

# Alcohol consumption patterns during transition and economic growth in Estonia: Results from the 1996 and 2006 Health Interview Surveys

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## ABSTRACT

**Aims:** To investigate alcohol consumption patterns in Estonia in 1996, which represents the transition period after the collapse of the Soviet Union, and in 2006, which is characterized by economic growth. **Methods:** Data from all 25 - 64 years old from the nationally representative 1996 and 2006 Estonian Health Interview Surveys were analysed. The frequency of alcohol consumption and heavy episodic drinking (HED) were examined. The odds ratios of at least weekly alcohol consumption and HED according to socio-demographic characteristics were calculated using logistic regression models. **Results:** In comparison with 1996, at least weekly alcohol consumption was nearly twice as high among men in 2006. No association between HED and the study year was found. Alcohol consumption was lower among respondents in the oldest age group. Weekly alcohol consumption was lower among non-Estonian men in both study years. HED was higher among non-Estonian men and women in 1996 but this difference disappeared in 2006. Weekly alcohol consumption was lower among less educated men in 1996 but not in 2006. No clear tendency in weekly alcohol consumption by education was found among women. HED was higher among less educated men in both study years; however, this association was weaker in 2006. While HED was not associated with education among women in 1996, an inverse relationship was found in 2006. **Conclusions:** The study confirmed that rapid societal changes had an effect on alcohol consumption patterns in Estonia. Estonia needs the implementation of a comprehensive alcohol policy to decrease harmful alcohol consumption in the whole society.

**Keywords:** Alcohol Consumption; Heavy Episodic Drinking; Socio-Demographic Factors; Adults; Estonia

## 1. INTRODUCTION

Alcohol consumption per capita doubled in Estonia from 1996 to 2006. While in 1996 the total adult per capita pure alcohol consumption was 5.6 litres, by 2006 it reached 11.4 litres [1,2]. The proportion of men drinking more than 280 g pure alcohol per week increased from 7.4% to 16.2%, and the proportion of women drinking more than 140 g pure alcohol per week increased from 2.7% to 4.7% between 1996 and 2006 [3]. In Estonia alcohol-related mortality was the lowest during 1988 - 1991 (3.5% of all deaths) and increased to 9.1% in 2002 -2005 [4]. At the same time, in Estonia age standardized mortality rates of alcoholic liver cirrhosis increased from 9.7 to 37.5 per 100,000 men and from 2.2 to 16.1 per 100000 women aged 25 - 64 in 1996-2006 [5].

One of the factors in the growth of alcohol consumption and alcohol-related premature mortality in Estonia could be related to societal changes. Estonia regained its independence in August 1991 after the collapse of the Soviet Union. The following societal reforms brought major changes to the residents of Estonia. 1996 represents a period of overwhelming transition. In terms of economic development, it was characterized by significant unemployment (9.9%) and the relatively low gross domestic product (GDP) (4890 Euros per person) [6]. On the other hand, 2006 is an example of economic growth and relative prosperity. By 2006 unemployment had dropped to 5.9% and the GDP had almost doubled (9022 Euros per person) [6].

In order to gain some insight into how rapid societal reforms and economic growth could be related to changes in alcohol consumption, the present paper compares alcohol consumption patterns in Estonia in 1996 and 2006.

## 2. MATERIALS AND METHODS

The data of the cross-sectional, nationally representative Estonian Health Interview Surveys (EHIS) of 1996 and 2006 were used. The full details of the survey methodologies have been described in published reports [7,8].

### 2.1. Study Population

In short, the target population of the 1996 EHIS consisted of men and women aged 15 - 79 on 1 January 1996 who had been permanent residents of Estonia at the time of the 1989 population census. The sampling frame was divided into 16 sampling units, and each of them was stratified by gender and five-year age groups. All in all 6019 eligible respondents were selected and forwarded to the interviewers. Of these 4711 respondents (2131 men and 2580 women) were interviewed. Therefore, the crude response rate was 78.3%, and the corrected response rate was 84.3% [7].

