

Alcohol-Related Causes of Death and Drinking Patterns in Moldova as Compared to Russia and Ukraine

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Abstract Most studies dedicated to alcohol-related mortality in the former USSR countries explore the situation primarily in Russia and Belarus, while somewhat less so in Ukraine. In these countries, the consumption of spirits is one of the main contributors to a huge decline in adult health since the mid-60s, especially among males. Moldova, also an ex-Soviet country, is quite different in that their drinking habits are much closer to those of the Mediterranean drinking culture, although they are still like Russia and Ukraine in that their level of alcohol consumption is among the highest in the world while life expectancy at birth is one of the lowest among developed countries. This study provides a descriptive analysis of the changes in alcohol-related mortality trends and drinking patterns in Moldova as compared to Ukraine and Russia, both during the Soviet period and after Independence. We found that accidental poisoning by alcohol in Moldova is of minor importance in contrast to Russia and Ukraine, whereas very high liver cirrhosis mortality without a traditional sex gap is a peculiar feature of the Moldovan mortality pattern. Furthermore, the burden of liver cirrhosis accounts for much lower Moldovan female life expectancy compared to their Russian or Ukrainian counterparts. We attempt to explain this phenomenon by hypothesizing the existence of harmful drinking habits of homemade wine consumption in Moldova, which seems to affect males and females equally. In Moldova, the anti-alcohol policies must include the measures aimed at reducing the consumption of homemade wine.

Keywords Alcohol-related mortality · Liver cirrhosis · Alcohol consumption · Moldova · Females

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1 Introduction

Even though various studies have shown that moderate consumption of wine is associated with a protective effect against diseases of the circulatory system, particularly myocardial infarction (Kabagambe et al. 2005; Leong et al. 2014), alcohol abuse results in numerous harmful effects on population health (Ledermann 1956). A number of studies have shown that the dangerous drinking habits that occur in the former Soviet republics are among the main reasons for lower life expectancy at birth compared to Western countries. The most extreme example is Russia (Meslé et al. 1996; Leon et al. 1997; McKee 1999; Chervyakov and Shkolnikov 2000; Nemtsov 2011; Meslé and Vallin 2012). Most of the studies dedicated to alcohol-related mortality in the former Soviet countries explore the situation in the traditionally spirits drinking countries like Russia, Ukraine, Belarus and the Baltic countries. However, not all former Soviet republics share the same drinking culture. Moldova and Georgia are traditionally wine-drinking countries. Moldova has a very long history of vine growing and wine making; and one of the first characterizations of the alcohol consumption traditions in this region is provided in the book, *Description of Moldavia*, by the Moldovan statesman Dimitrie Cantemir (1673–1723). He writes that Moldovans do not like spirits (*rachiul*) but drink a lot of wine at home, although one will rarely see a drunken woman (Cantemir 1714). Armenia is a spirit- and wine-drinking country, and it is well-known for its production of brandy. Finally, in Azerbaijan and the former Soviet republics of Central Asia, religion prohibits alcohol consumption (Pomerleau et al. 2005).

Our research question is whether the wine-drinking culture in Moldova has a beneficial or harmful effect on population health as compared to the traditionally spirits drinking countries like Russia and Ukraine. To answer to this question, we analysed the long-term mortality changes in the acute and chronic consequences of alcoholism and drinking habits in Moldova compared to Russia and Ukraine. The hypothesis is that the consumption of homemade wine practiced by the Moldovan population have much less acute consequences through mortality from injury and poisoning than they do in Russia and Ukraine. At the same time, this drinking culture may induce a high level of alcohol-related chronic diseases.

2 Typologies of Drinking Cultures and Alcohol-Related Problems

Comparative studies on alcohol and health-related problems are generally based on the concept of ‘drinking culture’. Although there is no widely accepted definition of this term in the literature, this term is usually associated with the common norms of the consumption of alcoholic beverages in a group or society (Landberg 2010). One way to think about drinking culture is ‘the way people drink, including the social norms, attitudes and beliefs around what is and what is not socially acceptable for a group of people before, during and after drinking’ (VicHealth 2016). The concept often includes the definition of drinking pattern, which basically refer to the

frequency of drinking, amount per occasion, the preferred alcoholic beverage as well as the usual drinking settings. Furthermore, drinking culture also refers to the existing system of social control in a society (Savic et al. 2016).

The tradition of classifying drinking cultures is very long. Savic et al. (2016) identified more than a dozen of different classifications of drinking cultures in the literature with the first one dated back to 1946. For the industrialized Western countries, the most commonly applied typology in comparative studies of alcohol and health-related harm is probably the distinction between 'wet' and 'dry' drinking cultures as proposed by Room and Mitchell (1972). This distinction focusing primarily on European and Anglophone societies emphasises not only the overall level of alcohol consumption and drinking pattern, but also the system of social control on drinking (Room and Mäkelä 2000; Room and Mitchell 1972). In this context, 'wet' cultures, typically represented by the Mediterranean countries, are characterized by high per capita consumption, less restrictive control structures, lower rates of drunkenness and higher mortality and morbidity associated with chronic conditions, such as liver cirrhosis. On the other hand, 'dry' cultures, standing for Nordic and Anglophone countries, show the opposite features such as less frequent but heavier drinking, more restrictive control structures, higher rates of drunkenness and higher rates of mortality and morbidity associated with short-term consequences of alcohol abuse.

Another typology of drinking cultures is based on the type of preferred alcoholic beverage and distinguishes between 'spirits', 'beer' and 'wine' drinking cultures (Sulkunen 1976), which are typically related to Northern, Central and Southern Western Europe, respectively. The relation of alcohol to the taking of meals is an essential feature of this typology. Thus, in wine cultures (e.g. France, Italy, Greece), drinking is commonly associated with eating, and wine is regarded as a natural component of a meal. In beer or spirits cultures, the alcohol consumption is typically confined to leisure time and has other than nutritional use value (Sulkunen 1976).

It is important to bear in mind that drinking culture is not homogeneous and static and does vary across different subpopulations and over time. Thus, traditionally spirits countries consume much more beer and wine than before, while the consumption of wine in the Mediterranean countries has gone down considerably (WHO 2004).

Alcohol use contributes to a diverse range of health consequences that according to Skog (1995) can be measured in two dimensions. The first one distinguishes between problems related to long-term heavy drinking or chronic alcohol abuse and problems related to a single drinking occasion, i.e. an episode of heavy drinking over a short period or so-called binge drinking. The second dimension separates somatic or direct problems, i.e. harm provoked by the direct alcohol's toxic effect on the individual organism, from behaviour-related or indirect problems that are more related to behavioural aspects of drinking (Landberg 2010). Examples of health problems resulted from a single drinking occasion include accidental poisoning by alcohol (somatic harm) and accidents and interpersonal violence (behaviour-related harm). Health problems associated with long-term excessive drinking and somatic nature refer to liver cirrhosis, pancreatitis, different types of

cancer, whereas behaviour-related harm resulting from long-term heavy drinking include suicide, mental, social and economical problems.

Health problems related to a single drinking occasion are often referred to as the mainly short-term or acute consequences of alcohol abuse, while health problems connected to long-term heavy drinking are usually considered as the mainly long-term or chronic consequences of alcohol abuse. It is important to note that this distinction is rather conditional, but the complexity of alcohol-related problems causes an overlap for certain conditions. For example, suicide can be linked to both short-term and long-term consequences of alcohol abuse; a single drinking occasion can trigger suicide attempts (WHO 2000). In the literature, the dimension that takes into account the underlying drinking pattern, i.e. acute/chronic consequences of alcohol consumption, even if it is not absolute, is more often used to monitor the alcohol-related health problems in a country. One of the reason is that different anti-alcohol policies are required to influence different drinking patterns.

3 Materials and Methods

Our analysis relies on the detailed cause-specific mortality series that is available at the Human Cause-of-Death Database (HCD) (<http://www.causesofdeath.org>) and which has been reconstructed for Moldova (Penina 2015), Russia (Meslé et al. 1996; Danilova 2016) and Ukraine (Meslé and Vallin 2003, 2012; Poniakina and Shevchuk 2016). The series has been listed in abridged form in the 10th revision of the International Classification of Diseases (ICD-10) since 1965 based on the method proposed by Meslé and Vallin (1996).

