

Research

Alcoholism and Alcoholic Psychoses Trends in Late-Soviet and Post-Soviet Belarus

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Abstract

Background: Although alcoholism and alcoholic psychoses incidence rates were comparatively high in Belarus even during the later-Soviet period, the alarming rise that has occurred during the post-Soviet period means that this country has one of the highest alcoholism and alcoholic psychoses rates in the world.

Aims: To estimate the aggregate level effect of alcohol consumption on the alcoholism/alcoholic psychoses incidence rates in the former Soviet Republic of Belarus.

Method: Trends in alcoholism/alcoholic psychoses incidence rates and alcohol consumption per capita from 1970 to 2015 in Belarus were analyzed employing an ARIMA (autoregressive integrated moving average) analysis.

Results: Alcohol consumption per capita is a statistically significant factor associated with alcoholic psychoses incidence rate, implying that a 1-litre increase in per capita alcohol consumption is associated with an increase in the alcoholic psychoses incidence rate by 17.8%.

Conclusion: This time-series analysis highlights close temporal association between alcoholic psychoses rate and population drinking in Belarus.

Keywords: alcoholism/alcoholic psychoses, ARIMA time series analysis, Belarus, 1970-2015.

Despite some positive changes in recent years, the former Soviet republic Belarus ranks among the world's heaviest drinking countries with an annual official consumption rate about 10 litres of pure alcohol per capita [1-3]. Furthermore, according to the WHO, in 2010, Belarus has appeared at the top of global rating with 17.5 litres of total alcohol consumption (including unrecorded consumption) per capita [4]. The drinking culture in Belarus characterized by a high overall level of alcohol consumption and the heavy episodic (binge) drinking pattern of strong spirits, leading to a high alcohol-related mortality rate [5,6-15].

Although alcoholism (alcohol dependence) and alcoholic psychoses incidence rates were comparatively high in Belarus even during the later-Soviet period, the alarming rise that has occurred during the post-Soviet period means that

this country has one of the highest alcoholism and alcoholic psychoses rates in the world [13,16]. Currently, there are approximately 160,000 alcohol dependent individuals in Belarus, and the number of heavy drinkers is three to four times that number [8]. The role of binge drinking of vodka in modifying the effect of alcohol on the risk of alcoholic psychoses in Belarus has been emphasized in clinical and aggregate-level studies [13].

This study examines the phenomenon of high alcoholism and alcoholic psychoses incidence rates in Belarus. More specifically, this study focuses on a comparative analysis of trends in alcohol consumption per capita and alcoholism/alcoholic psychoses incidence rates in Belarus from the late-Soviet to post-Soviet period.

Methods

Data

Alcoholic psychosis is a secondary psychosis that usually occurs in the alcohol-dependent individuals after the prolonged period of heavy drinking and withdrawal [17]. We specified the incidence of alcoholic psychosis as the number of persons who were admitted to the hospital for the first time with alcoholic psychoses (ICD-10: F 10). Since alcoholic psychosis is a disease in which patients are usually admitted to the hospital, first admission figures are usually good proxy of the real incidence. The data on alcoholism/alcoholic psychoses incidence rates (per 100.000 of the population) between 1970 and 2015 are taken from the Belarusian State Statistical Committee (Belsstat). The total level of alcohol consumption (in litres of pure alcohol) in Belarus has been estimated using the indirect method based on the alcohol poisonings mortality rate [12,18].

Statistical analysis

To examine the relation between changes in alcohol consumption and alcoholism/alcoholic psychoses incidence rates across the study period a time-series analysis was performed using the statistical package "Statistica 12. StatSoft". The dependent variables were the alcoholism/alcoholic psychoses incidence rates and the independent variable was aggregate alcohol consumption. Bivariate correlations between the raw data from two time-series can often be spurious due to common sources in the trends and due to autocorrelation [19]. One way to reduce the risk of obtaining a spurious relation between two variables that have common trends is to remove these trends by means of a 'differencing' procedure, as expressed in formula:

$$\nabla X_t = X_t - X_{t-1}$$

This means that the annual changes ' ∇ ' in variable 'X' are analyzed rather than raw data. The process whereby systematic variation within a time series is eliminated before the examination of potential causal relationships is referred to as 'prewhitening'. This is subsequently followed an inspection of the cross-correlation function in order to estimate the association between the two prewhitened time series. It was Box and Jenkins [20] who first proposed this particular method for undertaking a time series analysis and it is commonly referred to as ARIMA (autoregressive integrated moving average) modeling. We used this model specification to estimate the relationship between the time series of alcohol consumption and alcoholism/alcoholic psychoses incidence rates in this paper.

