



Non-communicable diseases at a regional hospital in Nepal: Findings of a high burden of alcohol-related disease



M.S. Amundsen ^{a, b, *, 1}, T.M.G. Kirkeby ^{a, c, 1}, S. Giri ^{d, e}, R. Koju ^d, S.S. Krishna ^d, B. Ystgaard ^f, E. Solligård ^{e, c}, K. Risnes ^{g, b}

^a Norwegian University of Science and Technology, NTNU, P.O. Box No.: 7491, Trondheim, Norway

^b St. Olavs Hospital, Children's Clinic, Olav Kyrres Gate 11, P.O. Box 7030, Trondheim, Norway

^c St. Olavs Hospital, Clinic of Emergency Medicine and Prehospital Care, Prinsesse Kristinas Gate 3, P.O. Box. No: 7030, Trondheim, Norway

^d Dhulikel Hospital, Kathmandu, P.O. Box No.: 11008, Nepal

^e Norwegian University of Science and Technology, NTNU, Institute of Circulation and Medical Imaging, NTNU, P.O. Box No.: 7491, Trondheim, Norway

^f St. Olavs Hospital, P.O. Box 3250, Sluppen, 7006, Trondheim, Norway

^g Norwegian University of Science and Technology, Institute of Public Health and General Practice, NTNU, P.O. Box No.: 7491, Trondheim, Norway

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ABSTRACT

Recent global burden of disease reports find that a major proportion of global deaths and disability worldwide can be attributed to alcohol use. Thus, it may be surprising that very few studies have reported on the burden of alcohol-related disease in low income settings. The evidence of non-communicable disease (NCD) burden in Nepal was recently reviewed and concluded that data is still lacking, particularly to describe the burden of alcohol-related diseases (ARDs). Therefore, here we report on NCD burden and specifically ARDs, in hospitalized patients at a regional hospital in Nepal. We conducted a retrospective chart-review that included detailed information on all discharged patients during a four month period. A local database that included sociodemographic information and diagnoses at discharge was established. All doctor-assigned discharge diagnoses were retrospectively assigned ICD-10 codes. A total of 1,139 hospitalized adult patients were included in the study and one third of these were NCDs (n = 332). The main NCDs were chronic obstructive pulmonary disease (COPD) (n = 148, 45%) and ARDs (n = 57, 17%). Patients with ARD often presented with signs of liver cirrhosis and were typically younger men, with a median age at 43 years, from specific ethnic groups. These data demonstrate that severe alcohol-related organ failure in relatively young men contributed to a high proportion of NCDs in a regional hospital in Nepal. These findings are novel and alarming and warrant further studies that can establish the burden of ARDs and alcohol use in Nepal and other similar low-income countries.

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1. Introduction

The role of alcohol in global disease burden is an emerging topic. According to the global burden of disease report (Lim et al., 2012), a major proportion of global deaths and disabilities can be attributed to alcohol use. Detailed and area-specific knowledge on the burden

of alcohol-related diseases (ARDs) and chronic diseases attributable to alcohol consumption is limited, particularly in low and middle-income countries (LMIC). Many reports have over the last decade described an increasing burden of non-communicable diseases (NCDs) in Nepal. Recently, this evidence was reviewed by Mishra et al., who highlighted high prevalence of diabetes and hypertension, although studies were typically small and no population based registry data could be retrieved (Mishra, Neupane, Bhandari, Khanal, & Kallestrup, 2015). In particular, the report concluded that despite a large body of literature that proves evidence of high prevalence of chronic diseases in Nepal, data is particularly lacking to describe the prevalence of alcohol use and ARDs.

The causality between alcohol consumption and non-communicable, chronic diseases is well established (Parry, Patra,

* Corresponding author. Present address: Østfold Hospital, P.O. Box 300, 1714, Grålum, Norway.