Although the range of causes of death attributable to excessive alcohol consumption is quite large (Rehm et al. 2003), our analysis is restricted to only two causes of deaths: accidental poisoning by alcohol and liver cirrhosis (Table 1). Accidental alcohol poisoning is the most direct consequence of acute alcoholism and is a well-known proxy for hazardous alcohol consumption in the Slavic post-

Table 1 Acute and chronic consequences of alcohol consumption according to the reconstructed list of causes of death. *Source:* Based on the Human Cause-of-Death Database, <http://www.causesofdeath.org>

Cause of death	ICD-10 detailed list (HCD intermediate list)	National groups of items		
		Moldova	Russia	Ukraine
All causes	A00-Y98 (1–104)	1–211	1–274	1–269
Acute consequences of alcoholism				
Accidental poisoning by alcohol	X45 (97)	198	247	261
Chronic consequences of alcoholism				
Liver cirrhosis	K70-K74 (77–79)	152–154	173–175	193–195

N.B. Each country has its own abridged list based on the detailed ICD-10 list. The intermediary list is the same for all countries. The corresponding codes are given in the second column in parentheses

Soviet countries, although acute alcoholism also has an important impact on various other categories of external causes of death. On the other hand, liver cirrhosis is the major product of chronic alcoholism and results from excessive regular alcohol consumption. We included both alcoholic liver cirrhosis (K70 under ICD-10) and non-alcoholic liver cirrhosis (K71–K74 under ICD-10) in our analysis, since there is evidence that most liver cirrhosis that is not specified as alcoholic in the former Soviet countries is actually due to alcohol abuse (Zaridze et al. 2009). In fact, the percentage of liver cirrhosis specified as induced by alcohol in all liver cirrhosis cases was relatively small in the three countries. In 1965–2013, it varied between 5 and 10% in Moldova, 10 and 25% in Ukraine and 15 and 30% in Russia, while in France it accounted for about 60% of total liver cirrhosis deaths in 2011. The problem with the codification of liver cirrhosis seems to be of particular importance in the case of Moldova, where more than 90% of deaths from this pathology are codified under the item K746, *Other and unspecified cirrhosis of liver*. There are certainly a number of causes of death that are also linked directly to unsafe alcohol consumption, such as *Mental and behavioural disorders due to use of alcohol* (F10 under ICD-10). However, the underlying drinking pattern for this pathology (acute or chronic alcoholism) is not very clear, and the prevalence of this cause of death can depend on national coding practices, even within the former Soviet republics. This is especially relevant, since it has recently been recommended that the ICD-10 code F10 not be used as the underlying cause of death (WHO 2016a).

Age- and cause-specific death rates were computed on the basis of population estimates extracted from the HCD. Age-standardization of cause-specific death rates is based on the 2013 European Standard Population.

For alcohol consumption, we used official sales data by type of alcoholic beverage, which is regularly published by the national statistical offices in the three countries (Table 'Alcoholic beverages sold through retail trade network, in mln dal'¹). For Moldova and Ukraine, data are available for the years 1970, 1980, and yearly for 1985–2012 (Komitetul de stat pentru statistik-e MSSR 1989; Departamentul Analize Statistice si Sociologice 1993, 1998; Departamentul Statistica si Sociologie 2003; Biroul National de Statistica 2006, 2014; Ministerstvo statistiki Ukrainskoy SSR 1989; Ministerstvo statistiki Ukraïni 1993; Derzavniy komitet statistiki Ukraïni 2003; State Statistics Service of Ukraine 2011, 2014); for Russia they are available for the years 1970, 1975, and yearly for 1980–2012 (Goskomstat 1991, 1995, Rosstat 2005, 2011, 2013; TsSu RSFSR 1986). In order to convert the official sales data into pure alcohol sales, the alcohol content of vodka/cognac, wine and beer was considered to be, respectively, 40, 12.5 and 5%. The estimates for Moldova since 2002 are based on the retail trade turnover and average price of alcohol products.² Data from the WHO Global Information System on Alcohol and

¹ 'mln dal': million decalitres (1 decalitre is equal to ten litres).

² Based on the retail trade turnover and average price (in Moldovan currency, LEI), the number of bottles by type of alcoholic beverage was estimated first. The figures were then converted into litres of alcohol consumed (the bottle volume for wine and sparkling wine is 0.75 l; for beer 0.5 l and for vodka, liquor and cognac 0.7 l (Expert Group 2008) and finally into units of pure alcohol by taking into account the above-mentioned coefficients. It is possible to make comparisons between Moldova, Ukraine and Russia when taking into account only alcoholic beverages sold through the retail trade network.

Health database³ were also taken into consideration for comparison to the official recorded or estimated data (see Sect. 5).

4 Changes in Life Expectancy at Age 15

Although data quality for Moldova is somewhat more questionable as compared to Russia and Ukraine both for the Soviet period (Penina et al. 2010a, b) and after Independence (Penina et al. 2015), trends in life expectancy at age 15 in all three countries are very chaotic and follow very similar paths from the mid-1960s up to now (Fig. 1). Among males, a progressive decline in life expectancy started from the mid-60s and ended only in 1980, once the Soviet government initiated anti-alcohol measures. In 1965–1980, male life expectancy at age 15 was reduced by 4.2 years in Moldova and 3.5 years in Russia and Ukraine. During the same period of time, Moldovan females lost 2.2 years of life expectancy, while the losses were much less among Russian and Ukrainian females (about 1.0 year).

The Gorbachev anti-alcohol campaign had the most sizable effect on life expectancy growth for Russian males, who gained 3.3 years in 1980–1987 (compared to 1.8 years in Ukraine and 1.9 years in Moldova). It also had a beneficial effect on female health, especially in Moldova and Russia (1.2 and 1.0 years, respectively), but less so in Ukraine (0.7 years).

A dramatic decline in life expectancy in the three countries resulted from the disuse of the anti-alcohol measures in 1987 and the dissolution of the USSR in 1991, in particular due to the subsequent social and economic crises that arose as the newly independent countries transitioned abruptly into a market economy. Losses were the most impressive among Russian males, whose life expectancy at age 15 was reduced by 7.8 years between 1987 and 1994. Among adult Ukrainian and Moldovan males, the decline was also very significant but to a much lesser extent. Ukrainian males lost 5.6 years of life expectancy between 1987 and 1995, while Moldovan males lost 4.0 years over the same period (unlike Russia, the decline in life expectancy in Ukraine and Moldova continued until 1995). The decline was much less pronounced among females. Russian female life expectancy was reduced by 3.3 years in 1987–1994, while the 1987–1995 losses in Ukraine and Moldova were 2.4 and 2.1 years, respectively. In Russia and Ukraine, the period of health decline between 1987 and 1994/1995 was much more significant compared to that before the anti-alcohol campaign, especially in Russia, where in 1994 life expectancy reached a historical minimum for the post-WW2 period (44.2 years in males and 57.7 years in females). At the same time, Moldovan males and females in 1987–1995 lost about the same number of life expectancy years as in 1965–1980 (about 4 years in males and 2 years in females).

In the second half of the 1990s, there was a short period of post-crisis life expectancy growth in the three countries. Gains in life expectancy at age 15 were almost the same as during the period of the anti-alcohol campaign. Russian males gained 3.7 years of life expectancy in 1994–1998, while the increase in Ukrainian

³ <http://apps.who.int/gho/data/node.main.GISAH?lang=en>.

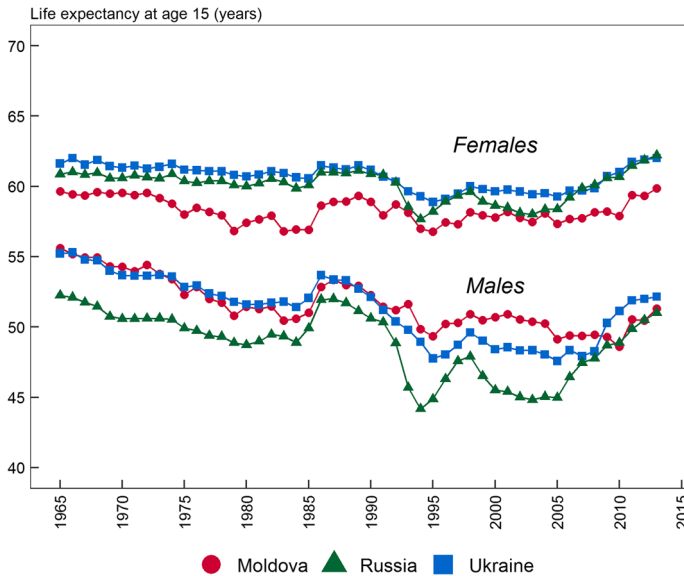


Fig. 1 Annual trends in life expectancy at age 15 in Moldova, Russia and Ukraine, 1965–2013, by sex. *Source:* Based on Human Cause of Death Database (<http://www.causesofdeath.org>)

and Moldovan male life expectancy in 1995–1998 was 1.8 and 1.6 years, respectively. The situation is the same among females, whose life expectancy at age 15 increased by 1.9 years in Russia, 1.1 years in Ukraine and 1.4 years in Moldova over the respective periods.

