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Hazardous alcohol use among female heads-of-household in rural Mozambique

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Abstract

Hazardous drinking places individuals at risk for adverse health events, resulting in a major public health burden globally. Patterns of alcohol consumption among women in Africa remains poorly understood. We aimed to describe alcohol consumption in a representative sample of female heads-of-household in Mozambique. A 2014 population-based cross-sectional study of 3,892 heads of household was conducted in Zambézia Province. Alcohol use was collected using the Alcohol Use Disorders Identification Test (AUDIT). Sociodemographic characteristics were summarized by alcohol use. Multivariable proportional odds model adjusted for age, education,

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Portuguese fluency, marital status, income, social support, depression, food insecurity, currently pregnant, and child mortality were used for the ordinal AUDIT scale as outcomes with robust covariance to account for clustering of respondents. The overall prevalence of current alcohol consumption among female heads-of-household was 15%. The mean PHQ-8 score was 2.7 (SD 4.7). The prevalence of women considered “hazardous drinkers” (score > 4) was 8%. In bivariate analyses, depression, marital status, currently being pregnant, food insecurity, and death of a child were associated with higher risk of hazardous drinking. After adjusting for multiple characteristics, depression (aOR: 2.20 [1.28, 3.76] $p=0.004$), death of a child (aOR: 2.44 [1.46, 4.07] $p=0.001$), and being currently pregnant (aOR: 1.83 [0.99, 3.39] $p=0.002$) were associated with hazardous drinking behavior. Being single (aOR: 0.48 [0.29, 0.80], $p=0.017$) and food insecure (aOR: 0.96 [0.92, 1.00], $p=0.050$) showed a protective effect on hazardous drinking behavior. The percentage of female heads of household in north-central Mozambique that regularly drink alcohol was lower than expected. This may be due to the unique characteristics of female heads of household and the extreme poverty pervasive in Zambézia.

Keywords

alcohol; Mozambique; female; Zambézia; hazardous drinking

Introduction

Hazardous drinking (HD; Alcohol Use Disorders Identification Test [AUDIT] scores >7 among men, >4 among women) results in high morbidity and mortality, contributing to 4% of total mortality and between 4–5% of disability-adjusted life-years worldwide (Reinert & Allen, 2007). Thus, it is one of the largest preventable risk factors for poor health outcomes (Beaglehole & Bonita, 2009; Rehm et al., 2001; WHO, 2014). Although high-income countries consume more alcohol, emerging economies tend to increase their alcohol consumption due to growing urbanization that leads to greater alcohol availability (Cooper, Field, Goswami, Jenkins, & Sahakian, 2010). HD is considered an important cause of health inequality for poor populations and low-income countries who have a higher relative burden of disease resulting from alcohol than their high-income counterparts (Beaglehole & Bonita, 2009; WHO, 2014). This is underscored given that these populations have less access to treatment, and the overall impact that alcohol use has on diseases that are more prevalent among poor populations, such as tuberculosis and HIV/AIDS (Rehm et al., 2009).

A 2013 World Health Organization (WHO) report for the African Region determined that the percentage of deaths attributed to alcohol and the alcohol-attributable burden of disease was, respectively, 5.8%/ 4.8% for men and 1.5%/ 1.2% for women. Among men, unintentional injuries/accidents (followed by intentional injuries/violence) were responsible for the largest share of alcohol-attributable health harm. Accidents were also the largest category of alcohol-attributable burden for women, with Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) being the second largest (Ferreira-Borges, Rehm, Dias, Babor, & Parry, 2016).

