

EPIDEMIOLOGY OF HEAVY ALCOHOL USE IN UKRAINE: FINDINGS FROM THE WORLD MENTAL HEALTH SURVEY

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Abstract — **Aims:** To describe the epidemiology of heavy alcohol use in Ukraine, using data from the world mental health (WMH) survey in Ukraine. **Methods:** The WMH composite international diagnostic interview was administered in 2002 to a national probability sample of Ukrainian adults ($n = 4725$). An algorithm for classifying heavy use in the past year was developed from self-reports about the quantity and frequency of drinking, and its convergent validity was demonstrated. Prevalence rates and socio-demographic risk factors were examined separately for men and women. **Results:** The 12-month rates of heavy alcohol use were 38.7% in men and 8.5% in women (22.0% overall). Among heavy alcohol users, 92% of men and 52% of women consumed at least 80 g of ethanol in a typical drinking day on a monthly basis in the year before the interview. The most significant risk factors in men and women were age (26–54 years for men; 18–25 years for women), living in the Southeast region, being in the labour force whether employed or unemployed, and for men, low education and being the father of a young child. A highly significant linear relationship of number of risk factors with heavy alcohol use was found for both sexes. **Conclusions:** The rates for men were similar to those reported in a Russian national survey with the exception of Southeast Ukraine where the rate was >10% higher. The highest rates were among men who were middle-aged, fathers and unemployed. Future prospective studies are needed to assess the impact of heavy alcohol use on Ukrainian health, mental health and occupational and social functioning.

INTRODUCTION

In the decade following 1991, when Ukraine became an independent country, its population declined by >6%, to 48 457 100 (Kuzio, 2003). This change is partially attributable to an increase in the crude death rate from 11.6/1000 in 1989 (Steshenko, 1997) to 15.4/1000 in 2000 (Eurostat, 2002) and to a corresponding decline in life expectancy by 4.5 years for men and 2.3 years for women (World Health Organization, 2003). The increased death rate has disproportionately occurred in men of pre-retirement age (Steshenko, 1997). Similar changes in mortality have occurred in Russia where the leading causes of death among pre-elderly men include cardiovascular disease, accidents, alcohol poisoning and cirrhosis of the liver. Heavy alcohol use is one of the key risk factors associated with such premature mortality (Nemtsov, 1998, 1999; Chenet *et al.*, 1998, 2001; Malyutina *et al.*, 2002). As part of the recently conducted Ukraine-world mental health (WMH) survey (Bromet *et al.*, 2004), we assessed the quantity and frequency of alcohol use in a national probability sample. This paper focuses on the prevalence and socio-demographic correlates of heavy alcohol use.

Information about rates of heavy drinking in former Soviet Union and Eastern bloc countries is available from government data on per capita consumption and several national and municipal surveys (Table 1). The rates of monthly heavy alcohol use range from 12% in Krakow (Bobak *et al.*, 2004) to 82% in Udmurtia (Pakriev *et al.*, 1998), and rates of daily heavy use range from 3% in Lithuania (McKee *et al.*, 2000) to 18% in Bulgaria (Balabanova and McKee

1999), reflecting differences in the definitions of heavy consumption, the regions surveyed and the sampling methods employed.

The correlates of binge or heavy drinking, based on American and Canadian studies, include being male, young (i.e. age 21–25 years), unmarried, lower educational attainment and unemployment (Barnes *et al.*, 1991; U.S. Department of Health and Human Services, 2002; Naimi *et al.*, 2003). In European studies, the correlates are similar except that heavy drinking in men is more prevalent in middle age (30s to 50s) (Bloomfield, 1998; Meyer *et al.*, 2000; Plant and Plant, 2001; Mateos *et al.*, 2002; Schroder *et al.*, 2004). Although the North American and European findings on age at risk differ, similar findings have been reported on the protective effect of parenting status in the US and the Netherlands (Labouvie, 1996; Hajema *et al.*, 1998). Available surveys from the former Soviet Union have consistently found that being male is a risk factor for heavy alcohol use, particularly in the 25–55 age group (Bobak *et al.*, 1999; Cockerham, 2000). None of the studies in the former Soviet Union was conducted in Ukraine where the recent rates of smoking and illicit substance abuse, particularly in the Southeast region, are among the highest in the former Soviet republics (Dehne *et al.*, 2000; Gilmore *et al.*, 2001; Poznyak *et al.*, 2002).