The sampling frame of the 2006 EHIS consisted of men and women aged 15 - 84 on 1 January 2006 who had been permanent residents of Estonia at the time of the 2000 population census. The sampling frame was divided into five regional sampling units. Each of them was stratified by gender and five-year age groups. All in all 11023 eligible respondents were forwarded to the interviewers. Of these 6434 individuals (3110 men and 3324 women) completed the interviews. While the crude response rate was 58.4%, the corrected response rate was 60.2% [8].

The present study focused on 25 - 64 years old adults; the total number of respondents was 2690 (1298 men and 1392 women) in 1996 and 3316 (1543 men and 1773 women) in 2006. Participants younger than 25 years of age were excluded because they were more likely to still be in higher education. The upper limit was used because of selective mortality in the older age groups.

### 2.2. Procedure

Face-to-face interviews were conducted in the Estonian and Russian languages, and trained interviewers were used. EHIS gathered data on a wide range of variables related to health status, life styles, health services utilization, household income, socio-economic status, and societal attitudes.

### 2.3. Alcohol Consumption

The 1996 EHIS consisted of 13 questions about alcohol consumption. Overall alcohol consumption was measured by the question: "Have you ever in your life drunk alcohol more than just to taste?" (yes/no). Alcohol

consumption during the previous four weeks was measured by the question: "Thinking back to the previous four weeks, have you used alcohol during this period?" (yes/no). A detailed assessment of alcohol consumption was acquired for the previous four weeks. Frequency of any alcoholic beverage consumption was assessed with the following question: "How frequently did you use alcohol during the last four weeks?" The options included "every day (almost every day)", "3 - 4 times a week", "1 - 2 times a week", "1 - 3 times a month". Drink-specific questions focused on the consumption of the typical amount of each beverage per occasion: "What kind of alcohol and how much did you yourself usually used at one sitting (per day) during the last four weeks?" The possible responses were "beer\_drinks", "wine or other light alcohol\_drinks", "vodka or other strong alcohol\_drinks".

The 2006 EHIS dataset measured alcohol consumption by means of 22 questions. Overall alcohol consumption was measured by the question: "Have you ever in you life drunk alcohol more than one shot of strong alcohol, a glass of wine or a bottle of beer?" (yes/no). Alcohol consumption during the previous four weeks was measured by the question: "Thinking back to the last four weeks, have you used alcohol during this period?" (yes/no). Frequency of consumption of all types of alcoholic drinks was assessed with the following question: "How frequently have you drunk beer/light alcoholic drink/wine/vodka, or some other kind of strong alcohol during last four weeks?" The possible responses were "every day/almost every day", "3 - 4 times a week", "1 - 2 times a week", "1 - 3 times a month", "I haven't drunk (this beverage) at all". A typical amount of alcohol per one occasion was asked by the following question: "How much (in drinks/doses) beer/light alcohol/wine/vodka, or some other kind of strong alcohol did you usually drink at one sitting during the last four weeks?"

In both study years the information concerning the amount of alcohol consumed was converted from litres to grams of pure alcohol per week assuming that an 0.5l bottle of beer or light alcohol, 100 ml of wine or 30 ml (one shot) of spirits contained 10 grams of pure alcohol (=one drink) and 0.5 bottle of strong beer (over 6%) contained 35 grams of pure alcohol. For both study years, the respondents who had reported the consumption of any type of alcohol at least weekly were classified as weekly drinkers. Drinking any kind of alcohol at least seven drinks per occasion among men and at least five drinks per occasion among women were classified as heavy episodic drinking (HED).