Alcohol use in Mozambique, the seventh poorest country worldwide (Pasquali, 2015), is a major risk factor for death and disability, second only to unsafe sex that leads to HIV infection (GBD, 2015). The two published studies with representative samples of Mozambicans aged 25–64 (Padrão et al., 2011) found that 24.2–28.9% of women and 48.7–57.7% of men were current drinkers (Padrão et al., 2011; Pires, Padrão, Damasceno, Silva-Matos, & Lunet, 2012); ~60% of current drinkers consumed alcohol frequently (at least once or twice a week); and that more than 40% of drinkers reported having had at least one binge drinking occasion in the previous week. Three quarters of drinkers reported consuming more affordable homemade traditional alcohol beverages (e.g., cabaça), which was strongly associated with binge drinking. Fermented traditional alcoholic beverages are brewed at home or in informal bar settings (*barzinho*, *cervejaria*). They are ubiquitous and popular in rural Mozambique (Padrão et al., 2011). These beverages are usually shared by several people in a single setting, including celebratory social events (Padrão et al., 2011), typical evenings in local bars, and anecdotal evidence suggests students drink it while in school (Sayagues, 2012). There has not been a comprehensive study on the culture of alcohol use in the country. Newspaper articles report a culture of drinking excess, but we are lacking anthropological studies designed to establish the social and cultural systems promoting binge and hazardous drinking. Studies designed to quantify patterns of alcohol consumption in Mozambique were done more than a decade ago, mainly with populations living in urban areas. As 67% of Mozambicans live in rural areas (Schwitters et al., 2015), as is the case in many African countries, patterns of alcohol consumption among the rural population need to be better understood. The present study was conducted among female heads of household living in rural Mozambique. This population has a specific set of responsibilities: they are in charge of farming, childcare, and housework, including duties such as cooking, cutting firewood, and fetching water. Thus, frequent hazardous drinking has implications for their health and well-being, as well as the health and well-being of the family and other household members. We aimed to describe the alcohol consumption habits in a representative sample of female heads of household, assessing their health status, as well as the well-being of their children.

Methods

Study Area

Zambézia Province, located in north-central Mozambique, is home to 4.4 million people primarily from five ethnic groups (Chuabo, Macua-Lomwe, Manhaua, Merenge, and Senas) who speak 11 languages. In rural communities, access to food is limited in January and February (“the hunger season”) but plentiful in May to June (“the harvest season”) (Korkalo, Freese, Alfthan, Fidalgo, & Mutanen, 2015). During the October and March period, floods often damage or destroy houses, basic social service facilities, and local agriculture. It is one of Mozambique’s poorest performing provinces in terms of health and development indicators—with low literacy rates, poor maternal and child health indices, high rates of tuberculosis, malnutrition, and the highest estimated total number of people living with HIV in Mozambique (Audet et al., 2010; Ministério da Saúde & Instituto Nacional de Saude, 2009). Public health support interventions, including community health counseling, water and sanitation interventions, economic agricultural aid, and malaria bed net distribution were

implemented over a five year period through a consortium of organizations funded by USAID (locally called Ogumaniha-SCIP). The Ogumaniha-SCIP survey was conducted at the program's end as a follow-up to identify changes in health and wellness among people living in Zambézia Province, Mozambique.

Survey Data

Data were collected from 12 May to 15 June 2014. This timing corresponds to the harvest period, a period of relative plenty in rural Mozambique. The design and implementation of the survey are detailed elsewhere (Victor et al., 2014). A total of 255 enumeration areas (EA) were selected with probability proportional to size. Two samples were taken such that 3 districts (Namacurra, Morrumbala, and Alto Molócuè) were heavily sampled with 206 EA (Figure 1), with another 49 EAs being drawn from the remaining districts across Zambézia Province, for a total of 3,892 households. At the time of survey administration, the Ministry of Health considered adults to be aged 16 or older, and this was an inclusion criterion for this study. Fifteen household interviews were planned per EA. Interviews were conducted with the self-reported female head-of-household. A female head-of-household is defined as the woman living in a given household who is responsible for household decision-making. This female head-of-household is not limited to women of a particular marital status; rather, it reflects her important role in the family structure. Interviews covered various topics including socio-demographics; knowledge, attitudes, practices, and access to health services and products; access to improved water and sanitation; nutrition; agricultural production; perceived economic stability and status; depression; and alcohol use (T.D. Moon et al., 2015; T. D. Moon, Sidat, Vergara, & Vermund, 2010; Victor et al., 2014). Of the 3,892 households, 3,543 (91%) respondents reported their age and all were 16 or older. In total, 2,752 (72%) of women answered questions about their alcohol intake. AUDIT items were more likely completed among single ($p = 0.006$), slightly better educated (mean: 2.9 vs. 3.4 years; $p < 0.001$) women, and those with a self-reported income of "less than sufficient" ($p < 0.001$).

