Socioeconomic status and alcohol use in low- and lower-middle income countries:

A systematic review

Luke Allen MPH[1], Nick Townsend PhD[1], Julianne Williams MPH[1], Bente Mikkelsen MD[2], Nia Roberts PhD[3], Kremlin Wickramasinghe DPhil[1]

[1]British Heart Foundation Centre on Population Based Approaches for Non-Communicable Disease Prevention, Nuffield Department of Population Health, University of Oxford, Oxford, United Kingdom

[2]WHO Global Coordination Mechanisms on the Prevention and Control of Non-communicable diseases, World Health Organization, Geneva, Switzerland

[3]Health Care Libraries, Bodleian Libraries, University of Oxford, Oxford, United Kingdom

Corresponding author:

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ABSTRACT

The role of alcohol as a driver of the unfolding non-communicable disease crisis has led to high-profile calls for better epidemiological data. Despite causing a disproportionate amount of harm in low-income groups, there is a critical dearth of evidence on the intra-national socioeconomic patterning of alcohol use in low- and lower-middle income countries (LLMICs). This review aims to fill the gap, providing evidence on the association between socioeconomic status (SES) and alcohol use in these low-income settings. We conducted a comprehensive literature search for primary research published between January 1st 1990 and June 30th 2015 using 13 electronic databases, including Embase and Medline, as well as a grey literature review and hand searching of references. We included studies from LLMICs presenting data on multiple measures of socioeconomic status and alcohol use. No age or language restrictions were applied. Due to high heterogeneity we used a narrative approach for data synthesis. After reviewing 4,242 records, and 247 full-text articles, 23 studies met our inclusion criteria reporting data on 861,295 individuals aged >10 years from ten countries. Alcohol use was found to be more prevalent in lower socioeconomic groups in the majority of South East Asian studies. The association was mixed for African studies, although these tended to have smaller sample sizes and weaker methods. Studies that measured multiple domains of SES found reasonable agreement between different indicators. Definitions of alcohol use and abuse varied widely between studies, as did socioeconomic groupings. The lack of consistency between studies and the abject lack of data from the majority of LLMICs presents a major barrier to policymakers tasked with reducing alcohol-related harm in these settings. Adherence to standardised definitions, the publication of WHO survey data on alcohol and SES, and enhanced surveillance is needed to build an accurate picture of the socioeconomic patterning of alcohol use in developing countries.

INTRODUCTION

Harmful use of alcohol contributes to over 200 different medical conditions and causes 5.9% of all global deaths; 3.3 million per year.[1] Since 1990 alcohol use has overtaken other risk factors including unsafe water, unsafe sanitation, non-exclusive breastfeeding and indoor air pollution to become the sixth most important cause of Disability-Adjusted Life Years (DALYs) worldwide.[2] Alcohol is also one of the four major behavioural risk factors driving the global rise of non-communicable diseases (NCDs) alongside physical inactivity, unhealthy diets, and tobacco.[3] NCDs are responsible for 70% of all deaths and - far from being diseases of affluence – 82% of premature mortality occurs low- and middle-income countries and risk of premature death is highest in these settings.[2, 3] To a large degree it is still not clear how NCD behavioural risk factors are distributed within these countries, including whether the most materially deprived groups have a higher or lower risk burden than relatively affluent groups.[1]

Previous evidence on the global epidemiology of alcohol use includes the 2014 Global Status Report which presents data on alcohol use at a country level, stratified by sex but not by socioeconomic status.[1] A review of surveys from 11 LMIC WHO sub-regions reported lower alcohol use amongst low-income groups compared with the relatively affluent.[4] This review was non-systematic and relied on imputing consumption levels from household economic data. The few remaining sources of global alcohol data, largely drawn from high-income countries, suggest that low-income groups are more likely to abstain from alcohol, but those that drink tend to engage in high risk drinking patterns and experience disproportionately more adverse health consequences than more affluent drinkers.[1, 5, 6]

This paper fills a critical gap in the literature by systematically reviewing studies from low- and lower-middle income countries that quantify the association between SES and alcohol use. It is the first to apply a rigorous and comprehensive methodology to the subject, and used broad definitions of alcohol use and SES to capture all relevant research. The findings from this paper are of importance for global policymakers, practitioners involved in NCD prevention and control, and the wider alcohol community.