E-mail addresses: mariesolamu@gmail.com (M.S. Amundsen), thine_89@hotmail.com (T.M.G. Kirkeby), samita.giri2009@gmail.com (S. Giri), rajendrakoju@gmail.com (R. Koju), drsan7@gmail.com (S.S. Krishna), brynjulf.ystgaard@stolav.no (B. Ystgaard), erik.solligard@ntnu.no (E. Solligård), kari.risnes@ntnu.no (K. Risnes).

¹ These authors equally contributed to this work, and are both listed as first authors.

& Rehm, 2011; Shield, Parry, & Rehm, 2014) and calls for evidence-based strategies to reduce harmful use of alcohol. Chronic diseases and conditions that are particularly attributable to alcohol consumption are cardiovascular diseases, liver diseases, pancreatitis and diabetes (Parry et al., 2011; Shield et al., 2014). High prevalence of alcohol abuse also leads to social problems like crime, antisocial behavior and inefficiency in the workforce that, in turn, is highly unfavorable for affected communities. It is therefore surprising that very few studies have reported the burden of ARDs in relation to NCDs and other conditions in low income settings.

To describe disease burden of chronic non-communicable diseases and specifically alcohol-related diseases, we conducted a retrospective chart-review in a regional hospital in Nepal.

2. Materials and methods

2.1. Study design

Nepal has only 0.67 doctors and nurses per 1000 population, which is significantly less than the World Health Organization's recommendation of 2.3 doctors, nurses, and midwives per 1000 population ((MoHP), 2013). Only 61.8% of the Nepalese households have access to health facilities within 30 min travel distance, this with significant urban (85.9%) and rural (59%) discrepancy (Statistics, 2011). After the Government introduced a Health Policy encouraging the private sector to invest in educating health workers and providing quality health services, several private health institutions have been founded. The private sector grew from a total share of 23% in 1995 to 78% in 2008 (Ministry of Health and Population, 2010). In 2008 there were 96 public hospitals and 147 private hospitals registered in Nepal (Ministry of Health and Population, 2010).

We conducted a retrospective observational study of all hospital charts from patients discharged from Dhulikhel Hospital (DH) in the period of 15th of September 2013 to 15th of January 2014. DH is a tertiary level university hospital, located in the center of the Kavre district in central Nepal, about 1 h by car from the capital Kathmandu. It is an independent, non-governmental university hospital that covers the population of approximately 1.9 million people from both rural districts (mainly Kavre, Sindupalchowk, Dolakha, Sinduli, Ramechhap), which mostly are mountainous hard to reach areas, and urban areas in the Kathmandu valley. The hospital is a non-profit supplement to government services for both primary care and hospital care (general surgery, traumatology/orthopedics, gynecology, obstetrics, pediatrics, ENT and internal medicine). The hospital is guided by social equity so all the social groups may approach the hospital directly without appointment or referral. DH runs special provision of charity to those who cannot afford treatment. In addition, DH runs 19 outreach centers offering primary health care services to people in rural areas. The hospital also provides regular outpatient (OP) services through its general, -and specialized OP clinics. Included in the present study are only patients that were admitted to hospital for inpatient diagnostics and treatment.

2.2. Data collection

Data was abstracted retrospectively from hospital records. Discharge information included age, sex, address, ethnicity and final diagnose(s) at discharge. Discharge diagnoses were assigned and written in English by the responsible doctors before discharge. Retrospectively, for the purpose of this study, we transformed the diagnoses into appropriate international classifications of disease (ICD) 10 codes in collaboration with local doctors.