Local authorities were notified prior to study initiation to ensure local support for the survey team. Fourteen all female teams, consisting of a team leader and four interviewers, collected the survey data with a mean survey completion time of 54 minutes (interquartile range, IQR: 39–88). All participants provided written informed consent (a fingerprint was sufficient for those unable to read and write). Consent forms were read aloud to each participant, and a written copy was provided before the interview began. No one refused to participate. Participants were read questions in their language of preference; the Bantu languages spoken in the province have no systematic written form but the survey was translated with the assistance of native speakers and a linguist fluent in all study languages from Universidade Politecnica (located in the provincial capital) to ensure understanding. The protocol for data collection was approved by the Mozambican National Bioethics Committee for Health and the Institutional Review Board of Vanderbilt University.

Measures

Alcohol use was collected using the Alcohol Use Disorders Identification Test (AUDIT). Participants with AUDIT scores >4 were considered to be "hazardous, harmful and high risk" drinkers, which is the recommended cutoff for women (Allen, Litten, Fertig, & Babor,

1997; Bohn, Babor, & Kranzler, 1995; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Depression data was assessed using the Patient Health Questionnaire Depression Scale (PHQ-8), with a focus on feelings and behaviors in the past two weeks. The suicide question (number 9 in the PHQ-9) was omitted; emergency care could not be guaranteed for those endorsing suicidal behavior. A score of 10 is associated with clinical depression (Kroenke et al., 2009; Smith, Gotman, Lin, & Yonkers, 2010). Questions on education achievement and aspirations were designed based on previous instruments used in Malawi (Grant, 2008; Lockheed, Fuller, & Nyirongo, 1989). The food security, dietary diversity, and food coping strategies were adapted from the Household Food Insecurity and Access Scale (HFIAS) of the Food and Nutrition Technical Assistance Project (Coates, Swindale, & Bilinsky, 2007), as well as from Food and Agriculture Organization and other resources (Tirivayi, Koethe, & Groot, 2009). Given that the survey was conducted in the “plenty” season, prevalence of food insecurity would likely be lower than any other time of the year. The section on social barriers and social participation addresses various factors that shape well-being, from access to social support networks to decision making within the family and gender differences. Questions in this section were selected from the Oxford Poverty and Human Development Initiative, UNICEF and others (Bhuiya et al., 2007; ChildInfo, 2010; Oxford Poverty and Human Development Initiative, 2010; Pulerwitz & Barker, 2008). Questions on material possessions and consumption of goods were adapted from several sources based primarily on the unsatisfied basic needs approach, where the aim is to estimate use or acquisition of assets presumed critical for well-being. Questions were included from the Demographic and Health Survey, the Multiple Indicator Cluster Survey as well as from other sources (DHS, 2010; Pradhan & Ravallion, 2000; Statistics South Africa, 2007; UNICEF, 2010). Spoken Portuguese language proficiency and household income were assessed via self-report. Instead of using the value reported for household income (which was missing in the majority of participants) we used the question of perceived household income (response categories of less than sufficient, sufficient, and more than sufficient). Child anthropometric data was assessed on randomly selected children under five years of age. We measured child weight and height to calculate weight-for-height, height-for-age, and weight-for-age.

