Isr J Psychiatry Relat Sci Vol 44 No. 2 (2007) 126–135

Alcohol Drinking Patterns and Prevalence of Alcohol-Abuse and Dependence in the Israel National Health Survey

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Abstract: Background: Coexistence of disparate religious/cultural mores with regard to alcohol drinking within the changing social milieu of Israel provides an informative environment for investigation of alcohol consumption patterns and alcohol-related mental disorders. *Method:* A national population-based survey of Israeli adults was conducted as part of the WHO/World Mental Health Survey initiative. Logistic regression models accommodated the complex sampling design and accounted for potential confounders. *Results:* Half of the 4,859 respondents reported any alcohol consumption in the year prior to interview; 5% drink 3 or more times weekly. DSM-IV criteria for alcohol-abuse or dependence (lifetime) were met by 4.3% of respondents. Significantly higher rates were found among males (AOR, adjusted odds ratio=7.3), younger adults (AOR=5.0), immigrants from the former Soviet Union (AOR=2.0), and those who were never married (AOR=1.6). *Limitations:* Under-reporting remains a potential concern in health behavior surveys, particularly in the face of opposing religious norms. *Conclusions:* The lifetime prevalence of alcohol abuse in Israel is identical to other European countries while drinking levels are considerably lower, suggesting a biological sensitivity alongside socio-cultural factors.

Introduction

The World Mental Health Survey Initiative of the WHO (1) has provided rich information about current alcohol consumption and the prevalence of alcohol disorders in a number of countries in Europe, Asia, North and South America, the Middle East and Australia (2–5). The aim of the present report is to describe the drinking patterns and the prevalence rates of lifetime and 12-month DSM-IV alcohol disorders in Israel.

Israeli society presents a rather unique and particularly informative environment in which to study the epidemiology of alcohol consumption, as it comprises within a single small country three primary cultural groups or "nationalities" with very differing attitudes toward alcohol consumption: Jewish (about five million or 75% of the population), Arab (about 1.5 million, 20%) and immigrants from Russia and other former Soviet Union (FSU) states — the majority of whom are of Jewish ancestry (about one million). The Arab-Israeli population is predominantly Muslim (approximately 75%), 17% are Christian and 8% Druze. Muslim tradition prohibits the drinking of alcohol, although historically this prohibition has been less than completely adhered to (6). The Jewish (and Christian) tradition tolerates and even advocates moderate and controlled alcohol consumption, at least within religious-ceremonial contexts (7). Traditionally, per capita consumption of alcohol in Israel has been considerably lower than in most Western countries (8), although alcohol is freely accessible in Jewish neighborhoods for purchase by adults in pubs/bars and supermarkets. It is likely that socio-cultural (9) as well as genetic influences (10, 11) contribute to this phenomenon.

Since the late 1980s, Israel has witnessed an influx of approximately one million immigrants from the FSU, which has resulted in a population increase of approximately 15% and a substantial altering of the socio-demographic profile of the country (12). In contrast to the traditional low alcohol-drinking norms that have typified mainstream Israeli society, Russia and other FSU states have some of the highest

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per capita alcohol consumption levels in the world (13). Previous reports have indeed concluded that more-recent FSU immigrants (i.e., those who arrived since 1989) are somewhat more likely to drink and get drunk that non-immigrant Israelis (14–16).

Members of these three population groups often work and live in close geographic proximity, and the Arab community is increasingly being exposed to the predominating Western culture. This coexistence of disparate religious and cultural mores with regard to the drinking of alcohol within a changing social milieu provides fertile ground for investigating patterns of alcohol consumption and the extent of alcohol-related mental disorders. Yet, recent estimates of alcohol consumption among Israeli adults are not readily available to the English-speaking scientific and professional community, and no information exists on the prevalence of alcohol abuse and dependence in Israel. As part of the WHO World Mental Health Survey Initiative, the Israeli National Health Survey (INHS) was designed to fill some of the existing information gaps.

Methods

This national population-based survey was run by the Ministry of Health and the field operation was conducted by the Israel Central Bureau of Statistics (CBS).