Following the end of wide fluctuations caused by the specific circumstances of the 1980s and 1990s, life expectancy at age 15 resumed the long-term downwards trend that established itself in the three countries before the anti-alcohol campaign. By 2005, life expectancy values roughly corresponded to those registered in 1994 in Russia and 1995 in Ukraine and Moldova. That year, Ukrainian male life expectancy at age 15 reached its minimum (47.6 years). Among Moldovan males, the situation continued to deteriorate until 2010, the year when male life expectancy reached its historical post-WW2 minimum in this country (as in Ukraine, the minimum of life expectancy for Moldovan females at age 15 was registered in 1995). Disregarding the wide fluctuations produced by the events of the 1980s and 1990s, the general life expectancy trend is a continuous decline in Russia and Ukraine until 2005 and in Moldova until 2010. From the mid-2000s onwards, the life expectancy completely reversed its long-term descending trend in Russia with a very consistent growth. In Ukraine, life expectancy after 2005 stopped declining in males and slightly increased in females over the next 3 years, followed by a marked increase that jumped notably in 2009 and less so in 2010. In Moldova, the period of recovery is still quite short. In total from 2005 to 2013, adult males gained 6.0 years in Russia, 4.6 years in Ukraine, and 2.2 years in Moldova. Among adult females, these gains were more in Russia and Ukraine (3.8 and 2.7 years, respectively) but less in Moldova (2.5 years). Disregarding these recent improvements, male life

expectancy at age 15 in all three countries is still lower than the level registered at the height of the 1985–87 anti-alcohol campaign, while female life expectancy has already caught it up.

Although male trends in life expectancy at age 15 are rather similar in the three countries, there are a few important peculiarities regarding their levels. The two curves for Ukraine and Moldova almost entirely superimpose one another, and they are much higher than the Russian curve (about 3 years in the 1970s) until the mid-1990s. Due to a much stronger response to the 1985 anti-alcohol campaign in Russia compared to Ukraine and Moldova, this difference diminished considerably in the 1980s (about 1.4 years in 1987). Then this gap with the other two countries again widened considerably due to a much more serious health decline caused by the social and economic crises of the 1990s in Russia. In 1994, the lowest point in the Russian life expectancy trend, the difference increased up to 5.9 years between Russian and Moldovan males and 4.8 years between Russian and Ukrainian males, while at the same time the Ukrainian curve began diverging from that of Moldova. Since 2005, a major turning point in Russian adult mortality trends, the distance between Russia and the other two countries reduced dramatically. Finally, male life expectancy since 2008 increases rapidly in the three countries at quite similar levels.

The situation for females differs completely from that for males. Here, the Moldovan curve is the lowest throughout the whole period under study. Fluctuations are much less important than for males. Moldovan women obtained greater benefits from the Gorbachev anti-alcohol campaign than their Russian and Ukrainian counterparts, but not quite enough for them to catch up, and they did not converge at all until recently. All these findings point to the importance of conducting a refined study of trends in alcohol-related mortality and their influence on life expectancy changes.

5 Trends in Alcohol-Related Mortality

5.1 Acute Consequences of Alcoholism

Acute consequences of alcohol consumption represented by accidental alcohol poisoning are by far much more important in Russia and Ukraine than in Moldova, especially among males (Fig. 2). In Russia and Ukraine, although accidental poisoning by alcohol accounts for only 10–15% of total deaths from injury and poisoning, this type of mortality has proved to have a strong negative correlation with life expectancy, especially in males (Levchuk 2009; Nemtsov et al. 2011). Indeed, mortality from accidental alcohol poisoning in these two countries is very chaotic and highly sensitive to the circumstances of the 1980s and 1990s, but it declined very considerably after 2005 in Russia and in 2009 in Ukraine. In Russia, male mortality from this category of external causes of death was higher than in Ukraine before the mid-1980s. Then, as with all other causes of mortality, the social and economic crises of the 1990s caused a much stronger rise in mortality from accidental alcohol poisoning in Russia than in Ukraine. In 1987–1994, standardized death rates among males increased by more than four times in Russia instead of a twofold growth in Ukraine. Conversely, mortality from acute alcoholism is not only

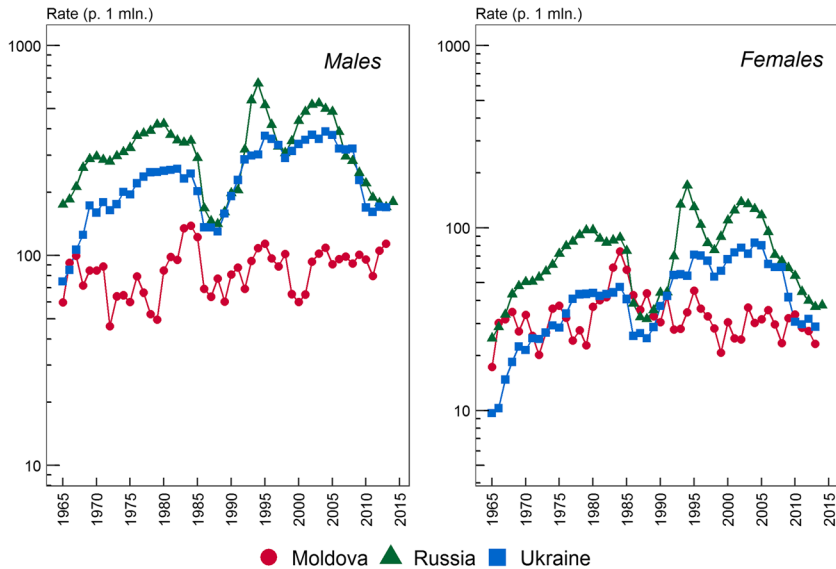


Fig. 2 Annual trends in the standardized mortality rate from accidental poisoning by alcohol in Moldova, Russia and Ukraine, 1965–2013, age 15 years and over, by sex. *Source:* Based on Human Cause of Death Database (<http://www.causesofdeath.org>)

much lower in Moldova than in Russia or Ukraine (the maximum excess mortality in Russia compared to Moldova for males is 8.5 times in 1979), but the overall trend is relatively stable, with quite a weak reaction to the crises of the 1990s and no recent improvements. Among females, the situation looks somewhat different because the Moldovan level is quite close to that of the Ukraine and not so far from Russia before the late 1980s.

5.2 Chronic Consequences of Alcoholism

Although mortality from liver cirrhosis is much higher in Moldova than in the other two countries (Fig. 3), the rapid increase observed in Russia and Ukraine contrasts sharply with the quasi-stagnation observed in Moldova since the mid-1980s. While the standardized death rates from this cause of death multiplied by 5 in Moldova from 1965 to 2013, they increased by more than 7 times in Ukraine and Russia. Females in all three countries were especially vulnerable. However, contrary to Russia and Ukraine, the situation in Moldova deteriorated very rapidly before the launch of the anti-alcohol measures of the early 1980s and then stagnated for a long period until 2010. Conversely, mortality growth in Ukraine and Russia was especially intensive from the late 1980s until 2008–2010. The abrupt prohibition of alcohol consumption in the 1980s contributed a great deal to mortality decline for both males and females in all three countries, especially in Moldova. This effect, known as the ‘reservoir effect’ (Zatoński et al. 2010), accounted in 1984–1987 for a 48% reduction in Moldova for both males and females, 38% among Ukrainian and Russian males and about 20% among Ukrainian and Russian females. The very