Statistical Methods

Sociodemographic characteristics were summarized by drinking behavior (non-drinkers, non-hazardous drinkers, and hazardous drinkers), and p-values were calculated for the bivariate association using Kruskal Wallis and chi-square tests ignoring the effects of clustering. For comparison between drinkers and non-drinkers we were able to adjust for clustering. We used the Rosner-Glynn-Lee adjusted Wilcoxon rank sum test for continuous variables (Rosner, Glynn, & Lee, 2006) and Chi-squared with Donner adjustment for categorical variables (Donner, 1989). Categorical variables are reported as weighted percentages, with each observation being weighted by the inverse of the household sampling probability. Continuous variables are reported as weighted estimates of median (interquartile range).

A binomial logistic regression model was used for the dichotomized AUDIT (a score >4 was associated with hazardous drinking) scale as an outcome with robust covariance to account

for clustering of respondents within EA (see <https://www.rdocumentation.org/packages/rms/versions/5.1-2/topics/robcov>). All covariates were selected *a priori* (with one exception: we have excluded an originally proposed variable distance to the clinic due to lack of variability) and included age, marital status, social support, income, depression, and death of a child. The significance level for all testing was two-sided and set at 0.05. If there was evidence of non-linearity ($p < 0.10$) of continuous covariates, then that variable was modeled using a restricted cubic spline. Multiple imputation was used to account for missing survey responses in covariates. We used the Hmisc package in R which employs predictive mean matching to take random draws from imputation models; 10 imputation data sets were used in the analysis. We employed R-software 3.2 (www.r-project.org) for all data analyses.

Results

The median age of survey respondents (interquartile range, IQR) was 27 (22–34), ranging from 16 to 62 years. Most (68%; 1,299) interviewees were officially married or in a common law relationship. Formal education was low, with a median (IQR) 3 (0–5) years of completed education and a range of 0 to 15 years. Forty-three percent of female heads of household reported fluency in Portuguese. The median (IQR) household size was 5 (4–6) persons. For those not fluent in Portuguese, surveys were conducted in Elomwe, Echuabo, Cisená, and Chinyanja - in order of volume - with a small proportion of Emakhuwa households (0.5%) through fluent translators. Eighty-six percent of households ($n=3,347$) had at least one child under the age of five. Most households self-identified their religion as Catholic (52.2%; 2,032), although there were various other religions. More than 80% of respondents ($n=3,114$) reported living in a rural location.

Alcohol consumption

The overall prevalence of current alcohol consumption among female heads of household was 15% ($n=287$), with 97% of drinkers reporting consumption of two or more drinks per day (Table 1). In a comparison between drinkers and non-drinkers, women who drank were more likely to be depressed ($p < 0.001$), pregnant ($p=0.05$), and had recently experienced the death of a child ($p=0.003$) (Table 2). The prevalence of women considered “hazardous drinkers” was 8% ($n=155$). Hazardous drinkers (vs. non-hazardous drinkers and non-drinkers) were more likely to be depressed ($p < 0.001$), currently be pregnant ($p=0.005$), be married ($p=0.024$), be food insecure ($p=0.016$), or have a child who died in the past year ($p < 0.001$). There was no significant bivariate association between perceived social support, or recent birth (Table 3).

After adjusting for multiple characteristics (age, education, Portuguese speaking ability, marital status, income, social support, depression, food insecurity, currently pregnant, and experiencing the death of a child), a positive depression screening (aOR: 2.20 [1.28, 3.76] $p=0.004$), death of a child (aOR: 2.44 [1.46, 4.07, $p < 0.001$]), and currently being pregnant (1.83 [0.99, 3.39]; $p=0.002$) were associated with increased odds of hazardous drinking. Being single (aOR: 0.48 [0.29, 0.80] $p=0.017$) and experiencing food insecurity (aOR: 0.96 [0.92, 1.00], $p=0.05$) were associated with reduced odds of risky drinking (Table 4: Adjusted odds ratios for AUDIT score).

