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Prevalence and associated variables to alcohol abuse in public transportation drivers in Lima, Peru

Prevalencia y variables asociadas al abuso de alcohol en conductores de transporte público en Lima, Perú

Paulo Ruiz-Grosso[1, 2], *Jorge Osada*[1]

ABSTRACT

Objective: To analyze the association of sociodemographic, occupational, and mental health variables with alcohol use disorders (AUD) among public transportation drivers in Lima, Peru. **Materials and methods:** A secondary analysis of a cross-sectional survey was conducted with data from 278 bus drivers (BD) and 227 mototaxi drivers (MTD) from 25 transportation companies selected through snowball sampling. AUD was assessed using the CAGE questionnaire (cutoffs ≥1 and ≥2 for AUD-1 and AUD-2, respectively). Sociodemographic, occupational, and mental health variables, including depression, anxiety, and burnout, were also recorded. Prevalence and associated factors were analyzed using logistic regression models. **Results:** Prevalence rates for AUD-1 and AUD-2 were 74.4% and 58.4%, respectively. Significant variation was observed between BD companies (p = 0.001), but not between BD and MTD. For AUD-1, male gender (OR = 7.8; 95%CI: 1.8-34.1), being a BD (OR = 0.27; 95%CI: 0.13-0.56), and being divorced (OR = 9.5; 95%CI: 1.14-79.03) were significant factors. For AUD-2, male gender (OR = 5.49; 95%CI: 1.50-20.07), being a BD (OR = 0.52; 95%CI: 0.30-0.92), and the depersonalization subscale score (OR = 1.05; 95%CI: 1.005-1.10) were associated. **Conclusions:** AUD is prevalent among public transportation drivers in Lima. Male gender and being a mototaxi driver seem to increase AUD risk, while depersonalization is linked to alcohol dependence severity.

Keywords: alcohol use disorders; alcoholism; public transportation; Peru.

RESUMEN

Objetivo: Analizar la asociación entre variables sociodemográficas, ocupacionales y de salud mental con los trastornos por consumo de alcohol (TCA) en conductores de transporte público en Lima, Perú. **Materiales y métodos:** Se realizó un análisis secundario de una encuesta transversal con datos de 278 conductores de autobús (CA) y 227 conductores de mototaxi (CMT) de 25 empresas de transporte seleccionadas mediante muestreo en bola de nieve. Los TCA se evaluaron con el

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Corresponding author:
Paulo Ruiz-Grosso
paulo.ruiz@upch.pe

[1] Universidad Peruana Cayetano Heredia, Facultad de Medicina Alberto Hurtado. Lima, Peru.
[2] Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi", Dirección Ejecutiva de Investigación, Docencia y Atención Especializada de Adultos y Adultos Mayores. Lima, Peru.

cuestionario CAGE (puntos de corte: ≥1 para TCA-1 y ≥2 para TCA-2). También se recopilaron variables sociodemográficas, ocupacionales y de salud mental, incluyendo depresión, ansiedad y agotamiento. Se analizaron la prevalencia y los factores asociados mediante modelos de regresión logística. **Resultados:** Las prevalencias de TCA-1 y TCA-2 fueron 74,4 % y 58,4 %, respectivamente. Se encontró variación significativa entre empresas de CA (p = 0,001), pero no entre CA y CMT. Para TCA-1, los factores asociados fueron ser hombre (OR = 7,8; IC 95 %: 1,8-34,1), ser CA (OR = 0,27; IC 95 %: 0,13-0,56) y estar divorciado (OR = 9,5; IC 95 %: 1,14-79,03). Para TCA-2, ser hombre (OR = 5,49; IC 95 %: 1,50-20,07), ser CA (OR = 0,52; IC 95 %: 0,30-0,92) y la subescala de despersonalización (OR = 1,05; IC 95 %: 1,005-1,10) fueron significativos. **Conclusiones:** Los TCA son frecuentes entre conductores de transporte público en Lima. Ser hombre y conductor de mototaxi aumenta el riesgo, mientras que la despersonalización se asocia con la severidad del consumo.