### 2.4. Socio-Demographic Factors

The analysis used the following socio-demographic

factors: age, ethnicity, and education. Age at the time of the interview was used and aggregated into 10-year age groups: 25 - 34, 35 - 44, 45 - 54, and 55 - 64. Ethnic origin was measured by self-identified nationality (Estonian/Russian/other) and was dichotomized as “Estonian” and “non-Estonian”. Education levels were divided into three categories: “basic” (primary level education), “secondary” (secondary education), and “higher” (university or academic education).

## 2.5. Statistical Analysis

As gender is a strong determinant of drinking rates, the data for men and women were analysed separately. The characteristics of the study sample, frequency, and volume of alcohol consumption were described by frequency tables.

Associations between alcohol consumption and socio-demographic variables were estimated using logistic regression models. The odds ratios (OR) with confidence intervals (95% CI) of at least weekly consumption of alcohol and HED during the previous four weeks were estimated using multiple logistic regression analysis with adjustment for all the socio demographic variables simultaneously. The models used dichotomized alcohol consumption as a dependent variable and socio demographic factors as explanatory variables.

The data were analyzed using the statistical package Stata 10 [9].

## 3. RESULTS

### 3.1. General Overview of the Sample

**Table 1** shows the socio-demographic characteristics

**Table 1.** Socio-demographic characteristics of 25 - 64 years old respondents, by gender, 1996 and 2006 Estonian Health Interview Surveys.

Characteristics	Men				Women			
	1996		2006		1996		2006	
	n	%	n	%	n	%	n	%
Age group								
25 - 34	273	28.8	290	26.0	190	27.6	246	24.5
35 - 44	262	27.6	313	28.0	223	32.4	272	27.2
45 - 54	220	23.2	281	25.2	165	23.9	278	27.8
55 - 64	193	20.4	233	20.8	111	16.1	205	20.5
<i>p-value</i>				0.493				0.009
Ethnicity								
Estonian	620	65.4	725	64.9	449	65.2	677	67.6
non-Estonian	328	34.6	392	35.1	240	34.8	324	32.4
<i>p-value</i>				0.814				0.291
Education								
higher	156	16.5	197	21.1	151	21.9	306	30.6
secondary	566	59.7	684	61.2	457	66.3	605	60.4
basic	226	23.8	197	17.7	81	11.8	90	9.0
<i>p-value</i>				<0.001				<0.001
Total	948	100	1117	100	689	100	1001	100

of the sample. In both study years Estonians comprised two thirds and non-Estonians (mainly Russians) about one third of the sample. More than 50% of the respondents had secondary education. Compared to 1996, the proportion of respondents with higher education was higher in 2006 ( $p < 0.001$ ).

Among the men in 1996, 94.0% had drunk in their life more than just to taste it) and 93.8% in 2006 ( $p > 0.05$ ). Among the women the respective proportions were 73.8% and 85.2% ( $p < 0.001$ ). During the previous four weeks 77.7% of the men had consumed alcohol in 1996 and 77.6% in 2006 ( $p > 0.05$ ). Among women, the respective proportions were 67.2% and 66.9% ( $p > 0.05$ ).

### 3.2. At Least Weekly Alcohol Consumption by Socio-Demographic Factors

While in 1996 37.7% of men consumed alcohol at least weekly, in 2006 54.4% did so ( $p < 0.001$ ). At the same time, the proportion of women consuming alcohol at least weekly remained at about the same level (18.1% and 17.9%, respectively).

In both study years more than half of the men and women drinking alcohol weekly were from the two younger age groups (**Table 2**). In 1996 and 2006 Estonians constituted more than two thirds of the adults who consumed alcohol weekly. Compared to 1996, in 2006 the proportion of university-educated women who drank weekly was significantly higher (39.7% and 24.8%, respectively), but the proportion of women with a secondary education significantly lower (50.8% and 69.6%, respectively).

Among men age was not associated with frequency

**Table 2.** Consumption of any type of alcohol at least once a week during the previous four weeks among men and women by socio-demographic factors, 1996 and 2006 Estonian Health Interview Surveys (n, %, 95% CI).

