13 ID Pharma Paris. Narcotest THC. Urinary test for marijuana detection. User's manual. 2003. Available at: http://www.iazeo.fr/pdf/produit/docTechnique/1378_8.pdf (2 January 2012, date last accessed).

14 Martin GW, Wilkinson DA, Kapur BM. Validation of self-reported cannabis use by urine analysis. *Addict Behav* 1988;3:147–50.

15 Zaldívar Basurto F, García Montes JM, Flores Cubos P, et al. Validity of the self-report on drug use by university students: correspondence between self-reported use and use detected in urine. *Psicothema* 2009;21:213–9.

16 Buchan BJ, Dennis M, Tims FM, Diamond GS. Cannabis use: consistency and validity of self-report, on-site urine testing and laboratory testing. *Addiction* 2002;97(Suppl 1):98–108.

17 Jaffee WB, Trucco E, Levy S, Weiss RD. Is this urine really negative? A systematic review of tampering methods in urine drug screening and testing. *J Subst Abuse Treat* 2007;33:33–42.

18 Ellis GM Jr, Mann MA, Judson BA, et al. Excretion patterns of cannabinoid metabolites after last use in a group of chronic users. *Clin Pharmacol Ther* 1985;38:572–8.

19 Huestis M, Henningfield J, Cone E. Blood cannabinoids. I. Absorption of THC and formation of 11-OH-THC and THCCOOH during and after smoking marijuana. *J Anal Toxicol* 1992;16:276–82.

20 Macdonald S, Hall W, Roman P, et al. Testing for cannabis in the work-place: a review of the evidence. *Addiction* 2010;105:408–16.

21 Ramaekers JG, Berghaus G, van Laar M, Drummer OH. Dose related risk of motor vehicle crashes after cannabis use. *Drug Alcohol Depend* 2004;73:109–19.

22 Pil K, Verstraete A. Current developments in drug testing in oral fluid. *Ther Drug Monit* 2008;30:196–202.

European Journal of Public Health, Vol. 23, No. 2, 332–339

doi:10.1093/eurpub/cks044 Advance Access published on 4 May 2012

Alcohol consumption and social inequality at the individual and country levels—results from an international study

Ulrike Grittner[1], Sandra Kuntsche[2], Gerhard Gmel[2,4,5,6], Kim Bloomfield[1,3]

1 Department for Biostatistics and Clinical Epidemiology, Charité – University Medicine, Berlin, Germany
2 Addiction Info Switzerland, Research Institute, Lausanne, Switzerland
3 Centre for Alcohol and Drug Research, Copenhagen Division, Aarhus University, Copenhagen, Denmark
4 Alcohol Treatment Center, Lausanne University Hospital, Lausanne, Switzerland
5 Centre for Addiction and Mental Health, Toronto, Ontario, Canada
6 University of the West of New England, Bristol, United Kingdom

Correspondence: Ulrike Grittner, Department for Biostatistics and Clinical Epidemiology, Charité – University Medicine Berlin, D-10098 Berlin, Tel: +49 30 450 562 004, Fax +49 30 450 562 972, e-mail: ulrike.grittner@charite.de

Background: International comparisons of social inequalities in alcohol use have not been extensively investigated. The purpose of this study was to examine the relationship of country-level characteristics and individual socio-economic status (SES) on individual alcohol consumption in 33 countries. **Methods:** Data on 101 525 men and women collected by cross-sectional surveys in 33 countries of the GENACIS study were used. Individual SES was measured by highest attained educational level. Alcohol use measures included drinking status and monthly risky single occasion drinking (RSOD). The relationship between individuals' education and drinking indicators was examined by meta-analysis. In a second step the individual level data and country data were combined and tested in multilevel models. As country level indicators we used the Purchasing Power Parity of the gross national income, the Gini coefficient and the Gender Gap Index. **Results:** For both genders and all countries higher individual SES was positively associated with drinking status. Also higher country level SES was associated with higher proportions of drinkers. Lower SES was associated with RSOD among men. Women of higher SES in low income countries were more often RSO drinkers than women of lower SES. The opposite was true in higher income countries. **Conclusion:** For the most part, findings regarding SES and drinking in higher income countries were as expected. However, women of higher SES in low and middle income countries appear at higher risk of engaging in RSOD. This finding should be kept in mind when developing new policy and prevention initiatives.

Introduction

In high-income countries socio-economic inequalities in health have been investigated extensively.[1] These studies conclude that persons of higher socio-economic status (SES) have lower mortality and morbidity as well as more favourable health behaviours than those of lower status.[2] When gender is taken into account deviations from this general pattern can be found. In some countries women of higher SES are more likely to report poor self-assessed health (Italy, Portugal, Sweden)[3] as well as higher rates of smoking (France, Italy, Spain, Portugal, Lithuania)[2] and risky single occasion drinking (RSOD) (Mexico, Brazil),[4] whereas among men, those of lower SES are more likely to report negative outcomes.

Some studies, mainly in Europe, have compared inequalities cross-nationally.[2–5] Comparative research enables the investigation of area-level effects which provides information for policy makers regarding (social) environmental factors affecting population health outcomes. The socio-economic position of a region can have an impact on a population's health beyond individual SES.[6] For the

most part, such studies have used aggregated individual data to describe the socioeconomic characteristics of a region, e.g. indices of relative deprivation,[7] income or income inequality,[8] occupation[9] and education.[10]

With regard to social inequalities in drinking behaviour, the general pattern is that people in higher SES groups are more often drinkers and drink smaller amounts more frequently, whereas those in lower SES groups have a higher proportion of abstainers but those who do drink do so more often in problematic ways.[11–13] But recent research in emerging economies shows a different pattern. A Brazilian study found that higher SES was associated with higher rates of alcohol consumption.[14] Research on RSOD in Israel which examined young Jews and Arabs found two distinct patterns with respect to SES: Jews followed the pattern seen in high-income countries. Among Arabs a strong positive association was found for income and occupation and RSOD.[15] A cross-sectional trend analysis in Russia from 1985 to 1995 found among men a consistent negative association between alcohol use and SES over time, but saw the inequalities closing due to increased drinking among the higher SES group.[16] In an international comparison of social inequalities in drinking across 15 countries, Bloomfield *et al.*[4] found that higher educated women and men in Brazil and higher educated women in Mexico were more likely to be RSO drinkers than their less educated counterparts. Such a pattern was not found for the remaining countries in the analysis.