Our study is the first epidemiologic study of alcohol use in Ukraine to be based on a national probability sample. Consistent with the mandate of the World Health Organization (WHO) WMH Consortium, the main interview tool was the WMH-composite international diagnostic interview (WMH-CIDI). This paper focuses on heavy alcohol use determined from questions on frequency of drinking days and the amount typically consumed. We focused on heavy alcohol use, rather than alcoholism per se, for two reasons. First, our goal was to compare the rates of heavy alcohol use in Ukraine with rates

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Table 1. Alcohol use surveys in former Soviet Union and Eastern Bloc Countries

Citation	Site	Study	<i>n</i>	Age (years)	Year	Response rate (%)	Findings
National surveys							
Cockerham, 2000	Russia	RLMS ^b	8402	16–102	1995	80.0	Frequent users were males, age 30–39 years
Bobak <i>et al.</i> , 1999	Russia	NRBS ^a	1599	18–65+	1996	66.2	Monthly binge: 31% men; 5% women
Balabanova and McKee, 1999	Bulgaria	–	1550	18+	1997	96.9	Daily binge: 18.2% men; 0.8% women
McKee <i>et al.</i> , 2000	Baltics	–	Estonia: 2010 Latvia: 2258 Lithuania: 2139	19–64	1997	Estonia: 67.3% Latvia: 77.7% Lithuania: 74.1%	Daily binge: 2–9% men; 0.2–0.5% women
Municipal surveys							
Stack <i>et al.</i> , 1994	Moscow, Russia	Moscow Oblast survey	374	16+	1992	68	–
Malyutina <i>et al.</i> , 2001	Novosibirsk, Russia	WHO MONICA ^c	Wave 1: 1661 Wave 2: 1700 Wave 3: 3050	25–64	Wave 1: 1985–1986 Wave 2: 1988–1989 Wave 3: 1994–1995	71.0–73.0	1994–1995: Monthly binge: 50% men; 5% women.
Pakriev <i>et al.</i> , 1998	Udmurtia, Russia	–	855	18–65	1995	85.9	Monthly binge: 82% men; 11% women.
Carlson, 2001	Taganrog, Russia	Taganrog Household survey	2191	18–70+	Wave 1: 1993–1994 Wave 2: 1998	Wave 1: 91.0 Wave 2: 81.0	1998: 160 grams pure ethanol/week: 14% men; 1% women.
Bobak <i>et al.</i> , 2004	Novosibirsk, Russia Krakow, Poland Karvina-Havirov, Czech Republic	HAPIEE ^d	Novosibirsk: 990 Krakow: 576 Karvina-Havirov: 677	45–64	1999–2000	Novosibirsk: 70% Krakow: 65% Koruina–Haurou: 71%	Monthly binge: Males: Novosibirsk: 30% Krakow: 12% Karvina-Havirov: 17% Females: Novosibirsk: 1% Krakow: 2% Karvina-Havirov: 4%

^aNew Russian barometer survey VI.

^bRussian longitudinal monitoring study.

^cMultinational monitoring of trends and determinants in cardiovascular disease.

^dHealth, alcohol and psychosocial factors in Eastern Europe.

reported for other countries in the former Soviet Union. Second, heavy use is widespread in the former Soviet countries and has been linked to illness and premature death. As such, its public health significance extends beyond that of alcohol disorders in the stricter sense. In this paper, the prevalence and correlates of heavy alcohol use are presented separately for men and women.

SUBJECTS AND METHODS

Sample and procedures

In 2002, we conducted a national survey of mental illness, substance disorders and health in Ukraine (Bromet *et al.*, 2004) as part of the WMH initiative (The WHO World Mental Health Survey Consortium, 2004). Ukraine (population

~48 million) is the second largest country in Eastern Europe (after Russia). Seventy-five percent of the population is ethnic Ukrainian, and 22% is Russian.

The Ukraine-WMH survey is based on a nationally representative sample of residents aged 18 and older from the country's 24 oblasts (counties) and the autonomous republic of Crimea. The sampling design had four stages: In the first stage, 170 primary sampling units (PSUs) were selected from the cities, towns and villages with probability proportional to size. The PSUs were drawn such that each oblast (county), and the urban and rural populations in each oblast, were represented proportionally. Second, within the PSUs, postal districts were randomly selected. Third, within each postal district, streets were randomly selected; then buildings within streets; and then, apartments within buildings. Fourth, people 18 years and older were randomly selected within apartments.

