

## Article

# Prevalence and correlates of heavy episodic alcohol consumption among adults in Ecuador: Results of the first national STEPS survey in 2018

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**Abstract:** The study aimed to assess the prevalence and correlates of heavy episodic drinking (HED) among adults in Ecuador. In the national cross-sectional 2018 Ecuador STEPS survey, 4,638 persons (median age=39 years, range 18-69 years) responded to a questionnaire and physical measures. Logistic regression was used to assess the determinants of HED. Results indicate that 24.1% had past-month HED, 36.7% among men, and 12.0% of women; 40.6% had past month HED among past 12-month drinkers. In adjusted logistic regression analysis, male sex (Adjusted Odds Ratio=AOR: 3.03, 95% Confidence Interval=CI: 2.44-3.77), past smoking (AOR: 1.42, 95% CI: 1.12-1.81), and current smoking (AOR: 2.94, 95% CI: 2.25-3.86) were positively and persons aged 50-69 years (AOR: 0.52, 95% CI: 0.39-0.68) was negatively associated with HED. In sex-stratified analyses, among men, African Ecuadorean or Mulato (AOR: 1.74, 95% CI: 1.07-2.84), and high physical activity (AOR: 1.43, 95% CI: 1.02-2.01) were positively associated with HED, and among women, being Montubia (AOR: 0.38, 95% CI: 0.16-0.90) was negatively and obesity (AOR: 1.58, 95% CI: 1.05, 2.38) was positively associated with HED. Almost one in four participants engaged in HED, and several sociodemographic and health indicators were identified associated with HED.

**Keywords:** heavy episodic drinking; sociodemographic factors; health variables; Ecuador

## Introduction

Harmful alcohol use is a significant contributor to the global burden of disease [1]. Heavy episodic drinking (HED) is defined as "drinking at least 60 grams or more of pure alcohol on at least one occasion in the past 30 days" [2]. HED is a major indicator for the acute effects of alcohol consumption, such as injury [2]. Worldwide, 18.2% of persons 15 years and older were estimated to engage in HED in 2016 [3], and HED is expected to increase to 23% in 2030 [4]. In the Americas region, the prevalence of HED ( $\geq 15$  years) decreased from 29.4% in 2000 to 21.3% in 2016 [3], and it was in 2016 in Columbia 15.4%, Peru 26.3%, Argentina 23.0%, Bolivia 21.1%, Brazil 19.7% and in Ecuador 21.3% [3]. In national population-based surveys, the prevalence of HED was among regular alcohol users, 46% in Brazil [5], and among the general population 12.5% in Ethiopia [6], and 12.8% in Kenya [7]. In the World Health Survey in Ecuador in 2003, 5.5% were heavy drinkers ( $\geq 1$  day,  $\geq 5$  standard drinks/past 7 days) [8]. In a study among university students in Ecuador, the prevalence of hazardous or harmful alcohol use was 23.8% among females and 49.7% in males [9]. There is a lack of national population-based data on the prevalence and correlates of HED in Ecuador.

Ecuador is an upper middle-income country and has a total population of 16.9 million, the largest ethnic group is Mestizo (people of mixed Indian and European descent) (71.9%), followed by Montubio (an aboriginal mestizo group that originates from the coastal part of Ecuador) (7.4%), Amerindian (or indigenous people) (7%), white (6.1%), and Afroecuadorian (4.3%), and

majority are Roman Catholic (74%) and Evangelical (10.4%) by religion [9]. The urban population is 64.2%, life expectancy at birth is 77.5 years, and 92.8% can read and write [9]. "Ecuador's high poverty and income inequality most affect indigenous, mixed race, and rural populations." [10]

Factors associated with HED may include male sex [6,7,11-15], middle adulthood [7,16,17], specific ethnic groups [7,17,18], lower socioeconomic status [5,17,19-21], urban residence [17], rural residence [6], former and current tobacco use [6-8,12,17,22], overweight/obesity [23-25], sedentary behaviour [5], physical activity [26-28], inadequate fruit and vegetable consumption [29], and less frequent primary health care utilization [30,31]. Epidemiological population-based surveys are needed to target interventions to prevent HED. The study aimed to assess the prevalence and correlates of HED among adults in a nationally representative survey in Ecuador in 2018.