Characteristics	Men		Women	
	1996	2006	1996	2006
Age groups	357	608	125	179
25 - 34	30.5 (25.8 - 35.3)	24.7 (21.2 - 28.1)	28.0 (20.1 - 35.9)	30.2 (23.4 - 36.9)
35 - 44	28.3 (23.6 - 33.0)	27.1 (23.6 - 30.7)	37.6 (29.1 - 46.1)	26.3 (19.8 - 32.7)
45 - 54	22.7 (18.3 - 27.0)	25.5 (22.0 - 29.0)	21.6 (14.4 - 28.8)	28.5 (21.9 - 35.1)
55 - 64	18.5 (14.5 - 22.5)	22.7 (19.4 - 26.0)	12.8 (0.69 - 18.7)	15.1 (0.98 - 20.3)
Ethnicity				
Estonian	72.0 (67.3 - 76.6)	68.8 (65.1 - 72.4)	67.2 (59.0 - 75.4)	69.8 (63.1 - 76.6)
non-Estonian	28.0 (23.4 - 32.7)	31.3 (27.6 - 34.9)	32.8 (24.6 - 41.0)	30.2 (23.4 - 36.9)
Education				
higher	21.6 (17.3 - 25.8)	21.9 (18.6 - 25.2)	24.8 (17.2 - 32.4)	39.7 (32.5 - 46.8)
secondary	54.3 (49.2 - 59.5)	58.2 (54.3 - 62.1)	69.6 (61.5 - 77.7)	50.8 (43.5 - 58.2)
basic	24.1 (19.7 - 28.5)	19.9 (16.7 - 23.1)	5.6 (1.6 - 9.6)	9.5 (5.2 - 13.8)

of alcohol consumption (**Table 3**). Compared to women in the youngest age group, the odds ratio of alcohol consumption at least once a week was slightly lower in the oldest age group of women in 2006. In both study years alcohol consumption at least weekly was lower among non-Estonian men. Weekly alcohol consumption was not associated with ethnicity among women. While weekly alcohol consumption was lower among less educated men in 1996, no such an association was found in 2006. Compared to the university-educated women, weekly alcohol consumption was slightly lower among women with a basic education in 1996 but lower among women with a secondary education in 2006.

### 3.3. Heavy Episodic Drinking (HED) by Socio-Demographic Factors

The proportion of men drinking seven or more drinks at one sitting during the previous four weeks was 42.7% in 1996 and 39.0% in 2006 ( $p > 0.05$ ). Among women, 11.2% reported having drunk five or more drinks per occasion in 1996 and 12.1% in 2006 ( $p > 0.05$ ). In comparison with 2006, in 1996 the proportion of HED was higher among women in the younger age groups (**Table 4**). In both study years nearly two thirds of HED men were Estonians. While in 1996 52.0% of HED women were Estonians, in 2006 this increased to 63.6%. Compared to the first study year, the proportion of university-educated HED men and women was higher in 2006 (6.7% and 16.7% for men and 14.3% and 21.5% for women, respectively). Compared with 1996, in 2006 the proportion of HED men with basic education was lower, but the proportion of HED among less educated women was higher.

Logistic regression analysis demonstrated that com-

pared to the 25 - 34 years old adults, HED was lower in the oldest age group of men and women in both study years (**Table 5**). Compared to Estonian respondents, the odds of being HED was significantly higher among non-Estonian men and women in 1996 but not in 2006. Compared to university-educated men, the odds of drinking at least seven drinks per occasion was significantly higher among less educated men in both study years. While in 1996 no association between HED and education was found among women, in 2006 HED was higher among lower educated women.

## 4. DISCUSSION

This article focused on alcohol consumption in different socio-demographic groups among 25 - 64 years old adults in 1996 and 2006. The strength of this study was that data was based on the large scale nationally representative Estonian Health Interview Survey. At the same time, all the questionnaire based surveys of alcohol consumption have several limitations.