Table 2. Comparison of heavy alcohol users and non-heavy users on pattern of drinking and selected validation criteria

Pattern of drinking	Males ^a			Females ^b		
	Heavy alcohol users	Non-heavy users		Heavy alcohol users	Non-heavy users	
Modal frequency	1–2 days/week	1–3 days/month	–	1–3 days/month	1–3 days/month	–
Median ethanol consumed on typical drinking day (g)	120.0	40.0	–	80.0	24.0	–
Inter-quartile range (g) for consumption on a typical drinking day	77.0	36.5	–	32.0	23.5	–
	%	%	χ^2	%	%	χ^2
Convergent validity						
Lifetime alcoholism ^c	43.6	15.9	71.5**	16.6	1.6	30.2**
Past-year alcoholism ^c	23.1	4.3	61.7**	11.2	0.3	22.9**
Childhood risk factors						
Drinking < age 18	71.8	61.7	13.8**	64.8	37.8	54.7**
Childhood conduct disorder symptoms	37.3	27.7	8.6*	21.6	9.2	12.3*
Behavioral correlates						
Lifetime aggression	53.8	35.6	40.7**	48.3	24.1	28.9**
Current-smoker	71.9	48.9	95.0**	32.6	9.9	33.8**

^aFor heavy alcohol users, $n = 810$. For non-heavy users (because of the structure of the WMH-CIDI), $n = 678$ for pattern of drinking variables and 1283 for validation criteria variables.

^bFor heavy alcohol users, $n = 219$. For non-heavy users, $n = 610$ for pattern of drinking variables and 2359 for validation criteria variables.

^cDSM-IV criteria for alcohol abuse or alcohol dependence.

* $P < 0.01$; ** $P < 0.001$.

The response rate was 78.3%. Study participants, compared with those who were unlocated or refusers, tended to be female (61.2% vs 49.5%) and older (48.3 vs 42.9 years).

Face-to-face interviews were carried out with 4725 respondents by the professional interview field staff of the Kiev International Institute of Sociology (KIIS) in collaboration with the Ukrainian Psychiatric Association (UPA). The paper-pencil version of the WMH-CIDI, a fully structured, modularized mental health interview schedule designed for lay interviewers, was administered. The interviewers were trained by a certified CIDI trainer over a period of 1 week.

The recruitment, consent and field procedures were approved by the Human Subjects Committees of University at Stony Brook, KIIS and UPA. Standard forward and back translation procedures were used to translate the instrument into Russian and Ukrainian languages.

Definition of heavy alcohol use

Questions about alcohol consumption in the WMH-CIDI's substance use module addressed the frequency of drinking and the number of grams of liquor (including domestically produced bootleg), wine and beer consumed over the past year on a typical drinking day. Variability was not ascertained. Quantity data were converted to grams of ethanol using suggested equivalents: $0.4 \times$ g of liquor; $0.12 \times$ g of wine; and $0.033 \times$ g of beer (Tremblay, 1975). For men, heavy alcohol use was defined as consuming ≥ 80 g of ethanol in a typical drinking day) or consuming either ≥ 60 g 3–4 days/week or ≥ 40 g nearly every day. In order to adjust for gender differences in metabolism and body weight (Wechsler and

Nelson, 2001), the dose criteria was reduced by 25% for women. Thus, for women, heavy alcohol use was defined as at least monthly consumption of ≥ 60 g of ethanol in a typical drinking day or consuming either ≥ 45 g 3–4 days/week or ≥ 30 g nearly every day. Non-heavy users included 'lifetime' abstainers (Table 2).

Demographic and geographic risk factors

Nine socio-demographic variables from the WMH-CIDI were examined: age (categorized as 18–25, 26–34, 35–54, ≥ 55 years); region (West, North-central including Kiev, Southeast); urbanicity (rural, semi-urban with towns of <200 000 people, urban with cities having >200 000 people); education [primary, secondary, specialized secondary, higher (Shkolnikov *et al.*, 1998)]; financial status (a Ukrainian variable classified as 'very inadequate' if there was not enough money for food; 'inadequate' if not enough money for clothing; 'adequate' if enough money for durables); employment status [out of the labor force (79.0% retired, 9.2% homemakers, 8.5% students and 3.3% disabled), unemployed, employed]; marital status (never married, married before, currently married) and parental status (parent of a child who is under the age of 18 and living at home vs others).