There were 140 children belonging to respondents classified as “hazardous drinkers”. There was no association between AUDIT score and child vaccination status ($p=0.34$) or AUDIT score and child anthropometric data (weight-for-age, $p=0.60$; length-for-age, $p=0.74$; weight-for-length, $p=0.95$; Spearman rank correlation test).

Discussion

The percentage of female heads of household in rural north-central Mozambique that regularly drink alcohol was only 8.4%, significantly lower than estimates of women in the general population (Padrão et al., 2011). This difference is likely associated to the unique characteristics of female heads of household and with the overwhelmingly rural characteristic of Zambézia Province. Female heads of household were self-identified and perceived themselves as having some level of responsibility for supporting those living in their home, including parents, siblings, significant others, and children. This group may be less likely to drink alcoholic beverages given the heavy responsibility of maintaining a functioning household, time devoted to subsistence farming, and/or the need to generate financial resources (Van Klaveren, Tijdens, Hughie-Williams, & Martin, 2009). In addition, more than 86% of women in Zambézia Province come from households that earn less than one dollar per day (T.D. Moon et al., 2015), likely limiting their ability to purchase alcohol.

Among women who reported drinking any alcohol, 97% reported consuming two or more drinks per day and 61% were considered hazardous drinkers. Thus, while fewer female heads of household drink alcohol than women in the general population, a high percentage of drinkers were considered hazardous drinkers (Padrão et al., 2011). Similar to other populations, having depressive symptoms (Adewuya, 2006; Pengpid, Peltzer, & Van der Heever, 2011; Rathod, Nadkarni, Bhana, & Shidhaye, 2015), death of a child (Clarke & Williams, 1979; Rubin, 1993; Wijngaards-de Meij et al., 2005), and having a higher household income (Mbatia, Jenkins, Singleton, & White, 2009; Padrão et al., 2011) was associated with higher odds of risky drinking behavior.

The association of pregnancy with hazardous drinking in bivariate analyses and the high percentage of pregnant women who are hazardous drinkers (5.4%) is concerning given risk of fetal alcohol spectrum disorders, including physical, behavioral, and learning problems (Abel & Sokol, 1987, 1991; Hoyme et al., 2005; Koren, Nulman, Chudley, & Loocke, 2003). Women are counseled about the risks of drinking during antenatal care visits, thus our findings were surprising. Among our population, there was no association between current maternal hazardous drinking and anthropometric data or rates of child vaccination, perhaps given recent initiation of drinking behavior. We did not assess cognitive impairment or other characteristics associated with fetal alcohol spectrum disorders (Benz, Rasmussen, & Andrew, 2009). In other sub-Saharan African countries, alcohol exposure during pregnancy ranges from 2.2 % – 87%, highlighting the extreme variability of hazardous drinking across the region (Culley et al., 2013).

The strengths of our study include the large sample size of women in Zambézia Province, the quality sampling strategies, and the collection of anthropometric data on children. Despite these strengths there are limitations to our study. We did not collect data on partner

drinking habits (Culley et al., 2013), nor did we collect data on the quantity or type of alcohol consumed. The use of cross-sectional data to understand the anthropometric data is of limited value and our one-time data collection during May-June may have skewed alcohol intake data higher (if one assumes drinking increases during period of plenty) or lower (given increased farming workload and reduced stress associated with food availability). While we were looking at anthropometric data as a proxy for child health and wellbeing, we did not collect data on mistreatment or neglect of children, which could result from hazardous drinking activity. This data was not collected given the complicated logistics needed to recruit another adult from the same household to confidentially complete this section, but future research may create a sub-survey for this purpose. Lastly, the fact that 55% of the sample required translation of the instrument from Portuguese to their native language by interviewers may also have influenced results.