### 4.1. Limitations

People usually underestimate their consumption and tend to disregard less common frequency and heavy drinking occasions. Also, heavy drinkers are generally less likely to participate in surveys. Moreover, alcohol consumption is on average much higher in those (e.g. non-household) subgroups of population that are excluded from survey sampling frames [10]. Compared to 1996, the response rate was much lower in 2006, and this could contribute to underestimation of heavy drinking especially in the latter study year. Furthermore, the questions concerning alcohol consumption varied slightly in different study years in this survey. However, a major

**Table 3.** Prevalence odds ratio (POR) and 95% confidence intervals (CI) for consuming any type of alcohol at least once a week among men and women, 1996 and 2006 Estonian Health Interview Surveys.

Characteristics	Men		Women	
	Adjusted OR <sup>a</sup> (95% CI)		Adjusted OR <sup>a</sup> (95% CI)	
	1996	2006	1996	2006
Age groups				
25 - 34	1.00	1.00	1.00	1.00
35 - 44	0.93 (0.65 - 1.32)	1.06 (0.77 - 1.46)	1.18 (0.72 - 1.93)	0.78 (0.50 - 1.21)
45 - 54	0.80 (0.55 - 1.17)	1.19 (0.85 - 1.66)	0.93 (0.53 - 1.63)	0.86 (0.56 - 1.34)
55 - 64	0.69 (0.45 - 1.04)	1.35 (0.95 - 1.92)	0.88 (0.46 - 1.72)	0.57 (0.34 - 0.95)
Ethnicity				
Estonian	1.00	1.00	1.00	1.00
non-Estonian	0.65 (0.49 - 0.87)	0.69 (0.54 - 0.89)	0.86 (0.56 - 1.30)	0.92 (0.65 - 1.32)
Education				
higher	1.00	1.00	1.00	1.00
secondary	0.52 (0.36 - 0.75)	0.86 (0.64 - 1.17)	0.92 (0.58 - 1.46)	0.61 (0.43 - 0.87)
basic	0.65 (0.43 - 1.00)	1.22 (0.83 - 1.80)	0.39 (0.16 - 0.96)	0.82 (0.45 - 1.50)

**Table 4.** Heavy episodic drinking (HED) during the previous four weeks among men and women by socio-demographic factors, 1996 and 2006 Estonian Health Interview Surveys (n, %, 95% CI).

Characteristics	Men		Women	
	1996	2006	1996	2006
Age groups	405	436	77	121
25 - 34	31.1 (26.6 - 35.6)	27.1 (22.9 - 31.2)	40.3 (29.3 - 51.2)	29.8 (21.6 - 37.9)
35 - 44	28.2 (23.8 - 32.5)	29.8 (25.5 - 34.1)	31.2 (20.8 - 41.5)	24.8 (17.1 - 32.5)
45 - 54	23.2 (19.1 - 27.3)	26.2 (22.0 - 30.3)	20.8 (11.7 - 29.8)	32.2 (23.9 - 40.6)
55 - 64	17.5 (13.8 - 21.2)	17.0 (13.4 - 20.5)	7.8 (1.8 - 13.8)	13.2 (7.2 - 19.3)
Ethnicity				
Estonian	57.8 (53.0 - 62.6)	62.4 (57.8 - 66.9)	52.0 (40.8 - 63.1)	63.6 (55.1 - 72.2)
non-Estonian	42.2 (37.4 - 47.0)	37.6 (33.1 - 42.2)	48.1 (36.9 - 59.2)	36.4 (27.8 - 44.9)
Education				
higher	6.7 (4.2 - 9.1)	16.7 (13.2 - 20.2)	14.3 (6.5 - 22.1)	21.5 (14.2 - 28.8)
secondary	65.4 (60.8 - 70.0)	61.7 (57.1 - 66.3)	76.6 (67.2 - 86.1)	65.3 (56.8 - 73.8)
basic	27.9 (23.5 - 32.3)	21.6 (17.7 - 25.4)	9.1 (2.7 - 15.5)	13.2 (7.2 - 19.3)

**Table 5.** Prevalence odds ratio (POR) and 95% confidence intervals (CI) for heavy episodic drinking (HED) among men and women, 1996 and 2006 Estonian Health Interview Surveys.