MATERIAL AND METHODS

The WHO commissioned a comprehensive review of the four major behavioural risk factors in low- and lower middle-income countries (LLMICs) which has been published elsewhere.[ref] This paper provides an expanded analysis of the studies that provide data on alcohol use.

Search strategy and selection criteria

Using a registered protocol (PROSPERO: CRD42015026604) and following PRISMA guidelines[7] (Appendix 1) we identified records published from 1st January 1990 - 30th July 2015, searching Embase, MEDLINE, Web of Science, Global Health and TRoPHI. We also searched grey literature in Digital Dissertations (Global full-text plus), WHOLIS (WHO Library) and the WHO regional databases: AIM (AFRO), LILACS (AMRO/PAHO), IMEMR (EMRO), IMSEAR (SEARO), and WPRIM (WPRO). We reviewed the first 30 hits from Google Scholar and searched MEDLINE In-process & other non-indexed citations, and the websites of the World Bank, DFID, USAID, and WHO, as well as scrutinising reference lists and contacting key authors to uncover additional or forthcoming work.

The same dates and strategy (Box 1) was used for all searches, tailored to specific databases by LA and an experienced medical librarian (NR). Ethics committee approval was not required for this work.

We conducted the search in English but did not restrict results by language or age range. Records were included if they presented primary data from one or more of the 84 LLMICs, as defined by the 2013 World Bank analytic classifications[8] on one or more NCD behavioural risk factor (defined by WHO as tobacco use, unhealthy diet, harmful alcohol use, and physical inactivity[3]), stratified by at least one socioeconomic indicator. We then filtered out all studies that examined alcohol use. We included direct measures of SES, income, wealth, assets, education, caste, and - where categories were ordinal - occupation. We excluded studies that did not allow comparison between more and less advantaged groups. Authors were contacted for additional data where poverty and behavioural risk factors were measured but reported independently.

Study selection and data extraction

Using a piloted form two reviewers independently screened titles and abstracts, stopping to compare decisions at 10% intervals (every 424 records). When interrater agreement exceeded 95%

and Cohen's kappa >0·75 ('excellent' agreement[9]) a single reviewer screened all remaining records independently, bringing any uncertainties to the group. The same protocol was used for full text review. Where data from included studies were unclear or if more information was required the authors were contacted by email. If this information was not available the study was excluded.

LA used a piloted version of the Cochrane EPOC Group data collection checklist[10] to extract relevant data from the included full text studies including study type, methods, outcomes, and results (see Appendix 2 for full list of variables). JW independently cross-checked a random 10% sample of included papers. Disagreements and ambiguities were resolved by full group consensus.

Risk of bias (quality) assessment

We assessed quality using a modified Newcastle-Ottawa scale[11] as recommended by the Cochrane Collaboration.[12] Appropriate versions of the scoring rubric were used for randomised controlled trials (RCTs), case-control and cross-sectional studies. Scores were based on design-specific sources of bias, methods for selecting participants, exposure measures, outcome variables, and methods to control for confounding. Source of funding was recorded for each study and presented in Table 1 along with study quality scores.

Strategy for data synthesis

Significant heterogeneity between studies, particularly in the exposure and outcome measures precluded meta-analysis. We adopted a narrative approach to data synthesis, grouping studies by outcome measure and WHO region. We analysed differences between men and women, and between different WHO regions.

