Chapter 6
Approaches to the Assessment of Alcohol-Related Losses in the Russian Population

V. G. Semyonova, N. S. Gavrilova, T. P. Sabgayda, O. M. Antonova, S. Yu Nikitina and G. N. Evdokushkina

Abstract Until recently, the level of alcohol-related losses in Russia was assessed using mortality from accidental poisoning by alcohol. Our study shows that currently the alcohol-related losses in Russia are determined primarily by degenerative diseases of alcoholic etiology. We show that partitioning of alcohol-related deaths into poisoning and somatic pathology (causes due to degenerative diseases related to alcohol abuse) provides important insights into the patterns of alcohol-related mortality. In particular, it shows that the use of accidental alcohol poisoning alone as an indicator of alcohol-related mortality leads to a significant underreporting of alcohol-related losses in Russia during the first decade of the twenty-first century.

The study of alcohol-related mortality in the Russian regions revealed areas of high risk for alcohol deaths and regions where deaths from alcohol poisoning or from somatic pathologies of alcoholic etiology are systematically underreported. Furthermore, the regional analysis provided us with an opportunity to assess how complete are the official statistics of alcohol-related losses in the Russian population. The existing legal framework in Russia and current diagnostic practices allow regional administrations to underreport socially significant losses including losses related to alcohol. There is no doubt that the establishment of uniform country-wide standards for reporting alcohol-related mortality will lead to a substantial increase in the scale of losses caused by alcohol. These measures are a necessary first step for developing effective programmes for the reduction of alcoholism in Russia.

Keywords Russia · Alcohol · Cause of death · Regional differences · Gender differences

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Alcoholism has long been the most significant source of excess mortality in Russia (Nemtsov 1998, 2001, 2009; Starodubov et al. 2003; Ivanova and Semyonova 2005; Mckee et al. 2001; Leon et al. 2007, 2009). The role of alcohol consumption as a risk factor of mortality has been demonstrated in a number of publications including papers by Leon et al. (1997) and Mäkelä et al. (1997). After the initial period of increase in life expectancy in Russia (1984–1987), mainly due to Gorbachev's anti-alcohol campaign, life expectancy in Russia rapidly dropped during the period of economic and political reforms (1988–1994). In the beginning of the twenty-first century life expectancy in Russia stabilized and started to increase slowly after 2005. Taking into account these new patterns and trends in life expectancy, it is important to assess the contribution of alcohol consumption to these changes (as a substantial risk factor of mortality for the adult population).

Until recently, the level of alcohol-related losses was assessed using mortality from accidental poisoning by alcohol (Andreev and Zbarskaya 2010). Moreover, even now, administrative officials in Russian regions consider mortality from accidental alcohol poisoning to be the only indicator of alcohol losses. The ICD-10, however mentions 12 major causes of death with an alcoholic etiology:

1. mental and behavioral disorders due to alcohol (F10);
2. alcohol-related degeneration of the nervous system (G31.2);
3. alcoholic polyneuropathy (G62.1);
4. alcoholic myopathy (G72.1);
5. alcoholic cardiomyopathy (I42.6);
6. alcoholic liver disease (alcoholic cirrhosis, hepatitis, fibrosis) (K70);
7. alcoholic gastritis (K 29.2);
8. chronic pancreatitis with alcoholic etiology (K86.0);
9. fetal alcohol syndrome (Q86.0);
10. accidental poisoning (exposure) by alcohol (X45);
11. intentional self-poisoning and exposure to alcohol (X65);
12. exposure and poisoning by alcohol with undetermined intent (Y15).

Thus, a complete account of alcohol deaths is not limited to accidental alcohol poisoning. On the one hand, this category does not include all cases of alcoholic poisoning and on the other hand it overlooks alcohol-related losses due to various kinds of somatic pathology. This raises a number of questions, the most important of which is the extent of losses due to alcohol abuse in Russia. We tested the correctness of using deaths from accidental alcohol poisoning as a universal indicator showing the possible losses caused by alcohol. For this, we estimated total alcohol-related mortality (i.e. mortality from all alcohol-related causes) and conducted an analysis of its trends and structure in Russia and the Russian regions.

The study of alcohol-related mortality in the Russian regions reveals areas of high and low risk for alcohol deaths. In addition, the regional analysis provides us with an opportunity to assess how complete are the official statistics of alcohol-related losses in the Russian population.

6.1 Data and Methods

To estimate the extent of alcohol-related mortality, we used the Rosstat database of recorded deaths, with all personal identifiers removed. This database uses codes of ICD-10 for specific causes of death rather than the abbreviated list of causes adopted in Russia (used in the basic form of statistical reports on mortality C-51). Alcohol-related mortality was calculated using the automated information system "FAISS-Potential" (Ermakov et al. 1999). Mortality was standardized with the European age structure as a standard in order to make results comparable to the results obtained by other researchers on this topic. Analysis was performed separately for persons at young working ages (20–39 years), old working ages (40–59 years) and older ages (60 years and older) to identify the age characteristics of alcoholic mortality.

Among the 12 causes of death of alcoholic etiology identified in ICD-10, three causes belong to poisoning; one refers to mental illness; three to diseases of the nervous system; one to cardiovascular diseases; three to diseases of the digestive system and one to congenital malformations (fetal alcohol syndrome). For some specific nosologies with a very small numbers of cases, the analysis was conducted in the context of the classes of causes of death to which these causes belong. We used four groups of somatic causes of alcohol-related mortality: mental alcohol-related deaths, alcohol-related diseases of the nervous system, alcoholic cardiomyopathy and alcoholic liver disease. The death rate from alcohol poisoning was evaluated as the sum of three categories: accidental alcohol poisoning (X45), alcohol poisoning with undetermined intent (Y15), intentional self-poisoning and exposure to alcohol (X65).

We applied the term "somatic" to degenerative diseases, the origin of which lies in alcohol abuse, rather than external causes of death or poisoning. As we show later, dividing alcohol-related deaths into poisoning and somatic pathology is very informative for describing patterns of alcohol-related mortality in Russia during the first decade of the twenty-first century (2000–2009).

In the analysis of regional mortality we used rank correlations. We did not include data on alcohol consumption at the regional level, taking into account the opinion of experts that such data are not reliable and greatly underestimate alcohol consumption both in Russia as a whole and in the Russian regions (Nemtsov 2011). The analysis is conducted by age group, rather than for all age groups together, because age is the most important factor when studying poisoning and somatic causes. Because of the high level of alcohol-related mortality at ages 40–59 years, overall alcohol mortality is determined by this middle age group rather that by mortality among young adults and the elderly.

6.2 Alcohol-Related Mortality of the Adult Russian Population in 2000–2009

During the past decade, total alcohol-related mortality in Russia rose slightly, especially among the elderly. At the same time a decrease in mortality from alcohol poisoning was observed in all adult age groups. These opposite tendencies require more detailed consideration. Figures 6.1 and 6.2 show that among persons of younger

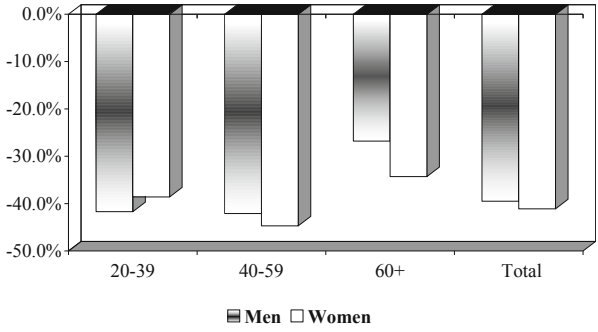

Fig. 6.1 Decline of mortality from alcohol poisoning among adult population in Russia from 2000 to 2009 (percent), by age and sex

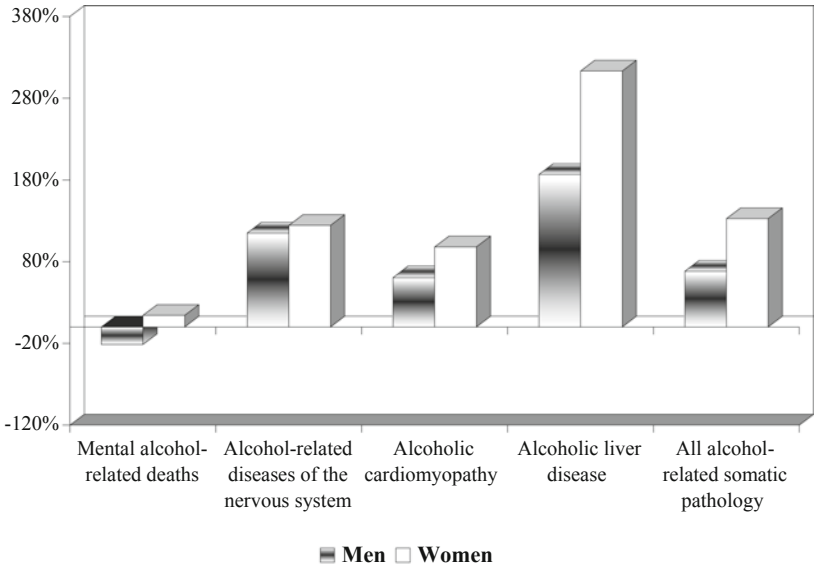

Fig. 6.2 Changes in mortality due to alcohol-related somatic pathology among population of younger working age (20–39 years) in Russia from 2000 to 2009 (percent), by sex and type of somatic pathology

working age (20–39) in 2000–2009 there was a decrease in mortality from alcohol poisoning by 41.7 % among men and 38.6 % among women, while deaths from alcohol-related somatic pathology increased by more than two thirds (68.3 %) for men and by 2.3 times for women (see Fig. 6.2).