It has been argued that the amount of alcohol consumed in a country is related to its economic development.[17] Previous research involving 24 countries showed that the prevalence of drinkers in a country is positively correlated with economic power, even if there are some exceptions: countries with a high economic power and a relatively low prevalence of drinkers (e.g. USA) or vice versa (e.g. Argentina).[18] As gender equality is seen as closely related to economic development,[19,20] it is also important to consider this factor. Rahav *et al.*[18] found that differences in drinking status across gender are lower where gender equality is higher. Furthermore, in addition to economic development, it has been shown that area income inequalities are associated with poorer health outcomes.[21,22] Some literature has found mixed results with respect to drinking behaviour,[23–25] thus prompting further investigation here.

The present study examines drinking behaviour in 33 countries with regard to gender and individual socio-economic position. Additionally it takes into account gender equity and the socio-economic characteristics of the study countries.

Although there is some recent research to suggest differing results among low and middle income countries, that which has been conducted in higher income countries remains the most consistent[11–13] and we use it as our point of departure for the following hypotheses:

1. Higher SES is positively associated with drinking status. This association will be stronger in societies with higher economic development and will be true for both men and women.
2. Lower SES is positively associated with RSOD. This association will be stronger in societies with higher economic development and will vary by gender.

Methods

For this study we used data from 101 525 individuals in 33 countries of the GENACIS project (www.genacis.org). About one percent ($n = 873$) of individuals were excluded because of missing information on education. In 22 of the countries the data came from national representative survey samples. In 11 countries only regional data were available (table 1). Additional details about the surveys and samples are reported elsewhere.[26] The age range was restricted to 25–69 years. Data were collected between the years 1993 and 2007. The mean age of the respondents was 43.5 years (SD = 12.2) and 45.4% of the respondents were male.

Table 1 Countries, number of individuals per country, survey year, GNI, Gini coefficient, Gender Gap index

Country (ordered according to GNI)	Survey year	*n*	GNI per capita, (2000)	Gini coefficient (2007/ 2008)	Gender Gap Index
Total		101 525			
Low income[a]					
Uganda[b]	2003	1070	670	45.7	0.68
Lower middle income[a]					
Nigeria[b]	2003	1713	1130	43.7	0.61
India[b]	2003	1765	1500	36.8	0.60
Nicaragua[b]	2005	1447	1780	43.1	0.66
Sri Lanka[b]	2002	950	2660	40.2	0.72
Kazakhstan[b]	2002/3	944	4480	33.9	0.69
Belize	2005	2910	4630	51.0	0.64
Upper middle income[a]					
Costa Rica	2003	916	6810	49.8	0.69
Brazil[b]	2001/2	814	7730	57.0	0.65
Uruguay	2004	822	8860	44.9	0.65
Argentina	2003	828	8950	51.3	0.68
Mexico	1998	4232	11 730	46.1	0.65
High income[a]					
Hungary	2001	1946	14 640	26.9	0.67
Czech Rep.	2002	2137	19 430	25.4	0.67
New Zealand	2007	1688	21 120	36.2	0.75
Spain[b]	2003	1323	21 480	34.7	0.73
Israel	2001	3664	24 590	39.2	0.69
Australia[b]	2007	1953	24 920	35.2	0.72
Italy[b]	2001/2	2680	25 370	36.0	0.65
Finland	2000	1339	25 470	26.9	0.80
UK	2000	1526	25 590	36.0	0.74
Germany	2000	7099	25 670	28.3	0.75
Japan	2001	2053	25 910	24.9	0.64
France	1999	10 217	26 380	32.7	0.65
Sweden	2002	4027	27 500	25.0	0.81
Canada	2004	11 473	27 630	32.6	0.72
Iceland	2001	1921	28 030	25.0	0.78
Denmark	2003	1568	28 180	24.7	0.75
Austria	1993	5858	28 570	29.1	0.70
Netherlands[b]	1999	3473	30 000	30.9	0.73
Switzerland	1997	9823	34 020	33.7	0.70
USA	2000	5740	35 190	40.8	0.70
Norway	1999	1606	35 640	25.8	0.80

a: According to the classification of the World Bank (2010b)
b: Regional sampling frame

As a measure of individual SES we used the highest educational level the respondent attained. The education variable from each country was recoded into three categories (low: ≤10 years of education; middle: >10 years and <3 years; high: Bachelor, Master or PhD). As indicators for alcohol use the variables *drinking status* and *monthly RSOD* were used. Persons were classified as current drinkers if they had drunk any alcohol during the last 12 months. RSOD was defined differently in the different countries. For most countries it is consuming ≥60 g of pure alcohol on a single occasion. But values range from 50 to 90 g.[26] Information about RSOD was not available for Austria, France, the UK, Italy or Spain.

To describe the economic development of the countries we chose purchasing power parity, as a measure of gross national income per capita (GNI)[27] and the Gini coefficient, as an indicator of income disparity.[28] With regard to the gender equality, the Gender Gap Index was chosen.[29]

For illustrative purposes we grouped the study countries based on a categorization of economic power developed by the World Bank[30] (table 1).

