

Beverage-Specific Alcohol Sales and Gender Difference in Life Expectancy in Russia

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Keywords Beverage-specific alcohol sales; Gender difference; Life expectancy at birth; Russia; 1970-2015

Abstract

Background: The difference in life expectancy at birth between males and females in Russia is unprecedentedly high compared with developed countries.

Objective: The aim of the current study was to examine the aggregate-level relationship between the consumption of different alcoholic beverages and gender difference in life expectancy in Russia between 1970 and 2015.

Method: To estimate the relation between these variables across the study period a time series analysis was performed using the statistical package "Statistica 12. Stat Soft".

Results: The results of ARIMA analysis indicate that vodka sales are closely linked with gender difference in life expectancy in Russia: an additional liter of vodka sales per capita was estimated to increase in the difference between male and female life expectancy by 4.1%. The results of the analysis also suggest that 18.5% of the difference in life expectancy between males and females in Russia could be attributed to consumption of vodka.

Conclusions: This piece of evidence provides support for the hypothesis that high level of vodka consumption in conjunction with binge drinking pattern may be a major reason for the high gender difference in life expectancy and its dramatic fluctuations in Russia during the last few decades.

Introduction

The difference in life expectancy at birth between males and females in Russian Federation is unprecedentedly high compared with developed countries [1-4]. The wide gender gap in life expectancy in Russia is an extreme example of so-called "Health-Survival Paradox" which refers to the fact that women live longer than men, even though they report worse health [5,6]. This phenomenon is usually attributed to a combination of biological, behavioral and socio-structural factors [7]. There is strong evidence highlighting the key role of binge drinking in the phenomenon of strikingly higher gender gap in life expectancy and its dramatic fluctuations over the recent decades in Russia [3,4,8-10]. In line with these pieces of evidence, we assume that binge drinking of vodka in Russia should result in a close link between vodka sales and gender difference in life expectancy at the aggregate level.

The aim of the current study was therefore to examine the aggregate-level relationship between the consumption of different alcoholic beverages and gender difference in life expectancy in Russia between 1970 and 2015.

Material and Methods

Data

The data on life expectancy and beverage-specific alcohol sales (in liters of pure alcohol per capita) between 1970 and 2015 were taken from the Rosstat's (Russian State Statistical Committee) annual reports.

Statistical analysis

The ARIMA (Autoregressive Integrated Moving Average) modeling technique was used to evaluate the relationship between changes in the consumption of different types of alcoholic beverages and gender difference in life expectancy across the study period. This method is most commonly used to reduce the risk of spurious trend relationship [11,12]. The first difference of log transformed beverage-specific alcohol sales and gender difference in life expectancy was used to remove time trends. The final models were tested using the Ljung-Box Q statistics. A time series analysis was performed using the statistical package "Statistica 12. StatSoft".