The largest increases in 2000–2009 were observed for diseases of the digestive system caused by alcohol (2.9- and 4.1-fold increase, respectively) as well as alcoholic cardiomyopathy (an increase of 60.45 % and a 2-fold, respectively). Such negative trends are also noted for diseases of the nervous system caused by alcohol abuse (more than 2-fold increase among males and females). The male death rate from mental and behavioral disorders due to alcohol consumption (i.e., those states

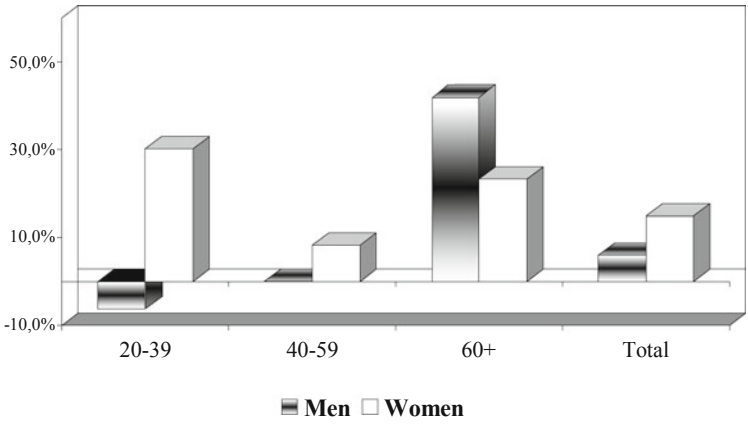

Fig. 6.3 Changes in total alcohol-related mortality of adult population in Russia in 2000–2009 (percent), by age and sex

of health termed chronic alcoholism) decreased by 21.4 % in 2000–2009, but female mortality from these causes grew by 14.3 %.

Because of these divergent trends (increase in mortality from somatic causes and reduction in alcohol poisoning), the results for 2000–2009 were significantly different for male and female populations. Figure 6.3 shows that the total alcohol-related mortality among men of younger working age decreased by 6.2 % for this period, while the mortality among women of this age increased by almost one third (30.2 %).

When discussing the changes in alcohol-related mortality over the past 10 years, we can consider two stages of mortality change for all age groups. During the first stage, until 2005, death rates were rising, and after 2005 (second stage) alcohol-related mortality began to decline. Figure 6.4 shows changes in total alcohol-related mortality among the younger working age population (20–39 years) in Russia from 2000 to 2009, in which we can see clearly these two divergent trends: growth in 2000–2005 and decline in 2005–2009.

The changes in total alcohol-related mortality and its components (external and somatic) during the period of declining mortality (2005–2009) are of particular interest. Figure 6.5 shows that the declines in both somatic mortality and in mortality from alcohol poisoning among the younger working age population accelerated dramatically in the last year of the period under study. There was a noticeable deceleration in the decline of total alcohol-related mortality in 2007–2008 compared with 2005–2007 (from 8.7 to 5.6 % among men and from 7.3 to 2.7 % among women) primarily due to an increase in somatic mortality (more than a two-fold reduction in the rate of decline among men and switch from a 6.0 % decrease to a 2.6 % growth in mortality among women). However, in 2009, the total alcohol-related mortality among men and women of younger working age fell by 11.1 and 14.2 % respectively as a result of 11.7 and 13 % reductions in somatic pathology and 10.3 and 17 % reduction in mortality from alcohol poisoning.

Similar trends were observed among the population of older working ages (40–59 years). Among men of this age group the total alcohol-related mortality in 2000

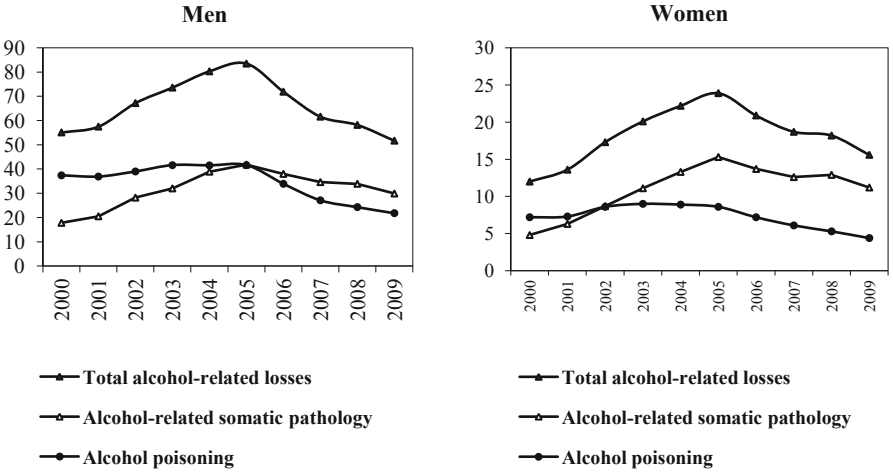

Fig. 6.4 Alcohol-related mortality among population of younger working age (20–39 years) in Russia in 2000–2009, by sex and type of alcohol-related losses (standardized rates per 100,000)

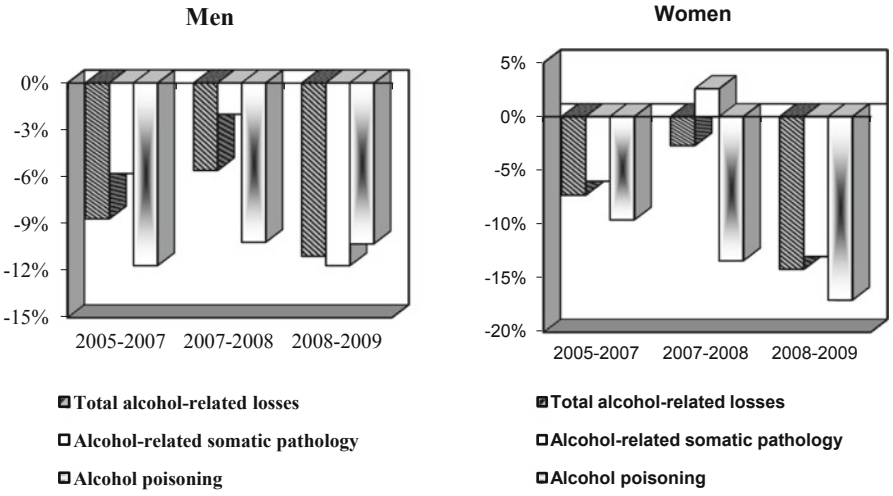

Fig. 6.5 Annual rates of changes in alcohol-related mortality among population of younger working age (20–39 years) in Russia, by sex, type of alcohol-related losses and calendar period (percent)

and 2009 was almost the same (166.2 and 166.4 per 100,000) and among women it increased by 8.3 %. Mortality from alcohol poisoning decreased by 42.1 % among men and by 44.7 % among women during this period while alcohol-related somatic mortality increased by 58.8 and 73.0 % respectively (Figs. 6.1, 6.3 and 6.6). Figure 6.6 shows changes in mortality due to alcohol-related somatic pathology among the population of 40–59-year olds in 2000–2009. Among the somatic causes of death, the worst tendencies were observed for mortality from diseases of the digestive

Fig. 6.6 Changes in mortality due to alcohol-related somatic causes among population of older working age (40–59) in Russia in 2000–2009 (percent), by sex and type of alcohol-related losses

system, which increased 2.2-fold for men and 2.6-fold for women. As in the younger age groups, mortality from these causes is predominantly determined by alcoholic liver cirrhosis, which comprises 66.6 % of all male deaths due to the diseases of the digestive system caused by alcohol, as well as 71.1 % of all such female deaths. Mortality due to diseases of the nervous system and sensory organs caused by alcohol (namely, the degeneration of the nervous system caused by alcohol—G31.2), had similar rates of growth for men and women (both showed a 2-fold increase). Also, mortality due to alcoholic cardiomyopathy had very similar rates of growth for men and women (63 and 55 % respectively).

The level of mortality from mental and behavioral disorders due to alcohol (F10), decreased by 17.2 % among men but only by 6.1 % among women in 2000–2009. As in the case of young working ages, during the last year of our study there is a noticeable improvement compared with the trends observed in 2005–2008: total alcohol-related mortality of 40–59-year olds declined by 11.8 % for men and by 10.9 % for women, which is close to the decline of mortality observed in 2005–2007 (10.4 and 11.1 % respectively).

These changes are particularly notable when compared with the 1—and 3.6 % growth rates of this indicator in 2007–2008 (Figs. 6.7 and 6.8). Figure 6.7 shows the dynamics of alcohol-related mortality among the population of older working age (40–59 years) in Russia since 2000 till 2009, and Fig. 6.8 shows the rates of change in such mortality from 2005 till 2009. Note that the change from a positive to a negative trend in 2008 was related to somatic causes (growth by 3.8 and 7.6 % as opposed to an annual decline of 9 and 10.1 % in 2005–2007). Mortality from alcohol poisoning continued to decline in 2007–2008, although the rates of improvement significantly

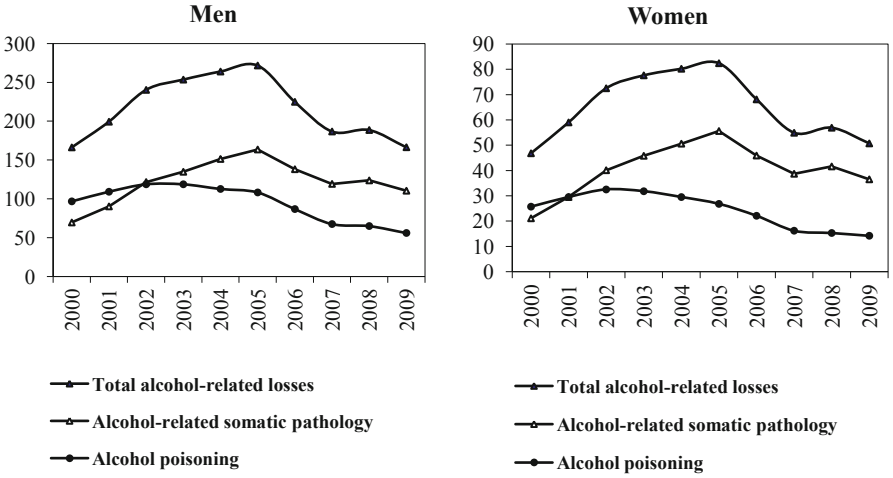

Fig. 6.7 Alcohol-related mortality among population of older working age (40–59 years) in Russia in 2000–2009, by sex and by type of alcohol-related losses (standardized rates per 100,000)

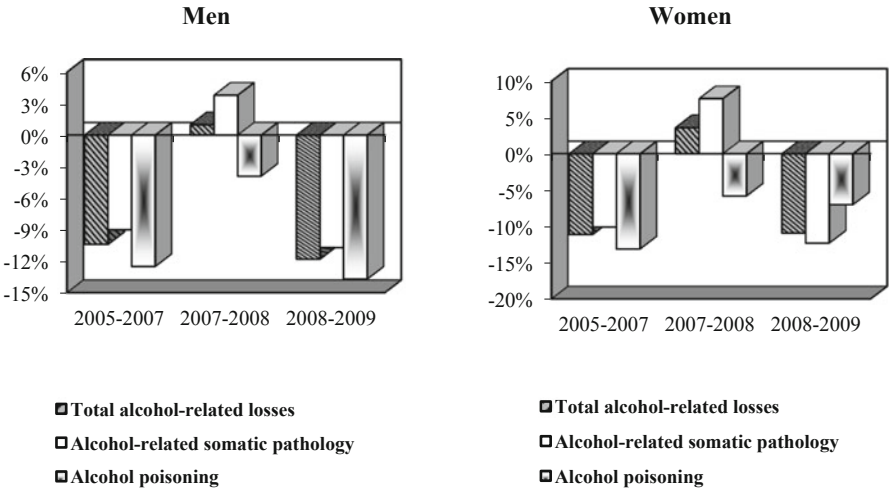

Fig. 6.8 Annual rates of change in mortality due to alcohol-related causes among population of older working age (40–59 years) in Russia, 2005–2009 (percent), by sex, type of alcohol-related losses and calendar period

decreased compared to 2005–2007 (3.9 and 5.8 % in 2007–2008 versus 12.5 and 13.1 % respectively). In 2009 there was a renewed decline in mortality due to alcohol poisoning, particularly among men (a decrease of 13.7 and 7.0 % respectively). Thus, as in the case of young working ages, the improvements in alcohol-related mortality observed in 2009 were determined by both alcohol poisonings and somatic alcohol-related causes.