Palabras clave: trastornos por consumo de alcohol; alcoholismo; transporte público; Perú.

INTRODUCTION

Around the world, alcohol use disorders (AUD) and alcohol-related traffic injuries (ARTIs) are significant contributors to the global burden of disease. According to the 2013 disease burden reports, ARTIs escalated from the tenth to the fifth position among the leading causes of years of life lost (YLL) globally (1). ARTIs rank as the eighth leading cause in developing countries, the third in Latin America and the Caribbean, and also in Peru. More recent evidence showed that in 2019, alcohol consumption was associated with 6.6% of all road injuries, with the highest burden observed in Europe and among young men, particularly motorcyclists (2). Some evidence suggests that the permitted blood alcohol level should be reconsidered to prevent ARTIs (3).

AUD have consistently ranked in the twenty-second position among contributors to years of healthy life lost globally (4-6). In 2016, approximately 3 million alcohol-attributable deaths and 131.4 million disability-adjusted life years (DALYs) were reported, accounting for 5.3% of all deaths and 5.0% of all DALYs worldwide. The impact of AUD is particularly pronounced among younger populations, with over 320,000 deaths annually among individuals aged 15-29. Local disease burden estimates show that AUD is among the top contributors to DALYs and YLLs, with particular relevance in the age group between 10 and 24 years (7).

Individually, both phenomena constitute important public health problems, but several pathways of interaction highlight their combined significance. The most studied pathway is driving under the influence of alcohol, which has been closely associated with a higher probability of experiencing ARTIs. This behavior exhibits a dose-response relationship and tends to decrease when penalized (8, 9). Besides, being under the influence of alcohol increases the likelihood of suffering more severe injuries. Finally, chronic alcohol use may increase the risk of ARTIs even when sober, possibly due to irreversible cognitive damage (10, 11).

In Peru, ARTIs are one of the main contributors to the burden of disease, with driving under the influence of alcohol being one of its primary causes. A significant portion of the population uses public transportation vehicles for both short and long distances. Among these, mototaxis—motorized, three-wheeled vehicles similar to rickshaws—and "combis"—small buses used for transportation—are the main vehicles associated with ARTIs (10% vs. 21.8%) (12). Public transportation drivers in Peru possess characteristics that may increase the risk of AUD. These include low education levels, a significant predominance of male drivers, young age (especially among mototaxi drivers), and particularly demanding work conditions. For example, many drivers do not receive a fixed salary but must pay a flat rate to rent the vehicle every day, earning money only after reaching that amount. Additionally, they face long working hours and extended night shifts (13).

Despite the apparent vulnerability of this population and its strategic importance for community road safety, it is known that no studies have reported on the prevalence and potential risk factors for AUD among public transportation drivers. Addressing this knowledge gap is essential for implementing preventive and corrective actions. The present study

aims to estimate the prevalence of AUD and identify key risk factors. This could inform the design of interventions to improve the selection and evaluation of public transportation drivers and identify modifiable occupational factors associated with alcohol use.

MATERIALS AND METHODS

Study design

The present study is a secondary data analysis of the study "Prevalence and factors associated with common mental disorders in public transportation drivers in Lima Metropolitana" (2010). This cross-sectional study was designed to estimate the prevalence of common mental disorders, including major depressive disorder, anxiety symptoms, burnout syndrome, daytime sleepiness, sleep apnea, and alcohol abuse. The results related to the prevalence of mental disorders and daytime sleepiness have been previously reported (13).

Population, sampling frame, and sample

All available data from the original study were used, accessed between March 3, 2014, and September 30, 2014. The authors did not have access to any information that could identify individual participants. The original study included mototaxi and urban bus drivers working for legal transportation companies in the districts of Carabayllo and San Juan de Miraflores in Lima. These districts are located in the northern and southern zones of Lima, respectively, and have been predominantly populated by migrants since the 1980s, during the period of terrorist violence in Peru.