Study population

The study population comprised household dwellers aged 21 and older, with "resident *de jure*" status. Residents of immigrant absorption centers, student residences, and sheltered housing for the elderly were also included. The sampling frame was constructed from the national population register in which a unique number identifies every resident, newborn or immigrant. Excluded from the sample were residents in non-household setting institutions (e.g., hospital, prison), persons residing outside recognized localities, immigrants within 6 months of arrival in the country, legal residents abroad for an extended period (more than 12 months), and foreign workers. Forty-two design groups were constructed based on sex, age (7 categories), and population group (3 groups: Israeli Arabs; Jews born in Israel or pre-1990 immigrants; post-1990 immigrants). Detailed sampling techniques are described elsewhere (pp. 86–87).

The overall response rate was 72.6%, which was higher in Arab localities (88%) than in Jewish/mixed localities and among immigrants from the former Soviet Union (about 70%). Nearly 14% of those contacted refused to participate, with a higher refusal rate among Jewish-Israelis (15%) than among Arab-Israelis (4%) and FSU immigrants (8%).

A total of 4,859 adults were interviewed from May 2003 to April 2004. The socio-demographic characteristics of the sample are, overall, highly reflective of the population of Israel, with a slight over-representation of married and employed persons (Table 1).

Survey Instrument

The Composite International Diagnostic Interview (WMH-CIDI) (17, 18) was administered face-to-face in Hebrew, Arabic or Russian in the home of respondents using computer-assisted personal interviewing (CAPI) technology. The WMH-CIDI is a fully structured questionnaire on the presence, persistence and intensity of clusters of psychiatric symptoms and provides, by means of computerized algorithms, lifetime and past 12-month DSM-IV (hierarchical) diagnoses (19). Some supplemental questions were added to the Israeli interview schedule and some response-categories were revised to more accurately accommodate the local reality. For example, categories of very low level drinking were added to the WMH-CIDI. Interviewers of the Central Bureau of Statistics conducted the interviews under the supervision of regional supervisors. Survey data were uploaded daily for quality control and a 10% sub-sample of interviewees were re-contacted for response verification.

Respondents who reported ever drinking on at least three days a month or more frequently were asked about abuse, but only those who met the abuse criteria were asked about dependence. Degree of religious observance was asked in the interview, but is not included in the present analyses due to a higher rate of missing data than noted for the other variables studied.

Table 1. *Socio-demographic characteristics of the study population*

Socio-demographic characteristics	Study population (unweighted) No.	Study population (unweighted) %	Study population (weighted) %	Israeli population %
Gender				
Female	2479	51.0	51.9	52.0
Male	2380	49.0	48.1	48.0
Age (years)				
21–34	1585	32.6	34.9	37.0
35–49	1317	27.1	27.8	27.0
50–64	1080	22.2	21.5	20.0
65+	877	18.1	15.8	16.0
Population group				
Jews	3332	68.6	71.0	*
Arabs	659	13.6	12.8	*
FSU immigrants	844	17.4	15.8	*
Others	24	0.5	0.6	*
Marital status				
Married	3229	66.5	67.8	57.0
Separated/divorced/widowed	730	15.0	13.4	12.0
Never married	897	18.5	18.8	30.0
Education				
None, some primary or secondary	1068	22.0	21.7	18.0
Complete secondary	1728	35.6	36.9	42.0
Post-secondary	800	16.4	16.2	14.0
Complete college	1263	25.9	25.2	26.0
Employment status				
Employed	2857	58.7	56.1	48.4
Unemployed currently	298	6.1	6.5	6.6
Not in work-force	1704	35.1	37.4	45.0

(Unweighted and weighted) compared to the Israeli population, Israel, 2003–2004.

* Information on the distribution of the adult population of Israel (21 years and older) by population group (Jews, Arabs, Immigrants, Others) is unavailable.

Statistical analysis

Prevalence estimates were derived using standard INHS procedures that account for sampling probabilities, as well as post-stratification adjustment to compensate for variation in survey non-response. Estimated variances are based on Taylor series linearization under SUDAAN software 9.0 (Research Triangle Institute, Research Triangle Park, NC), which accommodates the complex sampling design (20). Logistic regression modeling accounted for the potential confounding effects of socio-demographic factors. Regression estimates from logistic models are expressed as odds ratios (OR), adjusted OR (AOR) and their 95% confidence intervals (95% CI) and p-values.