Results

The trends in the alcoholism and alcoholic psychoses incidence rates in Belarus during the late-Soviet and post-Soviet period are displayed in Figure 1. As can be seen, the sharp

fluctuations have occurred in both time series across the study period. The graphical evidence also suggests that the temporal pattern of alcoholism and alcoholic psychoses incidence rates differ markedly. Alcoholic psychoses incidence rate rose steadily in the 1970s, before leveling off in the early 1980s and then, falling sharply during the anti-alcohol campaign in 1985-1987, reaching an all-time low of 4.0 per 100.000 of the population, increased steadily up to 1999, reaching an all-time high of 34.7 per 100.000 of the population, and then started to decrease. The incidence of alcoholism increased dramatically during the 1970s, then dropped sharply between 1985 and 1992, then started on an upward, before jumping dramatically between 2000 and 2006, reaching its peak (311.6 per 100.000 of the population), and then started to decrease in the most recent years. The graphical evidence suggests that the temporal pattern of alcoholic psychoses incidence rate fits closely with changes in alcohol consumption per capita (Figure 1). By contrast, there was significant discrepancy between the trends in alcoholism incidence rate and aggregate-level alcohol consumption.

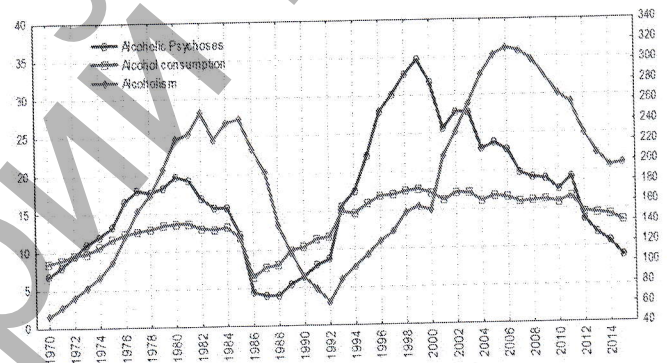


Figure 1. Trends in alcohol consumption per capita (left scale), alcoholism (right scale) and alcoholic psychoses incidence rate ((left scale) in Belarus between 1970 and 2015.

A Spearman's rank correlation analysis suggests a positive association between alcohol consumption per capita and alcoholism incidence rate ($r=0.47$; $p<0,000$) as well as alcoholic psychoses incidence rate ($r=0.91$; $p<0,000$). There were sharp trends in the time series data across the entire study period. These systematic variations were well accounted for by the application of first-order differencing and the specification of a first order moving average parameter (Figures 2). After prewhitening the cross-correlations between alcohol consumption and alcoholism/alcoholic psychoses incidence time series were inspected (Figures 3). The outcome indicated statistically significant cross-correlation between alcohol consumption per capita and alcoholic psychoses incidence rate at lag zero ($r=0.84$; $SE=0.149$). At the same time, there were no cross-correlations between prewhitened alcohol consumption and alcoholism incidence trends; these series were therefore not included in the model estimations. According to the results of ARIMA analysis, alcohol consumption is a statistically significant factor associated with alcoholic psychoses incidence rate in Belarus, implying that a 1-litre increase in consumption per capita is associated

with an increase in the alcoholic psychoses incidence rate by 17.8%.

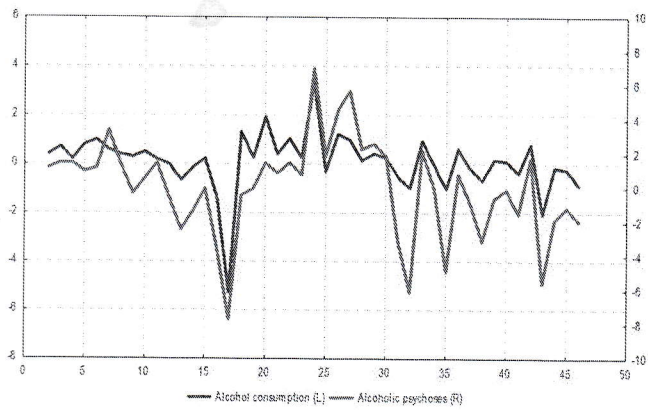


Figure 2. Trends in alcohol consumption per capita (left scale) and alcoholic psychoses incidence rate (right scale) in Belarus between 1970 and 2015 after differencing procedure.