Role of funding source

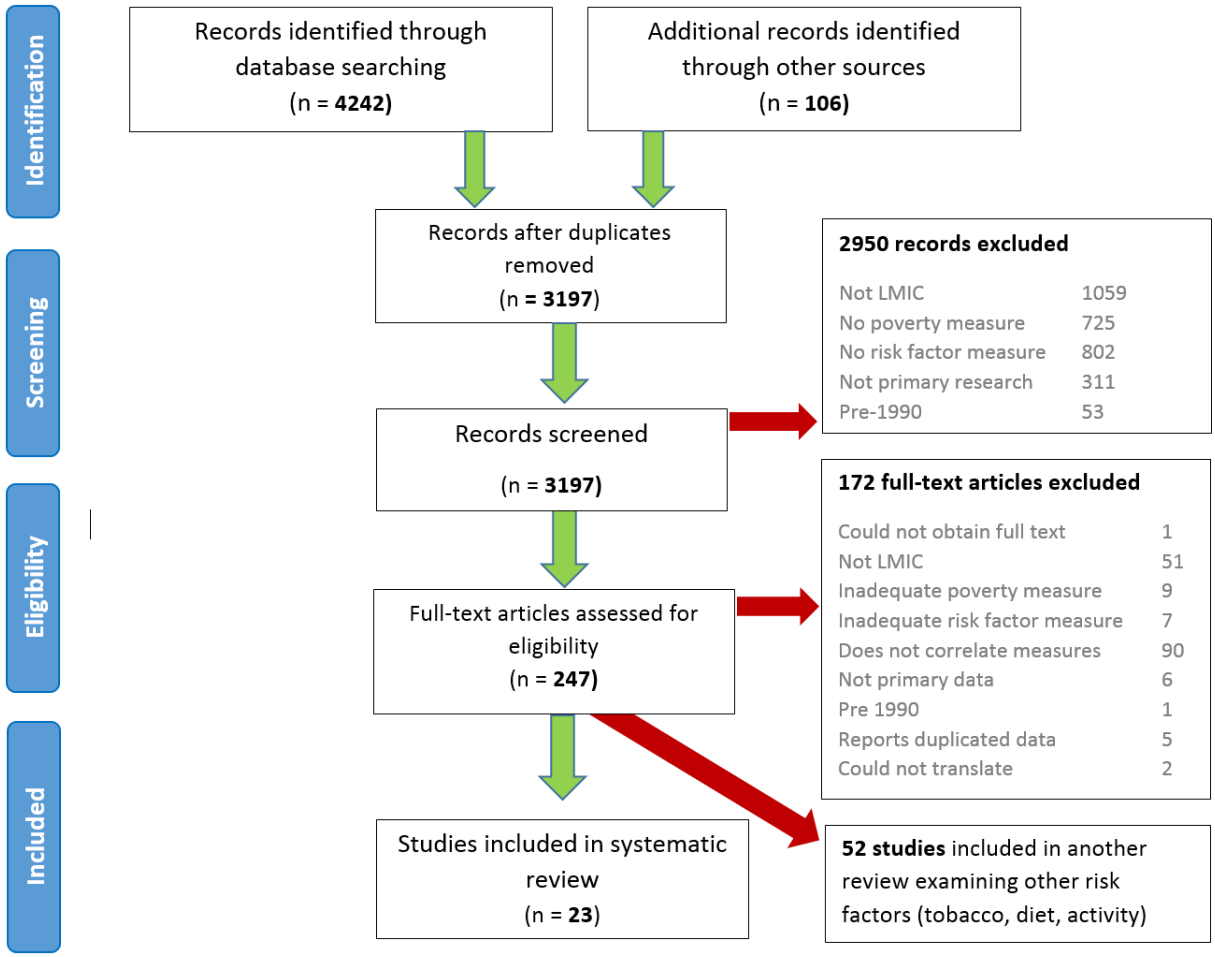
The original review of all four risk factors was commissioned and funded by the WHO. LA conducted this study whilst supported by funds from the WHO. NT and KW are supported by a grant from the British Heart Foundation (006/P&C/CORE/2013/OXFSTATS). JW is supported by the Nuffield Department of Population Health, University of Oxford. BM is a WHO employee and NR is employed by the Bodleian Libraries, University of Oxford.