Characteristics	Men		Women	
	Adjusted OR <sup>a</sup> (95% CI)		Adjusted OR <sup>a</sup> (95% CI)	
	1996	2006	1996	2006
Age groups				
25 - 34	1.00	1.00	1.00	1.00
35 - 44	0.88 (0.62 - 1.26)	1.07 (0.77 - 1.49)	0.60 (0.33 - 1.06)	0.72 (0.43 - 1.22)
45 - 54	0.84 (0.57 - 1.23)	0.99 (0.71 - 1.39)	0.53 (0.27 - 1.02)	0.91 (0.55 - 1.50)
55 - 64	0.60 (0.39 - 0.91)	0.64 (0.45 - 0.93)	0.29 (0.11 - 0.75)	0.45 (0.24 - 0.84)
Ethnicity				
Estonian	1.00	1.00	1.00	1.00
non-Estonian	1.87 (1.41 - 2.49)	1.21 (0.94 - 1.56)	1.90 (1.17 - 3.10)	1.15 (0.77 - 1.73)
Education				
higher	1.00	1.00	1.00	1.00
secondary	3.78 (2.40 - 5.95)	1.41 (1.02 - 1.93)	1.74 (0.88 - 3.43)	1.67 (1.04 - 2.67)
basic	5.49 (3.32 - 9.08)	2.15 (1.44 - 3.20)	1.66 (0.59 - 4.67)	2.49 (1.25 - 4.95)

<sup>a</sup>Each OR was adjusted for all the other characteristics in the table.

limitation of this survey was related to the conversion of alcohol consumption from litres to grams of pure alcohol per week assuming that an 0.5 l bottle of beer contains 10 grams of pure alcohol (=one drink). Typically, an 0.5 l bottle of beer (4.2% - 4.7%) contains 20 grams of pure alcohol. Thus, the present study underestimated HED. Unfortunately, the questionnaires defined the amount of different types of alcohol consumed per one occasion in

terms of drinks; therefore, it was impossible to reconvert the data without information concerning the strength of beer. Finally, a detailed assessment of alcohol consumption was acquired for previous four weeks only. Thus, the respondents who had not consumed any alcohol during the previous four weeks were left out from the analysis. With these caveats several observations can be made.



## 4.2. Socio-Demographic Differences in Alcohol Consumption

Proportion of abstainers was, not surprisingly, higher among women in both study years in Estonia. In comparison with 1996, the proportion of lifetime abstainers was the same among men, but significantly lower among women in 2006. This could be explained by traditionally low alcohol consumption among women during the Soviet period, increasing after its collapse [3,11]. At the same time, the share of proportion of drinkers during the previous four weeks was stable in the two study years in Estonia.

Frequency and the amount of drinking constitute an essential part of alcohol consumption patterns. Compared to 1996, the proportion of alcohol consumption at least weekly among men was nearly twice as high in 2006. In 1996 one third of men but in 2006 one in two men consumed alcohol at least weekly. Among women, nearly one fifth were weekly alcohol drinkers in both study years. Compared to Finbalt study in 2000 - 2006, consumption of any type of alcohol beverage at least weekly was similar among men in Estonia and Finland, but it was much lower among women in Estonia than in Finland [3]. At the same time McKee *et al.* [12] found that among 19 - 64 years old, 61% of men and 26% of women were weekly drinkers in Estonia in 1997. The inconsistency in the findings might be explained by different age groups used in these studies. Moreover, the survey of McKee *et al.* [12] was primarily designed to obtain data on nutrition, and therefore the questions about alcohol drinking were rather basic. In 2001, the proportion of weekly drinkers among men 18 years old and more was 58% in Estonia, 45% in Latvia, 59% in Lithuania, and 56% in Poland (respectively 22%, 15%, 23%, and 23% among women) [13]. Again, the results are not comparable because of different age groups and years used in these surveys.