Strictly speaking, the population to which these results can be generalized includes drivers of formal transportation companies in San Juan de Miraflores and Carabayllo. The sampling frame consisted of formal public transportation companies operating small buses (known as "coasters" or "custers") and mototaxis based in these districts. However, we considered that the sociodemographic characteristics of participants are reasonably similar to those observed in other formal transportation companies across Lima. The sample was systematically selected following the methodology described in the next section.

Sampling design and data collection method

The snowball sampling technique was used to recruit study participants. Key informants from transportation companies in Carabayllo and San Juan de Miraflores were initially contacted. After completing data collection at each company, informants were asked provide contact to similar transportation companies in the area. Company managers were then contacted, informed about the study's methodology and objectives, and asked for permission to contact their drivers.

Participants were contacted in two ways. First, group meetings or assemblies were organized to explain the study's objectives and methods, followed by individual question-and-answer sessions to address participants' concerns. Informed consent was then obtained. Second, individual drivers were approached—after obtaining prior authorization from the company's management—during their waiting periods before vehicle assignment or during rest breaks. In these cases, informed consent was obtained individually.

Once informed consent was obtained, participants received a data collection instrument, which included a detachable sheet with an alphanumeric identification code and the participant's national identification number (DNI, by its acronym in Spanish). This detachable sheet was placed in a sealed amphora or dark bag to protect participants' identities from the data collection staff. Study personnel remained nearby to answer any questions during data collection. Once participants completed the form, they handed it back to the staff, who thanked them for their participation and concluded their involvement in the study.

Operational definition of variables and instruments

Alcohol use disorders

The CAGE questionnaire was used to assess alcohol abuse and dependence. This survey is a rapid screening tool for AUD, consisting of four items with dichotomous "Yes/No" responses. Each affirmative response scores one point, resulting in a total score ranging from 0 to 4. The acronym CAGE refers to the key symptoms it assesses: C for "cutting down on drinking," A for "annoyance by criticism," G for "guilt," and E for "eye-opener" (14).

The psychometric properties of the CAGE scale have been extensively studied. In their literature review, Dhalla & Kopec (15) reported adequate test-retest reliability. Teitelbaum & Carey (16) found stability coefficients of 0.90 and 0.85 in general and psychiatric populations, respectively. The CAGE scores showed acceptable correlations with other tools for screening alcohol abuse or dependence, as well as good internal consistency (17-19). According to Dhalla & Kopec (15), the instrument's average sensitivity and specificity were 71% and 90%, respectively, with a cutoff value of

one or more affirmative responses (≥1) frequently used to identify alcohol abuse or dependence (15).

The use of different cutoff points has generated some debate regarding their interpretation, which will be addressed in the limitations section of this manuscript. For this study, both cutoff points (≥1 and ≥2) are reported to ensure comparability with the existing literature. A high probability of AUD is indicated with a score of ≥1 (AUD-1) or ≥2 (AUD-2), respectively.

Depressive symptoms and major depressive episode

Depressive symptoms were assessed using a validated Spanish version of the Center for Epidemiologic Studies Depression Scale (CES-D) (20). The total score was used to evaluate the intensity of depressive symptoms. Due to a higher availability of complete data, a shortened and validated version of the CES-D was employed to define a major depressive episode (MDE) with a cutoff score of ≥6. This shortened version demonstrated a sensitivity of 95.7% and a specificity of 93.4%, correctly classifying 94.7% of individuals, with strong internal consistency (Cronbach's alpha = 0.905) (21).

Burnout syndrome

Burnout syndrome (BOS) is a chronic adaptive disorder resulting from psychosocial demands at work, particularly in occupations that involve interpersonal relationships with a high degree of interdependence. It is characterized by emotional exhaustion, depersonalization, and a sense of low personal accomplishment.

In this study, each dimension was considered pathological when the score exceeded the 75th percentile of the values obtained on the Maslach Burnout Inventory (22). Burnout syndrome was classified as positive if a participant scored above the 75th percentile in at least two out of the three main dimensions. For analysis, BOS was treated as both a dichotomous variable (absence/presence) and a continuous variable for each of the three dimensions.