2.3. Outcome variables

First, all diagnoses were categorized into broad categories: obstetric cases, pediatric cases (<16 years of age), traumas, NCDs, infections, surgical cases or other diseases. The NCDs were further organized into six categories: chronic obstructive pulmonary diseases (COPD), cardiovascular diseases (CVDs), alcohol-related diseases (ARDs), diabetes, cancer and multiple NCDs (patients with more than one of the NCD categories). The diagnosis of ARD included patients with acute alcohol intoxication or a history of alcohol abuse (F10-F19) and related complications, typically alcoholic hepatitis and liver cirrhosis (K70), esophageal varices (I85) and alcohol-induced acute pancreatitis (K85.2). Many patients with a history of alcohol abuse, were diagnosed with hepatic encephalopathy, coded as "degeneration of nervous system due to alcohol" (G31.2). Procedure for diagnosis of alcoholic liver disease included blood samples for liver functioning, exclusion of infectious hepatitis, and, for most patients, abdominal ultrasound. Liver biopsy was never performed.

2.4. Demographic variables

We identified four different categories for ethnic groups for this study: Brahmin and Chhetri, Janajatis, Dalit and others/unknown based on the census from 2011. The living environment was based on the detailed patients' addresses and categorized to either "urban" or "rural" by local research assistants with detailed knowledge of the area.

2.5. Data analysis

Descriptive statistics were provided, and the association between the variables age, sex, ethnicity and place (urban/rural) with the disease categories within the patient population, was assessed by univariate logistic regression and presented as odds ratios (ORs) with 95% Confidence Intervals (CIs). Analyses were performed in SPSS 21.0 and STATA 13.

2.6. Ethics

The study was approved by ethical committees both in Nepal and in Norway: the Institutional Review Committee of Kathmandu University School of Medical Sciences, Dhulikhel Hospital, IRC-KUSMS, (approval number 58/13) and the Regional committee for Medical and Health Research Ethics (REK) South East Norway (approval number 2014/1246). One of REKs Ethical Guidelines is the Helsinki Declaration, and this study is in compliance with those principles.

3. Results

A total of 3,954 patients were admitted to Dhulikhel Hospital during the study period. We excluded pediatric cases (501), obstetric cases (1,332) and trauma cases (489) from the current analyses. Thus, we included 1,139 adult non-obstetric and non-traumatic hospitalized cases in the analyses (Table 1). Nearly one third of these patients had a NCD main diagnosis ($n = 332$). Nearly half of patients hospitalized for a NCD suffered from COPD, $n = 148$ (45%) (Table 2). Nearly one in five NCD hospitalizations were caused by ARDs ($n = 57$, 17% of NCDs). More than 80% of the ARD patients presented with severe complications of alcohol use including esophageal varices, acute pancreatitis, ascites, cirrhosis and alcoholic encephalopathy. Patients with ARDs were typically young men (median age 43 years, 75% men) and they were more likely to be from specific ethnic groups: the OR for the Janajati group was 2.3

Table 1
Distribution and characteristics of adult-patients included in the study.

	Adult hospitalized patients	NCD ^a	OR ^b 95%CI ^c	Infections	OR 95% CI	Other adult diseases (number, %)	OR 95%CI
Total/n, (%) of all patients	1,139	332 (29)		200 (18)		607 (53)	
Age (y), median (IQR^d)	47 (32–62)	58 (48–70)		42 (28–57)		43 (29–56)	
Sex, n (%)							
Male	525 (46)	164 (49)	Ref. ^e	84 (42)	Ref.	277 (46)	Ref.
Female	614 (54)	168 (51)	0.8 (0.6–1.0)	116 (58)	1.0 (0.8–1.3)	330 (54)	1.0 (0.8–1.3)
Living environment, n (%)							
Urban	609 (53)	177 (53)	Ref.	93 (46)	Ref.	339 (56)	Ref.
Village	530 (47)	155 (47)	1.0 (0.8–1.3)	107 (54)	1.4 (1.0–1.9)	268 (44)	0.8 (0.6–1.0)
Ethnicity n (%)							
Brahmin/Chhetri	465 (41)	138 (41)	Ref.	91 (45)	Ref.	236 (39)	Ref.
Janajatis	546 (48)	162 (49)	1.0 (0.8–1.3)	91 (46)	0.8 (0.6–1.1)	293 (48)	1.1 (0.9–1.4)
Dalit	68 (6)	20 (6)	1.0 (0.6–1.7)	14 (7)	1.1 (0.6–2.0)	34 (6)	1.0 (0.6–1.6)
Others	60 (5)	12 (4)	0.6 (0.3–1.1)	4 (2)	0.3 (0.1–0.8)	44 (7)	2.7 (1.7–4.9)

^a NCD: Non-communicable diseases.

