

## Article

# Harms to Adults from Others' Heavy Drinking in Five Indian States

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## Abstract

**Aims:** The aims of this study were to assess a wide range of alcohol-related harms from known heavy drinkers in Indian respondents' lives, and to assess respondents' characteristics and drinking patterns associated with reporting these harms.

**Methods:** Household interviews were administered in five Indian states from October 2011 to May 2012. For the secondary data analyses in this study, participants were Indians, ages 15–70, who self-reported having a heavy drinker in their lives ( $n = 5,375$ ). We assessed the proportion of respondents reporting seventeen types of alcohol-related harms from a heavy drinker.

**Results:** Approximately 83% of respondents reported at least one alcohol-related harm from a heavy drinker in their lives. Twenty-five percent of respondents reported physical harm, 6% reported sexual harm and 50% reported emotional harm or neglect. Controlling for other factors, being in the upper income quartiles was associated with reporting  $\geq 5$  harm types. Among females, being age 25–39 and married/cohabitating predicted reporting  $\geq 5$  harm types, while among males, being age 25–39 or age 40–70 and living in a rural area increased the odds. Among females, binge drinkers had 46% lower odds of reporting  $\geq 5$  harm types than abstainers; among males, binge drinkers had 54% greater odds.

**Conclusion:** Regardless of respondents' own drinking pattern, a substantial proportion of respondents reported experiencing a range of harms from a known heavy drinker; interventions are needed to reduce these harms.

## INTRODUCTION

Alcohol consumption contributed to approximately 350,000 deaths in India in 2010, making it the eighth leading cause of death in the country (Institute for Health Metrics and Evaluation, 2013). Less than one-sixth of the Indian population consumes alcohol; however,

among those who drink, they consume a high quantity per capita (World Health Organization, 2014). This pattern of heavy drinking is associated with increased risk of negative outcomes, such as injuries and chronic and infectious diseases (Saxena, 1999; Rajeswari *et al.*, 2002; Chandra *et al.*, 2003; Gururaj, 2004, 2008; Das *et al.*, 2012).

Emerging evidence suggests that adverse alcohol-related outcomes also impact those who do not drink (Gururaj *et al.*, 2006a,b).

Alcohol-related harm from others, or ‘the harm experienced as a result of someone else’s drinking’ (Laslett *et al.*, 2011), is documented in a growing body of evidence, primarily from high-income countries (Nutt *et al.*, 2007; Dale and Livingston, 2010; Giesbrecht *et al.*, 2010; Connor and Casswell, 2012). Recently, researchers in Australia and New Zealand have specifically examined alcohol-related harm from a heavy drinker in respondents’ lives (Casswell *et al.*, 2011; Laslett *et al.*, 2011). Among subsets of respondents who indicated having a heavy drinker in their lives who negatively affected them the most, nearly 30% of Australians and 84% of New Zealanders experienced an adverse outcome due to the heavy drinker in the past year (Casswell *et al.*, 2011; Laslett *et al.*, 2011).

Indian studies have also looked at alcohol-related harm from others, covering relatively small geographic areas (Gururaj *et al.*, 2006b; Benegal *et al.*, 2008; Benegal, 2009; Babu and Kar, 2010). One study in Eastern India found that women with alcoholic husbands experienced 5–13 times greater risk of violence, varying by risk for physical, psychological and sexual violence (Babu and Kar, 2010). In the southern city of Bangalore, drinkers reported abusing their parents (3%), siblings/family members (8%), friends/neighbors (21%) and children (27%), and attributed between 41% and 83% of these abuses to alcohol (Gururaj *et al.*, 2006b). Among injured emergency department patients in a Bangalore hospital, 13% reported that another person’s drinking led to their injury (Benegal, 2009). Furthermore, a study in the Andaman and Nicobar Islands found that approximately 20% of the respondents experienced alcohol-related harm from others’ drinking, such as being assaulted, experiencing family problems and being insulted/disturbed (Benegal *et al.*, 2008).

These findings suggest that a large proportion of alcohol-related harm from others remains undocumented across the country. The compilation of evidence on alcohol-related harm from others’ drinking has the potential to contribute to health policy decisions and stimulate changes in alcohol control policies that could effectively reduce the burden. The aims of this study were to assess a wide range of alcohol-related harms from known heavy drinkers in Indian respondents’ lives, and to assess respondents’ socio-demographic characteristics and drinking patterns associated with reporting these harms.

## METHODS

### Sampling and design

This cross-sectional study analyzes data from a parent study administered by the Indian National Institute of Mental Health and Neuro Sciences (NIMHANS) and conducted by local collaborators. The aim of the parent study was to assess patterns and consequences of alcohol misuse in India, using a case-control design to obtain an equal proportion of alcohol abstainers and drinkers (National Institute of Mental Health and Neuro Sciences, 2012). Between October 2011 and May 2012, participants were recruited for household interviews from five diverse geographical areas throughout India: Andhra Pradesh, Gujarat, Maharashtra, Odisha and Sikkim. A description of the study sites is provided elsewhere (National Institute of Mental Health and Neuro Sciences, 2012). Each of the five sites employed purposive quota sampling (Daniel, 2012) and aimed to recruit 2000 participants (1000 drinkers, 1000 matched controls by sex and age). In two sites, less than 2000 respondents were sampled because of logistical and administrative data collection issues. Using a stratified sampling technique, field staff randomly recruited 30% of the sample based on Census Enumeration

Blocks in urban areas and 70% from a random sample of rural villages, reflecting proportions of the Indian population.