Data analysis

Comparison of the unweighted distribution of the sample with the 2001 population census of Ukraine showed that the sample over-represented women, people >55 years of age, and those living in semi-urban settings. These biases were corrected by weighting the sample to the approximate gender, age, urbanicity and regional distributions of the 2001 census.

Analyses were conducted using SUDAAN (2003). All analyses were conducted separately for men and women. Logistic regression was used to explore the relationships of the risk factors to heavy alcohol use. Tests for trend (Wald *F* statistic with 1 degree of freedom for the numerator) were performed for age group, urbanicity, education and financial status. We first examined each risk factor separately, and then did a multivariate analysis, where age was kept in the model irrespective of significance, while other risk factors were eliminated in a stepwise fashion in order of least significance (modified backwards elimination). The explanatory power of the model was calculated as:

$$\frac{-2 \log L (\text{intercept only model}) - 2 \log L (\text{model of interest})}{-2 \log L (\text{intercept only model})}$$

Lastly, we summed the risk factors that were significant in the multivariate model to examine its relationship to heavy alcohol use. Statistical significance was set at $P < 0.05$.

RESULTS

Demographic characteristics are presented in Table 3. The sample contained relatively more women than men, particularly those ≥ 55 years. There was also a high rate of poverty, with approximately three-quarters of respondents unable to meet basic needs and only 50% employed.

Prevalence

Patterns of use for heavy and non-heavy alcohol users are presented in Table 2. We found that 1.0% of men and 4.7% of women were lifetime abstainers. To examine convergent validity, we compared heavy users with non-heavy users on lifetime and past-year DSM-IV alcohol abuse and dependence (Table 2). As expected, heavy alcohol users had significantly higher rates. We next approached validity by testing the differences between the groups on established childhood risk factors and behavioral correlates (Pulkkinen and Pitkanen,

Table 3. Weighted frequencies of demographic and geographic risk factors

Risk factors	Population ^a %	Total		Males		Females	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender ^b							
Male	45.0	2125	45.0	–	–	–	–
Female	55.0	2600	55.0	–	–	–	–
Age ^b (years)							
18–25	15.1	715	15.1	373	17.5	343	13.2
26–34	15.5	714	15.1	354	16.7	360	13.8
35–54	36.6	1759	37.2	831	39.1	928	35.7
55+	32.7	1537	32.5	568	26.7	969	37.3
Region ^b							
West	24.6	1168	24.7	518	24.4	650	25.0
North-central	33.2	1574	33.3	694	32.6	880	33.9
Southeast	42.2	1983	42.0	914	43.0	1069	41.1
Urbanicity ^b							
Rural	32.2	1521	32.2	686	32.3	834	32.1
Semi-urban	32.7	1649	34.9	752	35.4	897	34.5
Urban	35.1	1555	32.9	687	32.3	868	33.4
Education ^c							
Primary	6.6	461	9.8	131	6.1	331	12.7
Secondary	43.1	2179	46.1	1081	50.9	1098	42.2
Specialized secondary	32.0	1281	27.1	553	26.1	728	28.0
Higher	18.2	802	17.0	359	16.9	443	17.1
Financial status ^c							
Very inadequate	23.9	1436	30.8	493	23.6	943	36.6
Inadequate	47.5	2384	51.1	1129	54.0	1255	48.7
Adequate	27.6	848	18.2	470	22.4	348	14.7
Employment status ^c							
Out of the labor force	42.0	1789	37.9	608	28.7	1182	45.5
Unemployed	12.6	570	12.1	315	14.8	256	9.8
Employed	44.2	2361	50.0	1199	56.5	1162	44.7
Marital status ^c							
Never married	14.2	728	15.4	450	21.2	278	10.7
Married before	25.6	1172	24.8	302	14.2	870	33.5
Married	60.1	2825	59.8	1373	64.6	1452	55.8
Parental status							
Not parent of child	–	3293	69.9	1531	72.4	1762	67.8
Parent of child	–	1421	30.1	583	27.6	837	32.2

^aTotal population = 48 457 100 based on 2001 Ukrainian census.