Statistical analysis

In a first step we analysed the relationship between individuals' education and the two drinking indicators in a meta-analysis (figures 1 and 2). This was first done to analyse the relationship between education and drinking for every country seperately and

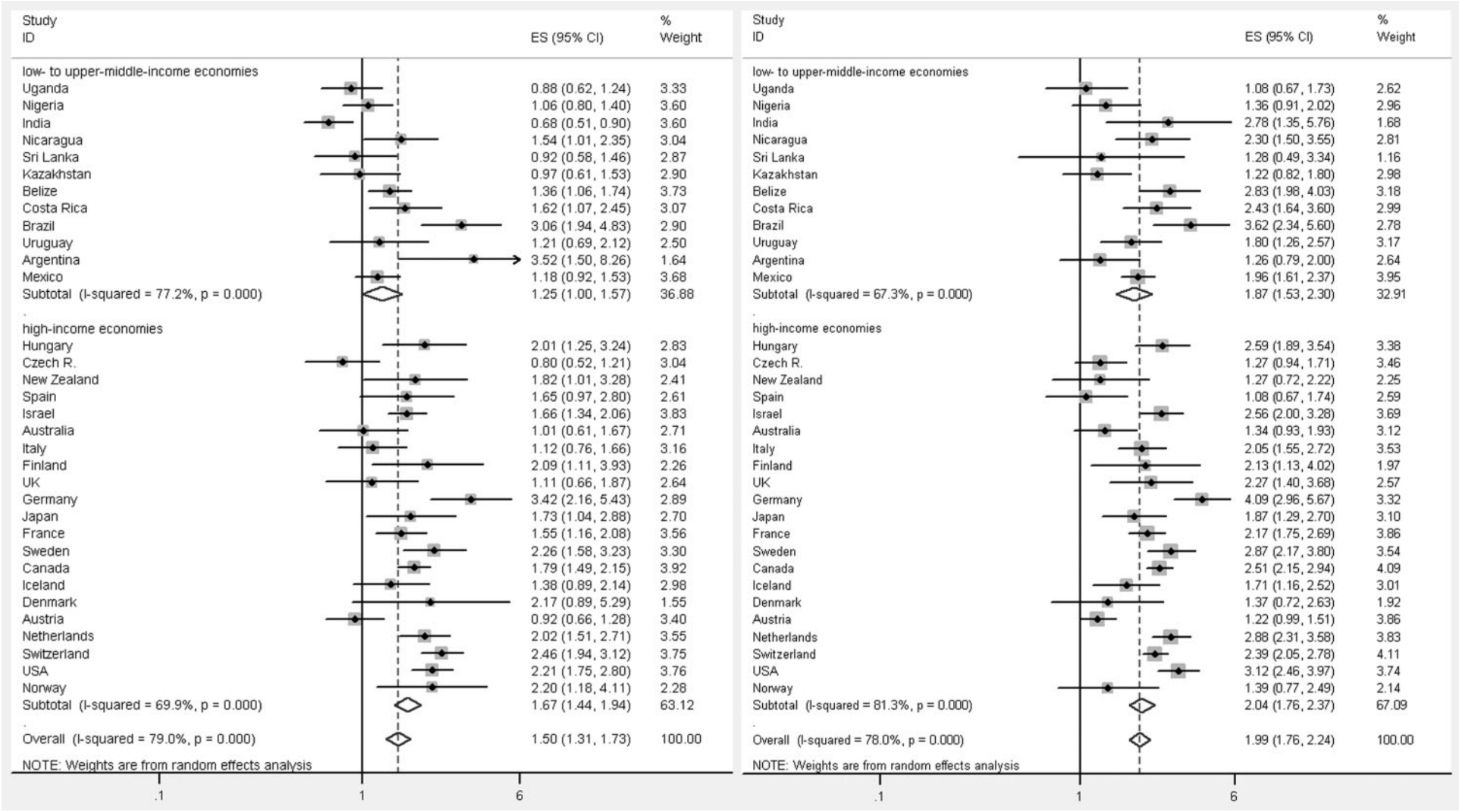

Figure 1 Age-adjusted odds ratios for higher education vs. lower education for drinking status, men (left) / women (right)