## Methods

### *Study design and participants*

Cross-sectional nationally representative data of 18-69 year-old persons from the 2018 Ecuador STEPS Survey were analyzed [32]. A three-stage cluster sampling strategy was used, first stage: selection of Primary Sampling Units (PSU) by stratum; second stage: selection of 12 occupied households within each PSU selected in the first stage, and the third stage random selection of 1 participant aged 18-69 years from each household [33]. The overall study response rate was 69.4% [33]. The data was collected using electronic tablet devices [33]. The Ethical Review Committee of the Ecuador Ministry of Health provided ethics approval of the study, and written informed consent was obtained from the study participants [33].

### *Measures*

#### *Alcohol use variables*

A standard unit of alcoholic beverage was defined as 10 g of ethanol or to pure alcohol (using showcards and examples), and questions included [33]: "Have you ever consumed any alcohol such as beer, wine, spirits, etc.?" (Yes, No); "Have you consumed any alcohol within the past 12 months?" (Yes, No); "Have you stopped drinking due to health reasons, such as a negative impact on your health or on the advice of your doctor or other health workers?" (Yes, No) "Have you consumed any alcohol within the past 30 days?" (Yes, No) "During the past 30 days, how many times did you have six or more standard drinks in a single drinking occasion?" (Number of times); Past week alcohol consumption was measured with seven questions on the drinks consumed on each day of the week (number), and "During the past 7 days, did you consume any homebrewed alcohol, any alcohol brought over the border/from another country, any alcohol not intended for drinking or other untaxed alcohol?" (Yes, No) "During the past 12 months, have you had family problems or problems with your partner due to someone else's drinking?" (1=yes: > monthly to 4=once or twice). *Alcohol dependence* was assessed with three questions of the "Alcohol Use Disorder Identification Test=AUDIT" (items 4-6), e.g., "How often during the last year have you found that you were not able to stop drinking once you had started?" Response options ranged from "0=never to 4=daily or almost daily"; total scores of 4 or more indicate alcohol dependence [34].

Socio-demographic factor questions included age (in years), sex (male, female), highest level of education completed (1=no formal school to 7=postgraduate degree), and ethnicity (Mestizo, Amerindian, Montubio, African-Ecuadorian, Whites, etc.) [33].

*The health risk behaviour* variables included past and current smoking, consumption of fruit and vegetables per day, and "based on the "Global Physical Activity Questionnaire", sedentary behaviour ( $\geq 7$  hours/day), and low, moderate or high physical activity [33]. Body Mass Index was measured: "<18.5kg/m<sup>2</sup> underweight, 18.5-24.4kg/m<sup>2</sup> normal weight, 25-29.9kg/m<sup>2</sup> overweight and  $\geq 30$  kg/m<sup>2</sup> obesity" [33]. One question was asked about a past 12-month health care provider visits [33].

### Data analysis

All statistical analyses were conducted using STATA software version 14.0 (Stata Corporation, College Station, TX, USA). The data were weighted to make the sample representative of the target population in Ecuador. Descriptive statistics were used to summarize the sample and HED prevalence characteristics. Unadjusted and adjusted (including variables significant at  $p < 0.1$  in univariate analysis) logistic regression was used to predict HED prevalence. In addition, sex-stratified multivariable logistic regression models with HED prevalence were calculated. Based on a previous literature review [5-8,12,16,17,19-31], covariates included sex, age group, highest level of education, ethnicity, smoking status, obesity, fruit and vegetable intake, physical activity, sedentary behaviour and health care utilization. Taylor linearization methods were applied to account for the complex study design and the sampling weight. Results from logistic regression analyses are reported as odds ratios (ORs) and 95% confidence intervals (Cis). Missing values (<3.6% for any study variable) were excluded and  $p < 0.05$  considered significant.