^bFrom 2001 Ukrainian census.

^cFrom KIIS.

1994; Dewit *et al.*, 2000; Wells *et al.*, 2000; Warner and White, 2003) assessed in the WMH-CIDI. As Table 2 shows, the measure of heavy alcohol use distinguished between groups on all measures.

The 12-month prevalence of heavy alcohol use was 38.7% for men and 8.5% for women (OR = 6.8; 95% CI = 5.7–8.2, $p < 0.001$). The overall rate was 22.0%. Figure 1 shows that the rates were the highest in men aged 26–34 years (49.7%) and 35–54 years (45.5%). In women, the highest rate occurred in the 18–25 age group (16.2%).

Ninety-two percent of the male heavy alcohol users consumed ≥ 80 g ethanol in 1 day at least once per month in the past year. In contrast, 50.4% of female heavy alcohol users consumed this amount at least monthly.

Risk factors

The associations of the socio-demographic variables with heavy alcohol use are presented in Tables 4 and 5. The univariate

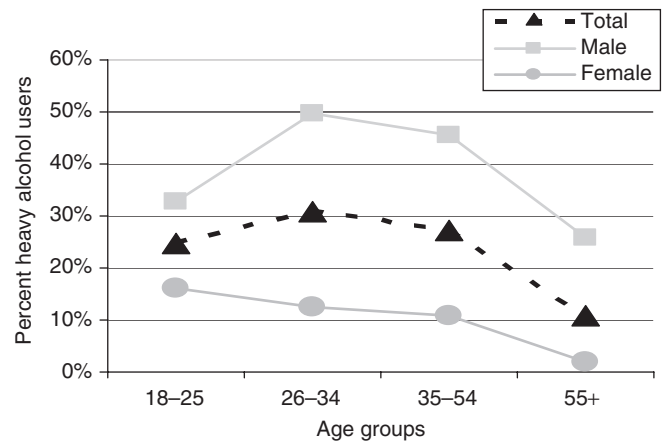


Figure 1. Relationship of gender and age to heavy alcohol use in Ukraine.

Table 4. Prevalence of heavy alcohol use by demographic and geographic risk factors in men: weighted proportions

Risk factors	%	Unadjusted			Adjusted ^a		
		OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Age (years)				<0.001			<0.05
18–25	32.7	1.0	–		1.0	–	
26–34	49.7	2.0	(1.4–2.9)***		1.7	(1.1–2.4)**	
35–54	45.5	1.7	(1.3–2.2)***		1.4	(1.1–2.0)*	
55+	25.8	0.7	(0.5–1.0)*		1.0	(0.7–1.5)	
<i>F</i> for trend		9.3**			0.3		
Region				<0.05			<0.05
West	36.0	1.0	–		1.0	–	
North-central	34.5	0.9	(0.7–1.3)		1.0	(0.7–1.4)	
Southeast	43.5	1.4	(1.0–1.8)*		1.4	(1.1–1.9)*	
Urbanicity				n.s.	– ^a		
Rural	41.4	1.0	–				
Semi-urban	39.7	0.9	(0.6–1.4)				
Urban	34.9	0.8	(0.5–1.2)				
<i>F</i> for trend		1.8					
Education				<0.01			<0.05
Primary	27.5	1.0	–		1.0	–	
Secondary	43.3	2.0	(1.2–3.3)**		1.0	(0.6–1.7)	
Specialized secondary	37.9	1.6	(1.0–2.7)		0.8	(0.4–1.3)	
Higher	30.4	1.2	(0.7–1.2)		0.6	(0.3–1.1)	
<i>F</i> for trend		4.1			9.9**		
Financial status				n.s.	– ^a		
Very inadequate	40.4	1.0	–				
Inadequate	39.4	1.0	(0.8–1.2)				
Adequate	36.9	0.9	(0.6–1.2)				
<i>F</i> for trend		0.9					
Employment status				<0.001			<0.05
Out of the labor force	25.2	1.0	–		1.0	–	
Unemployed	47.0	2.6	(1.9–3.7)***		1.9	(1.2–3.1)**	
Employed	46.5	2.3	(1.7–3.1)***		1.7	(1.0–2.7)*	
Marital status				n.s.	– ^a		
Never married	35.6	1.0	–				
Married before	42.4	1.3	(0.9–2.0)				
Married	38.9	1.2	(0.9–1.6)				
Parental status				<0.001			<0.05
Not parent of a child	33.8	1.0	–		1.0	–	
Parent of child	50.7	2.0	(1.5–2.6)***		1.5	(1.1–2.0)*	