Field staff recruited participants aged 15–70 years. Participants were recruited if they were at least 15 years old, as this generally represents the drinking population (World Health Organization, 2014). In the original study’s case-control design, cases were defined as those who had consumed an alcoholic beverage at least one time in the past year. Controls were defined as those who had not consumed an alcoholic beverage at least one time in the past year. A purposive sampling technique was employed in order to reach segments of the population that may have been missed through probability sampling techniques (e.g. female drinkers and young drinkers). Due to the lower prevalence of alcohol consumption among females (approximately 5%) and younger adults (approximately 11%) (Benegal *et al.*, 2005; International Institute for Population Sciences and Macro International, 2007), in households with multiple drinkers, interviewers prioritized drinkers who were female drinkers or males younger than 25. Amongst other adults, if there was more than one drinker from the same category, simple random sampling techniques were used to recruit one member. A minimum of three attempts were made before declaring a person as a non-responder. Of the 8567 heads of households approached by interviewers, the parent study sample included 8333 respondents, yielding a refusal rate of 2.7%. This refusal rate aligns with other Indian studies, which are often very low (Gururaj *et al.*, 2006b; Babu and Kar, 2010; Nayak *et al.*, 2010; Pillai *et al.*, 2013).

Household interviews were conducted face-to-face in the local language or in English and lasted approximately 45 min. The interviewers collected verbal consent and did not offer incentives. The present study is restricted to the subset of respondents who self-reported having a person in their lives whom they perceived to be a heavy drinker ( $n = 5375$ ). The parent study was approved by the NIMHANS Ethical Committee and the Ethical Review Committee of the World Health Organization (WHO). The Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB) determined that IRB oversight was not required for the secondary data analysis in this paper.

## Measures

### Harm from a heavy drinker

Respondent responses to interview questions on alcohol-related harm from a heavy drinker in their lives were analyzed. The questions came from a larger WHO/Thai Health international research initiative on the assessment of alcohol-related harms to others in low- and middle-income countries (World Health Organization, 2012). Respondents were asked, ‘Thinking about the last 12 months, can you think of anyone [else] among the people in your life—your family, friends, coworkers or others—who you would consider to be a fairly heavy drinker, or someone who drinks a lot sometimes?’ Heavy drinking was not defined in the interview. Respondents who answered ‘yes’ indicated the type of relationship with a heavy drinker (see Table 2 for relationship types) and the frequency in the past year of reporting any of the 17 different types of alcohol-related harms from the identified heavy drinker (see Table 3 for exact wording of the types of harms).

We summed the non-never responses to the 17 questions to calculate the number of harm types reported, ranging from 0 to 17. The number of harm types has been found to be a useful measure for assessing alcohol-related harm from others’ drinking; a study of Australian respondents who identified the most harmful drinker in their lives found a positive association between higher numbers of reported harm types and higher scores of being ‘harmed a lot’ in the past

year (Callinan, 2014). For the logistic regression analyses, we dichotomized the number of harm types reported into less than or equal to the mean versus greater than the mean. The choice to use a cut-point above the mean facilitated the exploration of characteristics associated with a subset who reported a relatively high number of harm types.

### Independent variables

Respondents were also asked about their socio-demographic characteristics and drinking patterns. Participants were matched by sex and age for recruitment. Dummy variables were created to compare strata of age groups, education, family income and respondents' drinking patterns. Alcohol abstainers were defined as those who had not consumed an alcoholic beverage in the past year. Non-binge drinkers were defined as those who had consumed an alcoholic beverage in the past year but had not consumed  $\geq 5$  drinks during any occasion. Binge drinkers were defined as respondents who consumed  $\geq 5$  drinks on an occasion in the past year.

### Analysis

Analyses were conducted using Stata 12.1 (Stata Corp, 2011). We calculated proportions of respondents reporting each type of relationship with a heavy drinker with responses of 'no' = 0 and 'yes' = 1. We assessed sex-specific proportions of reported past-year frequencies (never = 0, occasional = 1–4, frequent  $\geq 5$  times) for each type of harm.

To calculate unadjusted odds ratios (OR) for reporting greater than the mean number of harm types, we employed binary logistic regression. We conducted separate binary logistic regression analyses by sex, for each of the socio-demographic variables and for respondents' drinking pattern to assess how each variable was independently associated with reporting  $\geq 5$  harm types. To examine associations while holding potential confounders constant, we conducted sex-specific multiple logistic regression (Hosmer and Lemeshow, 2000). We controlled for socio-demographic variables of theoretical importance (i.e. age group, marital status, rurality and respondents' drinking) (Benegal *et al.*, 2005; International Institute for Population Sciences and Macro International, 2007). We did not adjust for family income in the main analysis because the real-life value of an Indian rupee varies considerably in urban and rural areas. Missing data that could not be imputed based on responses to other questions were treated as missing in analyses (typically missing was <2%). Differences were considered statistically significant if  $P < 0.05$ .