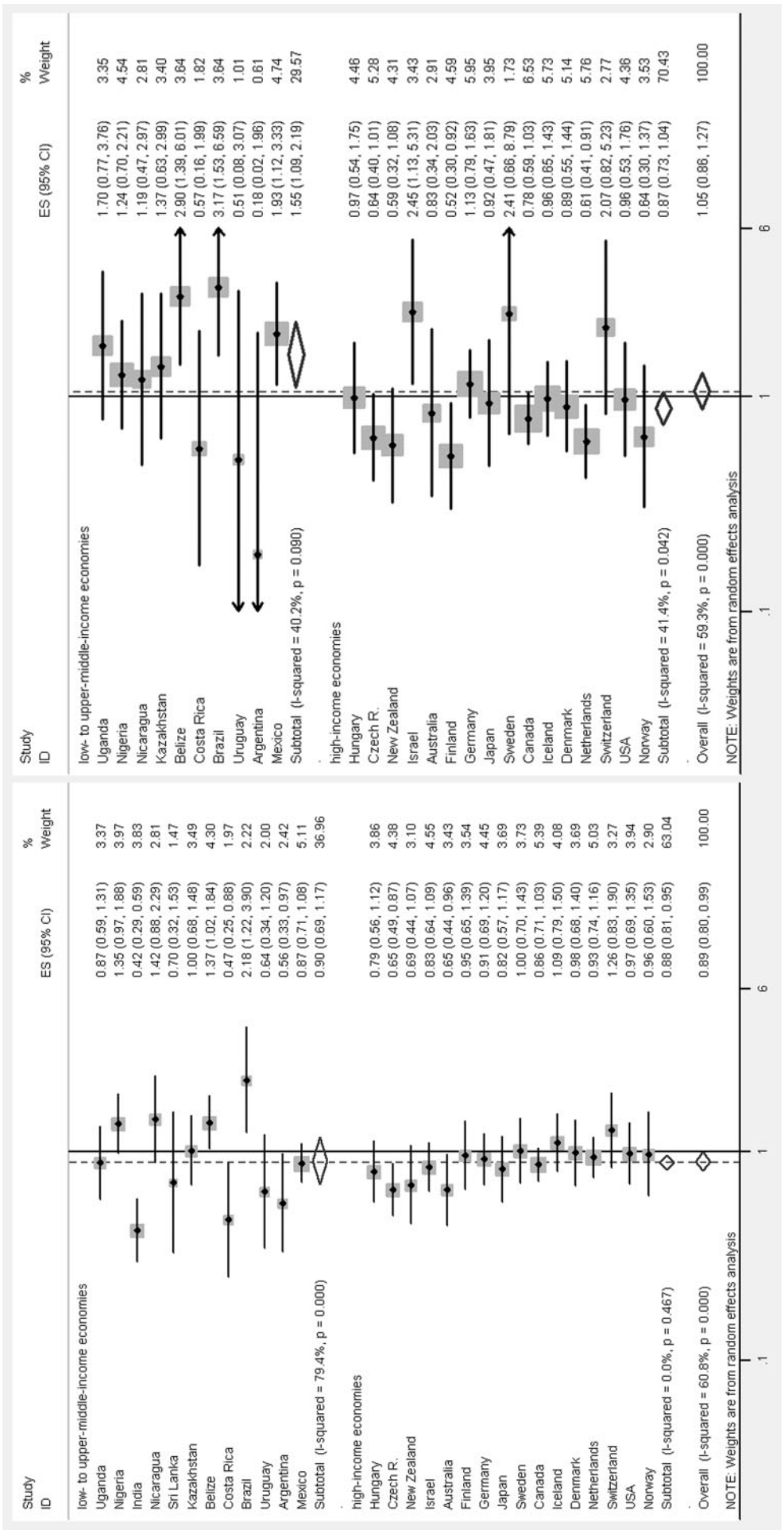

Figure 2 Age-adjusted odds ratios for higher education vs. lower education for monthly RSOD, men (left) / women (right)

Table 2 Multilevel logistic models (random intercept) for drinking status and monthly RSOD for men and women separately

	Drinking status		Monthly RSOD	
Fixed effects	**Men (33 countries/46 254 individuals)**	**Women (33 countries/55 269 individuals)**	**Men (28 countries/36 259 individuals)**	**Women (27 countries/43 124 individuals)**
Individual level	**OR (95%CI)**		**OR (95%CI)**	
education				
Low (≤10 years)	1	1	1	1
Middle (>10 and <13 years	1.52 (1.42–1.63)	1.90 (1.80–2.01)	0.97 (0.90–1.04)	0.98 (0.88–1.10)
High (bachelor, Master, PhD)	1.84 (1.70–2.00)	2.89 (2.68–3.11)	0.77 (0.71–0.83)	0.92 (0.80–1.05)
Age (in decades)	0.88 (0.85–0.90)	0.95 (0.93–0.96)	0.79 (0.77–0.81)	0.72 (0.69–0.75)
Age squared	0.96 (0.94–0.98)	0.92 (0.91–0.93)	0.97 (0.95–0.98)	–
Country level				
GNI (in ten thousand)	1.38 (1.01–1.89)	1.86 (1.23–2.80)	0.79 (0.61–1.03)	0.89 (0.61–1.31)
Gini (in tens)[a]	0.65 (0.45–0.95)	0.74 (0.45–1.21)	0.65 (0.49–0.87)	0.64 (0.43–0.95)
Gender Gap Index (in 1/10)[b]	1.10 (0.60–2.01)	1.60 (0.73–3.51)	1.01 (0.60–1.70)	1.25 (0.59–2.67)
Cross level interaction				
Education*GNI	1.21 (1.15–1.27)	1.09 (1.04–1.14)	1.06 (1.00–1.12)	0.88 (0.79–0.98)
Random effects	Beta (SE)		Beta (SE)	
Variance between countries	0.51 (0.13)	0.88 (0.22)	0.30 (0.08)	0.51 (0.15)

a: That means if the Gini coefficient was for example 30.0 we used a value of 3.0 in the regression to get better interpretable ORs
b: That means if the Gender Gap Index was for example 0.60 we used a value of 6.0 in the regression to get better interpretable ORs

also in a combined analysis. For ease of illustration we collapsed the categories for middle and high education and calculated odds ratios with low education as the reference. All analyses were gender-stratified. The overall effect estimate was calculated according to DerSimonian and Laird.[31] This estimate is a pooled estimate in a random effects meta-analysis. In a random effects analysis it is assumed that the estimates in the different countries form a random sample from a distribution with one central effect value and some degree of variability. The DerSimonian and Laird method incorporates an estimate of between-study variation into the study weights and the standard error of the common effect. Thus heterogeneity between countries with regard to the relationship between education and drinking is taken into account. The method provides the estimation of the total effect as well as an estimate for the variance between country-specific effects. The I^2 statistic is the proportion of total variation in the relationship of drinking and SES that is due to heterogeneity between studies.[32] The I^2 statistic is presented in the figures.

In a second step we combined individual level and country level analyses in a multilevel model to test more covariates on the individual and on the societal levels as well as cross-level interactions (table 2). On the individual level we included variables for highest educational achievement, age (in decades, centred) and a term for age squared as covariates. On the country level we entered GNI, the Gini coefficient and the Gender Gap Index. To test whether the relationship between education and current drinking or monthly RSOD differed between countries of different economic power we additionally included an interaction term.

Results

Table 1 displays information on the study country data sets including number of individuals per country, survey year and the country indicators. The supplementary table displays descriptive data of the survey samples. Countries are ordered according to the GNI. For women in all countries and for men in 29 countries, higher educated persons were more often drinkers than lower educated. Regarding RSOD the results were mixed: in 16 countries lower educated men reported RSOD more often; in 12 countries the opposite was true. In 18 countries higher educated women reported RSOD more often, whereas in nine countries the opposite was true.