While fewer female heads of household drink alcohol than previous studies among women in the general population, higher percentages of those who drink any alcohol were considered “hazardous drinkers”. Given that many hazardous drinkers are already in contact with the health system for their own health (via antenatal care) or the health of their child (during the illness of their child) there is a unique opportunity to screen women for alcohol use and provide necessary care. Home-based alcohol screening targeting women who have lost a child could also be implemented, following the model used to support those who have experienced gender based violence. There are currently no mental health services to assist those dependent on alcohol in the region. The need to adapt and implement evidence-based interventions to reduce alcohol intake in rural areas that have no access to care is essential.

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Highlights

- Hazardous drinking prevalence among female heads of household in Zambezia was 5.1%
- Among women who reported drinking any alcohol, 61% considered hazardous drinkers
- Depression, death of child, and no formal education associated with increased odds

Table 1**Dichotomized Responses for AUDIT Scale**

	Total (n=3821)
Frequency of alcohol consumption	
Missing, n(%)	429 (11.2%)
Never	91.6%
Sometimes or more	8.4%
Number of alcoholic drinks in a day	
Missing, n(%)	1770 (46.3%)
0 or 1	91.9%
2 or more	98.1%
Drink more than average in one occasion	
Missing, n(%)	1780 (46.3%)
Never	91.6%
Once a month or more	8.1%
Not able to stop drinking after started	
Missing, n(%)	267(7.0%)
Never	97.2%
Once a month or more	2.8%
After alcohol, stopped doing things you normally would do	
Missing, n(%)	250 (6.5%)
Never	97.0%
Once a month or more	3.0%
Ever need to drink to feel good after drinking heavily day before	
Missing, n(%)	234 (6.1%)
Never	96.7%
Once a month or more	3.3%
Feel remorse about drinking alcohol	
Missing, n(%)	230 (6.0%)
Never	96.5%
Once a month or more	3.5%
Not able to remember what happened after drinking	
Missing, n(%)	228 (6.0%)
Never	96.9%
Once a month or more	3.1%
Hurt or were hurt by someone drinking alcohol	
Missing, n(%)	371 (9.7%)
No	96.9%
Yes	3.1%
Parent, friend, doctor been worried about drinking	
Missing, n(%)	341 (8.9%)
No	96.8%

	Total (n=3821)
Yes	3.2%

Categorical variables are reported as weighted percentages, with each observation being weighted by the inverse of the household sampling probability.

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Table 2

Characteristics of AUDIT respondents, two categories

Factor	Nondrinker (n=1635)	Drinkers (n=287)	Combined (n=1922)	p-value (ignore cluster)	adjusted p-value
PHQ-8 score, median (IQR)	0 (0 – 2)	3 (0 – 9)	0 (0 – 4)	<0.001	<0.001
PHQ-8 score, mean (SD)	2.5 (4.4)	4.5 (5.0)	3.5 (4.9)		
Missing, n(%)	395 (24%)	44 (15%)			
NO	91.9%	75.3%	90.4%		
YES	8.1%	24.7%	9.6%		
Marital status				0.080	0.22
Single	24.7%	15.3%	28.8%		
Married/Common law	72.1%	80.9%	67.6%		
Divorced/separated/widowed	3.2%	3.7%	3.6%		
Education (years), median (IQR)	3 (0 – 5)	3 (1 – 7)	3 (0 – 5)	0.64	0.798
Education (years), mean (SD)	2.7 (2.8)	2.7 (3.2)	2.5 (2.8)		
Missing, n(%)	15 (1%)	0 (0%)			
Respondent understands Portuguese				0.52	0.654
No	53.7%	46.8%	56.7%		
YES	46.3%	53.2%	43.3%		
Currently pregnant				0.038	0.050
Missing, n(%)	391 (23.9%)	44 (15.3%)			
No	89.3%	86.2%	88.9%		
Yes	10.7%	13.8%	11.1%		
Household Income				0.061	0.247
Missing, n(%)	181 (11.1%)	21 (7.3%)			
More than sufficient	9.4%	11.3%	11.5%		
Sufficient	59.7%	52.1%	61.2%		
Less than sufficient	30.9%	36.6%	27.3%		
Household Food Insecurity Access (HFIAS), median (IQR)	3 (0 – 11)	3 (0 – 7)	3 (0 – 11)	0.004	0.006
Household Food Insecurity Access (HFIAS), mean (SD)	4.4 (5.1)	3.3 (4.4)	3.4 (4.5)		
Missing, n(%)	46 (3%)	5 (2%)			
Social support scale, median (IQR)	86.7 (66.7 – 100)	86.7 (66.7 – 100)	86.7 (66.7 – 100)	0.72	0.390