### Results

#### Characteristics of the sample and heavy episodic alcohol consumption

The sample comprised 4,638 persons 18 to 69 years (Median=39 years, IQR= 27-52), 1944 (41.9%) were men, and 2694 (58.1%) were women, 51.7% had secondary or higher education, and 78.9% were Mestizo by ethnicity. Almost one in four were past (24.4%) or current smokers (13.7%), 58.8% had 0-1 servings of fruit and vegetables per day, 49.8% had high physical activity, 12.4% had sedentary behaviour, 25.7% were obese, and 59.4% had visited a health care provider in the past 12 months. Almost one in four participants (24.1%) had HED, 36.7% among men, and 12.0% of women (see Table 1).

**Table 1.** Characteristics of the sample and heavy episodic drinking (HED) among adults in Ecuador, 2018.

Variable (#missing cases)	Sample N (%)	HED		
		Male %	Female %	Both sexes %
All	4638	36.7	12.0	24.1
Age in years (#0)				
18-29	1205 (30.1)	39.6	17.4	28.6
30-49	2034 (40.7)	41.1	11.6	25.2
50-69	1399 (29.3)	28.4	7.0	18.0
Education (#4)				
<Secondary	2452 (48.2)	37.8	9.2	22.8
Secondary	929 (21.2)	34.5	13.3	24.1
>Secondary	1253 (30.5)	36.6	15.9	26.3
Ethnicity (#2)				
Mestizo	3567 (78.9)	36.7	12.8	24.2
Amerindian	378 (6.5)	26.9	9.3	17.7
Montubio	335 (7.2)	38.1	4.6	24.0
African-Ecuadorian or Mulato	227 (4.4)	50.6	11.8	31.0
Whites or other	129 (3.0)	35.1	13.4	24.9
Smoking status (#0)				
Never	3046 (61.9)	30.4	10.2	16.7
Past	1007 (24.4)	32.7	17.1	28.0
Current	585 (13.7)	53.6	32.3	50.4
Fruit/vegetables (servings/day) (#11)				
0-1	2754 (58.8)	37.2	12.1	24.7
2-3	1416 (31.2)	34.4	11.3	21.9
4 or more	457 (10.0)	40.6	13.6	27.6
Physical activity (#6)				
Low	1083 (24.7)	30.9	13.3	20.0
Moderate	1206 (25.5)	30.7	11.5	18.8
High	2343 (49.8)	40.4	11.5	28.8
Sedentary behaviour (#3)	481 (12.4)	37.7	14.6	27.7

Obesity (#168)	1204 (25.7)	39.6	13.0	23.5
Health care provider visit in past 12 months (#0)	2753 (59.4)	34.3	11.9	21.7

### *Distribution of alcohol use pattern*

More than four in five participants (83.2%) had ever consumed alcohol, 59.8% in the past 12 months, and 39.3% in the past month. Infrequent (1-2 days) HED was 18.0% and frequent ( $\geq 3$  days) HED was 6.9%. HED among past 12-month alcohol users was 40.6%, and heavy alcohol use in the past 7 days (1 or more days  $\geq 5$  standard drinks/day) was 11.7%. The prevalence of alcohol dependence was 11.9%, 7.0% had alcohol family problems in the past year, 8.8% stopped drinking because of health reasons, and concurrent past-month HED and past month smoking was 6.9% (see Table 2).