## RESULTS

Table 1 describes the characteristics of those in this study who reported having a heavy drinker in their lives ( $n = 5375$ ). Nearly 36% were female, almost 47% abstained from alcohol in the past year and 25% reported binge drinking.

### Relationship to a heavy drinker

Respondents were allowed to identify more than one heavy drinker and accordingly, could indicate multiple relationship types. Females most often identified a spouse as a heavy drinker (65.6%), which was significantly greater than the proportion of males reporting a spouse (5.7%,  $P < 0.001$ ) (Table 2). The greatest proportion of males indicated neighbors as a heavy drinker in their lives (57.1%), which was also commonly reported by females (52.9%).

### Types of alcohol-related harms from others' heavy drinking

Approximately 83% of respondents reported at least one harm type resulting from having a heavy drinker in their lives across domains of physical, sexual, psychological, financial and social harm. Respondents reported an average of 4.0 different harm types (standard error = 0.05). Among all respondents, between 13.3 and 25.5% reported a type of physical harm, ranging from the proportion injured in an accident to being physically hurt (Table 3). Sexual harm was less common; 6.1% of respondents reported being forced or pressured into sex or something sexual in the past year. The majority of respondents reported psychological harm, including having a serious argument (66.2%) and being emotionally hurt or neglected (50.2%). Between 13.1 and 22.1% reported a type of harm in the financial domain, ranging from the proportion who went without food because of a household member's drinking to those who had money or valuables taken.

In the social harm domain, 15.9% of respondents had to leave home to stay somewhere else because of a heavy drinker in their lives. The other five social harms were even more common (e.g. 19.7% saw friends/family less because of embarrassment about someone in the household's drinking and 21.4% stopped seeing a heavy drinker in his or her life). Without controlling for potential confounders, females and males appear to have reported a similar proportion of each harm type. However, for 12 of the 17 harm types, the proportions of males reporting frequent experiences of the harms were greater than the proportions of females reporting frequent experiences, including harms in the physical, financial and social domains.

### Associations between socio-demographic characteristics, respondents' drinking and reporting harms

In a multiple logistic regression model that included sex, age group, marital status, rurality and respondents' own drinking, males had approximately 1.5 greater odds of reporting  $\geq 5$  harm types than females ( $P < 0.001$ ) (Supplementary Table 1). Among all respondents, being age 25–39 or age 40–70, married/cohabitating and living in a rural area also significantly predicted reporting  $\geq 5$  harm types, controlling for other factors.

Among females, controlling for other factors, being age 25–39 and being married/cohabitating significantly predicted reporting  $\geq 5$  harm types, but being age 40–70 and living in a rural area was not significantly associated with reporting of harms (Table 4). Additionally, female respondents in the upper family income quartiles had greater odds of reporting  $\geq 5$  harm types compared with the lowest income quartile, controlling for age group, marital status, rurality and respondents' drinking. Those in the second quartile had 1.4 greater odds of reporting  $\geq 5$  harm types ( $P = 0.034$ ), those in the third income quartile had 1.9 ( $P < 0.001$ ) and respondents in the highest quartile had 3.4 greater odds, compared with those in the lowest income quartile ( $P < 0.001$ ). Among males, controlling for other factors, being age 25–39 or age 40–70 and living in a rural area significantly predicted reporting  $\geq 5$  harm types, but being married/cohabitating was not significantly associated with reporting of harms (Table 5). Male respondents in the upper two family income quartiles also had greater odds of reporting  $\geq 5$  harm types compared with the lowest income quartile, and the magnitude was similar to that of females.

The odds of reporting greater than the mean number ( $\geq 5$ ) of types of harm from a heavy drinker varied by sex and respondents' drinking patterns (Tables 4 and 5). Among both sexes, differences between abstainers and non-binge drinkers were not significant, controlling for

**Table 1.** Description of study sample reporting having a heavy drinker in their lives, by sex ( $n = 5375$ )

Characteristic	Females, $n$ (%)	Males, $n$ (%)	Total, $n$ (%)
Overall	1902 (35.5)	3457 (64.5)	5359 <sup>a</sup>
Age group			
15–24	314 (16.7)	427 (12.4)	741 (13.9)
25–39	929 (49.3)	1433 (41.7)	2362 (44.4)
40–70	642 (34.1)	1574 (45.8)	2216 (41.7)
Education			
None	852 (45.1)	800 (23.4)	1652 (31.1)
Primary	260 (13.8)	403 (11.8)	663 (12.5)
$\geq$ Secondary	778 (41.2)	2220 (64.9)	2998 (56.4)
Marital status			
Not married nor cohabitating <sup>b</sup>	240 (13.1)	467 (13.8)	707 (13.5)
Married/cohabitating	1592 (86.9)	2922 (86.2)	4514 (86.5)
Rurality			
Urban	527 (28.0)	1077 (31.5)	1604 (30.2)
Rural	1353 (72.0)	2348 (68.6)	3701 (69.8)
Work status <sup>c</sup>			
Not currently working	98 (5.2)	232 (6.8)	330 (6.2)
Working	1793 (94.8)	3194 (93.2)	4987 (93.8)
Family income, in rupees, past year (US\$ equivalent)			
0–<35,000 (US\$ 0–<580)	473 (26.0)	571 (16.8)	1044 (20.0)
35,000–<70,000 (US\$580–<1160)	587 (32.2)	1070 (31.5)	1657 (31.8)
70,000–<110,000 (US\$ 1160–<1820)	341 (18.7)	718 (21.2)	1059 (20.3)
$\geq$ 110,000 (US\$ $\geq$ 1820)	422 (23.2)	1034 (30.5)	1456 (27.9)
Respondent's drinking <sup>d</sup>			
Abstainer	1408 (80.4)	898 (28.3)	2306 (46.9)
Non-binge drinker	190 (10.9)	1218 (38.4)	1408 (28.6)
Binge drinker	153 (8.7)	1054 (33.3)	1207 (24.5)