^b OR: Odds Ratio.

^c CI: Confidence Intervals.

^d IQR: Interquartile range.

^e Ref.: Reference.

(95% CI 1.2–4.3) and the corresponding OR for the Dalit group was 2.6 (95% CI 0.9–7.3), compared to the reference group of Brahmin/Chhetri. Living environment (urban or rural) was not associated with ARD in these hospitalized patients. In our study, men and women were equally represented in the adult hospitalized population (obstetric and trauma cases not included) (Table 1). We found no association between sex and the specific NCD categories except for a strong association between sex and ARD: the OR for ARD was 0.30 (95%CI 0.1–0.5) for women compared to men (Table 2). The third most common NCD was CVD (n = 52, 16% of NCDs).

4. Discussion

We found a high prevalence of alcohol-related diseases in hospitalized adults in this regional hospital in Nepal. Patients with ARDs often presented with clinical signs of liver cirrhosis and were typically younger men, with a median age at 43 years, from specific ethnic groups.

Global data on burden of disease and disability show that alcohol use is emerging as a major cause of ill health, and alcohol use attributed to an estimated 2.7 million deaths in 2010 (Lim et al., 2012). Thus, it might be surprising that global burden of ARDs has received relatively limited attention (Rajendram, Lewison, & Preedy, 2006). In fact, while the burden of alcohol diseases has increased from 1992 to 2003, the proportion of alcohol-related research has declined, now constituting <0.7% of all biomedical research literature (Rajendram et al., 2006). Of this research, 92% originate from industrialized countries, even if low- and middle income countries suffer from 82% of the global disease burden (Rajendram et al., 2006).

ARDs are both resource demanding and potentially very serious. Severe acute alcoholic hepatitis is associated with a mortality of up to 50%, and patients with advanced cirrhosis typically have a median survival of 1–2 years (Bruha, Dvorak, & Petryl, 2012). In our study, over 50% of the patients with alcoholic liver disease had several complications, like esophageal varices, ascites, portal

Table 2
Distribution and characteristics of patients with non-communicable diseases (NCDs).

	COPD ^a		CVD ^b		Cancer		Diabetes		ARD ^c		Multiple NCDs ^d	
	n (%)	OR ^e (95% CI ^f)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Total n, and (%) of NCD	148 (45)		52 (16)		17 (5)		14 (4)		57 (17)		44 (13)	
Age, median, (IQR^g)	64 (58–74)		60 (50–72)		58 (45–68)		48 (39–55)		43 (35–51)		58 (49–70)	
Sex												
Male	60 (40)	Ref.	22 (42)	Ref.	7 (41)	Ref.	8 (57)	Ref.	43 (75)	Ref.	24 (55)	Ref.
Female	88 (60)	1.3 (0.9–1.8)	30 (58)	1.2 (0.7–2.1)	10 (59)	1.2 (0.5–3.2)	6 (43)	0.6 (0.2–1.8)	14 (25)	0.3 (0.1–0.5)	20 (45)	0.7 (0.4–1.3)
Living environment												
Urban	75 (51)	Ref.	31 (60)	Ref.	11 (65)	Ref.	8 (57)	Ref.	27 (47)	Ref.	25 (57)	Ref.
Village	73 (49)	1.1 (0.8–1.6)	21 (40)	0.8 (0.4–1.4)	6 (35)	0.6 (0.2–1.7)	6 (43)	0.9 (0.3–2.5)	30 (53)	1.3 (0.8–2.2)	19 (43)	0.9 (0.5–1.6)
Ethnicity												
Brahmin/Chhetri	76 (51)	Ref.	20 (38)	Ref.	4 (23)	Ref.	4 (29)	Ref.	14 (25)	Ref.	20 (45)	Ref.
Janajatis	58 (39)	0.6 (0.4–0.9)	28 (54)	1.2 (0.7–2.2)	9 (53)	1.9 (0.5–6.3)	10 (71)	2.2 (0.7–6.9)	36 (63)	2.3 (1.2–4.3)	21 (48)	0.9 (0.5–1.7)
Dalit	9 (6)	0.8 (0.4–1.6)	3 (6)	1.0 (0.3–3.6)	1 (6)	1.7(0.2–15.6)	0	–	5 (9)	2.6 (0.9–7.3)	2 (5)	0.7 (0.2–3.0)
Others	5 (4)	0.5 (0.2–1.2)	1 (2)	0.4(0.05–2.9)	3 (18)	6.1(1.3–27.8)	0	–	2 (3)	1.1 (0.2–5.0)	1 (2)	0.4(0.05–2.9)