Figures 1 and 2 present the results from the meta analysis. Figure 1 shows age-adjusted odds ratios for higher education vs. lower education for drinking status among men and women. Men and women with higher educational attainment were more often drinkers than those with lower educational attainment (OR: 1.50, 95% CI: 1.31–1.73 for men, OR: 1.99, 95% CI: 1.76–2.24 for women). Only among Indian men was the opposite true. For men in nine and for women in two countries there was almost no difference in the prevalence of drinking between lower and higher educated individuals. The I^2 statistics indicates that there is considerable heterogeneity between countries with regard to the relationship between education and drinking (79% for men, 78% for women), but in most of the countries the effect is in the same direction; i.e. higher educated people were more often drinkers than lower educated people. This was true in 23 countries for men and in 31 countries for women.

Monthly RSOD was more prevalent among lower educated men than among higher educated men (figure 2) (OR: 0.89, 95% CI: 0.80–0.99 for men). Country specific odds ratios are more heterogeneous between lower income countries than between higher income countries as indicated by the I^2 statistic (79.4% in lower income countries, 0% in higher income countries).

Regarding monthly RSOD and considering all countries there was no clear direction in the difference between the SES groups for women (OR: 1.05, 95% CI: 0.86–1.27) (figure 2). However, in lower income countries higher educated women reported RSOD more often than lower educated women (OR: 1.55, 95% CI: 1.09–2.19) whereas in high-income countries the opposite occurred (OR: 0.87, 95% CI: 0.73–1.04).

Table 2 displays the results of the multilevel logistic regression models for drinking status and monthly RSOD. Regarding drinking status, the model (left side of table 2) includes individual level variables and all three country level variables simultaneously. Higher education was positively related to drinking status. Age was related to drinking in a non-linear manner: younger and middle aged people were more often drinkers than older people. In countries with a higher GNI the proportion of drinkers was larger than in countries with a lower GNI. This association was significant for women. Among men the proportion of drinkers was smaller in countries with higher income inequality, as indicated by the significant Gini coefficient. Additionally a cross-level interaction term was included: there was a stronger association between individual education and drinking in countries with higher economic power than in those with less economic power.

In the model examining monthly RSOD (right side of table 2) education was negatively associated with RSOD among men. Both

age variables were inversely related to RSOD among men: both younger and middle-aged men were more likely to be RSO drinkers. For women the significant linear term for age indicates that RSOD is more common among younger women.

The Gini coefficient was inversely related to the prevalence of RSOD in that the higher the income inequality, the lower the prevalence of RSOD. In contrast to the model for drinking status, GNI was for both genders negatively associated with RSOD. But the coefficient for the interaction term shows that the negative association between GNI and RSOD was more pronounced for higher educated women than for lower educated women, meaning that higher educated women in lower income countries have a greater likelihood for RSOD in contrast to higher educated women in higher income countries (as well as in contrast to lower educated women in lower income countries). Additionally, in higher income countries lower educated women were more often RSO drinkers than higher educated women (figure 2). Among men those of lower education reported more often RSOD than the higher educated across countries of all incomes. But as indicated by the significant interaction coefficient for education and GNI, the difference in the prevalence of monthly RSOD between lower and higher educated men is more pronounced in lower income countries than in higher income countries (figure 2).

Discussion

The present study has examined social inequalities in drinking behaviour from an international perspective. It has included both individual-level and country-level analyses which provides a more differentiated picture of drinking patterns. Our first hypothesis, predicting that higher SES will be positively associated with current drinking status, could be confirmed in that in the majority of our study countries those of higher education were more likely to be current drinkers. This was true for both genders. Additionally the relationship was found to be stronger in higher income countries as reflected in the interaction term between GNI and education in our multilevel models.

Our second hypothesis, predicting that lower SES would be positively associated with RSOD, could not be confirmed. There were mixed results showing a significant relationship between lower education and RSOD among men, but no significant relationship between education and RSOD among women. However, when examining relationships with country-level variables, our analyses indicated that women of higher education in lower income countries were more likely to engage in RSOD than women of lower education. For men, those of lower education in lower income countries were more likely to engage in RSOD. However, on the country level, risky drinking was more prevalent in countries with more income equality (i.e. a lower Gini coefficient). This result could be due to the fact that RSOD is quite common in the Nordic as well Eastern and Central European countries (see supplementary table). These countries, especially the Nordic countries, have strong welfare states and thus are both high-income countries with high-income equality.[33] Therefore the relationship between high-income equality and RSOD may also be a reflection of regional drinking cultures.

The higher prevalence of RSOD among higher educated women in contrast to lower educated women in lower income countries could be an indication of an emerging trend. This might be understood as the diffusion of an 'innovation' of RSOD among women in lower income countries.[34,35] According to Rogers[34] those first adopting the innovation are individuals or societies of higher education or higher SES. The innovative behaviour then moves to other segments of society.

A model for considering the diffusion phenomenon has been applied by Kuntsche and Gmel[36] to women's smoking in Switzerland. They found a smoking epidemic among women with rates rising and then declining. They also note the role of gender in the diffusion of smoking behaviour: both starting and quitting smoking begins first with higher SES men and then moves to women. Examining smoking rates of women, Schaap *et al.*[5] could also identify a smoking epidemic that spread from higher to lower SES women across all parts of Europe.