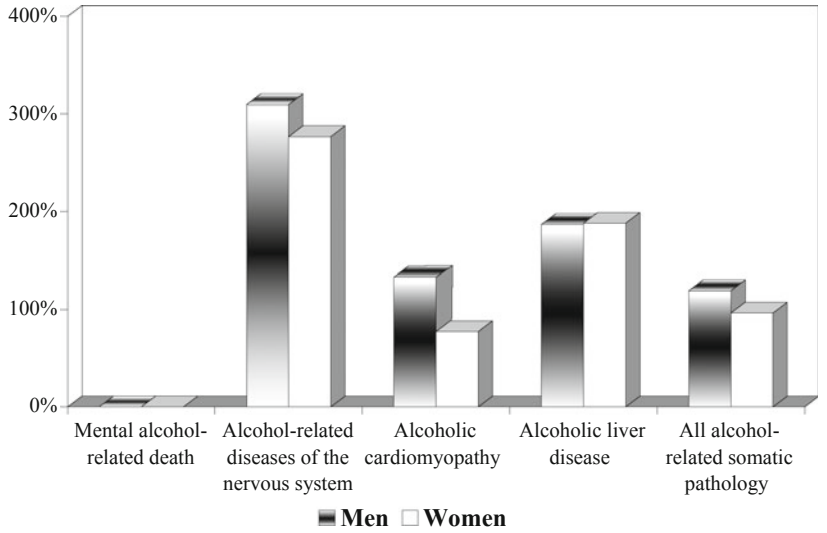

Fig. 6.9 Changes in mortality due to alcohol-related somatic causes among the elderly population (60 years and older) in Russia in 2000–2009, by sex and cause (percent)

Alcohol mortality in the elderly population (60 years and older) is characterized by trends which are similar to those observed at younger ages and here again the growth in death rates in 2000–2009, by 43.1 % among elderly men and by 23.2 % among women, was due to alcohol-related somatic pathology. Mortality due to somatic causes grew by 2.2 and 2 times among men and women respectively, compared with a 26.8 and 34.3 % decrease in mortality from alcohol poisoning (Figs. 6.1, 6.3 and 6.9). Figure 6.9 shows the rates of change in mortality due to alcohol-related somatic pathology among the elderly population in 2000–2009. The highest rate of increase (4.1-and 3.8-fold among men and women respectively) was observed for mortality due to diseases of the nervous system, almost all of which were due to alcoholic degeneration of the nervous system (G31.2). In the second place, in terms of mortality growth (2.9-fold for both older men and women), are diseases of the digestive system, among which alcoholic liver cirrhosis was the cause of death for over 70 % of men and 75 % of women. Mortality due to alcoholic cardiomyopathy increased 2.3-fold and by 77.4 % among elderly men and women respectively. Mental and behavioural alcohol-related disorders were the only causes of mortality which slightly declined in 2000–2009 (by 3.3 and 5.7 %).

Figure 6.10 shows the changes in alcohol-related mortality among the elderly Russian population from 2000 to 2009 and Fig. 6.11 shows the rates of change for this mortality from 2005 to 2009. It should be noted that the improvements in mortality in 2009 were minimal among the elderly population, although they are more noticeable compared to changes in 2007–2008. For example, in 2008–2009 total alcohol-related mortality decreased by 0.9 % among older men and by 5.5 % among older women versus a 5 and 0.5 % growth in 2007–2008. However, the rates of decline in 2009

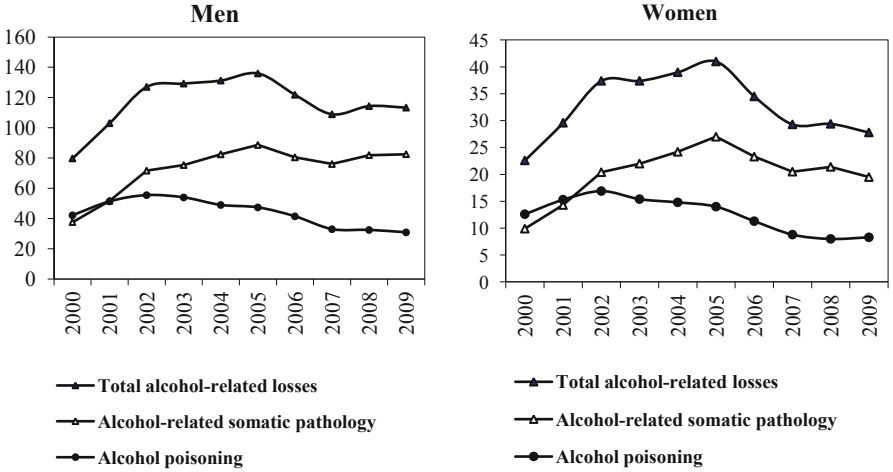

Fig. 6.10 Alcohol-related mortality among older (60+) population in Russia, 2000–2009, by sex and type of alcohol-related losses (standardized rates per 100,000)

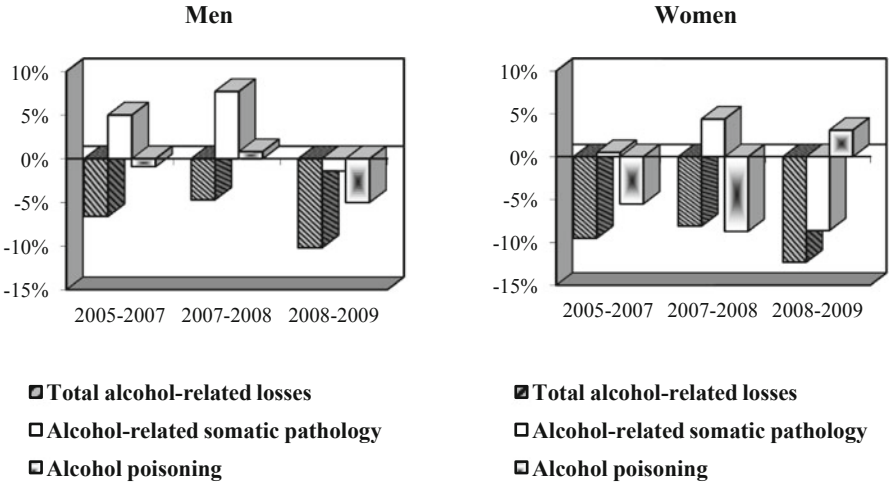

Fig. 6.11 Annual rates of change in mortality due to total alcohol-related causes among older population in Russia, 2005–2009, by sex and type of alcohol-related losses (percent)

were significantly lower than the annual rates of decline in 2005–2007, when they were 6.6 % among older men and 9.5 % among older women (Figs. 6.10 and 6.11).

We would like to note some gender differences in the trends of alcohol-related mortality among the elderly population in Russia, which appeared in the last year of the period under study. While the deterioration in alcohol-related mortality in 2007–2008 compared to 2005–2007 was due to somatic causes (growth by 7.7 % for older men and by 4.4 % for older women) with a very small improvement in mortality trends from alcohol poisoning, the trends of somatic mortality and mortality from

alcohol poisoning for older men and women in 2009 showed opposite trends. For men, the improvement in mortality due to alcohol poisoning accelerated (a decrease in mortality by 5 %) while for women the prior decrease in mortality from alcohol poisoning changed to a 3.1 % increase in 2009. At the same time, there was a slight deterioration in alcohol somatic mortality (growth for men by 0.8 % and a change from growth to decline among women). The positive developments in alcohol-related mortality observed in 2009 among the older Russian population were determined by positive changes in mortality from alcohol poisoning for men and by positive developments in alcohol-related somatic pathology for women.

Summarizing the analysis of alcohol-related mortality among the three age groups of the Russian population it should be noted that the positive trends in mortality from alcohol poisoning began as early as in 2002–2003. However, the decline in mortality from alcohol-related somatic pathology began only in 2005, and during the same period one could observe positive trends for total alcohol-related mortality. Some gender differences here should be emphasized: for men, alcohol-related losses grew mainly among the elderly, while for women, the growth of losses occurred mainly at ages 20–39. Thus, we may conclude that women (and young women of reproductive ages in particular) are now in the risk group for alcohol-related mortality in Russia.

Tables 6.1 and 6.2 show the level and the structure of mortality among the adult Russian population (older than 20 years) due to alcohol-related somatic pathology over a 10-year period (2000–2009). It is clear from the tables that alcoholic cardiomyopathy is the dominant cause of alcohol somatic pathology during the study period. The share of alcoholic cardiomyopathy among alcohol somatic deaths slightly decreased for men of younger working age (from 58.2 to 55.5 %), and grew among people older than 40 years, most notably among the elderly (from 58.6 to 60.1 % among 40–59-year-olds and from 51.4 to 54.7 % among persons age 60 + years). Among women, by contrast, there was a decline in the share of alcoholic cardiomyopathy among women in all age groups above 20 years, particularly among young women (from 54.6 to 46.4 %). At the same time, there is a stable growth in the importance of alcohol-related diseases of the digestive system for both men and women. The contribution of these causes to alcohol-related somatic deaths rose from 17.3 to 29.4 % and from 22.6 to 40.2 % among 20–39-year-olds, from 17.1 to 23.6 % and from 24.6 to 37 % among 40–59-year-olds, from 20.2 to 26.4 % and from 25.2 to 36.9 % among older individuals[1]. We note that 2009 did not bring any changes to the 10-year evolution of the structure of somatic mortality of alcoholic etiology (Tables 6.1 and 6.2).