<sup>a</sup>Missing responses were excluded from analyses so samples sizes do not add to 5375 for all characteristics.

<sup>b</sup>Includes never married, separated, divorced, abandoned, widowed.

<sup>c</sup>Not currently working includes in school/training, have a job, not working, unemployed/looking for work, unemployed/not looking for work, disabled/unable to work, enrolled in educational program but not attending and retired. Working consists of all types of work, including housewives.

<sup>d</sup>Abstainers are defined as those who have not consumed an alcoholic beverage in the past year. Non-binge drinkers are defined as those who have consumed an alcoholic beverage in the past year but have not had five or more drinks during any occasion. Binge drinkers are defined as those who have consumed five or more drinks on any occasion in the past year.

**Table 2.** Respondents' relationship to heavy drinker in past year by sex<sup>a</sup>

Relationship to heavy drinker	Females		Males		$\chi^2$ test <i>P</i> -value <sup>b</sup>
	<i>n</i>	% (95% CI)	<i>N</i>	% (95% CI)	
Spouse	1247	65.6 (63.4–67.7)	197	5.7 (4.9–6.5)	<0.001
Neighbor	1008	52.9 (50.8–55.2)	1973	57.1 (55.4–58.7)	0.004
Father/brother/male relative	323	17.0 (15.3–18.7)	662	19.1 (17.8–20.5)	0.050
Male friend/colleague	204	10.7 (9.3–12.1)	1749	50.6 (48.9–52.3)	<0.001
Sister/female relative	57	3.0 (2.2–3.8)	62	1.8 (1.4–2.2)	0.004
Female friend/colleague	133	7.0 (5.8–8.1)	86	2.5 (2.0–3.0)	<0.001
Child	86	4.5 (3.6–5.5)	36	1.0 (0.7–1.4)	<0.001

CI, confidence interval.

<sup>a</sup>Respondents were allowed to indicate having types of relationship in more than one category, if they had more than one heavy drinker in their lives.

<sup>b</sup>Chi-squared test of differences by sex (differences significant at  $P < 0.05$ ).

age group, marital status and rurality. Among females, binge drinkers had 46% (OR = 0.54) lower odds of reporting  $\geq 5$  harm types than abstainers ( $P = 0.006$ ), while among males, binge drinkers had 54% (OR = 1.54) greater odds ( $P < 0.001$ ).

## DISCUSSION

Among a sample of Indians who report having a heavy drinker in their lives, we found that respondents reported experiencing a broad range

of alcohol-related harms due to a heavy drinker in their lives, including physical, sexual, psychological, financial and social harms. Approximately 83% of respondents reported at least one harm imposed by a heavy drinker in the past year. Our study shows that alcohol-related harm from others' heavy drinking is a major problem; for instance, approximately one-fourth of respondents were threatened with violence or a weapon by a heavy drinker, and a similar proportion were physically hurt. These findings corroborate with other Indian studies that have also documented alcohol-related harm from others, including

**Table 3.** Proportion of reported frequency of harm in past year due to a heavy drinker in one's life, by type of harm and sex (*n* = 5375)