^a COPD: Chronic obstructive pulmonary disease.

^b CVD: Cardiovascular disease.

^c ARD: Alcohol-related disease.

^d NCD: Non-communicable disease.

^e OR: Odds Ratio.

^f CI: Confidence Intervals.

^g IQR: Interquartile range.

hypertension and degeneration of the nervous system, most likely indicating alcohol-use over time, with advanced disease and a relatively short life expectancy.

Previous studies on alcohol abuse in low- and middle income countries have mainly focused on men's alcohol use, since the prevalence of alcohol use disorders amongst men is reported much higher than what is reported amongst females (Wei, Derson, Xiao, Li, & Zhang, 1999). A study on alcohol dependence from Nepal in 2002 (Jhingan, Shyangwa, Sharma, Prasad, & Khandelwal, 2003) reported the prevalence to be twice as high for men compared to women. Our findings support a high burden of alcohol-related diseases in men, but possibly the relative low representation of women cases could be explained by lower health seeking behavior in women (Yamasaki-Nakagawa et al., 2001). In this study, however, men and women overall, are approximately equally seeking health care (Table 1). Gendered attitudes regarding alcohol use and misuse, might make women underreport on their alcohol consumption, leading to underrepresentation of the diagnosis of ARDs in women. A study on alcohol use among Nepalese women found, 11.7% (95% CI: 9.5–14.3) ever users of alcohol, 9.4% (95% CI: 7.4–11.7) last 12 months alcohol users, 7.1% (95% CI: 5.2–9.0) current drinkers, and 0.9% (95% CI: 0.5–1.6) with harmful use of alcohol. Women from upper age groups, hills and with no formal education were found likely to be consuming alcohol (Aryal et al., 2015). Unfortunately, good evidence from any relevant setting that describe drinking patterns or social acceptance of drinking in women is lacking. National prevalence of alcohol consumption ever among married women of reproductive age was 24.7% (95% CI: 21.7–28.0), last 12 months 17.9% (95% CI: 15.3–20.7) and last 30 days 11.8% (95% CI: 9.8–14.1) (Thapa et al., 2016).

In our study, ARDs were more common in specific ethnic groups. The Brahmin, Chhetri and Thakuri groups belong to traditional alcohol nonusers (TANU) group as they are prohibited from using alcohol by cultural norms. Hindu ethnicity groups other than Brahmin, Chhetri and Thakuri and various other ethnic and tribal communities of Nepal constitute traditional alcohol users (TAU) group. This cultural conviction may be a contributory explanation to why ARDs were more common amongst specific ethnic groups. Earlier studies have reported that 40.1% of the adolescents in the TAU-group reported using alcohol, compared to 19.4% of the adolescents in the TANU-group. Even if it is prohibited by law to sell alcohol to minors (<18 years), the law allows the TAU-group to produce alcohol at home for traditional ceremonies, and alcohol is being served to adolescents and minors in these occasions (Parajuli, Macdonald, & Jimba, 2015). To the best of our knowledge, there is no research about genetic or epigenetic differences between ethnic groups with respect to alcohol metabolism or toxicity towards alcohol.

