alcohol use disorders and mortality - A systematic review and meta-analysis. *Addiction, 108*(9), 1562–1578. doi:10.1111/add.12231.

Roerecke, M., & Rehm, J. (2014). Cause-specific mortality risk in alcohol use disorder treatment patients: A systematic review and meta-analysis. *International Journal of Epidemiology, 43*(3), 906–919. doi:10.1093/ije/dyu018

Schwarzinger, M., Thiébaut, S. P., Baillot, S., Mallet, V., & Rehm, J. (2018). Alcohol use disorders and associated chronic disease - A national retrospective cohort study from France. *BMC Public Health, 18*(1), 43. doi:10.1186/s12889-017-4587-y.

Shield, K. D., Rylett, M., & Rehm, J. (2016). *Public health successes and missed opportunities. Trends in alcohol consumption and attributable mortality in the WHO European Region, 1990-2014*. Copenhagen, Denmark: WHO European Region.

Tomkins, S., Saburova, L., Kiryanov, N., Andreev, E., McKee, M., Shkolnikov, V., & Leon, D. A. (2007). Prevalence and socio-economic distribution of hazardous patterns of alcohol drinking: Study of alcohol consumption in men aged 25-54 years in Izhevsk, Russia. *Addiction, 102*(4), 544–553.

Westman, J., Wahlbeck, K., Laursen, T. M., Gissler, M., Nordentoft, M., Hallgren, J., . . . Osby, U. (2015). Mortality and life expectancy of people with alcohol use disorder in Denmark, Finland and Sweden. *Acta Psychiatrica Scandinavica, 131*(4), 297–306. doi:10.1111/acps.12330

World Health Organization. (1994). *ICD-10 Classification of mental and behavioural disorders: with glossary and diagnostic criteria for research*. New York, NY: Churchill Livingstone.

World Health Organization. (2014). *Global status report on alcohol and health*. Retrieved from http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf

Zaigraev, G. (2004). The Russian model of noncommercial alcohol consumption. In A. Haworth & R. Simpson (Eds.), *Moonshine markets: Issues in unrecorded alcohol beverage production and consumption* (pp. 31–40). New York, NY, and Hove, UK: Brunner-Routledge.

Zaridze, D., Maximovitch, D., Lazarev, A., Igitov, V., Boroda, A., Boreham, J., . . . Boffetta, P. (2009). Alcohol poisoning is a main determinant of recent mortality trends in Russia: Evidence from a detailed analysis of mortality statistics and autopsies. *International Journal of Epidemiology, 38*, 143–153.