Anxiety symptoms

Anxiety symptoms were defined as an unpleasant sensation typically associated with unease, apprehension, fear, or worry arising from perceived uncontrollable or inevitable threats. Two criteria were used to assess anxiety: 1) a score greater than 50 on the Zung Self-Rating Anxiety Scale (SAS), indicating clinically significant anxiety symptoms, and 2) a continuous numerical score.

Sociodemographic and occupational variables

Sociodemographic and occupational data were collected using a self-administered questionnaire. Sociodemographic variables included age, sex, educational level, marital status, number of children, place of origin, and migration status. Occupational variables included the number of hours worked during the day (between 7 am and 7 pm) and night per week (the sum of hours worked from 7 pm to 7 am during a week), the duration of employment as a public transportation driver, the health insurance status, and the number of traffic fines received in the last 30 days, 6 months, and lifetime.

Statistical analysis

The data were analyzed following the usual cycle of explore-analyze-explore. In the first exploration cycle, univariate descriptions were performed using measures of central tendency and dispersion, as well as auxiliary graphs, to understand the distribution of the variables and characteristics of the sample. As part of this initial exploration, a hypothesis test of variance equality among companies was conducted for the variables considered in the analysis. The variability between transportation companies was statistically significant in most variables. To account for this variation in the analysis, a general linear model with random effects was used, considering companies as the clustering unit.

During the analysis cycle, the magnitude and significance of each independent variable as a predictor of alcohol abuse and dependence variables were estimated. Variables that showed statistical significance during the bivariate analysis, indicated by a p-value less than 0.2, were included in a final saturated multivariate model.

Ethical considerations

Both the present secondary analysis and the original study were reviewed and approved by the Institutional Ethics Committee of the Universidad Peruana Cayetano Heredia. All participants underwent an informed consent process before agreeing to participate in the study and complete the questionnaires. The authors did not have access to any information that could lead to the identification of individual participants.

The original study was funded by the Ministry of Transport and Communications of the Republic of Peru. This funding covered the salaries of data collectors and the researchers responsible for study

design, data collection supervision, and report preparation. The lead author of the study received compensation under this category. The funding institution had no involvement in the study's design, data collection, report preparation, or publications. The researchers declare no conflicts of interest.

RESULTS

Prevalence of alcohol use disorders

The proportion of individuals with scores indicative of AUD using the first cutoff score (AUD-1) was 73.2%, while for AUD-2, it was 58.3%. No significant differences were observed between bus drivers (BD) and mototaxi drivers (MTD) for AUD-1 and AUD-2 ($p = 0.088$ and $p = 0.242$, respectively). However, within the BD group, the proportion of individuals classified with symptoms compatible with AUD varied significantly between transportation companies ($p = 0.001$), whereas no significant variation was observed in the MTD group ($p = 0.288$). Detailed information is provided in Table 1.

Prevalence of mental disorders and burnout syndrome

The prevalence of Major Depressive Episode (MDE) was 13.9%, with no significant differences between BD and MTD ($p = 0.245$) or between transportation companies within each driver type (BD: $p = 0.230$; MTD: $p \sim 1.00$). Similarly, the proportion of participants with clinically significant anxiety symptoms was 22.8%, with no significant differences between the BD and MTD groups ($p = 0.647$). However, significant variation in this proportion was found among transportation companies within the BD group ($p = 0.017$).

A total of 13.9% of participants presented symptoms consistent with burnout syndrome, with no significant differences between the BD and MTD groups ($p = 0.131$) or among companies within each driver type (BD: $p = 0.281$; MTD: $p \sim 1.00$). Detailed information can be found in Table 1.

Sociodemographic data of the sample

The database includes information from 505 participants, of which 278 (55.1%) were BD and 227 (44.9%) were MTD. The majority of participants were male (96.3%), with an average age of 36.9 years. The most common educational level was complete secondary education (62.6%), followed by complete higher education (20.2%). Most participants were married or living with a stable partner (67.9%), followed by single participants (24.7%). The average number of children was 2.3. A total of 62.7% of participants reported not being born in Lima, with an average of 25.5 years of residence in the city.