Results

Alcohol consumption patterns

Lifetime alcohol abstinence was reported by 41% of all respondents, while just over half of respondents (52%) reported having consumed any alcohol in the past year. This latter rate was considerably higher among men (65.7%) than women (38.9%), and among Jewish-Israelis respondents (55.0%) compared with their Arab counterparts (22.7%). The rate of past-year drinking decreased monotonically with increasing age from 56.3% among 21–44 year olds, 51.4% among 45–64 year olds, 42.3% among respondents 65–74, and 28.8% among those 75 years or older.

While 60% of respondents drink infrequently (1–

3 times per month or less often), 5.1% of the sample reported "frequent" drinking (3 or more times in one week at least once) in the past year. Among Jewish-Israeli respondents, men were four times more likely than women to report frequent drinking — 8.7% and 2.2%, respectively, whereas among Arab-Israelis frequent drinking was reported by 5.4% of men and none of the women. The gender differentials persist, and even widen, across age groups (Figure 1). Younger adults (21–44 years) were slightly less likely (3.8%) to engage in frequent drinking compared to 6.6% of respondents aged 45–64, 6.8% of those 65–74 years old, and 5.8% of those 75 years or older (data not shown). Respondents who did not complete high school were slightly less likely to report frequent drinking (3.8%) than those with a high school education (6.0%), those with some post-high school education (5.2%) and those with an academic degree (6.2%).

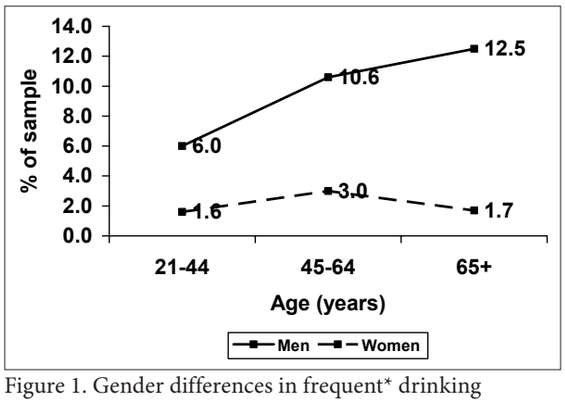

Figure 1. Gender differences in frequent* drinking

* Frequent drinking = drinking 3 or more times in one week at least once in the past year

With regard to quantity of alcohol consumed, the vast majority of drinkers (83.6%) reported drinking fewer than three drinks on days when they drank, and virtually none drank more than four drinks (the maximum number of drinks per day was 25, which was reported by less than 1% of respondents). The mean number of drinks consumed on a typical drinking day was 3.0±4.1 among drinkers.

Frequent *heavy* drinking (defined as the consumption of three or more drinks three or more times a week at least once during the past year) was reported by 6.8% of men and less than 1% of women. Young adults were more likely to report this drinking pattern than older respondents — 4.6% among 21–44 year olds and less than 2% among those 45 and older.

Alcohol disorders

Based on the responses to the screening questions about alcohol consumption, just over a quarter of the total sample (28.6%, n=1388) were referred to the diagnostic section. DSM-IV criteria for a lifetime diagnosis of an alcohol disorder were met by 215 respondents, or 4.3% of the study population. Of these, 194 met criteria for alcohol abuse (52 with a past-year diagnosis), and 21 met dependence criteria (four in the past-year).

The two most commonly endorsed DSM-IV alcohol abuse criteria were "drinking in physically hazardous situations" and "hangover interfered with daily activities" — endorsed by 46% and 41% of alcohol abusers, respectively. Drinking that resulted in interpersonal or social problems was endorsed by 22% of those with an alcohol disorder, with 18% reporting persistent drinking despite the presence of such problems. Ever having been stopped/arrested by police for drunkenness or drunk driving (added to the Israeli version of the questionnaire) was endorsed by 8% of respondents with an alcohol disorder, and 4% indicated having been stopped more than once.