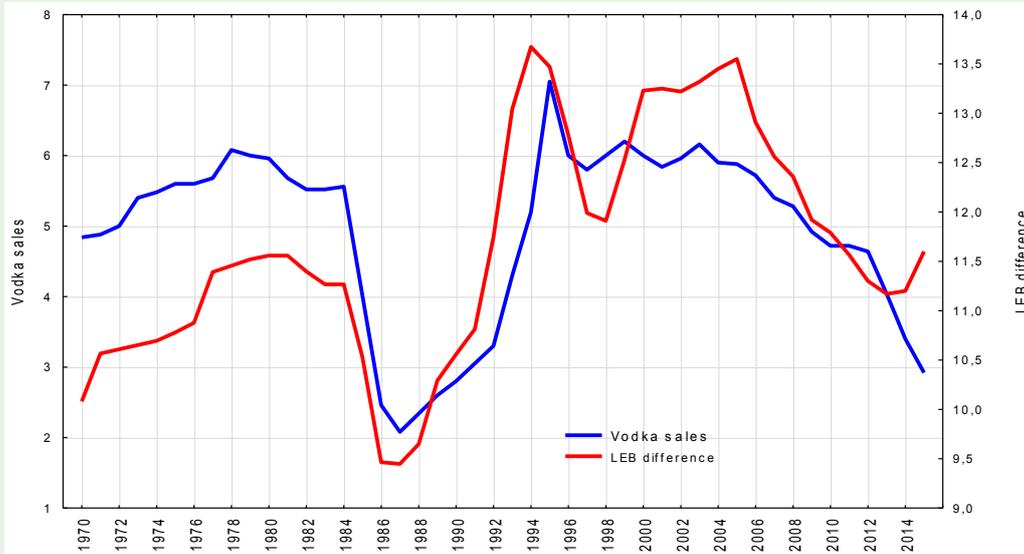


Figure 1: Trends in the gender gap in life expectancy at birth (LEB) and vodka sales in Russia between 1970 and 2015.

Results

The gender gap in life expectancy decreased substantially between 1984 and 1986, with the gender gap fell to an all-time low of 9.5 years, than jumped sharply between 1990 and 1994, reached an all-time high of 13.7 years. From 1995-1998 there was a fall in the gender gap of before it again rose between 1998 and 2005, and then started to decrease.

Figure 1 provides graphical evidence that the temporal pattern of gender gap in life expectancy fits closely with changes in vodka sales per capita. There was a strong trend in the time series across the study period. This trend was removed by means of a first order differencing procedure. After prewhitening of the data, the cross-correlations between beverage-specific alcohol sales and the gender difference in life expectancy time series were inspected. This indicated that there was a statistically significant cross-correlation between vodka sales and gender difference in life expectancy at lag 0 (Table 1). At the same time, there were no cross-correlations between prewhitened wine/beer sales and gender difference in life expectancy; these series were therefore not included in the model estimations.

Table 1: Effects of beverage specific alcohol sales per capita on gender difference in life expectancy rates in Russia. The results of cross-correlation analysis between prewhitened time series.

Lag	Vodka sale		Wine sale		Beer sale	
	r	SE	r	SE	r	SE
-3	0.13	0.154	0.14	0.154	0.05	0.154
-2	0.26	0.153	0.29	0.153	0.01	0.153
-1	0.27	0.151	0.18	0.151	0.15	0.151
0	0.49	0.149	0.04	0.149	0.24	0.149
1	0.22	0.151	0.08	0.151	0.05	0.151
2	0.08	0.152	0.11	0.152	0.18	0.152
3	0.17	0.154	0.04	0.154	0.04	0.154

The results of ARIMA analysis indicate that vodka sales are closely linked with gender difference in life expectancy in Russia: an additional liter of vodka sales per capita was estimated to increase in the difference between male and female life expectancy by 4.1%. The results of the analysis also suggest that 18.5% of the difference in life expectancy between males and females in Russia could be attributed to consumption of vodka.

Discussion

The dramatic fluctuations in the gender difference in life expectancy throughout the past decades in Russia suggest that the determinants cannot be purely biological, but might also reflect changes in sex-specific, modifiable lifestyle risk factors. It is well established in Russia that behavioral risk factors alone, primarily binge drinking and smoking, account for extremely higher rates in male mortality [1,13]. There are several factors which may result in vodka having a strong effect in terms of “Health-Survival Paradox” in Russia, including: vodka dominates in term of consumption; a heavy drinking of vodka is much more frequent among men than among women [14-16].

Conclusion

In conclusion, this study has shown that although sales of vodka were associated with gender difference in life expectancy in Russia during the later-Soviet and post-Soviet period, no effects were observed for the consumption of either wine or beer. This piece of evidence provides support for the hypothesis that high level of vodka consumption in conjunction with binge drinking pattern may be a major reason for the high gender difference in life expectancy and its dramatic fluctuations in Russia during the last few decades.

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