^aNon-significant risk factors were eliminated from the adjusted model in order of least significance.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table 5. Prevalence of heavy alcohol use by demographic and geographic risk factors in women: weighted proportions

Risk factors	%	Unadjusted			Adjusted ^a		
		OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Age (years)				<0.001			<0.001
18–25	16.2	1.0			1.0	–	
26–34	12.5	0.7	(0.5–1.2)		0.7	(0.4–1.1)	
35–54	10.9	0.6	(0.5–0.9)**		0.6	(0.4–0.8)***	
55+	1.9	0.1	(0.1–0.2)***		0.1	(0.1–0.2)***	
<i>F</i> for trend		158.1***			70.8***		
Region				< 0.05			<0.05
West	5.6	1.0	–		1.0	–	
North-central	7.3	1.3	(0.9–2.1)		1.5	(1.0–2.2)	
Southeast	11.2	2.2	(1.3–3.6)**		2.2	(1.4–3.5)**	
Urbanicity				n.s.		– ^a	
Rural	6.4		1.0	–			
Semi-urban	10.4	1.7	(1.0–2.8)*				
Urban	8.5	1.4	(0.9–2.1)				
<i>F</i> for trend		1.9					
Education				<0.01	– ^a		
Primary	2.3	1.0	–				
Secondary	9.9	4.7	(2.2–9.8)***				
Specialized secondary	10.2	4.8	(2.1–11.0)***				
Higher	6.9	3.1	(1.5–6.4)**				
<i>F</i> for trend		3.0					
Financial status				<0.001	– ^a		
Very inadequate	6.9	1.0	–				
Inadequate	8.2	1.2	(0.8–1.7)				
Adequate	13.6	2.1	(1.5–3.0)***				
<i>F</i> for trend		13.6***					
Employment status				<0.001			<0.05
Out of the labor force	3.7	1.0	–		1.0	–	
Unemployed	16.3	5.1	(3.1–8.3)***		2.2	(1.2–3.9)*	
Employed	11.6	3.5	(2.5–4.7)***		1.6	(1.0–2.5)*	
Marital status				<0.05	– ^a		
Never married	13.1	1.0	–				
Married before	7.2	0.5	(0.3–0.8)**				
Married	8.4	0.6	(0.4–0.9)*				
Parental status				<0.001	– ^a		
Not parent of a child	6.5	1.0	–				
Parent of child	12.6	2.1	(1.5–2.9)***				

^aNon-significant risk factors were eliminated from the adjusted model in order of least significance.

P* < 0.05; *P* < 0.01; ****P* < 0.001.

ORs for men (Table 4) showed that the odds of heavy alcohol use were significantly higher in those who were in the age group of 26–34 years and 35–54 years, lived in the Southeast (compared with the West), had a secondary education (i.e. high school), were employed or unemployed (*vs* out of the labor force), and were the parent of a child under the age of 18 living at home. The final multivariate model showed that heavy alcohol users were more likely to be in the age group of 26–54 years, living in the Southeast, employed or unemployed (*vs* out of the labor force) and the father of a young child, but the explanatory power was 5.2%.

In women (Table 5), the odds of heavy alcohol use were higher for those who were 18–25 years, lived in the Southeast, lived in a semi-urban settings, had more education, had adequate financial status, were employed or unemployed (*vs* out of the labor force), had never been married and had a child under the age of 18 living at home. The multivariate analysis

had an explanatory power of 9.2%, and showed that female heavy alcohol users were more likely to be young, living in the Southeast and employed or unemployed (*vs* out of the labor force).

Figure 2 shows the significant linear trends for the prevalence of heavy alcohol use with increasing number of risk factors.