The lead author had full access to all data in the study and final responsibility for the decision to submit for publication.

RESULTS

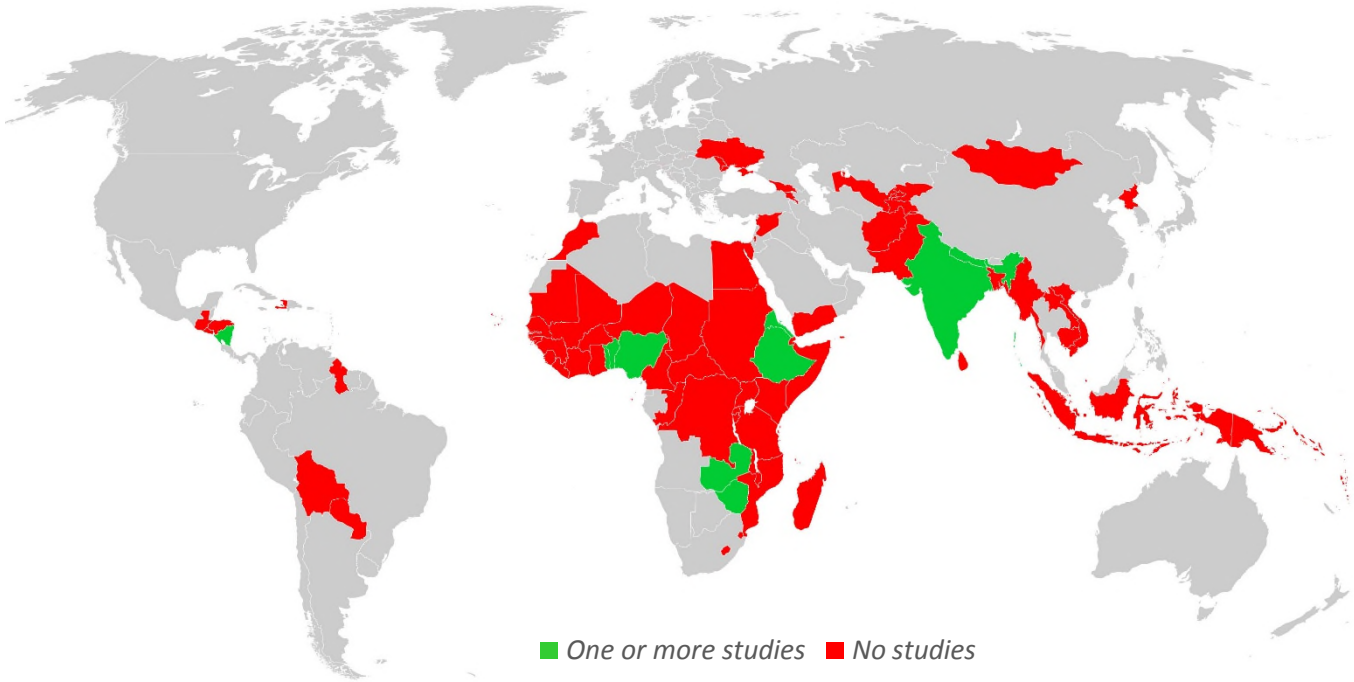
Our literature search returned 4,242 records and 106 additional records were retrieved from other sources (Figure 1). Over 1,000 papers were from higher- or upper-middle income countries. Among these papers Brazil and China were disproportionately represented. We assessed 247 full-text articles, of which 75 stratified one or more of the four main risk factors by SES. The 51 studies pertaining to diet, tobacco, and/or physical activity were set aside for another review. Twenty-three studies met our inclusion criteria stratifying alcohol use by SES in LLMICs.[13-35]

Figure 1: **PRISMA flow chart**



These 23 articles covered ten countries and presented data on 861,295 individuals aged >10 years. Global representation was poor overall and skewed towards South East Asia. There were no papers from the Western Pacific, Eastern Mediterranean or European regions and 74 LLMICs were not represented (Figure 2). Twelve studies were based in India, one came from Nepal, one from Nicaragua and the remaining nine came from Zimbabwe, Zambia, Togo, Ethiopia, Eritrea, Nigeria and Benin.