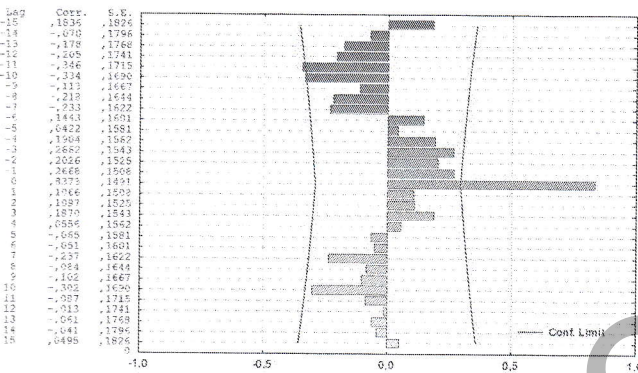


Figure 3. Cross-correlation between the trends in alcohol consumption per capita and alcoholic psychoses incidence rate in Belarus between 1970 and 2015 after differencing procedure.

Discussion

This study provides empirical evidence that in Belarus there have been parallel fluctuations in the alcohol consumption per capita and alcoholic psychoses incidence rate during the late-Soviet and post-Soviet periods. It is obvious that the sudden decline in the alcoholic psychoses incidence rate seen in the mid-1980s was a consequence of Gorbachev's anti-alcohol campaign, which substantially reduced alcohol consumption per capita [12,21]. So, Gorbachev's anti-alcohol campaign offers direct evidence that reducing population drinking brings to the decrease in the alcoholic psychoses incidence rate. In contrast, the increase in population drinking, fuelled by the availability of alcohol was implicated in the dramatic growth in the alcoholic psychoses incidence rate that followed by the collapse of the Soviet Union in the 1990s [14]. Since 1999, Belarus has experienced a steep decline in the alcoholic psychoses incidence rate which coincides with an increase in the state control over the alcohol market, including an intensification of the fight against home distillation, as well as against

consumption of the surrogate alcohol [8].

Before concluding, we should address the potential limitations of this study. The limitations mainly stem from effects, which might interfere with the time series of alcoholism/alcoholic psychoses incidence data: change of classification systems and diagnostic habits, changes in health service organization (use of new forms of alcoholism treatment/rehabilitation, early intervention programs, and alternative services). It is possible that the increase in alcoholic psychoses incidence rates in Belarus in the 1990s, at least partly, is a consequence of deterioration in the quality of health care system, following the collapse of the Soviet Union in late 1991 [8]. A process of destruction of the state-funded narcological service that began in 1989 continued in the 1990s [11]. During the 1990s, several important changes linked to broader post-Soviet socioeconomic transformation had significant effect on the addiction treatment system. In connection with the restructuring of the health care sector, the narcological service experienced the budgetary cutbacks [3]. In relation to this the total number of hospital beds has decreased and the length of the stay in hospital has shortened. Shortages of medications and staff were also common [11]. During this time state-run narcological service found themselves competing with an "alternative medicine" and a number of movements like Alcoholic Anonymous. Other changes came with the abolishment of the compulsory treatment laws and the commercialization of narcology [3]. This commercialization was directly linked to the treatment methods such as "chemical isolation" (implantation of disulfiram), and emotional-stress psychotherapy or "kodirovanie" which represented the main sources of additional income for physicians working in the state-run network [11]. Many other aspects of addiction treatment in Belarus had been radically transformed during the 1990s. In particular, anonymous forms of treatment have become much more popular [22]. It should be noted that these changes could be partially explained by a shift in treatment practices from long-term to short-term in-patients treatment and from in-patient to out-patient treatment.

In conclusion, according to the results of the present study there was a positive and statistically significant effect of per capita alcohol consumption on alcoholic psychoses incidence rate in Belarus. These findings suggest that the alcoholic psychoses incidence rate is a good proxy for population drinking. This evidence also indicates that the alcoholic psychoses incidence rate is considered to be an indicator of the efficiency of narcological service regarding early diagnosing and treatment for the alcohol dependence. The higher the alcoholic psychoses incidence rates, the bigger is the number of alcohol-dependent individuals getting into doctor's eyeshot at advanced stages of the disease. The outcomes provide indirect support for the hypothesis that the dramatic fluctuations in the alcoholic psychoses incidence rate in Belarus during the last decades were related to the availability/affordability of alcohol.

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