DISCUSSION

The Ukraine-WMH survey is the first large population-based study of alcohol use in Ukraine. Our survey found that the rate of heavy use was 22.0%. More than 4 out of 5 heavy users consumed >80 g/typical day at least monthly. In both men and women, living in the Southeast and being employed or unemployed (*vs* out of the labor force) were significant risk

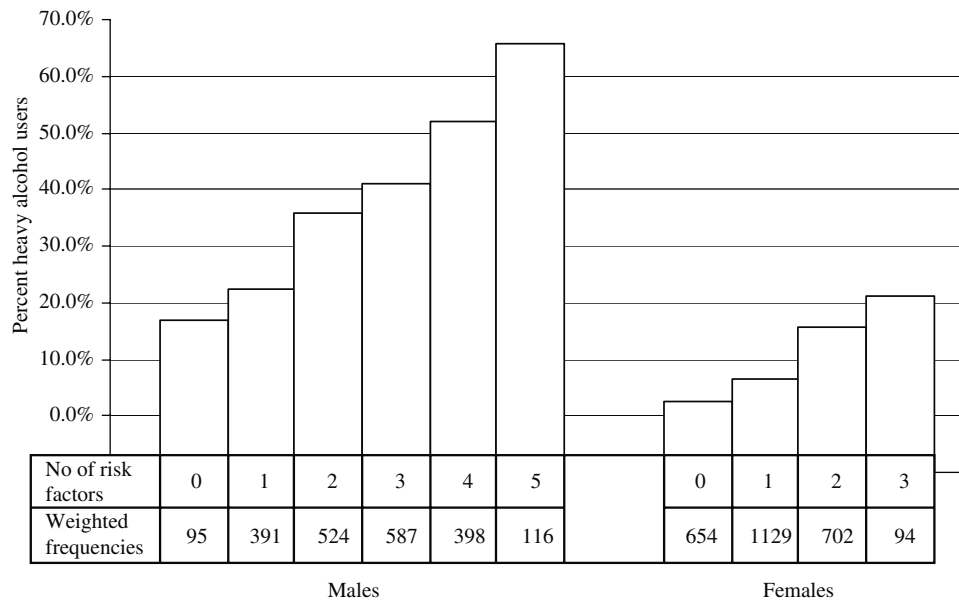


Fig. 2. Relationship of number of risk factors to heavy alcohol use (Tests for linear trend: men ($F = 73.6$, $P < 0.001$); women ($F = 69.3$, $P < 0.001$).

factors. Among men, the odds of heavy alcohol use were also increased for those 26–54 years of age, with a high school education and with young children at home. In women, the unique risk factor was being in the 18–25 years age group.

Our national rates of heavy alcohol use (38.7% for men; 8.5% for women) were comparable with the estimates of monthly binge drinking in Russia reported by Bobak *et al.* (1999). However, there were substantial regional variations within Ukraine, with the highest rate in the Southeast region, which is heavily populated by Russian migrants of the Soviet era. It is interesting to note that two of the three regional surveys in Russia also found particularly high rates (51–82% for men; 5–11% for women) (Pakriev *et al.*, 1998; Malyutina *et al.*, 2001). Clearly, the issue of regional variations is important for targeted public health planning, and more focused research using comparable tools and sampling techniques is needed.

A comparison of our findings with surveys elsewhere suggests that there are differences in risk factors between countries on either side of the Atlantic; i.e. the positive association of male heavy alcohol use with middle age is consistent with surveys in Russia, the Baltics and Bulgaria (Balabanova and McKee, 1999; Bobak *et al.*, 1999; Cockerham, 2000; McKee *et al.*, 2000), as well as Britain, Germany and Spain (Bloomfield, 1998; Meyer *et al.*, 2000; Mateos *et al.*, 2002; Schroder *et al.*, 2004). However, the findings differ from North American surveys in which male heavy drinking declines after age 25 (Layne and Whitehead, 1985; Bachman *et al.*, 2002; Naimi *et al.*, 2003). Our finding that marital status is not significantly related to heavy consumption in men is consistent with those of other surveys in the former Eastern bloc (Balabanova and McKee, 1999; Bobak *et al.*, 1999; Cockerham, 2000; Malyutina *et al.*, 2004), but not with findings from Western epidemiologic research. Most American and European surveys find adult family responsibilities (e.g. being or becoming married or a father)

to be negatively correlated with heavy drinking in men (Power and Estaug, 1990; Miller-Tutzauer *et al.*, 1991; Temple *et al.*, 1991; Kunz and Graham, 1996; Gotham *et al.*, 1997; Hajema and Knibber, 1998; Vik *et al.*, 2003). Not only did our study find marriage unrelated to heavy use, but fatherhood was positively related.