Figure 2: **Sources of data from LLMICs**



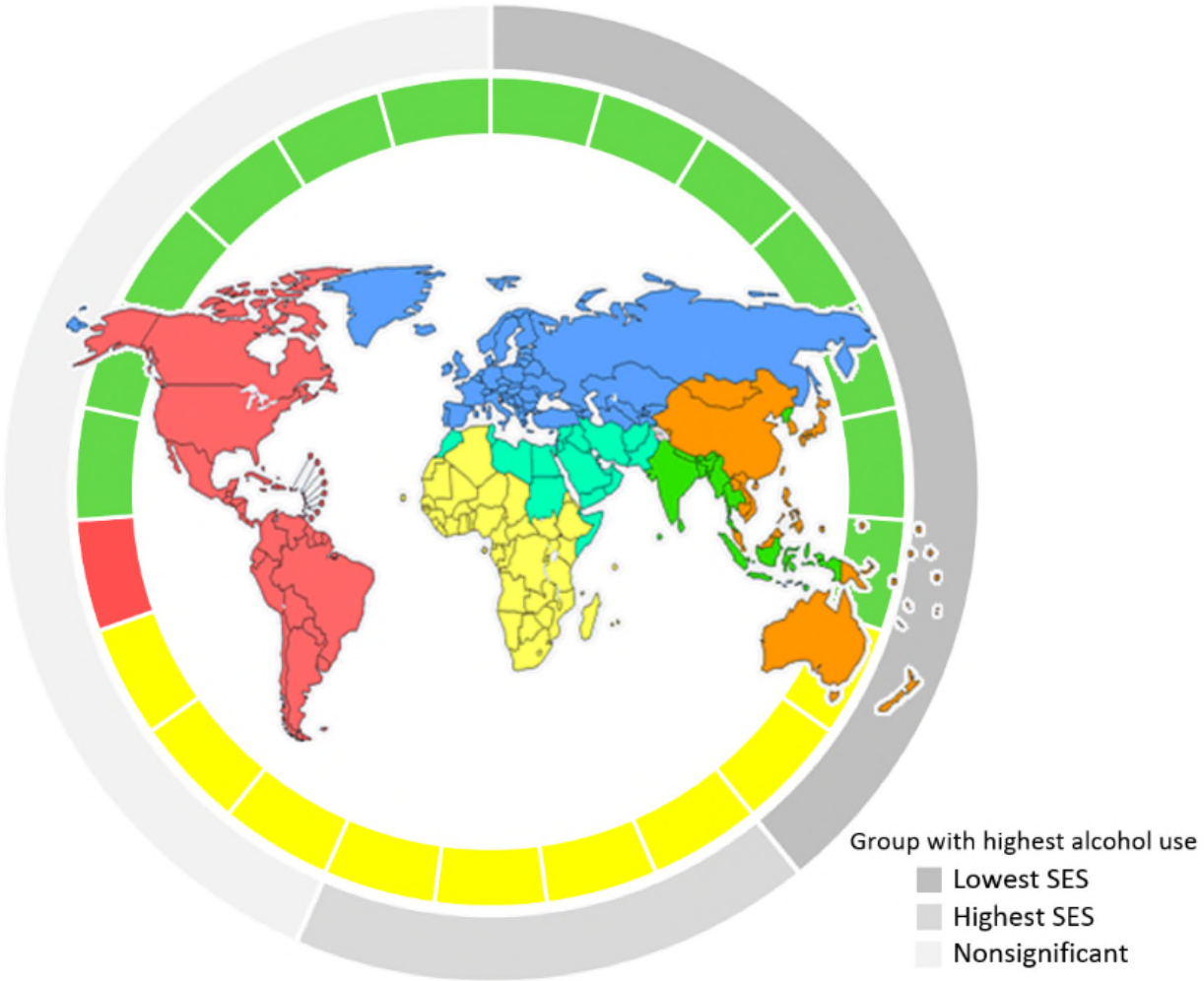
The median sample size (individuals for whom data of interest were reported) was 2,033 and the range was 66 - 471,143. The number of papers published annually increased over the study period of 1996-2015, with over half (n=14) published since 2010.