The condition of "chronic alcoholism" (F10) occupies the third place among alcohol-related somatic mortality, but its importance has declined by almost half over the study period comprising about 10 % in all the age-sex groups studied. The importance of degeneration of the nervous system caused by alcohol turned out to be minimal during the study period, and its changes showed fluctuations.

We can thus see a fundamental change in the pattern of alcohol-related mortality for the adult Russian population during the period of 2000–2009: on the one hand a

[1] Alcoholic cirrhosis of the liver dominated among the diseases of the gastrointestinal tract at any age.

Table 6.1 The nosology profile of mortality for the male Russian population aged 20 + years due to alcohol-related somatic pathology in 2000–2009 (standardized rates of mortality per 100,000 and contribution in percent)

Years	Mental alcohol-related causes		Alcohol-related diseases of the nervous system		Alcoholic cardiomyopathy		Diseases of digestive system		Alcohol-related somatic pathology	
	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	percent
Males of 20–39 years old										
2000	3.6	20.0	0.8	4.4	10.3	58.2	3.1	17.3	17.8	100.0
2001	3.5	16.9	1.2	5.6	11.9	58.1	4.0	19.4	20.5	100.0
2002	4.3	15.1	1.4	5.1	17.0	60.3	5.5	19.6	28.2	100.0
2003	3.8	11.8	2.0	6.2	19.7	61.5	6.5	20.4	32.0	100.0
2004	3.9	9.9	2.4	6.1	24.0	61.7	8.7	22.3	38.9	100.0
2005	4.2	9.9	2.4	5.6	24.9	59.5	10.4	25.0	41.8	100.0
2006	3.8	10.1	2.0	5.3	22.1	58.3	10.0	26.3	38.0	100.0
2007	3.5	10.1	1.7	4.9	19.7	57.1	9.6	27.9	34.6	100.0
2008	3.6	10.6	1.7	5.1	18.8	55.5	9.8	28.8	33.9	100.0
2009	2.8	9.4	1.7	5.7	16.6	55.5	8.8	29.4	29.9	100.0
Males of 40–59 years old										
2000	13.7	19.6	3.3	4.7	40.7	58.6	11.9	17.1	69.5	100.0
2001	16.5	18.3	4.7	5.3	53.6	59.4	15.4	17.0	90.2	100.0
2002	18.0	14.8	7.1	5.9	76.5	62.9	20.0	16.4	121.6	100.0
2003	17.3	12.8	8.4	6.2	85.7	63.6	23.5	17.4	134.8	100.0
2004	16.5	10.9	9.8	6.5	97.3	64.3	27.7	18.3	151.3	100.0
2005	16.2	9.9	10.5	6.4	105.0	64.2	31.8	19.5	163.5	100.0
2006	13.6	9.8	8.5	6.1	86.9	62.9	29.2	21.1	138.1	100.0
2007	12.3	10.3	7.0	5.8	73.9	62.0	26.1	21.9	119.2	100.0
2008	13.4	10.8	7.3	5.9	75.4	61.0	27.6	22.3	123.7	100.0
2009	11.3	10.2	6.7	6.1	66.4	60.1	26	23.6	110.4	100.0

Table 6.1 (continued)

Years	Mental alcohol-related causes		Alcohol-related diseases of the nervous system		Alcoholic cardiomyopathy		Diseases of digestive system		Alcohol-related somatic pathology	
	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	percent
Males of 60 years old and older										
2000	9.0	23.9	1.7	4.5	19.4	51.4	7.6	20.2	37.6	100.0
2001	10.0	19.3	2.7	5.3	28.2	54.6	10.7	20.8	51.7	100.0
2002	11.7	16.4	4.2	5.9	41.4	57.8	14.2	19.9	71.6	100.0
2003	11.0	14.6	4.6	6.1	44.3	58.8	15.4	20.5	75.3	100.0
2004	10.4	12.6	6.2	7.5	48.3	58.6	17.5	21.3	82.4	100.0
2005	10.1	11.4	6.8	7.6	52.2	59.0	19.5	22.0	88.6	100.0
2006	8.8	11.0	6.3	7.9	45.8	56.9	19.5	24.2	80.4	100.0
2007	8.7	11.5	5.8	7.7	41.8	54.9	19.7	25.9	76.0	100.0
2008	9.1	11.1	6.2	7.5	46.1	56.3	20.5	25.1	81.9	100.0
2009	8.7	10.5	6.9	8.4	45.1	54.7	21.8	26.4	82.5	100.0

Table 6.2 The nosology profile of mortality for the female Russian population aged 20+ years due to alcohol-related somatic pathology in 2000–2009 (standardized rates of mortality per 100,000 and contribution in percent)

Years	Mental alcohol-related causes		Alcohol-related diseases of the nervous system		Alcoholic cardiomyopathy		Diseases of digestive system		Alcohol-related somatic pathology	
	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	percent
Females of 20–39 years old										
2000	0.9	18.2	0.2	4.6	2.6	54.6	1.1	22.6	4.8	100.0
2001	0.8	13.2	0.4	5.9	3.4	54.7	1.6	26.2	6.3	100.0
2002	1.0	11.1	0.4	4.7	4.9	56.6	2.4	27.5	8.7	100.0
2003	1.1	10.0	0.5	4.8	6.1	54.9	3.4	30.3	11.1	100.0
2004	1.2	8.7	0.6	4.8	7.1	53.7	4.4	32.8	13.3	100.0
2005	1.1	7.5	0.8	5.0	8.0	52.3	5.4	35.1	15.3	100.0
2006	1.0	7.3	0.7	4.8	7.0	51.1	5.0	36.8	13.7	100.0
2007	1.2	9.6	0.5	3.8	5.9	46.7	5.0	39.9	12.6	100.0
2008	1.3	9.9	0.0	0.1	6.1	47.7	5.0	38.9	12.9	100.0
2009	1	8.9	0.5	4.5	5.2	46.4	4.5	40.2	11.2	100.0
Females of 40–59 years old										
2000	3.4	16.2	0.8	3.9	11.7	55.4	5.2	24.6	21.1	100.0
2001	4.3	14.5	1.5	5.0	16.9	57.3	6.8	23.2	29.5	100.0
2002	4.3	10.8	2.1	5.3	23.9	59.7	9.7	24.2	40.1	100.0
2003	4.4	9.6	2.6	5.7	26.9	58.8	11.9	26.0	45.8	100.0
2004	4.2	8.4	2.8	5.5	29.0	57.3	14.6	28.8	50.6	100.0
2005	4.1	7.4	2.8	5.0	31.8	57.2	16.9	30.5	55.6	100.0
2006	3.7	8.1	2.0	4.3	25.2	54.8	15.1	32.8	45.9	100.0
2007	3.4	8.7	1.9	4.8	20.2	52.2	13.3	34.3	38.7	100.0
2008	3.4	8.2	1.8	4.3	21.7	52.2	14.7	35.3	41.6	100.0
2009	3.2	8.8	1.7	4.7	18.1	49.6	13.5	37.0	36.5	100.0

Table 6.2 (continued)

Years	Mental alcohol-related causes		Alcohol-related diseases of the nervous system		Alcoholic cardiomyopathy		Diseases of digestive system		Alcohol-related somatic pathology	
	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	Percent	Mortality	percent
Females of 60 years old and older										
2000	1.7	17.1	0.3	2.7	5.5	55.1	2.5	25.2	9.9	100.0
2001	2.1	14.7	0.5	3.6	7.9	54.9	3.8	26.8	14.3	100.0
2002	2.3	11.4	0.8	3.8	12.0	58.6	5.4	26.3	20.4	100.0
2003	2.2	9.9	0.8	3.7	13.1	59.5	5.9	26.9	22.0	100.0
2004	2.2	9.1	1.1	4.6	13.8	57.0	7.1	29.3	24.2	100.0
2005	2.1	7.7	1.3	5.0	15.1	56.0	8.5	31.3	27.0	100.0
2006	1.8	7.6	1.3	5.4	12.5	53.8	7.7	33.2	23.3	100.0
2007	1.7	8.1	1.1	5.4	10.0	48.9	7.7	37.6	20.5	100.0
2008	1.7	8.0	1.1	5.1	11.2	52.5	7.3	34.4	21.4	100.0
2009	1.6	8.2	1	5.1	9.7	49.7	7.2	36.9	19.5	100.0

Table 6.3 Dynamics of distribution of alcohol-related male mortality (percent) in Russia in 2000–2009, by age and type of pathology

Type of pathology	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Males of 20–39 years old										
Alcohol poisoning	67.8	64.3	58.0	56.5	51.6	49.9	47.2	43.9	41.8	42.2
Alcohol-related somatic pathology	32.2	35.7	42.0	43.5	48.4	50.1	52.8	56.1	58.2	57.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Males of 40–59 years old										
Alcohol poisoning	58.2	54.7	49.4	46.8	42.7	39.8	38.6	36.2	34.4	33.7
Alcohol-related somatic pathology	41.8	45.3	50.6	53.2	57.3	60.2	61.4	63.8	65.6	66.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Males of 60 years old and older										
Alcohol poisoning	52.8	49.8	43.6	41.7	37.2	34.8	34.0	30.2	28.4	27
Alcohol-related somatic pathology	47.2	50.2	56.4	58.3	62.8	65.2	66.0	69.8	71.6	73
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

growth in mortality from alcohol-related somatic causes and, on the other, a decline in mortality from alcohol poisoning. In 2000, the alcohol-related mortality of the adult population in Russia was determined predominantly by mortality from alcohol poisoning while by 2009 somatic causes had become the leading causes of alcohol-related mortality (and the contribution of somatic alcohol mortality increases with age for both men and women). Overall, almost two thirds of alcohol-related mortality among men and three quarters among women were determined by various types of somatic pathology (see Tables 6.3 and 6.4). Note, however, that the situation in 2009 is somewhat different from the general evolution of alcohol-related mortality in the last decade. For the first time during the study period, the significance of alcohol poisoning increased, albeit marginally, among 20–39-year-old men and among women older than 40 years. Right now it is difficult to predict whether this is a random event or the beginning of an inversion in the structure of alcohol-related mortality in these age groups.