Factor	Nondrinker (n=1635)	Drinkers (n=287)	Combined (n=1922)	p-value (ignore cluster)	adjusted p-value
Social support scale, mean (SD)	83.4 (17.4)	83.1 (18.0)	82.4 (19.4)		
Missing, n(%)	15 (1%)	3 (1%)			
Recent Birth				0.53	0.6652
No	48.7%	60.6%	49.0%		
Yes	51.3%	39.4%	51.0%		
Child mortality				<0.001	0.0034
Missing, n(%)	613 (37.5%)	85 (29.6%)			
No	70.9%	58.0%	65.5%		
Yes	29.1%	42.0%	34.5%		

¹Total n=1922 (1635 non-drinkers, 287 drinkers)

²Continuous variables are reported as weighted estimates of median (interquartile range) and mean (SD).

³Categorical variables are reported as weighted percentages, with each observation being weighted by the inverse of the household sampling probability.

⁴Tests of association with hazardous drinking include Kruskal Wallis (continuous) and chi-square tests (categorical); they ignore the effects of clustering.

⁵p(separate) is the p value for test among three groups, p(drinker combined) is the p value for test the difference between non-drinkers vs. hazardous and nonhazardous drinker combined.

⁶Non-drinkers are defined as those who abstained from alcohol entirely; drinkers are those reporting any alcohol consumption in past.

Table 3

Characteristics of AUDIT respondents, three categories

Factor	Non-drinkers (n=1635)	Non-hazardous Drinkers (n=132)	Hazardous Drinkers (n=155)	Combined (n=1922)	p-value
PHQ-8 score, median (IQR)	0 (0 – 2)	2 (0 – 7)	5 (0 – 10)	0 (0 – 4)	<0.001
PHQ-8 score, mean (SD)	2.5 (4.4)	3.4 (4.6)	5.3 (5.2)	3.5 (4.9)	<0.001
Missing, n(%)	395 (24.2%)	25 (18.9%)	19 (12.3%)		
NO	91.9%	82.4%	67.4%	90.4%	
YES	8.1%	17.6%	32.6%	9.6%	
Marital status					0.024
Single	24.7%	11.6%	19.7%	28.8%	
Married/Common law	72.1%	82.7%	78.9%	67.6%	
Divorced/separated/widowed	3.2%	5.7%	1.4%	3.6%	
Education (years), median (IQR)	3 (0 – 5)	3 (0 – 7)	3 (1 – 8.2)	3 (0 – 5)	0.84
Education (years), mean (SD)	2.7 (2.8)	2.8 (3.1)	2.7 (3.3)	2.5 (2.8)	0.84
Missing, n(%)	15 (1%)	0 (0%)	0 (0%)		
Respondent understands Portuguese					0.30
No	53.7%	37.8%	57.5%	56.7%	
YES	46.3%	62.2%	42.5%	43.3%	
Currently pregnant					0.005
Missing, n(%)	391 (23.9%)	38 (28.8%)	6 (3.9%)		
No	89.3%	87.5%	84.9%	88.9%	
Yes	10.7%	12.5%	15.1%	11.1%	
Household Income					0.069
Missing, n(%)	181 (11.1%)	11 (8.3%)	10 (6.5%)		
More than sufficient	9.4%	17.8%	3.3%	11.5%	
Sufficient	59.7%	48.6%	56.4%	61.2%	
Less than sufficient	30.9%	33.6%	40.3%	27.3%	
Household Food Insecurity Access (HFIAS), median (IQR)	3 (0 – 11)	2 (0 – 8.6)	4 (0 – 6)	3 (0 – 11)	0.016
Household Food Insecurity Access (HFIAS), mean (SD)	4.4 (5.1)	3.1 (4.3)	3.5 (4.5)	3.4 (4.5)	0.016
Missing, n(%)	46 (3%)	3 (2%)	2 (1%)		
Social support scale, median (IQR)	86.7 (66.7 – 100)	86.7 (66.7 – 100)	93.3 (80 – 100)	86.7 (66.7 – 100)	0.91