Nine studies found higher prevalence of alcohol use among lower socioeconomic groups [16, 20-22, 24, 25, 27, 28, 33] and ten studies reported findings that were either mixed or not significant at the 0.05 level.[13-15, 17-19, 23, 26, 31, 35] Four studies – all from Africa - reported higher use among higher socioeconomic groups (Figure 4).[29, 30, 32, 34]

None of the studies from South East Asia found higher use among higher socioeconomic groups. The nine African studies tended to be smaller and more likely to report higher alcohol use among high SES groups.

Figure 4: **Study origins and findings**

Each inner circle segment represents one of the 23 studies. The colour indicates geographic origin whilst relation to the outer segments indicates overall finding



With the exception of four WHO STEPs surveys, all papers had been peer-reviewed. There were two cohort studies,[20, 32], two case-control studies,[25, 26] one RCT[34] and the remaining 18 studies were cross-sectional. Three studies were graded as low quality (including the RCT), 13 were moderate, and seven were of high quality including both case-control studies.

All of the studies used self-report survey instruments delivered by an investigator in the participant's native language. Six studies used nationally representative samples,[13, 16, 21, 25, 27, 33] three were representative at the state level, [14, 22, 23] six studies were multi-site, [17, 19, 30, 32, 34, 35] and eight studies were based in specific populations according to location,[15, 20, 28] occupation,[29, 31] medical status,[24, 26] or birth cohort.[18]

Types of exposures

The included studies used measures of income, education, occupation, state-defined poverty, caste and SES, mainly derived from wealth/asset scoring or combining other measures. Thirteen studies used one SES proxy, six used two measures, [18, 19, 24, 26, 32, 34] and four studies used three different measures of SES.[23, 25, 27, 28] Of the ten studies reporting multiple dimensions of SES (e.g. education and income) only one found significant conflicting results (highest alcohol use in low-income but high-education groups).[26] The other nine studies reported concordant findings. The widest differences in alcohol use were observed between those with secondary education vs those with no formal schooling. Differences between income strata were the least pronounced.

Types of outcomes

Table 1 shows the range of outcome definitions used. Six studies reported findings that can be used to determine the socioeconomic distribution of 'harmful' alcohol use.[16, 19, 24, 31, 32, 34] The remaining 17 studies reported variations of 'any alcohol use'.

Fourteen studies reported prevalence with percentages, seven used odds ratios [15, 17, 18, 25, 27, 35] and two studies presented grams of ethanol consumed by each socioeconomic groups.[31, 32]