Thus, we may conclude that during the last decade, the pattern of alcohol-related mortality in Russia was subjected to fundamental changes: in 2000, this mortality was determined predominantly by alcohol poisoning, while in 2009, it became determined mainly by somatic pathologies of alcohol etiology. For this reason, estimates of alcohol-related losses of population which are based on mortality from accidental poisoning by alcohol alone seriously underestimate the level of mortality from this cause: almost two thirds of male and three fourths of female alcohol-related mortality, which is determined by different kinds of somatic pathologies, remain in the "shadow".

We also should take into account another factor. According to the official statistics by Rosstat, the contribution of alcohol-related mortality to the total mortality of the working population in Russia does not exceed 10 % (Regions of Russia 2010). Meanwhile, according to the research by AV Nemtsov and coauthors (Nemtsov 2003,

Table 6.4 Dynamics of distribution of alcohol-related female mortality (percent) in Russia in 2000–2009, by age and type of pathology

Type of pathology	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Females of 20–39 years old										
Alcohol poisoning	59.8	53.8	49.8	45.0	40.1	35.9	34.5	32.8	29.2	28.2
Alcohol-related somatic pathology	40.2	46.2	50.2	55.0	59.9	64.1	65.5	67.2	70.8	71.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females of 40–59 years old										
Alcohol poisoning	54.9	50.0	44.8	41.0	36.8	32.5	32.5	29.5	26.8	28.0
Alcohol-related somatic pathology	45.1	50.0	55.2	59.0	63.2	67.5	67.5	70.5	73.2	72.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females of 60 years old and older										
Alcohol poisoning	56.0	51.6	45.3	41.2	38.0	34.1	32.7	30.1	27.4	29.9
Alcohol-related somatic pathology	44.0	48.4	54.7	58.8	62.0	65.9	67.3	69.9	72.6	70.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

2004, 2009; Nemtsov and Sudakov 2002) and Zaridze et al. (2009a, b), the alcohol component in the mortality of the Russian population is significantly higher than 10 % (according Zaridze's estimates for three Siberian cities, the share of alcohol-related deaths is equal to almost one half of mortality at working ages).

Such a situation may arise due to underreporting of losses due to alcohol abuse in the Russian regions. However, it is not clear whether the authors' conclusions about the high rates of alcohol-related mortality in the Siberian cities (Zaridze et al. 2009a, b) are applicable to other regions of Russia. To test this hypothesis, we conducted a regional analysis of alcohol-related mortality in 2009 in Russia[2].

6.3 Regional Specificity of Alcohol-Related Mortality Among the Adult Population of Russia

The regional distribution of alcohol-related mortality of the adult population in Russia (both total and cause-specific) does not show any marked age-specific pattern. This is evidenced by the high rank correlation coefficients for the main causes of death of alcoholic etiology between the regions for each age group (people of younger and older working ages, the elderly) and for the total male and female populations. Table 6.5 shows that in 2009 the correlation coefficients never dropped below 0.72 ($N = 83$, $p < 0.001$) for younger working-ages, below 0.97 ($N = 83$, $p < 0.001$) for older working-ages, and below 0.7 ($N = 83$, $p < 0.001$) for the elderly, which indicates a high degree of similarity between the regional distribution of rates among

[2] Republics of Ingushetia and Chechnya were excluded from the regional analysis due to insufficient reliability of mortality data in these regions.

Table 6.5 Coefficients of rank correlation for the main causes of death of alcoholic etiology between the regional mortality for three age groups (20–39, 40–59, 60 +) among men and women in 2009

Causes of death of alcoholic etiology	Men aged			Women aged		
	20–39	40–59	60 +	20–39	40–59	60 +
Mental alcohol-related death	0.72	0.98	0.88	0.87	1.00	0.97
Alcohol-related diseases of the nervous system	0.94	0.98	0.93	0.86	0.97	0.77
Alcoholic cardiomyopathy	0.91	0.99	0.91	0.94	0.97	0.96
Diseases of digestive system	0.84	0.97	0.79	0.79	0.97	0.84
Accidental alcohol poisoning	0.89	0.99	0.88	0.80	0.98	0.89
Alcohol poisoning with undetermined intent	0.99	1.00	0.99	0.96	0.99	0.89
Alcohol-related somatic pathology in total	0.90	0.98	0.90	0.93	0.99	0.95
Alcohol poisoning in total	0.92	0.99	0.91	0.79	0.98	0.88
Total alcohol-related mortality	0.89	0.99	0.89	0.93	0.99	0.94

people of all the studied age groups[3]. These results suggest that the patterns of alcohol-related mortality identified earlier for the total population can adequately characterize the regional profile of mortality among these three age groups of adult population.

Past studies of Russian mortality have revealed two regional gradients of mortality: life expectancy declines from the European West to the Asian East and life expectancy also declines from the European South to the European North. These regional gradients in mortality are well-established for Russia and have been described in detail elsewhere (Starodubov et al. 2003; Ivanova and Semyonova 2009). The most plausible explanation for these regional differences is an explanation based on living conditions and lifestyle (Starodubov and Ivanova 2012).

Tables 1A and 2A in the Appendix show a rather unexpected pattern of alcohol-related mortality: one of the Russian gradients ('good' West—'bad' East) is almost absent (particularly for men) and the other one ('good' European South—'bad' North) is well reflected in the data. The worst areas, the 10 regions with the highest level of alcohol-related mortality, are represented mainly by the European Northern regions, belonging to the Northwest and North Central federal districts (Novgorod and Vladimir regions, Chukotka Autonomous Okrug, as well as by men of Archangelsk, Tver, Yaroslavl, Lipetsk, Tula, Ivanovo and Amur regions, Buryatia republic, and by women of Tuva, Komi, Kaliningrad, Leningrad, Chita and Magadan regions). Thus, of the ten worst regions in terms of alcohol-related mortality only seven (two regions for men and five regions for women) are located in the Asian part of Russia. Yet, as recently as in 2004, the ten regions with the highest levels of alcohol-related mortality were all located in the Asian part of Russia (Nemtsov 2004).

The list of regions with the lowest alcohol-related mortality consists of the North Caucasian republics and Volga and the Southern regions. There is a greater gender conformity in this case. In 2009, the lowest alcohol-related mortality was observed in the republics of Dagestan, North Ossetia, Kalmykia, Bashkortostan and Tatarstan, and the Belgorod, Rostov and Kursk regions. Also, the lowest level of mortality was

[3] This pattern was also observed in 2008.

observed in Tomsk and the Tyumen regions for men and in Karachai-Cherkessia and Kabardino-Balkaria for women. Thus, in the Asian part of Russia only two regions were in the lowest mortality group (for men).

The less pronounced "East—West" gradient, together with a strong "European South—North" gradient, represents a specific pattern of regional distribution of alcohol-related mortality, which distinguishes it from the regional distribution of other leading causes of death. Also, in 2009, variations in total alcohol-related mortality in Russia reached 10.8 times for men (from 19.9 in Bashkortostan to 215.8 per 100,000 in the Amur region) and 63.5 times for women (from 2.4 in North Ossetia to 152.4 per 100,000 in the Chukchi Autonomous District). Female mortality in sparsely populated Chukotka exceeded mortality in the Tyva Republic (occupying the next position according to alcohol-related mortality) by 2.6 times. However, if we rely on data from the more populated regions, the variation in total alcohol-related mortality for the female population is reduced to 24.5-fold.

When we are talking about mortality from alcohol poisoning, it is impossible to avoid the problem of alcohol poisoning with undetermined intent (Y15). It is included in the group "lesions with undetermined intent" (Y10-Y34). According to ICD-10, this group includes "cases where the available information is not sufficient for medical and legal experts to conclude whether the incident was an accident, self-damage or violence with intent to kill or damage" (experts find it difficult to determine whether the alcohol poisoning was due to accident or suicide—X65). We should note that such an unusual method of suicide is extremely rare in Russia. In 2008, among nearly 40,000 suicides only 19 cases were reported under the category of X65. On the other hand, accounting for alcohol poisonings as "injuries with undetermined intent" substantially improves the statistics of such a socially important cause as alcohol poisoning for a particular region.

Mortality due to alcohol poisoning with undetermined intent was not registered in almost 40 % of Russian regions for men and in almost 60 % of regions for women. However, such mortality exceeded the country levels (2.2 for men and 0.5 for women per 100,000) in 22 and 17 regions respectively. In 2009, this latter group had a significant gender similarity. The list includes Khakassia, Stavropol Krai, Kursk, Orel, Ryazan, Tambov, Rostov, Volgograd, Nizhny Novgorod, Samara, Sverdlovsk, Omsk and Tomsk regions, Sakhalin and the Jewish autonomous region. This list is largely the same as in 2008, indicating a consistent pattern of underreporting of deaths due to alcohol poisoning. In some cases, there is gender specific registration of alcohol poisoning with undetermined intent, with the Amur region being the most striking example, where the level of male mortality due to this cause is the highest in Russia (88.9 per 100,000) although there are no cases of female mortality from this cause (see Tables 1A and 2A).

To demonstrate how easily and effectively the official statistics can be "improved" by using this uncomplicated technique, note, for example, that in 2009 the actual mortality rate from alcohol poisoning (overall mortality from accidental poisoning and poisoning with undetermined intent) exceeded the officially reported level of mortality from accidental poisoning by 3 times for males and 2.5 times for females in the Stavropol region, by 2.2 and 1.6 times in the Volgograd region, by 2.1 and 3.2

times in the Kursk region, by 2.8 and 2.5 times in the Rostov region, by 2.8 and 3.4 times in the Ryazan region, by 2.6 and 3.4 times in Sakhalin, by 1.5 and 1.8 times in the Tambov region, by 2.5 and 1, 8 times in the Tomsk region. In the Amur region the official death rate from alcohol poisoning for men was 2.4 times lower than the actual level. In Russia as a whole the real rate exceeded the officially reported one by almost 10 % (9.1 % for men and 8.3 % for women).