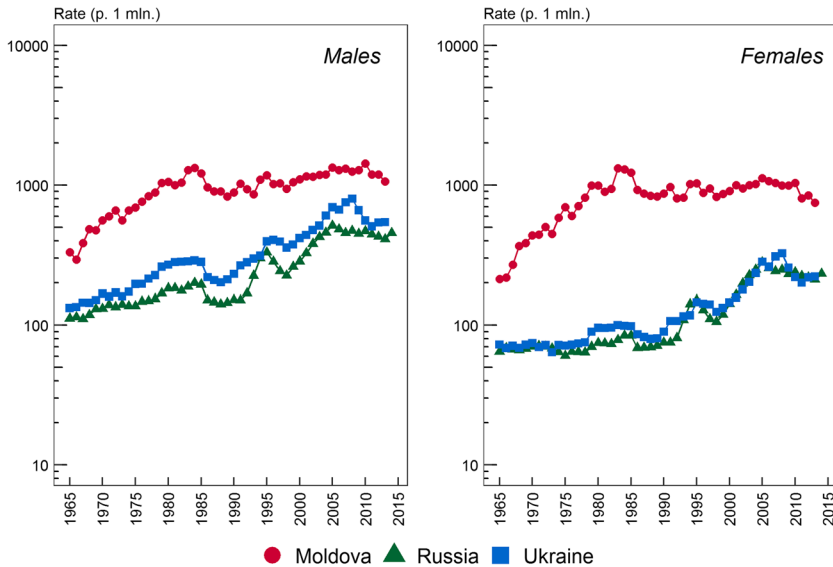


Fig. 3 Annual trends in the standardized mortality rate from liver cirrhosis in Moldova, Russia and Ukraine, 1965–2013, age 15 years and over, by sex. *Source:* Based on Human Cause of Death Database (<http://www.causesofdeath.org>)

rapid worsening of the situation observed between the late 1980s and 2005 in Russia (or 2009 in Ukraine) narrowed their gap with Moldova substantially. The anti-alcohol measures implemented in Russia after 2005 had a minor impact on mortality from liver cirrhosis compared to the reduction of accidental alcohol poisonings. As in the case of acute alcoholism, a marked decline was registered in Ukraine in 2009–2010, but it is too short-lived to make any conclusions. Moreover, the decrease stopped over the last 3 years in Ukraine, which may indicate the temporary character of this progress, as was already observed in the late 1980s and the late 1990s. In total, what is the most impressive is the much higher level of female mortality by liver cirrhosis in Moldova than in Russia and Ukraine, as well as its persistence. In spite of its reduction in the 1980s and 1990s, the gap is still very large and ceased reducing after 2000. To a lesser extent, the same is true for males. The only positive conclusion here is that cirrhosis mortality is now declining. The role that anti-alcohol measures and policies may have played in these past and recent trends will be explored next.

6 Anti-Alcohol Policies, Drinking Levels and Patterns

6.1 Anti-Alcohol Policies

From its beginnings, the Soviet power made several attempts to reduce the harmful effects of alcohol abuse on population health and labour productivity (1917, 1927, 1958, 1972, and 1985). In spite of its short-lived effect, the most spectacular

achievement was that of the Mikhail Gorbachev campaign initiated in May 1985. In fact, Gorbachev's predecessors started implementing some anti-alcohol measures earlier in the 1980s, and there is some evidence in the literature that both alcohol consumption and alcohol-related crimes had already diminished by 1984, although slightly (McKee 1999). The 1985 campaign included a set of strict administrative measures aimed at restricting population access to alcohol: the production and sales of alcoholic beverages were reduced by almost three times in the state's commerce (the sole legal source of alcohol in the USSR); the price of alcohol was raised; tougher penalties were legislated for homemade alcohol production; and there was an expansion in the networks of narcological clinics and special institutions for compulsory treatment of alcoholism, so-called medical-labour dispensaries (Nemtsov 1995). The campaign began in May 1985 and lasted no longer than 2 years, but it proved to increase life expectancy dramatically in all European republics of the USSR, including Moldova. Unfortunately, all these measures and their effects vanished as quickly as they arose.

After the dissolution of the USSR, no more anti-alcohol measures were implemented in Moldova for two decades. In 2012, however, the Moldovan Government approved a National Programme of Alcohol Control for the years 2012–2020, which aimed at reducing the harmful use of alcohol. It included a number of specific measures like raising the minimum age for purchasing alcohol, reducing sales hours and increasing the minimum price of strong alcohol as well as some other dangerous products (Guvernul Republicii Moldova 2012). Then, in 2014, the anti-alcohol campaign 'With sober mind' was launched in Moldova to increase public awareness about the problems caused by alcohol abuse.⁴

In Ukraine, the production and circulation of alcoholic beverages and tobacco products were regulated by a law which was adopted in 1995 and underwent subsequent modifications (Vidomosti Verkhovnoyi Rady Ukrayiny 1995), but these measures were rather ineffective. Later on, in 2008–2009, there was an increase in the level of wholesale and retail prices for some types of alcohol, which coincided with the country's financial crisis. Finally, in 2015, a new law on the production and regulation of alcoholic beverages established restrictions on the sale and advertisement of beer and low-alcohol beverages, and the minimum retail price for alcoholic beverages increased again, by 25–35%, depending on their type (Ministry of Finance of Ukraine 2015).

The anti-alcohol policies implemented in post-Soviet Russia, which are widely discussed in the literature, arrived at a major turning point in the mid-2000s. In particular, the Russian government asserted a monopoly over the alcohol industry in 2006 in order to strengthen state control over the volume and quality of alcohol production (Grigoriev and Andreev 2015). Excise stamps were introduced along with electronic surveillance systems designed to track the market and movements of alcohol (the use of raw materials, production volumes and leftover raw materials, among others). A number of serious problems (like the lack of excise stamps and poor functioning of the surveillance system) affected the implementation of this law

⁴ <http://www.euro.who.int/en/countries/republic-of-moldova/news/news/2014/02/with-a-sober-mind!-alcohol-awareness-campaign-launched-in-the-republic-of-moldova>.

(Levintova 2007). After 2009, an active phase of the anti-alcohol policy began with the introduction of new regulations on the production and sales of alcoholic beverages. Excise taxes increased by 30% in 2011–2012 and then by 80% in 2013–2014. The retail price of vodka increased by 77% in 2010–2013, while the real disposable income of the population rose by only 15% (Radaev 2015).

6.2 Drinking Levels

For heavy drinking countries such as Russia, Ukraine and Moldova, it is very problematic to provide accurate estimates of alcohol consumption. According to WHO data on total pure alcohol consumption (including unrecorded consumption) Moldova had the second highest level in the world after Belarus, with 16.8 l consumed per adult aged 15 or older in 2008–2010; while Russia and Ukraine had the fourth and the sixth highest level, respectively, at 15.1 and 13.9 l per capita (WHO 2014a). Although these estimates are inevitably inexact, they suggest a considerable amount of unrecorded alcohol consumption in these countries. *Unrecorded alcohol* includes not only illegally distributed alcoholic beverages, but also homemade and surrogate alcohol unintended for consumption by humans (Lachenmeier et al. 2014). According to WHO, unrecorded alcohol consumption in Moldova accounts for 60% of the total consumption as compared to 36% in Ukraine and 24% in Russia (WHO 2014a). In Moldova, the main contribution to unrecorded alcohol consumption is homemade wine, which contains about 11% pure alcohol (Expert Group 2008). According to data from a recent Moldovan health survey that included current drinkers—i.e. those who reported consuming alcohol in the past 30 days (70% for males and 54% for females in the adult population aged 18–69 years old)—almost half of them had consumed unrecorded alcohol (51% males, 40% females) in the previous 7 days. The consumption of homemade wine dominates the total unrecorded consumption (about 80% for both sexes), and it constitutes about 30% of the total alcohol consumed, without any significant difference by sex (it is even slightly higher for females). Unrecorded alcohol consumption is especially popular among Moldovan females aged 45–69 years old, for whom it accounts for about 45% of the total alcohol consumed as compared to 35% for males in the corresponding age group (WHO 2014b).

In Ukraine, unrecorded alcohol is mainly distilled alcohol, although *pyvo* (hopped beer, 3–6% alcohol) and *braha* (unhopped milled beer, 3–6% alcohol) are also consumed (Popova et al. 2007). In Russia, unrecorded alcohol consumption includes not only illicit spirits (*samogon*), but also legal non-beverage alcohols, such as medicinal tinctures or industrial alcohol (Leon et al. 2009).