A somewhat relevant comparison may in some ways be China. In rural Chinese men there has been an increase in alcohol abuse over the last three decades (Zhou et al., 2009) and the increase has been related to the increase in production of alcoholic beverages after economic reforms. A similar development has been seen in Nepal where there was an increase in alcohol production from the 1960's, as this business proved to be highly profitable. In 1989 the alcohol culture received another boost that has been related to new and liberal policies (R. Dhital, Subedi, Gurung, & Hamal, 2001). In Nepal, alcohol is now available "everywhere" and is sold to all age-groups without any restrictions (R. Dhital et al., 2001). However, home-made forms of alcohol for domestic use, and unlicensed home-brewing account for the major production of alcohol in the country (Jhingan et al., 2003). Lack of information about adverse side-effects could be a contributor to a high alcohol consumption in the country, and a study from 2001 shows that many young people and children start drinking due to easy access of alcohol (R. Dhital

et al., 2001). Among traditional user communities, cultural and religious ceremonies as well as other social gatherings are gateways for initiating alcohol use. 60% of children reported initiating their alcohol use on such occasions, this being more prominent amongst boys than girls (R. Dhital et al., 2001).

In this study, the patients hospitalized for ARDs were of relatively young age. As chronic alcohol diseases require excessive drinking over time, our findings indicate that many people start drinking alcohol at a very young age. An alternative explanation could be specific genetic variants, possibly linked to certain ethnic groups, that could lead to vulnerability to physical complications of alcohol. A meta-analysis from 2012, on the other hand, conclude that people of Asian origin are less likely to develop alcohol abuse and alcohol-induced medical diseases, as they often have a specific allele (*ALDH2504lys*), which leads to reduced capacity to clear acetaldehyde (Li, Zhao, & Gelernter, 2012). This can, in turn, lead to accumulation of acetaldehyde, and thereby heightened response and unpleasant reactions of alcohol and cannot explain the present findings of severe ARDs in relatively young Nepali men. However, we cannot exclude the possibility of Nepalese being carriers of a gene that alter genetic susceptibility to develop ARD at lower alcohol consumption than the general population.

Evidence on cultural and social patterns of alcohol consumption is lacking. A report from 2002 that presented interviews of 180 street children from urban centers in Nepal, found that these children first experienced alcohol at a median age of 11 years (R. Dhital, Gurung, Subedi, & Hamal, 2002). Another report on alcohol and drug use in Nepal concluded with a median age of 10 years at which children first experienced alcohol (R. Dhital et al., 2001).

The lack of protocols for the diagnosis of viral liver diseases is a weakness in the study. Thus, we cannot rule out a possibility that some of the cases may have been caused by other agents than alcohol. Viral hepatitis is a common cause of liver disease in many low income countries. In Nepal, however, the proportion of hepatitis B infections is low compared to the neighboring countries China and India (Shrestha & Shrestha, 2012). The prevalence of HBsAg in Nepal was only 0.9% (low prevalence defined as < 2%). Hepatitis B infection is therefore a rare cause of chronic liver cirrhosis in Nepal, making other agents more likely to be the main cause of liver disease in Nepal, including alcohol abuse.

Another possible agent causing liver disease is obesity. Non-alcoholic steatohepatitis (NASH) is a differential diagnosis for alcoholic liver disease, and misclassification can occur, especially if alcohol consumption is stigmatized and underreported in the Nepalese population. Obesity is considered the leading risk factor for NASH, and despite the fact that only 2–3% of Asians are classified as obese by current western criteria (BMI > 30 kg/m²) (Fan et al., 2007), the Nepalese population has the same pattern of abdominal adipose deposition despite normal BMI as rest of the Asian population (Deurenberg, Deurenberg-Yap, & Guricci, 2002). In addition, obesity is rising in low- and middle income countries, Nepal included (Vaidya, Shakya, & Krettek, 2010). Still, urbanization is the major driving force behind obesity in Nepal (Vaidya et al., 2010), and 90% of the Nepalese population live in rural areas.