**Table 2.** Distribution of alcohol use pattern among adults in Ecuador, 2018.

Variable	Male N (%)	Female N (%)	Both sexes N (%)
Ever alcohol use	1740 (90.4)	2050 (76.2)	3790 (83.2)
Alcohol use in the past 12 month	1401 (72.6)	1240 (47.6)	2641 (59.8)
Alcohol use in the past 30 days	973 (51.8)	674 (27.3)	1647 (39.3)
Heavy episodic drinking in the past 30 days			
0 days	1242 (62.5)	2373 (87.0)	3615 (75.0)
1 day	371 (19.3)	214 (8.6)	585 (13.8)
2 days	125 (7.1)	39 (1.5)	164 (4.2)
3 or more days	206 (11.1)	68 (3.0)	274 (6.9)
Alcohol dependence	396 (20.6)	97 (3.4)	493 (11.8)
Heavy alcohol use in the past 7 days (1 or more days $\geq 5$ standard drinks)	480 (11.7)	355 (18.6)	125 (5.0)
Alcohol family problems in the past 12 months	153 (7.6)	159 (6.4)	312 (7.0)
Stopped drinking alcohol due to health reasons	168 (8.9)	253 (8.6)	421 (8.8)
Undeclared alcohol use	98 (5.0)	33 (1.0)	131 (3.0)
Past month HED and past month smoking	246 (12.7)	27 (1.3)	273 (6.9)
HED among past 12 month alcohol users	682 (50.8)	297 (25.6)	979 (40.6)

### *Associations with HED*

In adjusted logistic regression analysis, male sex (Adjusted Odds Ratio=AOR: 3.03, 95% Confidence Interval=CI: 2.44-3.77), past smoking (AOR: 1.42, 95% CI: 1.12-1.81), and current smoking (AOR: 2.94, 95% CI: 2.25-3.86) were positively and persons aged 50-69 years (AOR: 0.52, 95% CI: 0.39-0.68) was negatively associated with HED. Furthermore, in the unadjusted analysis, health care provider visit in the past 12 months was negatively associated with HED (see Table 3). In addition, in sex-stratified analyses, among men, African Ecuadorean or Mulato (AOR: 1.74, 95% CI: 1.07-2.84), and high physical activity (AOR: 1.43, 95% CI: 1.02-2.01) were positively associated with HED, and among women, being Montubia (AOR: 0.38, 95% CI: 0.16-0.90) was negatively and obesity (AOR: 1.58, 95% CI: 1.05, 2.38) was positively associated with HED (see Table 4).

**Table 3.** Associations with heavy episodic alcohol consumption.

Variable	Simple logistic regression		Multiple logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Sex				
Female	1 (Reference)		1 (Reference)	
Male	4.25 (3.64, 5.10)	<0.001	3.03 (2.44, 3.77)	<0.001
Age in years				
18-29	1 (Reference)		1 (Reference)	
30-49	0.84 (0.69, 1.02)	0.082	0.87 (0.69, 1.10)	0.253
50-69	0.55 (0.43, 0.70)	<0.001	0.52 (0.39, 0.68)	<0.001
Education				
<Secondary	1 (Reference)		1 (Reference)	
Secondary	1.08 (0.86, 1.35)	0.524	0.95 (0.75, 1.22)	0.696
>Secondary	1.21 (1.00, 1.47)	0.052	1.09 (0.87, 1.37)	0.462
Ethnicity				
Mestizo	1 (Reference)		1 (Reference)	
Amerindian	0.67 (0.40, 1.14)	0.139	0.64 (0.37, 1.10)	0.104
Montubio	0.98 (0.72, 1.34)	0.920	0.95 (0.69, 1.31)	0.750
African-Ecuadorian or Mulato	1.40 (0.97, 2.03)	0.071	1.34 (0.93, 1.95)	0.118
Whites or other	1.03 (0.63, 1.70)	0.894	1.05 (0.60, 1.85)	0.864
Smoking status				
Never	1 (Reference)		1 (Reference)	
Past	1.94 (1.56, 2.41)	<0.001	1.42 (1.12, 1.81)	0.008
Current	5.06 (4.01, 6.39)	<0.001	2.94 (2.25, 3.86)	<0.001
Fruit/vegetables (servings/day)				
0-1	1 (Reference)		1 (Reference)	
2-3	0.86 (0.71, 1.03)	0.095	0.91 (0.75, 1.12)	0.382
4 or more	1.17 (0.88, 1.55)	0.286	1.11 (0.83, 1.48)	0.468
Physical activity				
Low	1 (Reference)		1 (Reference)	
Moderate	0.93 (0.71, 1.20)	0.567	0.85 (0.65, 1.12)	0.255
High	1.62 (1.30, 2.03)	<0.001	1.18 (0.93, 1.50)	0.177
Sedentary behaviour	1.24 (0.96, 1.60)	0.096	0.99 (0.75, 1.32)	0.946
Obesity	0.86 (0.68, 1.09)	0.858	---	
Health care provider visit in past 12 months	0.73 (0.61, 0.87)	<0.001	0.92 (0.75, 1.11)	0.371