Our study focuses on the prevalence and demographic correlates of heavy alcohol use. Future population-based case-control and longitudinal research is needed to evaluate other risk factors, such as genetic (Wang *et al.*, 2004), environmental (Velleman, 1992; Farrell *et al.*, 1995), alcohol-specific (e.g. drinking norms, peer drinking) (Choquette *et al.*, 1985; Chen *et al.*, 1994; Lintonen and Konu, 2004), and factors associated with historical and concurrent political and economic upheavals in Ukraine. Research focused on economic risk factors is particularly important. To the best of our knowledge, the suggested link between economic stress and heavy drinking in the former Soviet Union (Pridemore, 2002; Walberg *et al.*, 1998) has not been tested with individual-level data.

Further research is also needed to fully understand the public health significance of our findings. The high prevalence of heavy alcohol use, particularly by Ukrainian men, may mean that associated costs and problems are similarly prevalent. On the other hand, its ubiquity may be a sign that heavy drinking is largely normative, and thus, non-pathological. Indeed, despite high rates of alcoholism in Ukraine (Bromet *et al.*, 2004, World Mental Health Consortium, 2004), only 23.1% of the male and 11.2% of the female heavy users met the diagnostic criteria for an alcohol disorder. Given Ukraine's declining population, a more pressing issue is the impact of heavy alcohol use on mortality. A recent longitudinal study by Malyutina *et al.* (2002) found that middle-aged, Russian men who binged on an at least monthly basis were at a higher risk for death by injury and that more intense drinkers were at risk for cardiovascular-related

death. Future prospectively designed epidemiologic research is needed, which incorporates direct measurement of cardiovascular functioning, and begins with a cohort of men before the age at risk for heavy drinking. The impact of heavy alcohol use on the economy is obviously important to Ukraine during its transitional period. We found that nearly one of two employed men and one of ten employed women are heavy users. Thus, future studies should examine the effect of heavy use on occupational functioning (e.g. productivity, days missed at work).

Past prevention efforts in the former Soviet Union have been criticized for being indiscriminate and overly inclusive (Korolenko *et al.*, 1994). The results of our multivariate analyses indicated that heavy alcohol use is demographically widespread, but that groups with a higher concentration of heavy users can be identified when risk factors are clustered. Almost two-thirds of male heavy alcohol users in our study had three or more risk factors. One preliminary study in Russia (Lukomskaia, 1997) suggests that primary care may serve as an appropriate venue for screening and intervening with patients who have high-risk profiles (e.g. unemployed father with a high school education). Moreover, since half of the heavy alcohol users in Ukraine are employed, work settings provide obvious places to locate intervention programs. Alcohol testing is fairly common in the public and private sectors (Rice and Repo, 2000), but nearly half of Ukraine's oblasts (counties) are without state-funded outpatient programs for prevention or treatment of cases identified in the workplace (Ministry of Health of Ukraine, 2004).

Our study has a number of strengths, including a large national probability sample that reflects the economic conditions of Ukraine (Rhodes *et al.*, 1999; Barnett *et al.*, 2000), the structured assessment, and the use of a valid index for heavy alcohol use. Nevertheless, there are a number of limitations. First, the data are based on self-report, and past studies in former Soviet Union countries have shown that self-reported data underestimates drinking compared with biomedical and sales data (Laatikainen *et al.*, 2002; Nemtsov, 2003). Second, 33 potential respondents could not be interviewed because they were never sober when the interviewer tried to approach them. Third, the diagnostic instrument only determined lifetime abstinence, and hence the non-heavy use group included both users and non-users of alcohol in the past year; unfortunately, it is not possible to estimate what effect this has had on the risk factors presented here. Lastly, the sample excluded people in the military or other institutional settings where heavy drinking is a well-known problem. Thus for men, our estimates may be conservative.

CONCLUSIONS

The Ukraine-WMH survey found that 1 out of every 3 men and 1 out of every 12 women consume alcohol heavily. Future analyses should address the social and economic costs of heavy alcohol use in Ukraine. The associations with age, sex, employment, unemployment and region suggest that interventions should be developed to target high-risk pockets of the population.

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