Harm type	Females, % (95% Confidence interval)			Males, % (95% Confidence interval)			Total Ever <sup>b</sup>
	Never <sup>a</sup>	Occasional <sup>a</sup>	Frequent <sup>a</sup>	Never <sup>a</sup>	Occasional <sup>a</sup>	Frequent <sup>a</sup>	
<b>Physical</b>							
Were you threatened with violence/weapon?	79.6 (77.8–81.4)	16.7 (15.0–18.4)	3.7 (2.9–4.6)	75.4 (73.9–76.8)	19.0 (17.7–20.3)	5.6 (4.9–6.4)	23.1 (22.0–24.2)
Were you physically hurt?	73.4 (71.4–75.4)	21.5 (19.7–23.4)	5.1 (4.1–6.1)	75.1 (73.6–76.6)	20.3 (19.0–21.7)	4.6 (3.9–5.3)	25.5 (24.3–26.7)
Were you put at risk in a car/motorcycle while they were driving?	90.1 (89.4–92.0)	7.2 (6.1–8.4)	2.0 (1.4–2.7)	83.4 (82.2–84.7)	13.4 (12.3–14.6)	3.1 (2.5–3.7)	13.9 (13.0–14.9)
Were you injured in an accident because of any of these people's drinking?	90.1 (89.5–92.1)	6.2 (5.1–7.3)	3.0 (2.2–3.8)	84.5 (83.2–85.7)	11.1 (10.1–12.2)	4.4 (3.7–5.0)	13.3 (12.4–14.2)
<b>Sexual</b>							
Were you forced or pressured into sex or something sexual?	91.3 (90.0–92.6)	6.9 (5.8–8.1)	2.8 (1.2–2.4)	95.3 (0.95–0.96)	3.4 (2.9–4.1)	1.2 (0.8–1.6)	6.1 (5.5–6.7)
<b>Psychological</b>							
Did you have a serious argument?	30.0 (27.8–31.9)	48.7 (46.5–51.0)	21.4 (19.5–23.2)	35.9 (34.3–37.5)	47.3 (45.6–49.0)	16.8 (15.5–18.0)	66.2 (64.9–67.5)
Were you emotionally hurt or neglected?	46.1 (43.8–48.4)	39.4 (37.2–41.6)	14.5 (12.9–16.1)	51.9 (50.2–53.6)	36.2 (34.5–37.8)	11.9 (10.8–13.0)	50.2 (48.8–51.5)
<b>Financial</b>							
You have gone without food because of someone in the household's drinking?	87.4 (85.9–88.9)	8.9 (7.6–10.1)	3.7 (2.9–4.6)	86.6 (85.4–87.7)	10.2 (9.2–11.2)	3.2 (2.6–3.8)	13.1 (12.2–14.0)
There was less money for household expenses because of someone in the household using the money for drinking?	81.2 (79.4–83.0)	12.4 (10.9–13.9)	6.4 (5.3–7.5)	82.1 (80.8–83.4)	10.3 (9.3–11.3)	7.6 (6.7–8.5)	18.3 (17.2–19.3)
They took money or valuables that were yours?	77.7 (75.8–79.6)	15.4 (13.8–17.0)	6.9 (5.7–8.0)	78.0 (76.6–79.4)	14.4 (13.2–15.5)	7.6 (6.7–8.5)	22.1 (21.0–23.2)
They broke or damage something that mattered to you because of their drinking?	85.1 (83.4–86.7)	11.2 (9.7–12.6)	3.8 (2.9–4.7)	82.8 (81.6–84.1)	12.7 (11.6–13.8)	4.5 (3.8–5.2)	16.4 (15.4–17.4)
<b>Social</b>							
You had to leave home to stay somewhere else?	85.4 (83.8–87.0)	11.0 (9.6–12.4)	3.6 (2.7–4.4)	83.3 (82.1–84.6)	11.2 (10.1–12.2)	5.5 (4.7–6.3)	15.9 (15.0–16.9)
They failed to do something they were being counted on to do?	74.2 (72.2–76.2)	18.9 (17.1–20.7)	6.9 (5.7–8.0)	70.2 (68.6–71.7)	22.1 (20.7–23.5)	7.7 (6.8–8.6)	28.4 (27.2–29.6)
Someone in the household did not do their share of work around the house?	76.9 (75.0–78.8)	16.6 (14.9–18.3)	6.5 (5.4–7.6)	74.3 (72.9–75.8)	19.1 (17.8–20.4)	6.6 (5.7–7.4)	24.7 (23.6–25.9)
You do not see friends/family as much because you are embarrassed about someone in the household's drinking?	84.1 (82.5–85.8)	12.4 (10.9–13.9)	3.5 (2.6–4.3)	78.2 (76.8–79.6)	14.5 (13.4–15.7)	7.3 (6.4–8.2)	19.7 (18.6–20.8)
Did you stop seeing any of these people?	83.3 (81.6–85.0)	11.4 (9.9–12.8)	5.3 (4.3–6.4)	76.0 (74.6–77.5)	16.3 (15.1–17.6)	7.6 (6.8–8.5)	21.4 (20.3–22.6)
Their drinking spoiled a social occasion you were at?	78.1 (76.2–80.0)	16.3 (14.6–17.9)	5.6 (4.6–6.7)	71.0 (69.5–72.5)	19.3 (18.0–20.6)	9.7 (8.7–10.7)	26.5 (25.3–27.7)

<sup>a</sup>Never is defined as reporting the specific harm zero times in the past year; occasional is defined as 1–4 times in the past year and frequent is defined as five or more times in the past year.

<sup>b</sup>Among all respondents, reported the specific harm in the past year.

**Table 4.** Females odds of reporting  $\geq 5$  types of harm due to heavy drinker in past year by socio-demographics and respondents' drinking ( $n = 1826$ )