Factor	Non-drinkers (n=1635)	Non-hazardous Drinkers (n=132)	Hazardous Drinkers (n=155)	Combined (n=1922)	p-value
Social support scale, mean (SD)	83.4 (17.4)	81.6 (20.4)	84.3 (15.7)	82.4 (19.4)	0.91
Missing, n(%)	15 (1%)	3 (2%)	0 (0%)		
Recent Birth					0.79
No	48.7%	59.8%	61.6%	49.0%	
Yes	51.3%	40.2%	38.4%	51.0%	
Child mortality					<0.001
Missing, n(%)	613 (37.5%)	47 (35.6%)	38 (24.5%)		
No	70.9%	67.8%	48.3%	65.5%	
Yes	29.1%	32.2%	51.7%	34.5%	

¹Total n=1922 (1635 non-drinkers, 132 non-hazardous drinkers, 155 hazardous drinkers)

²Continuous variables are reported as weighted estimates of median (interquartile range) and mean (SD).

³Categorical variables are reported as weighted percentages, with each observation being weighted by the inverse of the household sampling probability.

⁴Tests of association with hazardous drinking include Kruskal Wallis (continuous) and chi-square tests (categorical); they ignore the effects of clustering.

⁵p(separate) is the p value for test among three groups, p(drinker combined) is the p value for test the difference between non-drinkers vs. hazardous and nonhazardous drinker combined.

⁶Non-drinkers reported no alcohol consumption; non-hazardous drinkers scored <5 on the AUDIT scale; Hazardous drinkers scored 5 on the AUDIT scale

Table 4

Characteristics associated with hazardous drinking among women

	Adjusted Odds Ratio (95% CI)	p-value
Age (per year)	1.02 (0.99, 1.04)	0.176
Education		0.102
Zero (Ref)	1	
3 years	0.72 (0.48, 1.08)	
6 years	0.86 (0.52, 1.42)	
12 years	2.60 (0.78, 8.72)	
Understands Portuguese	0.88 (0.54, 1.43)	0.602
Social support score		0.104
Zero	0.11 (0.01, 1.12)	
50	0.73 (0.37, 1.44)	
80	1.46 (0.94, 2.29)	
100 (ref)	1	
Marital status		0.017
Married/Common Law (ref)	1	
Single	0.48 (0.29, 0.80)	
Divorced/Separated/widowed	0.78 (0.35, 1.74)	
Household income		0.154
Less than sufficient	0.60 (0.36, 1.01)	
Sufficient	1	
More than Sufficient	1.11 (0.55, 2.23)	
Depression	2.20 (1.28, 3.76)	0.004
Food insecurity	0.96 (0.92, 1.00)	0.050
Currently Pregnant	1.83 (0.99, 3.39)	0.002
Any child born alive but later died	2.44 (1.46, 4.07)	<0.001

There are 1922 households included in this model. Missing values of baseline predictors estimated using multiple imputation. Due to evidence ($p < 0.10$) that the relationship of log-odds of AUDIT score is non-linear, education, social support scores, and distant is fit using restricted cubic splines