This practice is not specific to any one part of Russia. Among the regions "improving" the official indicators of mortality from alcohol poisoning there were regions belonging to all Federal districts (except for the North-West) as well as regions belonging to areas with both high and low life expectancy. Since the purpose of this study was an analysis of regional patterns of real levels of mortality from alcohol poisoning, the regional pattern of losses in this study is estimated using overall mortality from all poisoning causes regardless of the intent.

Mortality from alcohol poisoning in the Russian regions is characterized by significant variability: in 2009 there were 77-fold variations for male mortality (from 2.0 in the North Ossetia to 153.9 per 100,000 in the Amur region) and a 516-fold variation for female mortality. Mortality from alcohol poisoning in the region with the highest levels of this indicator was twice as high as mortality in the regions with the next highest level of alcohol poisoning (Tuva for men and Buryatia for women), but even if we exclude these extreme cases, the differences are 37.3 times for male and 223.0 times for female mortality.

In 2009, the ten areas with the lowest mortality rates from alcohol poisoning included Moscow, Dagestan, North Ossetia, Kabardino-Balkaria, Tatarstan, Murmansk and Rostov regions for both sexes, St. Petersburg, Bashkortostan, Kamchatka for men and Karachaevo-Cherkessia, Stavropol Krai, Khabarovsk Krai for women. The ten areas with the highest mortality rates from alcohol poisoning included the republics of Chuvashia, Altai, Buryatia and Tuva, the Kirov and Amur regions for both sexes, Arkhangelsk, Bryansk, Yaroslavl and Sakhalin regions for men, and the republics of Mari-El and Komi, Zabaikalsky Krai and Chukotka for women. Thus, the "East—West" gradient for mortality from alcohol poisoning is much clearer than the gradient for total alcohol-related mortality: the area of the highest mortality includes half of the Asian regions in the case of men and 60 % of the Asian regions in the case of women. At the same time, only one Asian region (Kamchatka for men and Khabarovsk Kraj for women) is in the list of regions with the lowest mortality from alcohol poisoning.

The variability of male mortality from alcohol-related somatic pathology is substantially smaller than that observed for mortality from alcohol poisoning. In 2009, variability was 24.6-fold for male mortality and 75-fold for female mortality. It is interesting that Tyva turned out to be a region with the lowest level of somatic alcohol mortality for men (7.7 per 100,000) while the lowest level of this mortality for women was observed in North Ossetia (1.8 per 100,000). The highest levels of mortality from somatic alcohol-related causes in 2009 were reported in the Chukotka Autonomous Area (189.5 for men and 135.1 for women per 100,000). If we remove the unreliable data of the Chukotka region from the list and use the data for the next region in the list, the Novgorod region (for male and female mortality), the ratio of

maximum and minimum regional mortality rates would be close for men and women: 20.1 and 24.0 times respectively.

The list of regions with the lowest mortality from somatic pathology caused by alcohol abuse in 2009 included also the Republics of Dagestan and Bashkortostan, Altai Krai, Belgorod, Rostov, Ryazan, Samara and Tomsk regions, as well as the Jewish Autonomous Region for male mortality and Karachaevo-Cherkessia for female mortality. Note that despite the low somatic mortality from causes of alcoholic etiology in two regions (Tuva and the Ryazan region) the death rate from alcohol poisoning in these regions was high (Ryazan region was included in the 20 worst regions for this indicator). The list of regions with the highest mortality (besides those already mentioned) include Chukotka Autonomous Okrug and the Novgorod region, Vladimir, Ivanovo, Tula, Leningrad and Kamchatka regions, as well as Tver and Lipetsk regions for male mortality and Kaliningrad and Magadan regions, the republic of Komi for female mortality.

Thus, we may conclude that the "East—West" gradient is offset by counter-trends in somatic pathologies of alcoholic etiology. There were only two regions for men and three regions for women in the Asian part of Russia out of 10 regions with the highest levels of somatic alcohol mortality. On the other hand, there were four regions for men and two regions for women in the Asian part of Russia among the 10 regions with the lowest mortality. We should note that the offsetting of the 'good' West—'bad' East gradient is determined in the first place by the diseases of the digestive system of alcoholic etiology (mainly by alcoholic liver cirrhosis) (see Tables 1A and 2A).

It is fundamentally important to note the very poor similarity between regional patterns of mortality from somatic pathologies of alcoholic etiology. Even for such common pathologies as alcoholic cardiomyopathy and alcoholic liver cirrhosis the coefficient of rank correlation was equal to 0.42 ($N = 83$, $p < 0.001$) for men and 0.27 ($N = 83$, $p = 0.01$) for women. The similarity between mortality from alcohol poisoning and mortality from total alcohol-related somatic pathology is particularly low, with coefficients of rank correlation equal to 0.12 ($N = 83$, $p = 0.27$) for men and 0.23 ($N = 83$, $p < 0.05$) for women.

This a the most unexpected result, in our opinion: we would normally expect a common risk factor (alcohol abuse) to result in a similarity in the regional mortality patterns of mortality from major causes of alcoholic etiology. A high level of losses from alcohol poisoning cannot be accompanied by low level of mortality from somatic alcohol pathology (Ledermann 1956, 1964). There might be some exceptions to this rule. One example of such exceptions is France where a high level of alcohol consumption is accompanied with low level of cardiovascular mortality. Despite high levels of alcohol consumption, France has very low levels of mortality from alcohol poisoning, which is related to the manner in which alcohol products are consumed. Russia, on the other hand, is characterized by a different, "Northern" pattern of alcohol consumption, resulting in higher levels of alcohol poisonings and somatic diseases of alcohol etiology (Nemtzov 2011).

We thus suggest that using the regional rank conformity of mortality from alcohol poisonings and somatic causes as our criterion it is possible to identify regions

where some components of alcohol mortality are underestimated (Semyonova et al. 2010). In order to avoid bias in making conclusions about systemic underestimation of mortality we used a difference of 30 points in both directions. This decision was determined by the scale of the study, which included data for 78 regions of the Russian Federation. The existing data do not allow us to determine what is the true reason for the lack of balance between external and somatic causes of alcohol mortality. It may happen because poisonings, or somatic causes, or both causes are underestimated. In our study we rely more on the data on mortality from alcohol poisoning because this diagnosis is based on the expertise of a medical examiner.

Based on the criterion of rank conformity by mortality from alcohol poisoning and somatic causes, we found that somatic alcohol-related mortality is underestimated in more than 15 % of Russian regions while mortality from alcohol poisoning is underestimated in more than 17 % of regions. Moreover, regions with a good match between external and somatic alcohol-related mortality (ranks differ by no more than 10 points) account for less than one third of all the Russian regions both for men and for women. A serious imbalance between two types of alcohol-related mortality (more than 30 points) was observed in almost one third of the Russian territories (see Tables 1A and 2A).

Our data suggest that a systemic undercount of alcohol poisonings (difference of 30 and more points in ranks between two types of alcohol-related mortality) is being practiced in such regions as Moscow and St. Petersburg, the Republic of Sakha (Yakutia), Krasnodar and Stavropol territories, Murmansk, Vladimir, Volgograd, Chelyabinsk, Magadan and Kamchatka regions, while underestimation of somatic alcohol-related mortality is practiced in the republics of Chuvashia, Altai, Tyva and Khakassia, Krasnoyarsk kraj, Bryansk, Ryazan, Samara, Kostroma and Tomsk regions. The largest imbalance reaches 65 points for men and 48 points for women in Kamchatka (poisonings). For alcohol-related somatic causes the largest imbalance is observed for men in Tyva (77 points) and women in Chuvashia (61 points).

6.4 Discussion

According to the official data, overall alcohol-related mortality in Russia in 2000–2009 comprised about 10 % of total mortality declining up to 1–2 % among the elderly. However, regional analysis of alcohol-related mortality allowed us to reveal serious imbalances between regional profiles of mortality from alcohol poisonings and alcohol-related somatic causes. These facts allowed us to suggest the existence of systematic underestimation of alcohol-related losses in a number of Russian regions including such large cities as Moscow and St Petersburg.

Using this approach we have been able to identify regions where the administrations systematically attempt to minimize alcohol-related losses in their statistical reports, either from alcohol poisonings or from alcohol-related somatic causes. We can use the very large differences in the ranks of regions by the levels of mortality from alcohol poisoning and alcohol-related somatic pathology as a criterion of systematic undercount of alcohol-related deaths. It is reasonable to suggest that a

difference in 30 points in the study of 78 regions (i.e., one third of the list) in both directions is too big.

Also, it is possible to consider regions adjacent to the regions with mortality imbalances, which are similar in their level of economic development, culture, population health, etc. and hence in the structure of their causes of death. For example, in two neighboring regions (Sverdlovsk and Chelyabinsk oblasts) we observe an almost 1.5-fold difference in overall alcohol-related mortality for men (82.5 vs 121.7 per 100,000) and for women (22.9 vs 33.3 per 100,000). This difference occurs because of a twofold difference in mortality from alcohol cardiomyopathy (31.3 vs 64.7 and 8.3 vs 16.8 per 100,000) suggesting an underestimation of this type of alcohol-related mortality in Sverdlovsk region.

Our proposed approach based on conformity in the ranking of mortality from somatic and external causes of death should be considered as purely indicative, but it does allow researchers to identify regions with systematic and intentional underestimation of losses caused by alcohol. Further studies can provide more accurate estimates of alcohol losses and the extent of such underreporting in the identified regions. Our estimates of alcohol-related mortality do not agree with those reported by Andreev and Zbarskaya, who argue that the quality of alcohol-related statistics in Russia is acceptable (Andreev and Zbarskaya 2010). We believe that this estimate is too optimistic, and that the quality of data on alcohol-related losses in Russia is not as good as it is, for instance, in the U.S., France and Finland. The key difference between Russia and the developed countries is the way in which administrative resources are used when data on socially important causes of death (including deaths from alcohol-related causes) are reported. Unfortunately the attention paid by the Russian leaders to demographic problems often results in attempts to underestimate the scale of the problem by regional administrations—a phenomenon, which is unlikely to be observed in the US, Finland and France.

In fact, a more recent paper by Andreev and colleagues (Leon et al. 2011) makes a similar argument. In this article the authors present data about a sizeable alcohol component in mortality from coronary heart disease and cerebrovascular disease in Russia. We believe that the conclusions by Nemtsov and Zaridze about the underestimation of alcohol-related mortality in Russia and its regions look more reasonable, although a true extent of this undercount requires more research.