Investigators in several higher income countries determined that after the 1960s an increase in women's drinking had occurred.[37,38] Also a narrowing of the gender gap between men's and women's drinking had been identified in Denmark,[39] Finland,[40] the Netherlands,[41] Norway[42] and Sweden.[43]

With both smoking and drinking, similar factors are at work in higher income countries regarding the adoption of such behaviours by women. First, women of higher SES or occupationally active women adopt behaviours of men and then they diffuse to all classes of women. These behaviours, when adopted by women, are associated with symbols of greater gender equality.[5,40]

A question arises as to why in higher income societies lower SES women engaged more in RSOD than higher SES women, rather than all women drinking similarly. This pattern is actually similar to that of cigarette smoking where in most high-income countries, smoking remains highly prevalent among low SES women.[5] But what may be playing a larger role in the present study is the process of affordability of alcohol. In low income countries alcohol is seen as a higher priced commodity. In higher income countries alcohol has become increasingly affordable. For example, Rabinovich *et al.*[44] found that for 19 of the 20 EU member states studied, the affordability of alcohol rose between 1996 and 2005.

This explanation, however, ignores the possibility of 'drinking to cope', which can be a reason for RSOD.[45] Since women in lower income countries are often abstainers, it could be that only high SES women can afford to violate those societies' traditions by drinking. In societies where it is generally acceptable for women to drink, women of low SES may resort to drinking heavily to cope more often than higher SES women who may have other means of coping or have fewer socio-economic stressors. Thus RSOD may be a status privilege in societies where most women abstain, but may be a coping resource for disadvantaged women in societies where women's drinking is more permissible.

Returning to the idea of innovation, women of high SES in lower and middle income countries, especially those countries with growing economies (e.g. Brazil, Mexico, Belize), may be at the forefront of a new wave of 'innovation': that of taking up RSOD in a more frequent manner than other women.

If what is observed in our study is the start of a new trend of drinking among high SES women in lower income countries, it is happening at a time of concern about increased marketing and availability of externally produced beverages. Low income countries normally have a tradition of home-brewed alcohol.[46] Increasingly this is being supplemented or supplanted by imported foreign beverages. The World Health Organization has expressed concern about the consequences of the increased availability of alcohol in countries that have weak national alcohol policies.[46,47] Therefore, monitoring of alcohol intake among various subgroups of the general population in lower income countries should be part of any future alcohol policy development. The detection of beginning trends in hazardous drinking may be caught earlier rather than later and appropriate initiatives taken.

Limitations

Although this research suggests important relationships between drinking patterns and SES at both the individual and country levels, it has limitations. Some countries employed only regional samples; therefore, these results cannot necessarily be considered representative of countries. In addition differences in the method of data collection among countries, in drinking measures and, in some cases, small sample sizes contribute to variations between

countries which can lead to selection and information bias. Also different participation rates[28] between countries and SES groups might lead to biased results. We also tested another classification system for education, the earlier ISCED 97,[48] which accounts more for variations in systems. However, we could not find substantial differences when comparing it to the presently used education classification system. Differences in the definition of RSOD might influence the prevalences of monthly RSOD in the countries but we could not find a correlation between RSOD cut-off and prevalences of monthly RSOD for men or women across countries. Another limitation is the time span of 14 years across our surveys. Developments in alcohol consumption can vary across countries and the picture could look differently if a shorter time span were available. Finally, our study is cross-sectional in nature; thus causal relationships cannot be inferred from the statistically significant associations we have found.

Supplementary Data

Supplementary Data are available at *Eurpub* online.

Acknowledgements

We would like to thank Dr. Ludek Kubicka and Professor Richard Wilsnack for their useful comments on earlier drafts of this article, as well as the helpful comments of three anonymous reviewers. The data used in this paper are from the project, Gender, Alcohol and Culture: An International Study (GENACIS). GENACIS is a collaborative international project affiliated with the Kettil Bruun Society for Social and Epidemiological Research on Alcohol and coordinated by GENACIS partners from the University of North Dakota, Aarhus University, the Alcohol Research Group/Public Health Institute, the Centre for Addiction and Mental Health, the University of Melbourne, and the Swiss Institute for the Prevention of Alcohol and Drug Problems.