A simple measure of HED has been related to increased risk of mortality [14]. In this study 'at risk' HED was defined as consumption of seven and more drinks per occasion for men and five or more for women. Compared to the women, proportion of HED was much higher among men in both study years. Also Pomerlau *et al.* reported much higher proportion of heavy episodic drinking among men in eight countries of the former Soviet Union. No difference in HED was found between 1996 and 2006 in Estonia. Nevertheless, the proportion of men drinking 280 grams and the proportion of women drinking more than 140 grams pure alcohol per week increased significantly between 1996 and 2006 in Estonia [3]. This inconsistency might be related to the different methodology: in EHIS was measured HED per occasion, but in Finbalt study in pure alcohol per week.

Compared to the youngest age group, in 2006 weekly alcohol consumption was lower in the oldest age group of women, but HED was lower among 55 - 64 years old adults in both study years. These findings are similar to those of the Finbalt surveys on health behaviour, where drinking more than six drinks per occasion was more common among younger women in all three Baltic countries and Finland [15,16]. The higher proportion of alcohol drinking among adults in the younger age groups could reflect liberal alcohol policy and attitudes towards alcohol consumption in Estonia [17].

In general, the proportion of non-Estonian men, but not women, who drink at least weekly, was lower in both study years. At the same time, the proportion of HED non-Estonian men and women was higher in 1996, but the ethnic gradient disappeared in 2006. These findings are in accordance with earlier studies in Estonia [3]. Higher frequency of alcohol drinking among Estonian men could be explained by the preference for beer while non-Estonian men prefer to drink strong alcohol. Pärna *et al.* [3] reported that in Estonia more than half of men are weekly beer drinkers and more than a fifth drink spirits weekly. During 1994-1999 the consumption of beer doubled among men in Estonia [18]. In 1996-2006 the consumption of beer nearly tripled (from 33.2 to 85.8 litres per capita) while the consumption of spirits nearly doubled (from 6.4 to 12.3 litres per capita) among adults in Estonia [1,2]. Moreover, in terms of pure alcohol the consumption of beer increased the most, too. In 1996 consumption of beer was 2 litres in pure alcohol per capita, but in 2006 it reached 4.4 litres (2.9 litres of spirits and 4.7 litres of pure alcohol, respectively) [1,2]. Disappearance of ethnic differences in HED in 2006 could be explained by the integration (including drinking habits) of non-Estonians into Estonian society during 15 years after Estonia regained independence in 1991. Moreover, compared to 1996, in 2006 a diverse selection of light alcoholic beverages was available. This might also influence the preferences for different types of alcohol among both ethnic groups. At the same time non-Estonians were more likely to be surrogate alcohol (legal manufactured ethanol-containing liquids not intended for consumption) drinkers [19,20] and more likely to die from alcohol-related causes than Estonians in 1996-2006 [3,4].

In general, the educational gradient among men and women showed that better-educated people were more likely to drink alcohol at least weekly, but less educated were more often HED in Estonia. While less educated men drank alcohol with lower frequency in 1996, then no such an association was found in 2006. At the same time no clear tendency in weekly alcohol consumption by education was found among women. Compared to university-educated men, HED was more common among

less educated men in both study years. Nevertheless, in 2006 the association between HED and education was weaker. On the other hand, while no association was found between HED and education among women in 1996, then HED was more common among less educated women in 2006. Also, the Finbalt survey reported similar results for men and women in Estonia, Latvia, Lithuania and Finland [3,15]. At the same time Pomerleau *et al.* [11] did not find educational differences in HED among adults in eight former Soviet countries which might be explained by different definition of HED in these studies. In 1996-2006 there was an inverse relationship between the educational level and the risk of alcohol-related death [3,4]. Nevertheless, educational and socio-economic differences exposed by self-reported questionnaire studies in HED and heavy alcohol consumption are less marked than the differences in register-based studies of alcohol-related mortality [5].