Characteristic	$\geq 5$ types <i>n</i> (%)	Binary logistic regression <sup>a</sup>			Multiple logistic regression <sup>b</sup>	
		<i>n</i>	Odds ratio (95% CI)	<i>P</i> -value	Odds ratio (95% CI)	<i>P</i> -value
Age group		1810				
15–24	70 (23.0)		Ref.		Ref.	
25–39	304 (34.3)		<b>1.74 (1.29–2.36)</b>	<b>&lt;0.001</b>	<b>1.46 (1.05–2.03)</b>	<b>0.025</b>
40–70	193 (31.1)		<b>1.51 (1.10–2.07)</b>	<b>0.011</b>	<b>1.37 (0.97–1.94)</b>	<b>0.070</b>
Education		1814				
None	225 (27.2)		Ref.			
Primary	63 (25.6)		0.92 (0.67–1.28)	0.627		
$\geq$ Secondary	278 (37.6)		<b>1.61 (1.30–2.00)</b>	<b>&lt;0.001</b>		
Marital status		1762				
Not married nor cohabitating <sup>c</sup>	30 (13.3)		Ref.		Ref.	
Married/cohabitating	521 (33.9)		<b>3.33 (2.24–4.97)</b>	<b>&lt;0.001</b>	<b>2.87 (1.87–4.39)</b>	<b>&lt;0.001</b>
Rurality		1806				
Urban	149 (29.8)		Ref.		Ref.	
Rural	412 (31.6)		1.09 (0.87–1.36)	0.473	0.98 (0.77–1.26)	0.894
Work status <sup>d</sup>						
Not currently working	24 (26.1)	1816	Ref.			
Working	543 (31.5)		1.30 (0.81–2.10)	0.277		
Family income (in rupees, past year)		1762				
0–<35,000	100 (21.6)		Ref.		Ref.	
35,000–<70,000	144 (25.3)		1.23 (0.92–1.64)	0.168	<b>1.42 (1.03–1.96)</b>	<b>0.034</b>
70,000–<110,000	108 (33.2)		<b>1.81 (1.31–2.49)</b>	<b>&lt;0.001</b>	<b>1.92 (1.33–2.76)</b>	<b>&lt;0.001</b>
$\geq$ 110,000	196 (48.5)		<b>3.42 (2.55–4.59)</b>	<b>&lt;0.001</b>	<b>3.44 (2.42–4.89)</b>	<b>&lt;0.001</b>
Respondent's drinking <sup>e</sup>		1693				
Abstainer	434 (31.9)		Ref.		Ref.	
Non-binge drinker	42 (23.1)		<b>0.64 (0.45–0.92)</b>	<b>0.017</b>	0.69 (0.47–1.01)	0.054
Binge drinker	27 (18.1)		<b>0.47 (0.31–0.73)</b>	<b>0.001</b>	<b>0.54 (0.35–0.84)</b>	<b>0.006</b>

Boldface indicates statistical significance ( $P < 0.05$ ).

CI, confidence interval.

<sup>a</sup>Odds ratios from binary logistic regression for reporting greater than the mean (i.e.  $\geq 5$ ) types of alcohol-related harms.

<sup>b</sup>Adjusted odds ratios from multiple logistic regression for reporting greater than the mean (i.e.  $\geq 5$ ) types of alcohol-related harms, controlling for age group, marital status, rurality and respondents' binge drinking pattern ( $n = 1609$ ). In the multiple logistic regression model with the family income variable,  $n = 1556$ .

<sup>c</sup>Includes never married, separated, divorced, abandoned, widowed.

<sup>d</sup>Not currently working includes in school/training, have a job, not working, unemployed/looking for work, unemployed/not looking for work, disabled/unable to work, enrolled in educational program but not attending and retired. Working consists of all types of work, including housewives.

<sup>e</sup>Abstainers are defined as those who have not consumed an alcoholic beverage in the past year. Non-binge drinkers are defined as those who have consumed an alcoholic beverage in the past year but have not had five or more drinks during any occasion. Binge drinkers are defined as those who have consumed five or more drinks on any occasion in the past year.

intimate partner violence (The International Center for Research on Women and The Centre for Development and Population Activities, 2000; Babu and Kar, 2010; Nayak *et al.*, 2010; Pillai *et al.*, 2013), abuse (Gururaj *et al.*, 2006b), injuries (Benegal, 2009) and financial problems (Gururaj *et al.*, 2006b; Nayak *et al.*, 2010).

Thus far, the literature has focused more on Indian women's experiences of harm from their partners (The International Center for Research on Women and The Centre for Development and Population Activities, 2000; Babu and Kar, 2010; Nayak *et al.*, 2010; Pillai *et al.*, 2013) than on men's experiences of harm from people known to them. Our study deviates from the current literature and shows that compared with females, males actually have greater odds of reporting  $\geq 5$  harm types, primarily due to alcohol use by their neighbors and male friends or colleagues. Among males, we found that being older than age 24 and living in a rural area predicted reporting  $\geq 5$  harm types resulting from a known heavy drinker in their lives, controlling for potential confounders. These predictors reflect the characteristics associated with a greater prevalence of alcohol consumption, as documented by the third wave of India's National Family Health Survey and other studies (Benegal *et al.*, 2005; International Institute for

Population Sciences and Macro International, 2007). Overall, males had greater odds of reporting  $\geq 5$  harm types than females, but among female respondents, those aged 25–39 and married/cohabitating also had increased odds of reporting  $\geq 5$  harm types. By age 40–70, the increased odds were no longer statistically significantly associated with the reporting of many harms, nor was living in a rural area. It is possible that these sex-specific associations would differ slightly if we examined the odds of reporting harms by domains of harms rather than an overall number of harms; however, our findings do not suggest that the proportions of females and males reporting each type of harm vary substantially.