As seen in Table 2, males were much more likely to meet criteria for an alcohol disorder than were females ($OR_{adjusted}$=7.3, 95% CI=4.8–11.1). A strong inverse relationship was found between the presence of an alcohol disorder and age — those in the youngest age group were five times more likely to have an alcohol disorder than were those in the oldest age group ($OR_{adjusted}$=5.0, 95% CI=2.3–11.0). Upon adjustment for the effects of the other socio-demographic characteristics, no significant relationship was noted with education. The odds of having an alcohol disorder increased monotonically across the income quartiles, although only the difference between the 4th and the 1st quartile reached statistical significance ($OR_{adjusted}$=1.9, 95% CI=1.1–3.3). The likelihood of an alcohol disorder was also higher among respondents who were never married ($OR_{adjusted}$=1.6, 95% CI=1.1–2.4 compared with married respondents), and immigrants from the former Soviet Union ($OR_{adjusted}$=2.0, 95% CI=1.4–2.9, compared with native Jewish-Israelis.

Table 2. *Characteristics of respondents who met criteria for a lifetime DSM-IV alcohol disorder: Results of unadjusted (OR) and adjusted (AOR) weighted logistic regression analyses*

Characteristics			Ever had a DSM-IV alcohol disorder					
	N	%*	χ^2 test	p-value	OR	95%CI	AOR	95%CI
Total	215	4.3						
Gender			118.2	<0.001				
Female	28	13.5			1.00		1.00	
Male	187	86.5			7.41	4.9–11.2	7.33	4.8–11.1
Age (years)			56.8	<0.001				
21–34	111	53.7			5.51	2.8–10.7	5.02	2.3–11.0
35–49	61	27.6			3.47	1.8–6.7	4.17	1.9–8.9
50–64	33	14.1			2.27	1.1–4.7	2.55	1.2–5.6
65+	10	4.6			1.00		1.00	
Educational level			13.9	0.003				
None, primary, some secondary	28	13.5			1.00		1.00	
Complete secondary	101	45.8			2.05	1.3–3.2	1.20	0.7–1.9
Post-secondary	37	18.2			1.84	1.1–3.1	1.00	0.6–1.7
Academic degree	49	22.5			1.44	0.9–2.4	0.89	0.5–1.5
Income (quartiles)			7.6	0.054				
I	24	12.0			1.00		1.00	
II	62	31.7			1.51	0.9–2.5	1.32	0.8–2.2
III	80	36.6			1.65	1.0–2.7	1.64	0.9–2.7
IV	49	19.7			1.90	1.1–3.2	1.89	1.1–3.3
Marital Status			27.5	<0.001				
Married	114	53.6			1.00		1.00	
SDW**	22	9.6			0.91	0.6–1.5	1.54	0.9–2.7
Never married	79	36.8			2.62	1.9–3.5	1.63	1.1–2.4
Population group			9.9	0.019				
Jews	143	68.1			1.00		1.00	
Arabs	19	8.2			0.66	0.4–1.2	0.70	0.4–1.2
FSU immigrants	52	22.8			1.55	1.1–2.2	2.01	1.4–2.9
Others	1	0.9			1.73	0.2–12.9	1.58	0.2–16.3
Employment Status			14.7	<0.001				
Employed	150	66.1			1.00		1.00	
Unemployed currently	18	8.6			1.14	0.7–1.9	1.19	0.7–2.0
Not in work-force	47	25.3			0.56	0.4–0.8	1.12	0.8–1.7

* Weighted percentage out of the total sample (N=4,859); ** Separated, Divorced, Widowed
OR=unadjusted odds ratio; AOR=adjusted odds ratio (adjusted for all other variables in the table)

Respondents who met criteria for a past-year diagnosis tended to be younger than those with a lifetime (but not past-year) diagnosis (Table 3). Of those with a past-year diagnosis, 69.4% were in the 21–34 year old category compared with 48.2% of those with a lifetime diagnosis. Those with a past-year diagnosis

were also more likely to never have been married (54.8%) compared with 30.5% among those with a lifetime, but not past-year diagnosis (p=0.01). No other noteworthy socio-demographic differences were found between the two groups.