Funding

Support for aspects of the project comes from the World Health Organization, the Quality of Life and Management of Living Resources Programme of the European Commission (Concerted Action QLG4-CT-2001-0196), the U.S. National Institute on Alcohol Abuse and Alcoholism/National Institutes of Health (Grants R21 AA012941 and R01 AA015775), the German Federal Ministry of Health, the Pan American Health Organization, and Swiss national funds. Support for individual country surveys was provided by government agencies and other national sources. The study leaders and funding sources for data sets used in this report are: *Argentina:* Myriam Munné, MS, World Health Organization; *Australia:* Paul Dietze, PhD, National Health and Medical Research Council (Grant 398500); *Austria:* Irmgard Eisenbach-Stangl, PhD, Ludwig-Boltzmann-Institut; *Belize:* Claudina Cayetano,MD, Pan American Health Organization; *Brazil:* Florence Kerr-Corréa, MD, PhD, Foundation for the Support of Sao Paulo State Research (Fundação de Amparo a Pesquisa do Estado de São Paulo, FAPESP) (Grant 01/03150-6); *Canada:* Kathryn Graham, PhD, Canadian Institutes of Health Research (CIHR); *Costa Rica:* Julio Bejarano, MSc., World Health Organization; *Czech Republic:* Ladislav Csémy, PhD, Ministry of Health (Grant MZ 23752); *Denmark:* Kim Bloomfield, Dr. P.H., Sygekassernes Helsefond, Danish Medical Research Council; *Finland:* Pia Mäkelä, PhD, National Institute for Health and Welfare (THL); *France:* Fracois Beck, PhD, National Institute of Prevention and Heath Education (INPES); *Germany:* Ludwig Kraus, PhD, German Federal Ministry of Health (BMGS) and in cooperation with the Institute for Therapy Research, Munich, Germany; *Great Britain:* Martin Plant, PhD, and Moira Plant, PhD, Alcohol Education and Research Council, European Forum for Responsible Drinking, University of the West of England, Bristol; *Hungary:* Zsuzsanna Elekes, PhD, Ministry of Youth and Sport; *Iceland:* Hildigunnur Ólafsdóttir, PhD, Alcohol and Drug Abuse Prevention Council, Public Health Institute of Iceland, Reykjavík, Iceland; *India:* Vivek Benegal, MD,World Health Organization; *Israel:* Giora Rahav, PhD, and Meir Teichman, PhD, Anti Drugs Authority of Israel; *Italy*: Allaman Allamani, PhD, Centro Alcologico, Florence Health Agency, Regional Health Agency of Tuscany; *Japan:* Shinji Shimizu, PhD, Japan Society for the Promotion of Science (Grant 13410072); *Kazakhstan:* Bedel Sarbayev, PhD, World Health Organization; *Mexico:* Maria-Elena Medina-Mora, PhD, Ministry of Health, Mexico, Office of Antinarcotics Issues; US Embassy in Mexico; National Institute of Psychiatry; National Council Against Addictions; General Directorate of Epidemiology and Subsecretary of Prevention and Control of Diseases, Ministry of Health, Mexico; *the Netherlands:* Ronald Knibbe, PhD, Ministry of Health and Welfare of the Netherlands; *New Zealand:* Jennie Connor, PhD, Otago University Research Grant; *Nicaragua:* José Trinidad Caldera Aburto, MD, PhD, Pan American Health Organization; *Nigeria:* Akanidomo Ibanga, MSc, World Health Organization; *Norway:* Sturla Nordlund, PhD, Norwegian Institute for Alcohol and Drug Research; *Spain:* Juan Carlos Valderrama, MD, Dirección General de Atención a la Dependencia, Conselleria de Sanidad, Generalitat Valenciana; Comisionado do Plan de Galicia sobre Drogas, Conselleria de Sanidade, Xunta de Galicia; Dirección General de Drogodependencias y Servicios Sociales, Gobierno de Cantabria; *Sri Lanka:* Siri Hettige, PhD, World Health Organization; *Sweden:* Karin Helmersson Bergmark, PhD, Ministry for Social Affairs and Health, Sweden; *Switzerland:* Gerhard Gmel, PhD, Swiss Federal Office for Education and Science (Contract 01.0366); Swiss Federal Statistical Office; University of North Dakota (Subcontract no. 254, Amendment No.2, UND Fund 4153- 0425); *Uganda:* M. Nazarius Tumwesigye, PhD, World Health Organization; *USA:* Thomas Greenfield, PhD, National Institute on Alcohol Abuse and Alcoholism/ National Institutes of Health (Grant P50 AA05595); *Uruguay:* Raquel Magri, MD, World Health Organization.

Conflicts of interest: None declared.

Key points

- First study to examine social inequalities in alcohol consumption among men and women in 33 countries.
- Both individual level and country-level indicators of socio-economic status (SES) were included in multi-level analyses
- In most countries those of higher SES were more likely to currently consume alcohol.
- Men of lower SES were more likely to engage in risky episodic drinking.
- Women of higher SES in lower income countries were more likely to engage in risky episodic drinking. This finding should be kept in mind when developing new policy and prevention initiatives.

References

1 Dow WH, Rehkopf DH. Socioeconomic gradients in health in international and historical context. *Ann N Y Acad Sci* 2010;1186:24–36.

2 Mackenbach JP, Stirbu I, Roskam AJ, et al. Socioeconomic inequalities in health in 22 European countries. *N Engl J Med* 2008;358:2468–81.

3 Bambra C, Pope D, Swami V, et al. Gender, health inequalities and welfare state regimes: a cross-national study of 13 European countries. *J Epidemiol Community Health* 2009;63:38–44.

4 Bloomfield K, Grittner U, Kramer S, Gmel G. Social inequalities in alcohol consumption and alcohol-related problems in the study countries of the EU concerted action 'Gender, Culture and Alcohol Problems: a Multi-national Study'. *Alcohol Alcohol Suppl* 2006;41:i26–36.

5 Schaap MM, Kunst AE, Leinsalu M, et al. Female ever-smoking, education, emancipation and economic development in 19 European countries. *Soc Sci Med* 2009;68: 1271–8.

6 Pickett KE, Pearl M. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *J Epidemiol Community Health* 2001;55: 111–22.

7 Mohan J, Twigg L, Barnard S, Jones K. Social capital, geography and health: a small-area analysis for England. *Soc Sci Med* 2005;60:1267–83.

8 Backlund E, Rowe G, Lynch J, et al. Income inequality and mortality: a multilevel prospective study of 521 248 individuals in 50 US states. *Int J Epidemiol* 2007;36: 590–6.

9 Bosma H, van de Mheen HD, Borsboom GJ, Mackenbach JP. Neighborhood socioeconomic status and all-cause mortality. *Am J Epidemiol* 2001;153:363–71.

10 Roos LL, Magoon J, Gupta S, et al. Socioeconomic determinants of mortality in two Canadian provinces: multilevel modelling and neighborhood context. *Soc Sci Med* 2004;59:1435–47.

11 Marmot M. Inequality, deprivation and alcohol use. *Addiction* 1997; 92(Suppl 1):13–20.

12 van Oers JA, Bongers IM, van de Goor LA, Garretsen HF. Alcohol consumption, alcohol-related problems, problem drinking, and socioeconomic status. *Alcohol Alcohol* 1999;34:78–88.

13 Bloomfield K. Alcohol consumption and alcohol problems among women in european countries. *Subst Abus* 2000;21:223–29.

14 Almeida-Filho N, Lessa I, Magalhaes L, et al. Social inequality and alcohol consumption-abuse in Bahia, Brazil– interactions of gender, ethnicity and social class. *Soc Psychiatry Psychiatr Epidemiol* 2005;40:214–22.