Table 2 shows the recorded pure alcohol consumed per person aged 15 years and over, according to the estimates based on official sales data and WHO estimates in the three countries for the selected years. It is important to note that the source of data used by WHO for producing the corresponding estimates can be other than the officially published sales data.⁵ In the case of Russia, the level of the recorded

⁵ WHO estimates of recorded alcohol consumption for Moldova and Ukraine are based on the Food and Agriculture Organization of the UN and, additionally for Ukraine, the WHO Global Survey on Alcohol

Table 2 Recorded pure alcohol consumed per person, aged 15 years and over, based on official sales data and WHO estimates, in litres. *Source:* Based on official sales data for Russia, Ukraine and Moldova (statistical yearbooks); and the Global Information System on Alcohol and Health (<http://apps.who.int/gho/data/node.main.GISAH?lang=en>)

Year	Russia		Ukraine		Moldova	
	Sales data	WHO	Sales data	WHO	Sales data	WHO
1970	10.8	8.6	6.5	–	3.6	–
1980	12.6	7.9	8.0	7.7	7.0	–
1987	5.4	4.6	4.1	4.0	2.4	–
1995	8.7	11.2	2.3	3.7	1.2	15.8
2005	12.2	11.6	3.1	7.3	1.4	10.8
2012	11.0	11.0	3.6	8.4	1.5	10.7

alcohol consumption based on official sales data and WHO estimates almost coincides from the late 1980s, and it consists of 11 l of pure alcohol per adult (aged 15 years and older) in 2012. At the same time, for Ukraine and especially for Moldova, WHO estimates of recorded alcohol consumption for recent years are based on sources other than the official sales data, which leads to an important discrepancy between the two estimates. Thus, the recorded alcohol consumption in 2012, according to the sales data, consists of 3.6 l in Ukraine and only 1.5 l in Moldova, while WHO estimates of the recorded alcohol consumed for the same year are, respectively, 8.4 and 10.7 l.

Disregarding these differences in estimated levels, one can observe the important changes provoked by the anti-alcohol measures implemented in 1980–1987, when alcohol consumption, based on official sales data, was reduced almost twofold in Ukraine (from 8.0 to 4.7 l), more so in Russia (from 12.6 to 5.4 l) and threefold in Moldova (from 7.1 to 2.4 l). After the end of the campaign in 1987 and following the dissolution of the USSR, the state lost its monopoly over alcohol production and recorded consumption became highly under-estimated due to illegal alcohol production for the black market. This is especially obvious for Ukraine and Moldova, whose official alcoholic beverage sales faced a deep decline in the 1990s. In recent years, Russia has seen an obvious decline in the total level of recorded alcohol consumption in terms of both sales and WHO estimates, although this is not the case for Ukraine or Moldova. Some authors suggest that this decrease may possibly be triggered not only by the anti-alcohol measures taken after 2005, but also by a decline in the population's real disposable income in the 2000s, especially in the wake of the 2008–2009 financial crisis and its following recession, when consumers reduced alcohol consumption or switched to cheaper homemade alcoholic beverages (Radaev 2015). However, WHO estimates suggest that alcohol consumption stagnated at very high levels in the past two decades (Table 2).

Footnote 5 continued

and Health 2012. For Russia, WHO estimates are based on World Drink Trends and official sales data (WHO 2016b).

Nevertheless, important changes seem to have happened in regard to the type of beverage consumed.

6.3 Drinking Patterns

In the three examined countries, patterns of alcohol intake by types of beverages consumed underwent thorough and important changes, both in the Soviet period and after Independence. Figure 4 presents the structure of alcohol consumption by three types of alcoholic beverage (spirits, wine and beer), based on alcohol sales data.

Before the anti-alcohol campaign of the early 1980s, the pattern of alcohol consumption was quite different in the three countries. In Moldova, the drinking pattern in 1970 was characterized by a predominance of wine (45%) and a lower share of spirits (30%). Conversely, in Russia and Ukraine, spirits dominated the total consumption (68 and 55%, respectively). The anti-alcohol measures of the 1980s did not considerably change the pattern of alcohol consumption. The proportion of spirits decreased mostly in favour of wine in Russia and beer in Ukraine, but it still dominated the total consumption. Conversely, by the end of the 1980s, the share of wine and beer in Moldova increased to more than 80% of total alcohol consumed. The disuse of the anti-alcohol measures followed by the severe social and economic crises that affected the former Soviet republics after the breakup of the USSR led to wine and beer sales being replaced very rapidly by spirits sales in the three countries. Between 1987 and 1995, the share of strong

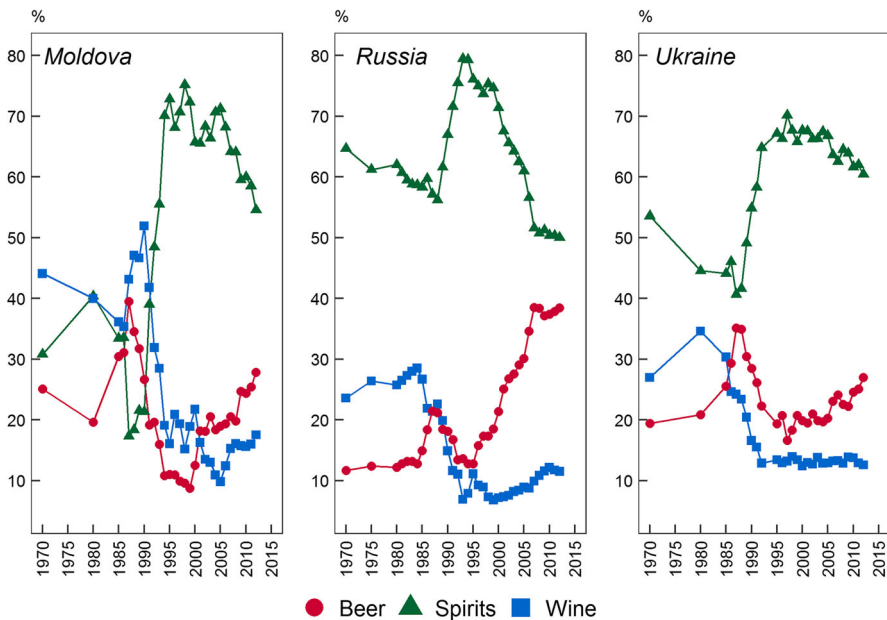


Fig. 4 Percentage of pure alcohol consumption per person aged 15 years and over by type of alcoholic beverage, based on official sales data in Moldova, Russia and Ukraine. *Source:* Based on official sales data for Russia, Ukraine and Moldova (statistical yearbooks)

alcoholic beverages in total alcohol sales increased from 57 to 76% in Russia, from 40 to 67% in Ukraine and from 17 to 73% in Moldova. In the latter, however, such a drastic change in the preferences of alcoholic beverages during the economic crisis is more artificial than real, due mainly to an increase in the under-registration of wine consumption.

In Russia, the period between 1995 and 2005 saw a gradual substitution of spirits sales with beer sales. Thus, the proportion of spirits in total alcohol sales decreased from 76 to 60%, while the contribution of beer sales increased from 13 to 30%. These figures correspond to the Russian Longitudinal Monitoring Survey (RLMS) data, according to which the share of spirits (*vodka*) consumption in terms of pure ethanol decreased from 69 to 49% between 1994 and 2002 while the consumption of beer increased from 6 to 15% and *samogon* from 10 to 22% (Andrienko and Nemtsov 2005). The period after 2005, when Russia implemented new alcohol measures, coincided with a marked decline in vodka sales (from 7.4 l of pure alcohol in 2005 to 5.5 l in 2012 per adult aged 15 years and over), but not in beer sales. In 2012, spirits sales account for 50% of total alcohol consumption in Russia, and beer for 40%.

In Ukraine and Moldova, the substitution of spirits sales with beer sales began somewhat later, but the trend is obvious in both countries. Although the sales data demonstrate very low figures in terms of the alcohol consumed in Ukraine and especially in Moldova, the recent changes in their patterns (substitution of spirits sales with beer sales) are very likely to reflect the real situation. This trend would be even more pronounced in the case of Ukraine if unrecorded beer consumption were to be taken into account, while the impact of the unrecorded homemade wine would not influence the observed changes in Moldovan drinking habits regarding beer and spirits.

Another important dimension of drinking patterns is the time variation in drinking that is often associated with a percentage of heavy drinkers over the last 12 months. The prevalence of episodic heavy drinkers is much higher among Russian (30%) and Ukrainian (25%) males compared to Moldovan males (13%) (Pomerleau et al. 2005). There is a specific Russian term, *Zapoi*, which is used to describe a period of 2 or more days of continuous drunkenness when the person is withdrawn from normal social life (Leon et al. 2007).

7 Discussion

Differences in drinking behaviours between Moldova on the one hand and Russia and Ukraine on the other explain the existing differences in alcohol-related mortality. However, this effect differs by sex. The consumption of homemade wine in Moldova has a somewhat less harmful effect on male health, especially when compared to Russia. Although, the acute consequences of alcoholism (mainly injury and poisoning) contribute to overall male life expectancy changes in Moldova (Penina et al. 2010a, b); such a relationship is, by far, of much less importance in this country than it is in Russia and Ukraine. In contrast, while the spirits drinking culture affects mostly males, a hazardous variation of the Mediterranean drinking

culture in Moldova causes severe health problems in females, who seem to share the habits of males in drinking the same homemade wine. Moreover, some studies show that females have higher susceptibility to the development of chronic liver disease when compared to males (Corrao et al. 1997). Moldovan females appear to suffer from the most extreme manifestation of the hazardous wine-drinking culture, at least among European countries.