Table 3. *Socio-demographic profile of respondents by the presence or absence, and recency of an alcohol disorder; weighted percentages Israel, 2003–2004*

Characteristics	No alcohol disorder		Alcohol disorder diagnosed: Not in past year		Alcohol disorder diagnosed: Past year			
	N	%	N	%	N	%	χ^2 test*	p-value*
Total	4644	95.7	158	3.19	57	1.1		
Gender							0.82	0.367
Male	2193	46.4	141	87.8	46	82.7		
Female	2451	53.6	17	12.2	11	17.3		
Age (years)							11.01	0.011
21–34	1474	34.1	73	48.2	38	69.4		
35–49	1236	27.8	46	29.0	15	23.3		
50–64	1047	21.8	30	17.2	3	5.2		
65+	687	16.3	9	5.6	1	2.1		
Educational level							3.34	0.342
None, primary, some secondary	1040	22.0	23	15.1	5	9.2		
Complete secondary	1627	36.5	70	42.3	31	55.8		
Post-secondary	763	16.1	28	18.7	9	16.5		
Academic degree	1214	25.4	37	23.9	12	18.5		
Income (quartiles)							2.79	0.425
I	749	18.3	20	13.4	4	8.0		
II	1410	32.0	45	31.6	17	32.0		
III	1637	33.9	55	34.0	25	44.0		
IV	848	15.8	38	21.0	11	16.0		
Marital Status							9.01	0.011
Married	3115	68.5	93	59.2	21	37.6		
SDW**	708	13.6	17	10.3	5	7.6		
Never married	821	17.9	48	30.5	31	54.8		
Population group							2.73	0.435
Jews	3189	71.1	109	70.4	34	61.4		
Arabs	640	12.9	13	7.5	6	10.4		
FSU Immigrants	792	15.4	35	21.0	17	28.2		
Others	23	0.6	1	1.1	0	—	—	—
Employment Status							2.37	0.306
Employed	2707	55.7	107	64.4	43	71.1		
Unemployed currently	280	18.4	16	10.1	2	4.3		
Not in work-force	1657	37.9	35	25.5	12	24.6		

* Comparison of respondents with an alcohol disorder in the past year and those with an alcohol disorder but not in the past year

Discussion

The above findings clearly indicate low levels of alcohol consumption, with nearly half of the Israeli population never having consumed an alcoholic drink, and among those that have, most drink infrequently and few drink more than three drinks during a typical drinking occasion. As expected, Arab-Israeli respondents were significantly less likely to report any past-year alcohol consumption or frequent drinking than Jewish-Israelis and FSU-immigrant participants, and were less likely to be diagnosed with an alcohol disorder (although the latter did not reach statistical significance due to the small number of Arab-Israeli respondents who met criteria for an alcohol disorder).

The lifetime prevalence of alcohol abuse in Israel of 4% is identical to the overall rate in other European countries (21), while drinking levels are considerably lower in Israel than in other European countries. For example, 11% of interviewed Europeans reported to be alcohol abstinent, compared with 40% of Israelis, and the proportion of drinkers who report three or more drinking episodes weekly is 35% and 10% in Europe and Israel, respectively. Indeed, historically, Israel has one of the lowest per capita alcohol consumption levels (8, 22). In the U.S.A., on the other hand, where lifetime alcohol abuse rates are estimated at 13% (3), Jews exhibit lower rates of alcohol abuse and dependence compared with other religious groups (23).

Recent findings suggest that alongside social and cultural influences, long thought to explain the reduced levels of alcohol drinking among Jews, an inherited heightened sensitivity to the effects of ethanol may also be a contributing factor (24). This sensitivity to the inebriating or aversive effects of ethanol is likely to be related to alcohol dehydrogenase (ADH) genetic polymorphisms. Several studies have now shown that inheritance of the *ADH1B*2* (SNP rs1229984) allele is associated, in Jews, with reduced alcohol consumption and a lowered risk of alcohol dependence (10, 14, 25–27). Furthermore, these studies consistently found this allele to be relatively common (allele frequency = 0.19–0.32) in Jewish populations in the U.S.A. and Israel. Jewish carriers of the "protective" allele exhibit significantly increased rates of ethanol metabolism (11, 28). Faster alcohol elimination associated with the *ADH1B*2* genotype may increase the exposure of the individual harboring this allele to relatively larger concentrations of acetaldehyde, which may in turn produce aversive drinking reactions (29, 30). Thus, the effects of even small quantities of alcohol among *ADH1B*2* carriers may be sufficiently powerful to cause respondents to endorse subjective DSM-IV criteria for alcohol abuse (e.g., "hangover interfered with daily activities"). Collection of biological samples would enhance the scientific value of national epidemiologic surveys.