An unexpected finding in our study was that males and females in the upper income quartiles had 1.5–3.4 greater odds of reporting  $\geq 5$  harm types than those in the lowest income quartile. Other studies have generally found associations between lower income and increased likelihood of drinking and negative outcomes (Benegal *et al.*, 2005; International Institute for Population Sciences and Macro International, 2007; Pillai *et al.*, 2013); however, the proportion of abstainers in our study was similar across income quartiles so it is unknown why members of the upper income quartiles had greater odds of reporting many

**Table 5.** Males odds of reporting  $\geq 5$  types of harm due to heavy drinker in past year by socio-demographics and respondents' drinking ( $n = 3254$ )

Characteristic	$\geq 5$ types $n$ (%)	Binary logistic regression <sup>a</sup>			Multiple logistic regression <sup>b</sup>	
		$n$	Odds ratio (95% CI)	$P$ -value	Odds ratio (95% CI)	$P$ -value
Age group						
15–24	101 (24.3)	3232	Ref.		Ref.	
25–39	551 (40.7)		<b>2.13 (1.66–2.73)</b>	<b>&lt;0.001</b>	<b>1.84 (1.37–2.49)</b>	<b>&lt;0.001</b>
40–70	579 (39.6)		<b>2.04 (1.59–2.61)</b>	<b>&lt;0.001</b>	<b>1.61 (1.19–2.18)</b>	<b>0.002</b>
Education		3227				
None	226 (31.0)		Ref.			
Primary	121 (31.4)		1.02 (0.78–1.33)	0.894		
$\geq$ Secondary	884 (41.9)		<b>1.61 (1.34–1.92)</b>	<b>&lt;0.001</b>		
Marital status		3197				
Not married nor cohabitating <sup>c</sup>	124 (27.1)		Ref.		Ref.	
Married/cohabitating	1090 (39.8)		<b>1.78 (1.43–2.22)</b>	<b>&lt;0.001</b>	1.26 (0.96–1.66)	0.092
Rurality		3231				
Urban	336 (32.5)		Ref.		Ref.	
Rural	887 (40.4)		<b>1.41 (1.20–1.64)</b>	<b>&lt;0.001</b>	<b>1.30 (1.10–1.54)</b>	<b>0.002</b>
Work status <sup>d</sup>		3229				
Not currently working	77 (35.5)		Ref.			
Working	1150 (38.2)		1.12 (0.84–1.50)	0.429		
Family income (in rupees, past year)		3193				
0–<35,000	180 (33.7)		Ref.		Ref.	
35,000–<70,000	273 (27.6)		<b>0.75 (0.60–0.94)</b>	<b>0.012</b>	0.86 (0.72–1.07)	0.192
70,000–<110,000	249 (36.5)		1.13 (0.89–1.43)	0.310	<b>1.48 (1.14–1.93)</b>	<b>0.003</b>
$\geq$ 110,000	513 (52.0)		<b>2.13 (1.71–2.65)</b>	<b>&lt;0.001</b>	<b>2.71 (2.10–3.48)</b>	<b>&lt;0.001</b>
Respondent's drinking <sup>e</sup>		2994				
Abstainer	294 (35.1)		Ref.		Ref.	
Non-binge drinker	370 (32.6)		0.89 (0.74–1.08)	0.235	0.89 (0.73–1.08)	0.221
Binge drinker	466 (45.6)		<b>1.55 (1.29–1.87)</b>	<b>&lt;0.001</b>	<b>1.54 (1.27–1.87)</b>	<b>&lt;0.001</b>

Boldface indicates statistical significance ( $P < 0.05$ ).

CI, confidence interval.

<sup>a</sup>Odds ratios from binary logistic regression for reporting greater than the mean (i.e.  $\geq 5$ ) types of alcohol-related harms.

<sup>b</sup>Adjusted odds ratios from multiple logistic regression for reporting greater than the mean (i.e.  $\geq 5$ ) types of alcohol-related harms, controlling for age group, marital status, rurality and respondents' binge drinking pattern ( $n = 2913$ ). In the multiple logistic regression model with the family income variable,  $n = 2866$ .

<sup>c</sup>Includes never married, separated, divorced, abandoned, widowed.

<sup>d</sup>Not currently working includes in school/training, have a job, not working, unemployed/looking for work, unemployed/not looking for work, disabled/unable to work, enrolled in educational program but not attending and retired. Working consists of all types of work, including housewives.

<sup>e</sup>Abstainers are defined as those who have not consumed an alcoholic beverage in the past year. Non-binge drinkers are defined as those who have consumed an alcoholic beverage in the past year but have not had five or more drinks during any occasion. Binge drinkers are defined as those who have consumed five or more drinks on any occasion in the past year.

harm types. These findings need to be interpreted cautiously, though, because income levels and the standard of living varies across the country, and therefore, the value of an Indian rupee is not equal in all areas. The sample in this study was comprised of 30% from urban areas and 70% from rural areas, which we controlled for in the analysis, though we were unable to control for more localized costs of living.