7.1 Acute Consequences of Alcohol Consumption

In terms of life expectancy at age 15, Moldovan males maintain a more favourable position, especially when compared to Russian males up until very recent years. The lion's share of this difference stems from deaths from injury and poisoning (more than 75% in 1993), to which young working ages (20–39 years old) have the highest contribution. A combination of factors can explain the exceptionally high alcohol poisoning rates and their unprecedented growth in the post-Soviet period, specifically: the volume of alcohol consumed (how much is drunk), its quality (what is drunk) and the drinking behaviour as well as the consumption of illicit alcohol (how the beverage is accessed) (Stickley et al. 2007). The magnitude of alcohol consumption in Ukraine is somewhat 'lighter' than in Russia, and it results in a different magnitude of changes in mortality from acute alcoholism in these two countries. Thus, a population-based case-control study conducted in 2003–2005 in Izhevsk, a city on the western side of the Ural mountains, concluded that 43% of deaths among men aged 25–54 years were attributable to hazardous drinking (Leon et al. 2007).

The gradual substitution of spirits sales with beer sales in Russia and Ukraine is very likely to be one of the factors responsible for the recent decline in mortality from accidental alcohol poisoning. In Russia, this period of improvement also coincides with the implementation of new anti-alcohol measures and a decline in overall alcohol consumption, particularly of spirits but not beer. This fact can explain a much deeper and more stable reduction in mortality from acute alcoholism in Russia as compared to Ukraine. Certainly, the 'beer factor' concerns primarily the younger generations, while mature and older age groups traditionally prefer spirits in these countries. However, there is some evidence, based on the RLMS data, indicating that the changes in drinking preferences (beer instead of spirits) are characteristic not only of the youth but also of mature adults, while the older population is more consistent in its drinking behaviour (Roschina 2012). In Ukraine, a substantial drop in alcohol-related mortality in 2009–2010 could be attributable to the 2008–2009 increase in alcohol prices, which, as in Russia, coincides with the financial crisis and the country's subsequent recession.

7.2 Chronic Consequences of Alcohol Consumption

A rapid decline in Moldovan female life expectancy at age 15 occurred before the beginning of the anti-alcohol measures, and this is explained by a dramatic increase in mortality from liver cirrhosis in this country. This type of pathology alone accounts for half of the total life expectancy losses among adult Moldovan females

in 1965–1980 (1.1 years out of 2.2 years), with the most affected age groups being 45–64 years old. Thus, in 1980, adult Moldovan women lived on average 2.5 years less than Russian women; and more than half of this difference is attributable to liver cirrhosis.

There are two major factors contributing to the development of liver cirrhosis at the population level: alcohol consumption and viral hepatitis (Detels et al. 2009). There is no evidence that the impact of the latter is of greater importance in Moldova compared to Ukraine or Russia. The prevalence of hepatitis B carriers in Moldova is 8–12%, compared to 8.3% in Ukraine and 1.9% in Russia (with great regional differences) (Bonanni 1998; Berger 2016; Grob 1998). In Moldova, before implementing compulsory immunization of all infants in 1994 (Iarovoi et al. 2008), viral hepatitis indeed played an important role in the public healthcare system, especially among children and pregnant women, and this was due mostly to unsafe injection practices (Hutin et al. 1999). However, there is little reason to assume that the spread of viral infections could provoke such a dramatic increase in adult mortality from liver cirrhosis before the launch of the anti-alcohol campaign in Moldova. Moreover, when we consider the effect that the Gorbachev anti-alcohol campaign had on both male and female mortality from liver cirrhosis in Moldova, combined with the fact that its growth resumed following the campaign, we have an indirect indication of the predominantly alcoholic nature of liver cirrhosis in this country.

Although the share of alcoholic liver cirrhosis among all types of liver cirrhosis in Moldova is relatively small compared to Ukraine and Russia (due to a more important under-registration of this type of pathology), its mortality level for both males and females is higher in Moldova compared to the other two countries, especially during the Soviet period. Furthermore, as with all types of liver cirrhosis, the male/female ratio is much less high in Moldova (1.2 in 2013) when compared to Ukraine (2.8) or Russia (2.3). This means that the alcoholic factor in Moldova (regular consumption of large quantities of homemade wine) has the same impact on the development of liver diseases for both sexes.

The quality of the unrecorded wine consumption that accounts for the largest share of the total alcohol intake in Moldova could be important in providing a reasonable explanation for the high mortality from liver cirrhosis, although this has not been proved due to the absence of appropriate studies. Hungary is also largely influenced by the Mediterranean style of drinking, and the case for this country suggests that the poor quality of unrecorded alcohol may contribute to its high level of alcohol-induced liver cirrhosis (Szucs et al. 2005).

In Russia and Ukraine, the recent increase in mortality from liver cirrhosis has another nature than in Moldova. It is very possible that the substitution of vodka consumption with beer consumption led to a positive effect on the acute consequences of alcoholism, which in turn had a negative impact on mortality from chronic alcoholism in the former two countries. In Russia, a decline occurred in overall alcohol consumption after 2005, mostly due to a reduction in the intake of spirits, and this had a more modest (but consistent) effect on liver cirrhosis compared to alcohol poisoning. The situation is less clear with Ukraine, where, since 2005, mortality from liver cirrhosis decreased sharply only in 2009 and 2010

while the situation continued to deteriorate in all other years. In the case of Ukraine, we can again refer to the 2008–2009 increase in alcohol prices that coincided with the overall economic crisis in the country, which therefore led to a decline in the population's purchasing power. Much more time and many more efforts towards alcohol policies may be required before we can observe positive changes in this type of mortality.

8 Conclusions

In this paper, we analysed the changes in drinking cultures in relation to the changes in alcohol-related causes of death in three post-Soviet countries. The fact that Moldova is a wine-drinking country could have been a great advantage for its population health compared to the traditionally spirits drinking Russia and Ukraine, which have been suffering from huge population losses due to cardiovascular mortality and external causes of death over the last half a century. However, overall adult mortality in the three countries has been continuously increasing in the long-term, despite specific chaotic fluctuations related to the 1985 Gorbachev anti-alcohol campaign and the social and economic crises of the 1990s. Furthermore, female health status in Moldova is of particular interest due to much lower life expectancy values compared to Russian and Ukrainian females while, on the other hand, the indicator for Moldovan males does not differ greatly from these other two countries.

Our research question was whether the wine-drinking culture in Moldova has a beneficial or harmful effect on population health as compared to the traditionally spirits drinking former USSR republics like Russia and Ukraine. Our answer is that the existing drinking culture in Moldova certainly has a harmful effect. For males, the impact of the hazardous Mediterranean drinking culture in Moldova and the spirits drinking culture in Ukraine in terms of the overall mortality does not differ greatly, although compared to Russia Moldovan males are at an advantage. The difference exists only at the level of alcohol-related causes of death. If life expectancy losses among Russian and Ukrainian males are closely correlated to the acute consequences of alcoholism, specifically in terms of deaths from injury and poisoning, Moldovan males suffer much more from the chronic consequences of alcoholism, namely liver cirrhosis. On the contrary, wine-drinking culture in Moldova has by far much heavier effects on female health as compared to the spirits drinking culture. The burden of liver cirrhosis accounts for much lower Moldovan female life expectancy compared to their Russian or Ukrainian counterparts.

Certainly, the poor quality of the sales statistics on alcohol consumption, especially for Moldova, is the main limiting factor that restricted us only to the given descriptive analysis. However, this study could serve as a theoretical background for further epidemiological research. In particular, a study evaluating the toxicity of homemade wine in Moldova may be useful in identifying additional risk factors for liver cirrhosis in Moldova. Finally, it is time to realize for the Moldovan policy makers that liver cirrhosis along with cardiovascular diseases constitutes the main source for life expectancy growth and adequate anti-alcohol

measures can substantially improve the situation. Certainly, in Moldova, anti-alcohol policies should differ from those undertaken in other countries that practice spirits drinking cultures; in particular, they must be aimed at reducing the consumption of homemade wine and the overall level of alcohol.