### 4.3. Societal Context in 1996 and 2006

Considering the frequency and amount of alcohol drinking in 1996 and 2006, it is worth analysing them in the context of societal changes. In Estonia the year 1996 presented a period of transition and tumultuous changes in many areas, but 2006 was characterized by economic boom and prosperity. Compared to the year 1996, unemployment was twice lower, but the GDP was nearly twice as high in 2006.

During 1996-2006 alcohol policy was virtually non-existent in Estonia. There was a national alcoholism and drug abuse prevention programme for 1997-2007, which was continued since 2004 under national drug abuse prevention strategy (1994-2012) [21]. This programme mainly focused on the creation of a nationwide information system for evaluating the damage caused by alcohol and drug abuse. In 1996-2006 the share of alcohol excise in excise revenue decreased 13% (from 43% in 1996 to 30% in 2006) constituting 6% in 1996 and 4% in 2006. This had an effect on alcohol consumption in Estonia and on alcohol policy and alcohol drinking in the neighbouring countries, such as Finland. When Estonia joined the European Union on 1 May 2004, Estonia became a destination of alcohol tourism, and citizens imported low-priced alcohol from Estonia to Finland on a large scale [22,23]. In turn, it brought about reduced alcohol prices and increased drinking in Finland [16].

An increase in alcohol consumption has been shown to be related to increased income and wealth in society [24]. Moreover, reduced alcohol prices bring about increased alcohol consumption [16]. In 1996-2006 the prices of alcoholic beverages increased in Estonia (1.3 times for domestically produced beer and 1.4 times for vodka). However, the average price increase has been

slower than the increase in the consumer price index, as well as slower than the increased income of inhabitants, which most likely has also contributed to the increase of alcohol consumption [1]. Thus, affordability of alcohol increased more than 50% in Estonia in 1996-2004, which was one of the highest in the European Union [23]. While in 2000 one could buy 199 litres of beer or 28 litres of vodka, then in 2006 this amount nearly doubled (348 and 54 litres, respectively) [1,2]. While in 1996 the sales of alcoholic beverages in litres of pure alcohol per capita (including purchases by tourists) was 2.5 for strong alcohol, 1.9 for beer and 0.5 for wine in Estonia, the respective figures for 2006 were 5.7, 5.6 and 1.1 (additionally 1.7 litres for light alcoholic beverages) [1,2]. In general, alcohol was easily available in Estonia. In 2006 there were 195 retail shops per 100,000 inhabitants in Estonia, 6.3 in Finland, and 4.5 in Sweden [1,2]. Thus, policy actions in Estonia should include reduction of the density of alcohol outlets and clearer separation of alcoholic beverages from other goods in retail stores [17].

On the basis of this situation, recommendations for the improvement of alcohol policy were developed in 2004 in Estonia. The most appropriate actions were the following: increase of alcohol taxation by 50% (compared to the 2004 level), complete ban of alcohol advertising, further restrictions on alcohol sales (with regard to both place and time), and brief counselling in primary health care [25]. The first step of strengthening the alcohol policy in Estonia was a 5% increase in the excise tax on alcohol with the exception of wine in 2005 [17].

### 4.4. Conclusions

The present study confirmed that economic upturn had an important role in the increase of alcohol consumption in Estonia. Also, rapid societal changes had an effect on alcohol consumption patterns. Estonia needs the implementation of a comprehensive alcohol policy where price regulation is used in a combination with other effective and cost-effective measures against harmful alcohol consumption [26]. Special attention should be paid to the less educated subgroup.

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