We suggest four major reasons for the undercount of alcohol-related deaths in Russia (Weissman et al. 2006):

- In the case of somatic causes of death it is possible to report an alcohol-related diagnosis in the death certificate in only two cases: if the deceased was registered in a narcotics dispensary, or in the presence of an expert in alcohol/drug dependence. Thus, the existing legal system does not prevent registration of deaths from alcohol poisoning as somatic deaths. It also gives an opportunity to undercount alcohol somatic deaths by using diagnoses not related to alcohol abuse (Weissman et al. 2006).
- Tests for alcohol in the blood, which are mandatory for forensic examinations, are not required during the postmortem studies conducted in the event of death from a non-external cause, including cardiovascular diseases and diseases of the digestive system.

- At present, it is the common practice in Russia to make 'alcohol' diagnoses as the diagnoses of the last resort in the case of no other possible options. For example, in the case of death due to a traffic accident, when the level of alcohol in the blood of the deceased is close to 5% (lethal dose), the medical death certificate would still indicate traffic accident as the cause of death. This situation may change after the adoption of new rules of testing for alcohol among drivers and stricter punishment for driving under the influence of alcohol, particularly in the case of traffic accidents involving victims.
- Requests from relatives to change 'compromising' diagnosis.
- The methods of data manipulation are specific to each region, so the regional analysis of alcohol-related mortality does not reveal uniform regularities in distribution of major alcohol-related deaths.
- A group of causes named "Symptoms, signs and ill-defined conditions" as well as other diffuse causes included in categories such as "Other," or "Unspecified" (in particular, alcoholic cardiomyopathy is often considered as cardiomyopathy unspecified) serve as a latent reservoir of alcoholic losses (both due to poisoning, and somatic pathology), An example of the reshuffling of deaths related to alcohol poisoning to deaths from injuries of undetermined intent ('alcohol poisonings of undetermined intent') mentioned earlier is the most obvious and the easiest way to reveal such manipulations. Taking into account that we consider here socially meaningful and socially conditioned causes of death, risks of data manipulations in order to minimize alcohol-related mortality may be particularly high.

6.5 Conclusion

The study showed that currently alcohol-related losses in Russia are determined primarily by degenerative diseases of alcoholic etiology rather than by alcohol poisoning. Therefore, we believe that the use of mortality from accidental alcohol poisoning as an indicator of alcohol-related mortality in Russia as well as in the Russian regions is not correct, because this approach may lead to a significant underreporting of alcohol-related losses.

The study also showed the existence of a specific group of regions where deaths from alcohol poisoning or from somatic pathologies of alcoholic etiology are systematically underreported. Overall, a significant underestimation of one or another component of alcohol-related mortality is practiced in one third of the Russian regions, including Moscow and St. Petersburg.

This situation follows from the existing legal framework in Russia and the current practice of diagnostics of alcohol-related deaths, which allows regional administrations to underreport socially significant losses including losses related to alcohol. There is no doubt that the establishment of uniform country standards of accounting for alcohol-related mortality will lead to substantial increase in the scale of losses caused by alcohol, but these measures can only be a first step for the developing of effective programs for alcoholism reduction in Russia.

Appendix

Table A.1 Regional distribution of male alcohol-related mortality (per 100,000) in Russia in 2009, by specific alcohol-related cause of death

Region	1	2	3	4	5	6	7	8	9
Russian Federation	5.2	3.4	29.8	13	24.1	2.2	51.4	26.3	77.7
Altay territory	1.7	1.1	6.2	4.7	29	0.1	13.7	29.1	42.8
Krasnodar territory	4.6	2.5	47	13.9	10.8	0	68	10.8	78.8
Krasnoyarsk territory	5.5	1.9	5.5	6.4	45.4	0.7	19.3	46.1	65.4
Primorye territory	1.1	1.1	10.9	6.4	10.8	19.5	19.5	30.3	49.8
Stavropol territory	1.3	1.4	49.7	6.5	4.4	8.9	58.9	13.3	72.2
Khabarovsk territory	2.8	0.4	13.1	6	5.5	14.7	22.3	20.2	42.5
Republic of Adygea	8.3	0.5	17.3	6.5	30.5	0	32.6	30.5	63.1
Republic of Altai	0.0	1	31.7	10.6	58.2	0	43.3	58.2	101.5
Republic of Bashkiria	0.0	0.1	6	3.6	10	0.2	9.7	10.2	19.9
Republic of Buryatia	0.0	1.6	45.4	25.5	64.2	0	72.5	64.2	136.7
Republic of Dagestan	4.3	0.8	0.9	11.6	2.9	0.3	17.6	3.2	20.8
Republic of Kabardino-Balkaria	6.1	0.4	18.5	12.8	3.1	0	37.8	3.1	40.9
Republic of Kalmykia	2.2	0	3.6	16.4	11.6	0.7	22.2	12.3	34.5
Republic of Karachaevo-Cherkessia	6.2	1	8.6	12.5	8.2	7.9	28.3	16.1	44.4
Republic of Karelia	7.9	11.5	25	9.4	34	1.3	53.8	35.3	89.1
Republic of Komi	12.8	3.8	20.1	33.8	51.2	0	70.5	51.2	121.7
Republic of Mari El	2.3	1.3	29.4	19.4	53.2	0	52.4	53.2	105.6
Republic of Mordovia	9.0	0.3	22.6	2.3	16.6	0	34.2	16.6	50.8
Republic of Saha (Yakutia)	3.9	2.1	57.6	18	10.7	0.8	81.6	11.5	93.1
Republic of Severnaya Ossetia	1.0	2	10	17.6	1.4	0.6	30.6	2	32.6
Republic of Tatarstan	0.5	1.3	14.2	8	6.9	2.7	24	9.6	33.6
Republic of Tyva	1.1	0	2.8	3.8	74.6	0	7.7	74.6	82.3
Republic of Udmurtia	3.3	10	41.9	35.5	41.4	0	90.7	41.4	132.1

Table A.1 (continued)

Region	1	2	3	4	5	6	7	8	9
Republic of Khakassia	3.1	2.6	8.9	5.3	33.7	2.5	19.9	36.2	56.1
Republic of Chuvashia	2.0	1.7	11.7	3.7	57.1	0	19.1	57.1	76.2
Amur region	2.7	1.9	38	19.3	65	88.9	61.9	153.9	215.8
Arkhangelsk region	5.2	7.6	57.6	15.3	63.9	0.1	85.7	64	149.7
Astrakhan region	0.4	5.1	14.9	2.6	22.4	0.7	23	23.1	46.1
Belgorod region	0.7	0.1	2.7	11.6	18.2	1	15.1	19.2	34.3
Bryansk region	2.8	11	24.9	14.2	64.7	1.4	52.9	66.1	119
Vladimir region	7.5	7.7	104.7	33.2	27.5	0	153.1	27.5	180.6
Volgograd region	0.6	1.8	59.3	9.4	4.8	5.7	71.1	10.5	81.6
Vologda region	3.8	2.2	31.7	16.9	31.7	0	54.6	31.7	86.3
Voronezh region	3.6	1.9	12.9	12.7	24.9	2.3	31.1	27.2	58.3
Ivanovo region	8.6	24.3	64.1	32.1	54.3	0	129.1	54.3	183.4
Irkutsk region	2.7	1.1	24.9	4.3	20.9	0.1	33	21	54
Kaliningrad region	5.7	2.7	56.3	12.4	48.4	0.5	77.1	48.9	126
Kaluga region	4.8	1.1	17.3	10.6	43.4	0	33.8	43.4	77.2
Kamchatka region	23.1	0	66	8.7	8.5	0	97.8	8.5	106.3
Kemerovo region	14.1	6.2	41.5	9.1	43.2	0	70.9	43.2	114.1
Kirov region	6.7	6.8	36.3	9.7	63.2	1.4	59.5	64.6	124.1
Kostroma region	7.0	1.3	15.2	17.1	50	0.6	40.6	50.6	91.2
Kurgan region	8.4	1.4	25.9	5.9	46.5	0	41.6	46.5	88.1
Kursk region	5.5	3.2	5.3	6.4	8.2	8.9	20.4	17.1	37.5
Moscow	8.1	6.1	15.3	15.9	2.8	0	45.4	2.8	48.2
St. Petersburg	3.0	7.6	50.8	4.4	10.1	0	65.8	10.1	75.9
Leningrad region	52.2	5.9	9.3	30.7	37.6	0.3	98.1	37.9	136
Lipetsk region	50.6	1.9	37.8	28.1	29.4	0	118.4	29.4	147.8
Magadan region	30.1	1.2	57.7	4.9	32.6	0	93.9	32.6	126.5
Moscow region	5.2	1.7	58.7	19.5	19.2	0	85.1	19.2	104.3
Murmansk region	6.1	5.9	36	10.9	3.7	0.9	58.9	4.6	63.5
Nizhny Novgorod region	5.0	4.2	44.2	25.7	41.5	4.2	79.1	45.7	124.8
Novgorod region	13.0	7.8	118.2	21.6	37.9	0.4	160.6	38.3	198.9

Table A.1 (continued)

Region	1	2	3	4	5	6	7	8	9
Novosibirsk region	0.1	1.6	33.1	9.4	26.5	0.1	44.2	26.6	70.8
Omsk region	1.6	6.5	30.2	9.8	38.5	7.3	48.1	45.8	93.9
Orenburg region	8.4	4.7	32	8.5	18.2	0	53.6	18.2	71.8
Orel region	2.0	2.6	17.3	18.8	42.5	9.6	40.7	52.1	92.8
Penza region	0.6	3.4	11	12.9	45.3	0	27.9	45.3	73.2
Perm region	3.8	4.2	25	16.8	40.2	0	49.8	40.2	90
Pskov region	2.5	2	25.3	26.3	19.4	0	56.1	19.4	75.5
Rostov region	4.2	0.6	2.8	4.6	3.7	6.6	12.2	10.3	22.5
Ryazan region	7.2	1	3.5	6.5	17.7	31.1	18.2	48.8	67
Samara region	0.5	2.1	5.5	10.1	24.9	9	18.2	33.9	52.1
Saratov region	3.5	1.6	11.4	10.5	35	0.1	27	35.1	62.1
Sakhalin region	2.6	0.8	36.6	18.9	22.3	35.7	58.9	58	116.9
Sverdlovsk region	0.3	2.2	31.3	14.4	27.7	6.6	48.2	34.3	82.5
Smolensk region	22.5	0.8	29.1	9.1	46.3	0	61.5	46.3	107.8
Tambov region	3.1	2.1	48.8	15.9	24.1	12.9	69.9	37	106.9
Tver region	2.1	8.3	83.6	8.5	56.5	0	102.5	56.5	159
Tomsk region	0.0	0.4	7.7	0.6	5.4	7.9	8.7	13.3	22
Tula region	3.7	9.5	77.1	30.1	37.3	0.3	120.4	37.6	158
Tyumen region	1.3	1.8	15.8	4.3	11.7	4.6	23.2	16.3	39.5
Ulyanovsk region	0.7	0.9	22.6	8	35.3	0.3	32.2	35.6	67.8
Chelyabinsk region	7.9	1.9	64.7	22.9	22.8	1.5	97.4	24.3	121.7
Trans-Baikal territory	4.2	1.4	62.6	9.4	42.2	0	77.6	42.2	119.8
Yaroslavl region	1.7	10	47.9	30.5	56.7	0.7	90.1	57.4	147.5
Jewish autonomous region	0.0	0	11.8	7	24	4	18.8	28	46.8
Chukotka autonomous area	59.6	0	110.1	19.8	16	0	189.5	16	205.5