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References

- Andrienko, Y., & Nemtsov, A. (2005). Estimation of individual demand for alcohol. *Economics Education and Research Consortium Working Paper Series*, 5(10). http://pdc.ceu.hu/archive/00003805/01/Estimation_of_individual_demand_for_alcohol.pdf. Accessed 2 October 2016.
- Berger, S. A. (2016). *Infectious diseases of Ukraine*. Los Angeles: GIDEON Informatics Inc.
- Biroul National de Statistica. (2006). *Anuarul statistic al Republicii Moldova in 2005 [Statistical yearbook of the Republic of Moldova in 2005]*. Chisinau: Statistica Moldovei.
- Biroul National de Statistica. (2014). *Anuarul statistic al Republicii Moldova in 2013 [Statistical yearbook of the Republic of Moldova in 2013]*. Chisinau: Statistica Moldovei.
- Bonanni, P. (1998). Report on working group 1: Albania, Andorra, Canada, France, Italy, Moldova, Portugal, Poland, Romania and Spain. *Vaccine*, 16(Suppl), S58–S60.
- Cantemir, D. (1714). *Descrierea Moldovei*.
- Chervyacov, V. V., & Shkolnikov, V. M. (Eds.). (2000). *Политика по контролю кризисной смертности в России в переходный период [Policies for the Control of the Transition's Mortality Crisis in Russia]*. Moscow: United Nations Development Programme (Russia), Transnational Family Research Institute (Moscow).
- Corrao, G., Aricò, S., Zambon, A., Torchio, P., & Di Orio, F. (1997). Female sex and the risk of liver cirrhosis. Collaborative groups for the study of liver diseases in Italy. *Scandinavian Journal of Gastroenterology*, 32(11), 1174–1180.
- Danilova, I. (2016). About Russia data on causes of death. *The Human Cause-of-Death Database*. http://causesofdeath.org/Data/RUS/20160121/RUS_bd.pdf. Accessed 12 May 2016.
- Departamentul Analize Statistice si Sociologice. (1993). *Anuarul statistic al Republicii Moldova, 1992 [Statistical yearbook of the Republic of Moldova in 1992]*. Chisinau: Statistica Moldovei.
- Departamentul Analize Statistice si Sociologice. (1998). *Anuarul statistic al Republicii Moldova in 1997 [Statistical yearbook of the Republic of Moldova in 1997]*. Chisinau: Departamentul Analize Statistice si Sociologice.
- Departamentul Statistica si Sociologie. (2003). *Anuarul statistic al Republicii Moldova in 2002 [Statistical yearbook of the Republic of Moldova in 2002]*. Chisinau: Statistica Moldovei.
- Derzavniy komitet statistiki Ukraïni. (2003). *Statisticnij scorienik Ukraïni za 2002 rik [Statistical yearbook of Ukraine for 2002]*. Kiev: Consultant.
- Detels, R., Beaglehole, R., Lansang, M. A., & Gulliford, M. (Eds.). (2009). *Oxford textbook of public health*. Oxford: Oxford University Press.
- Expert Group. (2008). *Consumul și abuzul de alcool în Republica Moldova: evaluarea situației și impactului [Alcohol consumption and abuse in Moldova: Assessment of the situation and impact]*. Chisinau: Expert Group.
- Goskomstat. (1991). *Narodnoe khozyaystvo RSFSR v 1990 godu. Statisticheskiy ezhegodnik [Statistical yearbook of RSFSR in 1990]*. Moscow: Respublikanskiy informatsionno-izdatel'skiy tsentr.
- Goskomstat. (1995). *Rossiyskiy statisticheskiy ezhegodnik, 1995 [Russian statistical yearbook, 1995]*. Moscow: LOGOS.
- Grigoriev, P., & Andreev, E. M. (2015). The huge reduction in adult male mortality in Belarus and Russia: Is it attributable to anti-alcohol measures? *PLoS ONE*, 10(9), e0138021.
- Grob, P. J. (1998). Report on working group 2: Austria, Belgium, Bulgaria, Germany, Greece, Hungary, Malta, Russia, Switzerland, Turkey and Uzbekistan. *Vaccine*, 16(Suppl), S61–S62.

- Guvernul Republicii Moldova. Hotarare pentru aprobarea Programului national privind controlul alcoolului pe anii 2012–2020 [Decision with regard to the approval of the National Programme for alcohol control in 2012–2020]. HGM360/2012 (2012). <http://lex.justice.md/viewdoc.php?action=view&view=doc&id=343538&lang=1>. Accessed 24 June 2016.
- Hutin, Y. J., Harpaz, R., Drobeniuc, J., Melnic, A., Ray, C., Favorov, M., et al. (1999). Injections given in healthcare settings as a major source of acute hepatitis B in Moldova. *International Journal of Epidemiology*, 28(4), 782–786.
- Iaroveni, P., Rimis, C., Spinu, C., & Isac, M. (2008). Epidemiology of hepatitis B virus infection in the Republic of Moldova. *The Journal of Infection in Developing Countries*, 2(03), 190–192.
- Kabagambe, E. K., Baylin, A., Ruiz-Narvaez, E., Rimm, E. B., & Campos, H. (2005). Alcohol intake, drinking patterns, and risk of nonfatal acute myocardial infarction in Costa Rica. *The American Journal of Clinical Nutrition*, 82(6), 1336–1345.
- Komitetul de stat pentru statistik-e MSSR. (1989). *Yekonomiya natsional-e a RSS Moldoveneshi'. Anuar statistik. 1988 [The Economy of MSSR in 1988. statistical yearbook]*. Chisinau: Kartya Moldovenyask-e.
- Lachenmeier, D. W., Monakhova, Y. B., & Rehm, J. (2014). Influence of unrecorded alcohol consumption on liver cirrhosis mortality. *World Journal of Gastroenterology*, 20(23), 7217–7222.
- Landberg, J. (2010). *Alcohol-related problems in Eastern Europe. A comparative perspective*. Department of Sociology, Stockholm University, Stockholm. Retrieved from <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A360384&dswid=4355>.
- Ledermann, S. (1956). *Alcool, alcoolisme et alcoolisation. Données scientifiques de caractère physiologique, économique et social (INED.)*. Paris: PUF.
- Leon, D. A., Chenet, L., Shkolnikov, V. M., Zakharov, S., Shapiro, C. N., Rakhmanova, G., et al. (1997). Huge variation in Russian mortality rates 1984–94: Artefact, alcohol, or what? *Lancet*, 350(9075), 383–388.
- Leon, D. A., Saburova, L., Tomkins, S., Andreev, E., Kiryanov, N., McKee, M., et al. (2007). Hazardous alcohol drinking and premature mortality in Russia: A population based case-control study. *The Lancet*, 369(9578), 2001–2009.
- Leon, D. A., Shkolnikov, V. M., & McKee, M. (2009). Alcohol and Russian mortality: A continuing crisis. *Addiction (Abingdon, England)*, 104(10), 1630–1636.
- Leong, D. P., Smyth, A., Teo, K. K., McKee, M., Rangarajan, S., Pais, P., et al. (2014). Patterns of alcohol consumption and myocardial infarction risk observations from 52 countries in the INTERHEART case-control study. *Circulation*, 130(5), 390–398.
- Levchuk, N. (2009). Alcohol and mortality in Ukraine. *MPIDR working paper*, (WP-2009-017), 24.
- Levintova, M. (2007). Russian alcohol policy in the making. *Alcohol and Alcoholism*, 42(5), 500–505.
- McKee, M. (1999). Alcohol in Russia. *Alcohol and Alcoholism*, 34(6), 824–829.
- Meslé, F., Shkolnikov, V. M., Hertrich, V., & Vallin, J. (1996). *Tendances récentes de la mortalité par cause en Russie 1965–1994 [Современные тенденции смертности по причинам смерти в России 1965–1994]* (Vols. 1–2 diskettes). Paris: Institut national d'études démographiques (Paris), Центр Демографии и Экологии Человека Института Народногохозяйственного Прогнозирования РАН (Москва).
- Meslé, F., & Vallin, J. (1996). Reconstructing Long-Term Series of Causes of Death. The Case of France. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 29(2), 72–87.
- Meslé, F., & Vallin, J. (2003). *Mortalité et causes de décès en Ukraine au XXe siècle (Cahiers de l'INED.)*. Paris: INED.
- Meslé, F., & Vallin, J. (2012). *Mortality and causes of death in 20th-century Ukraine (Vols. 1-CD)*. Dordrecht: Springer.
- Ministerstvo statistiki Ukraïni. (1993). *Narodne gospodarstvo Ukraïni u 1992 roci. Statisticnij scoricnik [The Economy of Ukraine in 1992. Statistical yearbook]*. Kiev: Tehnika.
- Ministerstvo statistiki Ukrainsoy SSR. (1989). *Narodnoe khozyaystvo Ukrainsoy SSR v 1988 godu. Statisticheskii ezhegodnik [The economy of Ukraine in, 1988 statistical yearbook]*. Kiev: Tekhnika.
- Ministry of Finance of Ukraine. (2015). The minimum prices of alcohol are going to be increased as part of the fight against illegal alcohol circulation. *Ministry of Finance of Ukraine*. http://195.78.68.18/minfin/control/en/publish/article?art_id=418493&cat_id=264727. Accessed 5 October 2016.
- Nemtsov, A. V. (1995). Алкогольная ситуация в России [Alcohol situation in Russia]. In *Фонд “Здоровье и окружающая среда”* (p. 126). Москва.
- Nemtsov, A. V. (2011). *A contemporary history of alcohol in Russia*. Huddinge: Södertörns högskola.