Nevertheless, the trend suggesting the increased odds for reporting a high number of harm types among those in the upper income quartiles compared with those with relatively low family incomes may, in part, be due to the greater amounts of money available to spend on alcohol and their corresponding drinking patterns (Caetano and Laranjeira, 2006). With the growing middle class, alcohol consumption has been steadily rising (Benegal, 2005; Prasad, 2009), partly due to the globalization of the alcohol industry (Jernigan, 2009; Esser and Jernigan, in press). Increasing population-level alcohol consumption is associated with alcohol-related problems (Rehm *et al.*, 2009); thus, alcohol control policy interventions may help prevent alcohol-related harms from others' drinking (World Health Organization, 2014). For states that do not have complete alcohol prohibition,

the WHO has recommended policy interventions to reduce alcohol-related harms among the general population, such as reducing alcohol outlet density and limiting the days and hours of alcohol sales (World Health Organization, 2010, 2014), based on strong evidence of effectiveness (Babor *et al.*, 2010).

Although male binge drinkers had the greatest odds of reporting  $\geq 5$  harm types, abstainers are still reporting experiencing these harms as much as non-binge drinkers and more than female binge drinkers—while controlling for potential confounders. Male binge drinkers may have increased odds of experiencing many harm types because they put themselves into riskier situations involving alcohol, increasing their susceptibility to experience harm from others' drinking (Saxena, 1999; Chandra *et al.*, 2003; Rehm *et al.*, 2003). Conversely, female binge drinkers, who represent a small proportion of the Indian population, may hold unique beliefs and have lower odds of reporting many harm types than abstainers because perhaps they are less likely to name alcohol as the cause of harm. However, this finding warrants cautious interpretation because of the relatively small sample size of female binge drinkers. Additionally, we did not

assess these associations with the reporting of specific harm types while holding other factors constant—doing so might shed more light on how drinking by males and females is associated with their experiences of harms from a heavy drinker in their lives.

This study has limitations. First, data were based on case-control sampling techniques so our results cannot be interpreted as population incidence estimates. Second, although we provide descriptive data by specific harm type, the methods used to enumerate the harms in the logistic regression analyses that assessed predictors for reporting a greater than average number of harm types treated all harms equally; however, in actuality, the severity of the harms differ. Third, data were available on the types of relationships respondents had with heavy drinkers but not on amount of exposure to the known persons' drinking (e.g. hours per day or number of days), or on the extent to which each harm negatively affected different aspects of their lives. Fourth, we were unable to standardize income levels based on local circumstances, limiting our ability to comprehensively examine the association between income levels and the reporting of harms from others heavy drinking in the sample spanning multiple regions.

Nonetheless, data for this study came from respondents who were purposefully selected from sites with diverse alcohol environments in five different regions of India to broaden the transferability of the findings. Our study documents reported experiences of harms from a heavy drinker in the lives of both abstainers and drinkers—including females and persons younger than age 25 who drink; experiences of people in these groups would have been challenging to capture using nationally representative survey data. Our findings show socio-demographic characteristics and respondents' drinking patterns associated with reporting a high concentration of different types of harms. Future research could assess the separate and cumulative impact of each harm on respondents' well-being. Additional studies could also use other measures to further explore the association between economic status and experiences of alcohol-related harm from others' drinking.

Surveys across the country show that approximately one-third of the Indian population consumes alcohol and 16.8% are alcohol-dependent (Ray, 2004; International Institute for Population Sciences and Macro International, 2007); evidence suggests that drinkers are burdened by short- and long-term consequences of drinking (Gururaj *et al.*, 2011). The present study adds to this knowledge, as we found that regardless of one's choice not to drink, a substantial proportion of adults in this study reported alcohol-related harms from a heavy drinker in their lives across multiple domains of harms. These findings can be used to support a public health prevention approach, that is, the use of more evidence-based alcohol control policies coupled with enhanced enforcement of existing policies (Babor *et al.*, 2010; World Health Organization, 2014). Implementing and enforcing policies that reduce alcohol's availability—such as those that decrease alcohol outlet density or limit times of alcohol sales may be optimal approaches for reducing alcohol-related harms in India.

In conjunction with policy interventions, increased use of screening and brief interventions may be another evidence-based strategy to address alcohol misuse and prevent harms to others (Babor and Higgins-Biddle, 2001; Nayak *et al.*, 2009). In addition, community mobilization and empowerment may be a complementary intervention approach, as has been effective in battling other health issues in India (Mohan *et al.*, 2006; Rajendran *et al.*, 2010; Blanchard *et al.*, 2013; Beattie *et al.*, 2014). Encouraging victims to speak out against harms from others' alcohol use and empowering communities to collectively fight against the acceptability of harms resulting from another person's drinking offers a promising strategy to reduce such harms.

## CONCLUSIONS

Both alcohol abstainers and drinkers in India reported experiencing a broad range of alcohol-related harms due to having a heavy drinker in their lives. Alcohol policy interventions to reduce the availability of alcohol (e.g. regulating alcohol outlet density and restricting the days and hours of alcohol sales) may help to prevent alcohol-related harms from others' drinking (World Health Organization, 2014). In combination with the implementation of more evidence-based alcohol control policies, screening and brief interventions, as well as community engagement and empowerment are likely to be effective approaches for reducing harms from others' alcohol use in India (Babor and Higgins-Biddle, 2001; Garcia-Moreno *et al.*, 2015).

## SUPPLEMENTARY MATERIAL

Supplementary Material is available at *Alcohol and Alcoholism* online.

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## CONFLICT OF INTEREST STATEMENT

None declared.

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