The observed prevalence of alcohol abuse may have been artificially inflated due to the wording of the translated Hebrew version of the abuse criteria. Specifically, the Hebrew translation of the phrase "was there ever a time in your life when…" back-translates to "did it ever happen that…." This may have inadvertently encouraged respondents to report one-time events that would have gone unreported by respondents in countries in which the English version was used. This is a methodological issue that warrants further investigation not only with regard to the Hebrew version of the WMH-CIDI, but for all cross-country comparisons.

Alcohol abuse, particularly past-year, was more often diagnosed among younger, single male respondents. These findings are largely similar to those found in European countries where unmarried younger males with higher education generally exhibit higher rates of alcohol disorders, although, unlike our results, alcohol disorders are generally more common among unemployed Europeans (21). The association between alcohol drinking and socio-economic status (SES) is complex (31). Population groups of higher SES tend to exhibit a higher prevalence of light to moderate drinking (32–34), whereas lower SES groups are more likely to have elevated rates of drinking problems and alcohol dependency (35–37), alcohol-related morbidity (38) and mortality (39, 40). Some of this variation may stem from cultural attitudes toward drinking that vary across social groups and religions (41, 42). The picture is further complicated by the variable used to assess SES (e.g., education, income, employment status), and, as Marmot and Feeney (33) have pointed out: "the strength of a SES indicator in predicting health related outcomes does not necessarily reflect its util-

ity as a target for intervention to reduce social inequality." Reliance upon a single or composite SES indicator in a culturally diverse population, such as Israel, may be inadequate for the identification of high-risk groups for prevention and intervention.

Underestimation of point-prevalence rates of alcohol consumption based on self-report data is a potential limitation of all health behavior surveys (43). This might be particularly true for heavy drinking, as heavy drinkers tend to be under-represented in population-based surveys (44). The degree of underreporting may be greater among Arab-Israeli respondents, who may be more reluctant to report religiously prohibited behaviors. The prevalence of past-year alcohol drinking among 21–44 year olds reported above (56%) is slightly lower than reported in several papers from previous Israeli national surveys of 18–40 year old adults conducted in 1995 and 2000 (e.g., 15, 16, 45, 46). Given the declining prevalence of past-year drinking with increasing age as observed above, the lower rate likely reflects the exclusion of individuals aged 18–20 years (who are more likely to be drinkers) and the inclusion of older adults in the present survey, rather than a declining rate of drinking.

We have shown that this sample is broadly representative of the general population of the country based on comparisons with national data (Table 1), yet a certain degree of caution is indicated whenever generalizing results based on a sample to the entire population. For example, the proportion of married individuals in the present sample is slightly higher (10%) than their proportion in Israeli society (Table 1). Given the lower rate of alcohol disorders among married respondents, this survey may underestimate the rate in the population. Additionally, questions about alcohol dependence were only asked of those respondents who met criteria for alcohol abuse, in keeping with the WHO World Mental Health Survey Initiative algorithms. This may underestimate the prevalence of dependence if dependence criteria are met even in the absence of abuse (47).

Bearing these caveats in mind, this report, based on the most nationally representative and current data available in Israel, provides valuable information about drinking patterns and drinking related disorders of three distinct nationality groups co-existing within a single small country steeped in tradition and religious influence and with one of the lowest per capita alcohol consumption rates in the world.

Acknowledgements

The Israel National Health Survey was funded by the Ministry of Health of Israel. The survey was carried out in conjunction with the World Health Organization World Mental Health Survey Initiative.

We thank the WMH staff for assistance with instrumentation, fieldwork and data analysis, and acknowledge the support of: NIMH (R01MH070884); John D. and Catherine T. MacArthur Foundation; Pfizer Foundation, U.S. Public Health Service (R13-MH066849, R01-MH069864, R01-DA016558); Fogarty International Center (FIRCA R01-TW006481); Pan American Health Organization; Eli Lilly & Co.; Ortho-McNeil Pharmaceutical, Inc.; GlaxoSmithKline; Bristol-Myers Squibb.

A complete list of WMH publications can be found at http://www.hcp.med.harvard.edu/wmh/

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