Our findings need to be interpreted with caution. The study is limited by small sample size, and the fact that diagnostics are not as specific as in high income settings. Thus, data rely on the accuracy of the prospectively assigned diagnoses made by responsible doctors. In addition, the study only included hospitalized patients and does not reflect distribution of alcohol-related diseases in the population. Inpatient admissions tend to reflect the more severe cases, and many patients with NCDs are examined and treated in OPD clinics. Thus, inpatient admissions will not capture all cases of NCDs. In the case of alcohol, social stigma may also lead to delay in seeking health care. It is possible that this could specifically have

lead to underreporting of ARDs in women. In some settings, social circumstances may be more contributing to the admission than the acute medical illness. In Nepali culture, a person with a very difficult social situation will be taken care of in the community or in the families and not be sent to hospital unless an acute severe illness occurs. This indicates that such mechanisms are less likely to have caused overrepresentation of ARDs in hospitalized cases in this study.

In our study, we excluded traumatic-, pediatric-, and obstetric admissions. Alcohol can contribute in traumas, and maternal alcohol consumption in children's health and obstetrical complication. In this way, the extent to which alcohol consumption attributes to disease and hospitalization is likely to be underestimated. In the present study only cases that were considered by the doctors to be directly attributable to alcohol abuse had prospectively been diagnosed as caused by alcohol. Importantly, alcohol is a component cause of more than 200 diseases and conditions, like malign neoplasm, diabetes, neuropsychiatric conditions, cardiovascular disease and digestive diseases (Shield et al., 2014). Therefore, it is likely that several other NCD cases in our study could have been linked to alcohol if a detailed alcohol history had been taken. Unfortunately, this information was not available and we have not seen other studies from Nepal that has been able to assess the association between alcohol and NCD or other diseases through prospective quality information on alcohol use.

The study was conducted over four months, and we cannot rule out the possibility of seasonality, both in alcohol consumption and in contacting health care. During monsoon season (from June to August), roads in Nepal often encounter landslides and road blockages that make hospital access difficult, especially for people living in the mountains. It also causes higher rates of hospitalization for infectious diseases. The proportion of reported NCDs and ARDs hospitalized patients may therefore be lower in these months. Also, Nepali festivals are in some groups related to high alcohol consumption, but the study period did not include the festival season.

Despite these limitations, to our knowledge, this study is the first that attempts to identify and describe burden of ARDs in relation to other NCDs in this region. Our findings are alarming, and needs to be re-examined in a bigger sample, studied in larger, population-based studies. Further studies should explore possible patterns related to ethnic groups, sex, the age distribution and cultural context of drinking, as well as alcohol-related NCDs, psychiatric diseases and alcohol-related deaths. This knowledge is imperative to plan and develop specific alcohol prevention programs.

5. Conclusion

Severe alcohol-related organ failure in relatively young men contributed to a high proportion of NCDs in the present study. Our findings are novel and alarming and warrant further studies that can establish the burden of alcohol-related diseases and alcohol use in Nepal and other similar low income countries.

Competing interest

The authors declare that they have no competing interests.

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List of abbreviations

NCD	Non-communicable disease
ARD	Alcohol-related disease
LMIC	Low-, and middle-income countries
DH	Dhulikhel Hospital
OPDs	Out-patient clinics
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
ICD	International classifications of disease
OR	Odds ratio
CI	Confidence interval
REK	Regional committees for medical and health research ethics in Norway
NASH	Nonalcoholic steatohepatitis
TANU	Traditional Alcohol Nonuser
TAU	Traditional Alcohol User

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