***Table 1*: Studies reporting measures of harmful use**

Study	Outcome	Definition
General definitions of alcohol use		
Laux et al. (2012) Nicaragua	Ever user	Ever drank alcohol
WHO STEPS (2007) India	Current drinkers	Drank alcohol in last 12 months
Kar (2010) India	Current alcohol intake	Undefined
WHO STEPS (2008) Zambia	Alcohol consumption	Undefined
Rahlenbeck et al. (1998) Ethiopia	Alcohol use	Undefined
Samuel et al. (2012) India	Alcohol use	Undefined
Hashibe et al. (2003) India	Alcohol use	Undefined
WHO STEPS (2004) Eritrea	Alcohol use	Drink alcohol
Taylor et al (1996) Nigeria	Alcohol use	Drink alcohol
Subramanian et al. (2005) India	Alcohol use	Drink alcohol
Dhungana et al. (2014). Nepal	Alcohol use	Use of alcohol until up to 30 days before interview
Neufeld et al. (2005) India	Alcohol use	Regular use of any alcoholic beverage
Zaman et al. (2012) India	Alcohol use	>1 drink on >1 day/week
Houehanou et al. (2015) Benin	Alcohol use	Drink alcohol >4 days/week
Deepa et al. (2011) India	Alcohol use	Drinks any quantity of alcohol daily
Kinra et al. (2010) India	Alcohol use	Consumed >10 days/month any time in previous 6 months
Menon et al. (2015) India	1) Alcohol 2) Number of drinks per week	1) Undefined 2) Categorical: <1, 1, 2, 3, 4, 5, 6, 7
Definitions that can be used to gauge harmful use		
Bunker et al. (1996) Nigeria	Alcohol use	Ethanol intake grams/week
Sossa et al. (2013) Benin	Alcohol intake	Ethanol intake grams/day
Gupta et al. (2012) India	Alcohol abuse	Undefined - probably >7 drinks/week
Cubbins et al. (2012) Zimbabwe	1) Current alcohol consumption 2) Frequency of alcohol consumption 3) Quantity of drinks consumed 2) Frequency of getting drunk	1) Drank alcohol at least once in last 30 days 2) Number of days drank in last 30 days 3) On days that you drink alcohol, how many drinks do you have? 4) In the last 30 days, how many times did you get drunk?
Pillai et al. (2013) India	1) Drunkenness 2) Frequent heavy drinking 3) High risk alcohol consumption	1) Feel drunk at least once per week 2) >5 drinks in a single occasion at least once a month 3) >60g pure alcohol consumed per drinking day in the last 12 months
WHO STEPS (2010) Togo	Harmful alcohol consumption	≥60 g of pure alcohol a day for men and ≥40 g for women

Harmful use of alcohol

India - Gupta et al. presented adjusted prevalence rates of undefined 'alcohol abuse' in their high quality study surveying 6,198 residents from middle-class areas of 11 Indian cities. Associations varied by measure of SES: rates were lowest in the lower occupational groups (5.1%); commensurate across SES groups (at around 11.5%); and highest amongst highly educated groups (11.5% vs 9.6% in least-educated). The authors do not present measures of statistical significance.[19]

Amongst drinkers in Goa, lower socioeconomic groups drank more often and were three times more likely to engage in frequent heavy drinking than wealthier and more educated groups. However well-educated groups were eight times more likely to consume large amounts of alcohol on drinking occasions ($P<0.01$).[24]

Africa - The WHO Togo STEPS survey demonstrated a significantly higher unadjusted prevalence of harmful alcohol use (>60g men; >40g women) in those with no formal education. The study had a representative sample of 4,370 people but presented unadjusted results.[16]

Cubbins et al. presented data from 5,543 young adults from 30 sites in rural Zimbabwe. Baseline data from this low quality RCT suggest that drunkenness, frequency of alcohol consumption, and quantity of alcohol consumed were positively correlated with years of education and months in paid employment ($p<0.05$).[34]