Statistically significant differences ($p < 0.05$) were found between BD and MTD in age, proportion of men, number of children, divorced status, and time of residence in Lima. Within the BD group, significant variation ($p < 0.05$) was observed between transportation companies for age, number of children, and levels of complete secondary and higher education. In the MTD group, significant differences were found between companies for age and marital status (married or living with a partner). Detailed sociodemographic results are presented in Table 1.

Labor-related data of the sample

The average number of daytime working hours per day was 12.3, with a significant difference between BD and MTD ($p < 0.001$). Within the BD group, significant variability was observed between transportation companies ($p = 0.046$). The average number of nighttime driving hours per week was 21.6, with no statistically significant differences between BD and MTD groups; however, a significant difference was found between companies within the MTD group ($p < 0.001$).

The average duration of work as a public transportation driver was 11.2 years, with no significant differences between BD and MTD groups. Significant differences were observed between transportation companies (BD: $p < 0.001$; MTD: $p = 0.003$). The average number of companies for which participants had worked was 1.4, with significant differences between BD and MTD groups ($p < 0.001$) but no significant variation between companies (BD: $p \sim 1.000$; MTD: $p = 0.245$).

The average number of traffic tickets issued in the 30 days prior was 0.3; in the past 6 months it was 0.7; in the past 5 years it was 3.3; and over a lifetime it was 5.4. Statistically significant differences ($p < 0.05$) were found between BD and MTD groups, as well as between transportation companies, except for the number of tickets in the last 6 months for the BD group.

The average personal monthly income was S/887.50 (S/ = Peruvian Soles), with significant differences between BD and MTD groups ($p = 0.016$) and among transportation companies within the BD group ($p < 0.001$). The average family income was

S/1,299.70, with no significant differences between BD and MTD groups or among transportation companies (p > 0.05). A total of 36.1% of participants reported having some form of health insurance, with no significant differences between BD and MTD groups. Detailed labor-related data are available in Table 1.

Table 1. Sample description.

Variable	Total (n = 505)		Bus drivers (BD) (n = 278)		Mototaxi drivers (MTD) (n = 227)		p-value **
	%/mean	p-value*	%/mean	p-value*	%/mean	p-value*	
AUD-1	73.2%	<0.001	67.7%	0.001	79.6%	0.288	0.088
AUD-2	58.3%	0.007	54.4%	0.003	62.9%	~1.000	0.242
Major depressive episode	13.9%	~1.000	15.6%	0.230	11.9%	~1.000	0.245
Clinically significant anxiety symptoms	22.8%	0.092	23.6%	0.017	21.9%	~1.000	0.647
Burnout syndrome	13.9%	~1.000	16.8%	0.281	11.2%	~1.000	0.131
Age	36.9	<0.001	40.4	<0.001	32.3	<0.001	<0.001
Male	96.3%	0.418	99.3%	~1.000	92.7%	~1.000	<0.001
Number of children	2.3	<0.001	2.8	0.002	1.7	0.162	<0.001
Married/cohabitant	67.9%	0.002	71.7%	0.273	62.5%	0.001	0.114
Divorced	6.9%	0.127	9.8%	0.47	3.1%	~1.00	0.003
Complete high school	62.6%	0.035	64.4%	0.015	61.8%	~1.000	0.671
Complete superior education	20.2%	<0.001	22.9%	<0.001	15.9%	0.184	0.186
Migrant	62.7%	~1.000	63.8%	~1.000	61.3%	0.354	0.565
Time living in Lima	25.5	<0.001	28.4	<0.001	21.6	0.205	0.001
Work hours per 24-hour period in daytime	12.3	<0.001	13.9	0.046	10.4	0.116	<0.001
Work hours per week during nighttime	21.6	<0.001	24.8	0.06	18.8	<0.001	0.22
Time as a public transportation driver	11.2	<0.001	13.2	<0.001	9	0.003	0.678
Number of bus companies	1.4	0.001	1.6	~1.000	1.2	0.245	<0.001
Number of traffic tickets in the last month	0.3	<0.001	0.7	0.05	0.1	0.002	0.023
Number of traffic tickets in the last 6 months	0.7	<0.001	1.4	0.413	0.1	0.009	<0.001
Number of traffic tickets in the last five years	3.3	<0.001	7	<0.001	0.3	0.001	<0.001
Number of lifetime traffic tickets	5.4	<0.001	13	<0.001	0.5	0.05	<0.001
Monthly income (individual)	887.5	<0.001	1011.2	<0.001	741.9	~1.000	0.016
Montly income (family)	1299.7	~1.000	1300.9	~1.000	1271.4	~1.000	0.872
Have health insurance	36.1%	<0.001	36.8%	0.001	35.3%	~1.000	0.637