OR=Odds Ratio; CI=Confidence Interval.

**Table 4.** Multivariable logistic regression with heavy episodic alcohol consumption stratified by sex.

Variable	Men		Women	
	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age in years				
18-29	1 (Reference)		1 (Reference)	
30-49	1.07 (0.80, 1.42)	0.653	0.63 (0.44, 0.90)	0.012
50-69	0.64 (0.46, 0.89)	0.009	0.34 (0.20, 0.56)	<0.001
Education				
<Secondary	1 (Reference)		1 (Reference)	
Secondary	0.84 (0.61, 1.15)	0.273	1.21 (0.78, 1.90)	0.392
>Secondary	0.96 (0.70, 1.30)	0.778	1.34 (0.94, 1.92)	0.104
Ethnicity				
Mestizo	1 (Reference)		1 (Reference)	
Amerindian	0.60 (0.29, 1.21)	0.154	0.84 (0.49, 1.45)	0.527
Montubio	1.14 (0.79, 1.65)	0.483	0.38 (0.16, 0.90)	0.028
African-Ecuadorian or Mulato	1.74 (1.07, 2.84)	0.026	0.77 (0.38, 1.58)	0.483
Whites or other	1.06 (0.51, 2.19)	0.884	1.11 (0.50, 2.49)	0.794
Smoking status				
Never	1 (Reference)		1 (Reference)	
Past	1.21 (0.90, 1.62)	0.211	1.85 (1.24, 2.75)	0.003
Current	2.57 (1.94, 3.40)	<0.001	4.06 (2.35, 7.03)	<0.001
Fruit/vegetables (servings/day)				
0-1	1 (Reference)		1 (Reference)	
2-3	0.93 (0.72, 1.20)	0.561	0.91 (0.65, 1.26)	0.572
4 or more	1.16 (0.80, 1.69)	0.435	0.97 (0.61, 1.55)	0.903



Physical activity				
Low	1 (Reference)		1 (Reference)	
Moderate	0.95 (0.64, 1.43)	0.819	0.76 (0.52, 1.13)	0.180
High	1.43 (1.02, 2.01)	0.039	0.89 (0.60, 1.31)	0.552
Sedentary behaviour	1.04 (0.72, 1.49)	0.837	0.92 (0.59, 1.34)	0.705
Obesity	1.28 (0.92, 1.77)	0.140	1.26 (0.92, 1.74)	0.154
Health care provider visit in past 12 months	0.88 (0.69, 1.13)	0.320	0.97 (0.71, 1.33)	0.850

OR=Odds Ratio; CI=Confidence Interval.