- Nemtsov, A. V., Levchuk, N. M., & Davydov, K. V. (2011). Alcohol-related mortality in Ukraine and Russia (1980–2007). *ICAP Periodic Review on Drinking and Culture*.
- Penina, O. (2015). Reconstruction of the continuity of cause-specific mortality trends for the Republic of Moldova. *Economy and Sociology: Theoretical and Scientific Journal*, 2, 70–77.
- Penina, O., Jdanov, D., & Grigoriev, P. (2015). Producing reliable mortality estimates in the context of distorted population statistics: The case of Moldova. *MPIDR Working Paper WP-2015-011*. http://www.demogr.mpg.de/en/projects_publications/publications_1904/mpidr_working_papers/producing_reliable_mortality_estimates_in_the_context_of_distorted_population_statistics_the_case_5498.htm.
- Penina, O., Mesle, F., & Vallin, J. (2010). What causes of are driving life expectancy in Moldova? In *European population conference*. Presented at the European population conference, Vienna.
- Penina, O., Meslé, F., & Vallin, J. (2010b). Correcting for under-estimation of infant mortality in Moldova. *Population (English Edition)*, 65(3), 499–514.
- Pomerleau, J., McKee, M., Rose, R., Haerpfel, C. W., Rotman, D., & Tumanov, S. (2005). Drinking in the commonwealth of independent states—evidence from eight countries. *Addiction*, 100(11), 1647–1668.
- Poniakina, S., & Shevchuk, P. (2016). About Ukraine data on causes of death. *The Human Cause-of-Death Database*. http://causesofdeath.org/Data/UKR/20160121/UKR_bd.pdf. Accessed 12 May 2016.
- Popova, S., Rehm, J., Patra, J., & Zatonski, W. (2007). Comparing alcohol consumption in central and eastern Europe to other European countries. *Alcohol and Alcoholism (Oxford, Oxfordshire)*, 42(5), 465–473.
- Radaev, V. (2015). Impact of a new alcohol policy on homemade alcohol consumption and sales in Russia. *Alcohol and Alcoholism*, 50(3), 365–372.
- Rehm, J., Gmel, G., Sempos, C. T., & Trevisan, M. (2003). Alcohol-related morbidity and mortality. *Alcohol Research & Health*, 140, C00–C97.
- Room, R., & Mäkelä, K. (2000). Typologies of the cultural position of drinking. *Journal of Studies on Alcohol*, 61(3), 475–483.
- Room, R., & Mitchell, A. (1972). Notes on cross-national and cross-cultural studies. *Drinking and Drug Practices Surveyor*, 5(14), 16–20.
- Roschina, Y. (2012). Динамика структуры и потребления алкоголя в России [Alcohol consumption dynamics and patterns in Russia]. *Вестник Российского мониторинга экономического положения и здоровья населения НИУ ВШЭ*, 2, 238–257.
- Rosstat. (2005). *Rossiyskiy statisticheskiy ezhegodnik, 2005 [Russian statistical yearbook, 2005]*. Moscow: Statistica Rossii.
- Rosstat. (2011). *Rossiyskiy statisticheskiy ezhegodnik, 2011 [Russian statistical yearbook, 2011]*. Moscow: Tipografiya “Novosti”.
- Rosstat. (2013). *Rossiyskiy statisticheskiy ezhegodnik, 2013 [Russian statistical yearbook, 2013]*. Moscow: Statistica Rossii.
- Savic, M., Room, R., Mugavin, J., Pennay, A., & Livingston, M. (2016). Defining “drinking culture”: A critical review of its meaning and connotation in social research on alcohol problems. *Drugs: Education, Prevention and Policy*, 23(4), 270–282.
- Skog, O. -J. (1995). Alkoholproblem. In T. Goldberg (Ed.), *Samhällsproblem* (Vol. 4). Stockholm: Liber Utbildning.
- State Statistics Service of Ukraine. (2011). *Statistical yearbook of Ukraine for 2010*. Kiev: « Avgust Trade » Ltd. http://www.ukrstat.gov.ua/druk/publicat/kat_e/publ1_e.htm. Accessed 15 June 2015.
- State Statistics Service of Ukraine. (2014). *Statistical yearbook of Ukraine for 2013*. Kiev: State Statistics Service of Ukraine.
- Stickley, A., Leinsalu, M., Andreev, E., Razvodovsky, Y., Vågerö, D., & McKee, M. (2007). Alcohol poisoning in Russia and the countries in the European part of the former Soviet Union, 1970–2002. *European Journal of Public Health*, 17(5), 444–449.
- Sulkunen, P. (1976). Drinking patterns and the level of alcohol consumption: An international overview. In R. J. Gibbins (Ed.), *Research advances in alcohol and drug problems* (Vol. 3, pp. 223–281). New York: Wiley.
- Szucs, S., Sárváry, A., McKee, M., & Adány, R. (2005). Could the high level of cirrhosis in central and eastern Europe be due partly to the quality of alcohol consumed? An exploratory investigation. *Addiction (Abingdon, England)*, 100(4), 536–542.
- TsSu RSFSR. (1986). *Narodnoe khozyaystvo RSFSR v 1985 godu. Statisticheskiy ezhegodnik [Statistical yearbook of RSFSR in 1985]*. Moscow: Finansy i statistika.

- VicHealth. (2016). *Alcohol Cultures Framework background paper A framework to guide public health action on drinking cultures* (p. 12). Melbourne, Australia. <https://www.vichealth.vic.gov.au/>. Accessed 3 September 2017.
- Vidomosti Verkhovnoyi Rady Ukrainy. (1995). Pro derzhavne rehulyuvannya vyrobnytstva i obihu sprytu etylovoho, kon'yachnoho i plodovoho, alkohol'nykh napoyiv ta tyutyunovykh vyrobiv [On state regulation of production and turnover of ethyl, cognac and fruit, alcoholic beverages and tobacco products] . <http://zakon5.rada.gov.ua/laws/show/481/95-%D0%B2%D1%80>. Accessed 24 June 2016.
- WHO. (2000). *International guide for monitoring alcohol consumption and related harm* (p. 193). <http://www.who.int/iris/handle/10665/66529>. Accessed 3 September 2017.
- WHO. (2004). *Global status report on alcohol 2004* (p. 94). Geneva. http://www.who.int/substance_abuse/publications/globalstatusreportalcoholchapters/en/. Accessed 3 September 2017.
- WHO. (2014a). *Global status report on alcohol and health 2014*. http://www.who.int/substance_abuse/publications/global_alcohol_report/en/. Accessed 12 May 2016.
- WHO. (2014b). *Prevalence of noncommunicable disease risk factors in the Republic of Moldova, steps 2013* (p. 221). Copenhagen: WHO Regional Office for Europe. <http://www.euro.who.int/en/countries/republic-of-moldova/publications/prevalence-of-noncommunicabledisease-risk-factors-in-the-republic-of-moldova.-steps-2013-2014>. Accessed 10 Feb 2016.
- WHO. (2016a). *International statistical classification of diseases and related health problems. 10th Revision* (V., Vol. 2). http://apps.who.int/classifications/icd10/browse/Content/statichtml/ICD10Volume2_en_2016.pdf?ua=1&ua=1. Accessed 19 Jan 2016.
- WHO. (2016b). Global information system on alcohol and health. WHO. <http://www.who.int/gho/alcohol/en/>. Accessed 29 April 2016.
- Zaridze, D., Maximovitch, D., Lazarev, A., Igitov, V., Boroda, A., Boreham, J., et al. (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(1), 143–153.
- Zatoński, W. A., Sulkowska, U., Mańczuk, M., Rehm, J., Boffetta, P., Lowenfels, A. B., et al. (2010). Liver cirrhosis mortality in Europe, with special attention to Central and Eastern Europe. *European Addiction Research*, 16(4), 193–201.