15 Neumark YD, Rahav G, Jaffe DH. Socio-economic status and binge drinking in Israel. *Drug Alcohol Depend* 2003;69:15–21.

16 Malyutina S, Bobak M, Kurilovitch S, et al. Trends in alcohol intake by education and marital status in urban population in Russia between the mid 1980s and the mid 1990s. *Alcohol Alcohol* 2004;39:64–9.

17 Graham K, Bernards S, Knibbe R, et al. Alcohol-related negative consequences among drinkers around the world. *Addiction* 2011;106:139–405.

18 Rahav G, Wilsnack R, Bloomfield K, et al. The influence of societal level factors on men's and women's alcohol consumption and alcohol problems. *Alcohol Alcohol Suppl* 2006;4:i4755.

19 Kabeer N. *Reversed Realities*. London: Verso, 1994.

20 Boserup E. *Womens Role in Economic Development*. Trowbridge: Cromwell Press, 1970.

21 Wilkinson R. Income distribution and life espectancy. *BMJ* 1992;304:165–8.

22 Wilkinson R, Pickett K. Income inequality and population health: a review and explanation of the evidence. *Soc Sci Med* 2006;62:1768–84.

23 Blomgren J, Martikainen P, Mäkelä P, Valkonen T. The effects of regional characteristics on alcohol-related mortality – a register-based multilevel analysis of 1.1 million men. *Soc Sci Med* 2004;58:2523–35.

24 Galea S, Ahern J, Tracy M, Vlahov D. Neighborhood income and income distribution and the use of cigarettes, alcohol and marijuana. *Am J Prev Med* 2007;32: S195–202.

25 Dietze P, Jolley D, Chikritzhs T, et al. Income inequality and alcohol attributable harm in Australia. *BMC Pub Health* 2009. Available at: www.biomed.com/1471-2458/9/70 (date last accessed 12 October 2011).

26 Wilsnack RW, Wilsnack SC, Kristjanson AF, et al. Gender and alcohol consumption: patterns from the multinational GENACIS project. *Addiction* 2009;104:1487–500.

27 World Bank. Available at: http://databank.worldbank.org/ddp/home.do (date last accessed 5 May 2010).

28 United Nations Development Programme. Human Development Report 2007/2008 - Fighting climate change: human solidarity in a divided world. New York: Oxford University Press, 2007.

29 Hausmann R, Tyson LD, Zahidi S. The Global Gender Gap Report 2006. Geneva: World Economic Forum, 2006.

30 World Bank. Available at: http://data.worldbank.org/about/country-classifications (5 May 2010, date last accessed), 2010b.

31 DerSimonian R, Laird N. Meta-analysis in clinical trials. *Control Clin Trials* 1986;7: 177–88.

32 Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ* 2003;327:557–60.

33 Bambra C. Going beyond the three worlds of welfare capitalism: regime theory and public health research. *J Epidemiol Comm Health* 2007;61:1098–102.

34 Rogers E. *Diffusion of Innovations*. London: The Free Press, 2003.

35 Ferrence R. Diffusion theory and drug use. *Addiction* 2001;96:165–73.

36 Kuntsche S, Gmel G. The smoking epidemic in Switzerland–an empirical examination of the theory of diffusion of innovations. *Soz Praventivmed* 2005;50: 344–54.

37 Knibbe RA, Drop MJ, Van Reek MJ, Saenger G. The development of alcohol consumption in the Netherlands: 1958-1981. *Br J Addict* 1985;80:411–9.

38 Bengtsson C, Allebeck P, Lissner L, et al. Alcohol habits in Swedish women: observations from the population study of women in Gothenburg, Sweden 1968-1993. *Alcohol Alcohol* 1998;33:533–40.

39 Saelan H, Moller L, Koster A. Alcohol consumption in a Danish cohort during 11 years. *Scand J Soc Med* 1992;20:87–93.

40 Bloomfield K, Gmel G, Neve R, Mustonen H. Investigating gender convergence in alcohol consumption in Finland, Germany, The Netherlands, and Switzerland: a repeated survey analysis. *Subst Abus* 2001;22:39–53.

41 Neve RJ, Diederiks JP, Knibbe RA, Drop MJ. Developments in drinking behaviour in The Netherlands from 1958 to 1989, a cohort analysis. *Addiction* 1993;88: 611–21.

42 Hammer T, Vaglum P. The increase in alcohol consumption among women: a phenomenon related to accessibility or stress? A general population study. *Br J Addict* 1989;84:767–75.

43 Bergmark KH. Gender roles, family, and drinking: women at the crossroad of drinking cultures. *J Fam Hist* 2004;29:293–307.

44 Rabinovich L, Brutscher PB, de Vried H, et al. The Affordability of Alcoholic Beverages in the European Union: Understanding the Link between Alcohol Affordability, Consumption and Harms. Cambridge, UK, etc. 2009: RAND Europe. Available at: http://www.rand.org/pubs/technical_reports/TR689 (10 August 2011, date last accessed).

45 Cooper M, Frone M, Russell M, Peirce R. Gender, stress, coping and alcohol use. In: Wilsnack RW, Wilsnack SC, editors. *Gender and Alcohol: Individual and Social Perspectives*. New Brunswick, NJ: Rutgers Center for Alcohol Studies, 1997: 199–224.

46 World-Health-Organization. Global Status Report on Alcohol and Health. 2011. Available at: http://www.who.int/substance_abuse/publications/global_alcohol_report/msbgsruprofiles.pdf (5 May 2010, date last accessed).

47 Burki T. Changing drinking patterns: a sobering thought. *Lancet* 2010;376:153–4.

48 OECD. Classifying Educational Programmes, Manual for ISCED-97 Implementation in OECDCountries. 1999 Edition. OECD 1999, Paris. Available at: www.oecd.org/LongAbstract/0,2546,en_2649_34515_1897801_119669_1_1_1,00.html (date last accessed 12 October 2011).