1 psychiatric disorders caused by alcohol; *2* diseases of nervous system caused by alcohol; *3* alcohol cardiomyopathy; *4* diseases of digestive system caused by alcohol; *5* accidental poisoning by alcohol; *6* alcohol poisonings with undetermined intent; *7* somatic pathology caused by alcohol; *8* alcohol poisonings; *9* total mortality caused by alcohol

Table A.2 Regional distribution of female alcohol-related mortality (per 100,000) in Russia in 2009, by specific alcohol-related cause of death

Region	1	2	3	4	5	6	7	8	9
Russian Federation	1.4	0.8	7.9	6	6	0.5	16.1	6.5	22.6
Altay territory	0.7	0.2	1.8	1.7	8.4	0	4.4	8.4	12.8
Krasnodar territory	1.2	0.5	9.7	7	2.6	0	18.4	2.6	21
Krasnoyarsk territory	1.2	0.6	1.6	3.8	14.3	0.3	7.2	14.6	21.8
Primorye territory	0.1	0.2	3.5	4.1	2.9	0	7.9	2.9	10.8
Stavropol territory	0.3	0.5	9.5	2.5	0.8	1.2	12.8	2	14.8
Khabarovsk territory	0.9	0.5	6.3	2.8	1.6	0	10.5	1.6	12.1
Republic of Adygea	2.7	0	2.1	3.3	13	0	8.1	13	21.1
Republic of Altai	0.0	0	11.5	3.6	17.8	0	15.1	17.8	32.9
Republic of Bashkiria	0.1	0	1.9	1.8	2.6	0	3.8	2.6	6.4
Republic of Buryatia	0.0	0.4	17.7	13.4	22.3	0	31.5	22.3	53.8
Republic of Dagestan	1.2	0.1	0.7	1	0.1	0	3	0.1	3.1
Republic of Kabardino-Balkaria	0.6	0	3.6	1.8	0.6	0	6	0.6	6.6
Republic of Kalmykia	0.0	0	0.8	1.8	4.3	0	2.6	4.3	6.9
Republic of Karachaevo-Cherkessia	0.0	1.5	1.1	1.7	0.8	0	4.3	0.8	5.1
Republic of Karelia	5.1	4.8	12	7	7.5	0.2	28.9	7.7	36.6
Republic of Komi	2.5	1.4	5.9	24.9	19	0.2	34.7	19.2	53.9
Republic of Mari El	0.2	0.4	9.7	11.6	16.4	0	21.9	16.4	38.3
Republic of Mordovia	2.2	0	4	0.5	2	0	6.7	2	8.7
Republic of Saha (Yakutia)	0.8	0	17.8	6.6	5.9	0.2	25.2	6.1	31.3
Republic of Severnaya Ossetia	0.3	0	0.6	0.9	0.3	0.3	1.8	0.6	2.4
Republic of Tatarstan	0.1	0.2	4	2.6	1.1	0.3	6.9	1.4	8.3
Republic of Tyva	0.0	0	2.5	4.7	51.6	0	7.2	51.6	58.8
Republic of Udmurtia	1.2	2.6	10.4	16.7	12.2	0.1	30.9	12.3	43.2
Republic of Khakassia	2.6	0.6	3.6	4.6	8.4	2.3	11.4	10.7	22.1
Republic of Chuvashia	1.3	0.4	2.6	2.3	18.8	0	6.6	18.8	25.4

Table A.2 (continued)

Region	1	2	3	4	5	6	7	8	9
Amur region	0.9	0.6	10.8	10.5	17.3	0	22.8	17.3	40.1
Arkhangelsk region	1.4	1.9	17.1	7.7	15	0	28.1	15	43.1
Astrakhan region	0.0	1.3	2.7	2	6.9	0	6	6.9	12.9
Belgorod region	0.1	0.1	0.4	3.6	2.7	0.1	4.2	2.8	7
Bryansk region	0.2	0.9	3.2	4.7	10.6	0.2	9	10.8	19.8
Vladimir region	1.5	1.7	23.9	15.4	6.1	0	42.5	6.1	48.6
Volgograd region	0.3	0.3	14.5	4.1	1.4	0.9	19.2	2.3	21.5
Vologda region	0.7	0.4	4.9	5.7	6.5	0	11.7	6.5	18.2
Voronezh region	0.7	0.4	2.8	6.1	4.8	0.3	10	5.1	15.1
Ivanovo region	1.5	4.6	10.9	15	12.6	0	32	12.6	44.6
Irkutsk region	0.8	0.2	7	2.5	6.2	0	10.5	6.2	16.7
Kaliningrad region	1.9	1.8	27.4	11.1	16.1	0.2	42.2	16.3	58.5
Kaluga region	1.4	0.3	6.1	6	10.1	0	13.8	10.1	23.9
Kamchatka region	8.4	0.5	21.5	5.2	4.7	0	35.6	4.7	40.3
Kemerovo region	6.6	1.5	14.6	5.8	14.5	0	28.5	14.5	43
Kirov region	0.8	1.1	8.7	5.4	17.3	0.7	16	18	34
Kostroma region	0.7	0	2.2	10.4	11.3	0	13.3	11.3	24.6
Kurgan region	2.9	0.5	8.6	2.8	11.9	0	14.8	11.9	26.7
Kursk region	0.0	0.4	0.8	2.2	0.9	2	3.4	2.9	6.3
Moscow	2.3	1.3	4.1	6.8	0.8	0	14.5	0.8	15.3
St. Petersburg	0.8	2.1	12	1.7	2.2	0	16.6	2.2	18.8
Leningrad region	19.9	2	2.3	14.4	8.9	0.2	38.6	9.1	47.7
Lipetsk region	11.3	0.3	6.7	6.3	3.3	0	24.6	3.3	27.9
Magadan region	9.2	0	27.4	5.9	6	0	42.5	6	48.5
Moscow region	0.9	0.3	14.9	8.6	3.2	0	24.7	3.2	27.9
Murmansk region	2.9	3	10.1	4	0.9	0	20	0.9	20.9
Nizhny Novgorod region	0.8	0.6	11.7	11	7.5	0.9	24.1	8.4	32.5

Table A.2 (continued)

Region	1	2	3	4	5	6	7	8	9
Novgorod region	3.5	1.4	30.5	7.7	11	0	43.1	11	54.1
Novosibirsk region	0.1	0.3	9.7	4.9	5.9	0	15	5.9	20.9
Omsk region	0.8	0.6	10.6	3.4	11.4	1.2	15.4	12.6	28
Orenburg region	2.1	1	8.5	5.9	4.5	0	17.5	4.5	22
Orel region	0.4	0.4	4.2	7.5	7.3	2.5	12.5	9.8	22.3
Penza region	0.0	1	2.8	4.9	6.8	0	8.7	6.8	15.5
Perm region	1.3	1	8	11.4	11.4	0	21.7	11.4	33.1
Pskov region	1.0	0.7	5.4	12.9	3.5	0	20	3.5	23.5
Rostov region	0.6	0.2	0.8	1.2	0.8	1.2	2.8	2	4.8
Ryazan region	1.3	0.1	1	2.2	2.2	5.3	4.6	7.5	12.1
Samara region	0.2	0.4	1.2	2.6	6.2	1.8	4.4	8	12.4
Saratov region	0.5	0.3	1.9	4.4	6.8	0	7.1	6.8	13.9
Sakhalin region	0.6	0	14	13.1	5.5	10.4	27.7	15.9	43.6
Sverdlovsk region	0.0	0.4	8.3	7.1	5.9	1.2	15.8	7.1	22.9
Smolensk region	4.7	0	5.5	5.9	11.6	0	16.1	11.6	27.7
Tambov region	0.4	0.9	9.1	4.5	2.9	2.1	14.9	5	19.9
Tver region	1.1	1.8	22.4	4.7	12.2	0	30	12.2	42.2
Tomsk region	0.0	0.3	3.2	0.3	3.7	2.9	3.8	6.6	10.4
Tula region	1.2	2.2	23.6	14.1	5.4	0	41.1	5.4	46.5
Tyumen region	0.4	0.3	5.8	4.4	3.1	1.7	10.9	4.8	15.7
Ulyanovsk region	0.4	0.1	5.9	5	7.8	0.3	11.4	8.1	19.5
Chelyabinsk region	1.4	0.6	16.8	9.3	5	0.2	28.1	5.2	33.3
Trans-Baikal territory	0.9	0.2	21	7.8	16.8	0	29.9	16.8	46.7
Yaroslavl region	0.2	2.3	10.5	14.9	10.4	0	27.9	10.4	38.3
Jewish autonomous region	0.0	0	6.2	9.4	6	2.8	15.6	8.8	24.4
Chukotka autonomous area	41.3	0	86.5	7.3	17.3	0	135.1	17.3	152.4

1 psychiatric disorders caused by alcohol; diseases of nervous system caused by alcohol; *3* alcohol cardiomyopathy; *4* diseases of digestive system caused by alcohol; *5* accidental poisoning by alcohol; *6* alcohol poisonings with undetermined intent; *7* somatic pathology caused by alcohol; *8* alcohol poisonings; *9* total mortality caused by alcohol

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