## Discussion

For the first time in this national community-based survey among adults 18-69 years old in Ecuador, a higher prevalence of past month HED among the general population (24.1%) was found than estimates in the Americas region (21.3%) in 2016 [3], Columbia 15.4% [3], Argentina 23.0% [3], Bolivia 21.1% [3], Brazil 19.7% [3], Ecuador 21.3% [3], Ethiopia (12.5%) [6], Kenya (12.8%) [7], and lower than among regular alcohol users in Brazil (46%) [5]. The prevalence of past month alcohol use (39.3%) in this study was similar to a national sample of 20-59 year-olds in Ecuador in 2012 (41.3%) [35]. Compared to the 2003 Ecuador World Health Survey (5.5% past week heavy drinkers) [8], this study in 2018 showed a prevalence of 11.7% past week heavy drinkers. The possible increase of alcohol consumption in Ecuador is also shown in the high prevalence of hazardous or harmful alcohol use (23.8% among females and 49.7% in males) among university students in Ecuador [9]. The overall increase of heavy drinking in Ecuador from 2003 to 2018 may be related to a larger middle class and economic development in Ecuador, as "alcohol consumption and resulting problems are likely to rise with increasing income" [36]. The World Health Organization [36] (p.2) notes that, "traditional drinking patterns dominated by sporadic episodes of intoxication continue, but involvement in the cash economy and industrialization of alcohol production and distribution have permitted the episodes to become more frequent."

In agreement with previous studies [6,7,11-17], this study found that male sex increased the odds and older age (50-69 years) decreased the odds of engaging in HED. Sex specific role expectations and norms, such as associating drinking alcohol with masculinity, may be related to the male preponderance of HED [6,14]. In older age, a reduction of HED may be expected since the tolerance towards alcohol reduces with ageing [37]. Among different ethnic groups in Ecuador, African Ecuadorean or Mulato men had higher odds of HED and Montubia women had lower odds of HED. It is possible that the legacy of slavery and marginalization of African Ecuadorean or Mulato (mixed between African and White) men in Ecuador increases their risk of HED [38], and since Montubia women mostly inhabit the rural areas of the coastal provinces in Ecuador have a lower risk for HED [39]. While previous research showed an association between lower education or lower socioeconomic status [5,17,19-21], this study did not find that educational level was associated with HED.

Consistent with previous research findings [6-8,12,17,22], this study found strong associations between past and current smoking with HED. Reasons for this may lie in the co-dependence risk of HED and nicotine [40]. Public health interventions should be directed at integrating smoking cessation in persons with HED. A small proportion of participants in this study (8.8%) had stopped drinking due to health reasons. Therefore, screening and brief intervention of alcohol problems in primary care should be reinforced.

Having visited a health care facility in the past 12 months was in an unadjusted analysis protective against HED, which is consistent with previous research [30,31]. In a study in Brazil, people who were highly health conscious were less likely to engage in HED [5]. Some studies [5] showed a clustering of HED with other health risk behaviours, apart from tobacco use, such as sedentary behaviour [5], physical activity [26-28], inadequate fruit and vegetable consumption [29], and obesity [23-25], while in this study physical activity was among men and obesity among women associated with HED, but no associations were found for inadequate fruit and vegetables intake, and

sedentary behaviour. Interventions targeting obesity in women in Ecuador should include HED, as HED is related to caloric content [23].

In line with the World Health Organization [41] recommendations, Ecuador has incorporated in its Strategy for the Prevention and Control of Harmful Alcohol Consumption, three measures: reduce the ability to purchase due to less availability, for example, reduce hours and sales in public places; reduce exposure to advertising; and increase taxes and prices. However, challenges remain to effectively implement policies for the prevention and control of harmful consumption of alcohol, such as reducing hours and spending in public places, reducing advertising, and increase taxes and prices [33].

### *Study limitations*

The study was limited by its cross-sectional design and self-report of some data, including alcohol use. Some variables in the Ecuador 2018 STEPS survey had too missing values, such as household income, and could therefore not included in the analysis. A further limitation was that in this household survey, heavy drinking populations, such as military personnel, homeless, or institutionalized persons, were not included [42].

### **Conclusions**

Almost one in four participants engaged in HED and two in five among current drinkers had HED, and sociodemographic factors (male sex, 18-29 and 30-49 year-olds and ethnicity) and health factors (smoking, body weight status, and physical activity) were associated with HED.

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