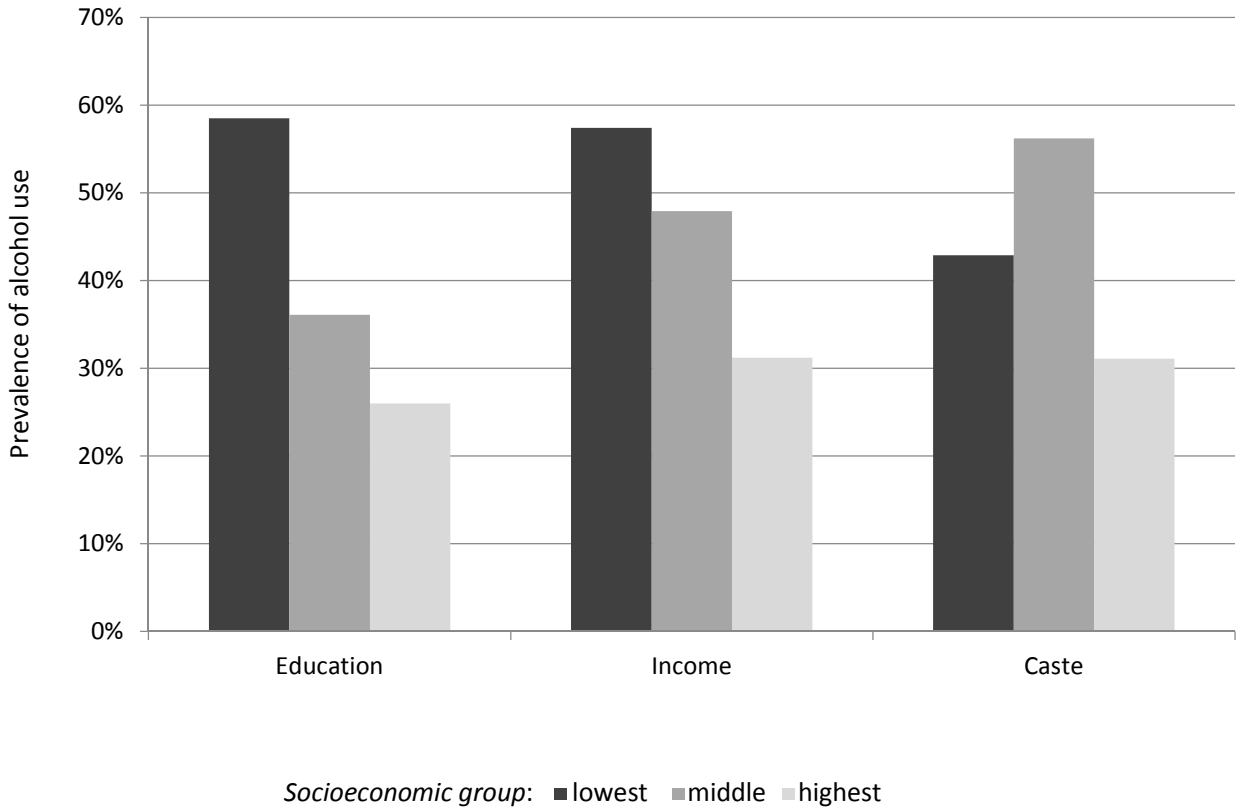
Data from the small (n=208) multisite cohort-study by Sossa et al. in Benin suggested that those with a high school education consumed twice as much ethanol as those with no formal schooling.[32] At 8.2g per day, this level of drinking is within international recommended levels.[36, 37] In a much older study Bunker et al. found Nigerian civil servants to consume higher amounts of ethanol (23g/day for male junior staff), however these findings were non-significant at $p<0.05$.[31]

Regional patterns in the prevalence of alcohol use

South East Asia - Ten studies were based in Indian populations and consistently demonstrated that lower-income, less-educated, unskilled, and lower-caste groups had the highest prevalence of alcohol use.[14, 17, 18, 20-23, 25-27] The four prevalence studies in general populations reported that use ranged from 4% - 26.6%.[14, 20, 22, 26]. The two studies stratifying by sex found large differences between men and women.[21, 23] Less than 2% of female villagers in Andhra Pradesh drank alcohol once per week compared to around a quarter of men.[23]

A prevalence study from Nepal reported higher overall alcohol use than the Indian studies (ranging from 25%-58.5%) but a similar socioeconomic patterning.[28] Middle castes had the highest prevalence of alcohol use, along with the least-educated and those with the lowest incomes (Figure 5).

Figure 5: **Prevalence of alcohol use among different socioeconomic groups in Nepal**



Africa - Three of the six African studies were moderate-quality WHO STEPs surveys[13, 15, 16], a further three were small, low-moderate quality cross-sectional studies from the 1990's.[29-31] The remaining three consisted of a low quality RCT,[34] a large moderate-quality study based on a STEPs survey,[33] and a small moderate-quality cohort study.[32]

The older studies found income to correlate positively with alcohol use[29, 30] and a nonsignificant association with job seniority amongst Beninese civil servants.[31] In 2015 Houehanou et al. found alcohol use to be significantly higher amongst the low-income Beninese groups using nationally