AUD-1: High risk of alcohol use disorders using a cutoff score of ≥1 of the CAGE scale, AUD-2: High risk of alcohol use disorders using a cutoff score of ≥2 of the CAGE scale.
*p-value for the null hypothesis that the proportion of the variable does not differ among transportation companies within each group (MTD and BD). A p-value less than 0.05 would indicate evidence supporting variation in the variable across companies within either the MTD or BD group.
**p-value for the null hypothesis that the proportion of the variable does not vary by type of driver (MTD vs. BD).

Table 2. Association between AUD and mental disorders, sociodemographic, and job-related variables.

Variable	AUD-1				AUD-2			
	OR	p	95%CI	p-value*	OR	p	95%CI	p-value*
Major depressive episode	0.98	0.953	0.53-1.82	<0.001	1.42	0.215	0.81-2.49	0.017
Depressive symptoms	1.08	0.080	0.99-1.17	0.029	1.12	0.004	1.04-1.20	0.029
Clinically significant anxiety symptoms	1.39	0.279	0.76-2.54	<0.001	1.62	0.066	0.97-2.73	0.004
Anxiety Symptoms	1.03	0.098	0.99-1.07	<0.001	1.04	0.014	~1.00-1.08	0.009
Burnout Syndrome	1.26	0.514	0.63-2.55	0.002	1.73	0.085	0.93-3.23	0.095
Emotional distress	1.03	0.010	1.01-1.05	<0.001	1.03	0.001	1.01-1.05	0.026
Depersonalitation	1.04	0.025	~1.00-1.08	<0.001	1.06	0.001	1.02-1.09	0.019
Personal Realization	~1.00	0.897	0.98-1.02	0.002	0.99	0.547	0.97-1.01	0.089
Age	0.98	0.044	0.96-~1.00	<0.001	0.98	0.045	0.97-0.99	0.044
Male	6.90	<0.001	2.37-20.11	<0.001	4.89	0.005	1.62-14.69	0.001
Number of children	0.87	0.016	0.77-0.97	0.02	0.9	0.061	0.81-~1.00	0.054
Married/cohabitant	0.89	0.630	0.55-1.44	<0.001	0.92	0.695	0.61-1.39	0.009
Divorced	4.05	0.027	1.17-14.01	<0.001	1.39	0.405	0.64-3.04	0.006
Complete high school	1.25	0.325	0.80-1.25	<0.001	1.07	0.731	0.72-1.59	0.010
Complete superior education	0.82	0.465	0.48-1.40	<0.001	0.8	0.369	0.49-1.30	0.018
Migrant	1.08	0.749	0.68-1.70	<0.001	0.96	0.851	0.64-1.43	0.008
Time living in Lima	0.99	0.086	0.97-~1.00	<0.001	0.99	0.068	0.97-~1.00	0.052
Bus driver	0.57	0.088	0.30-1.09	<0.001	0.75	0.242	0.45-1.22	0.029
Work hours per 24-hour period in daytime	0.99	0.664	0.93-1.05	<0.001	0.99	0.672	0.94-1.04	0.017
Work hours per week during nighttime	1.01	0.105	~1.00-1.02	0.040	1.01	0.108	0.99-1.02	0.463
Time as a public transportation driver	~1.00	0.738	0.99-1.01	<0.001	1.01	0.556	0.99-1.01	0.006
Number of bus companies	1.12	0.666	0.67-1.89	0.040	0.96	0.697	0.81-1.15	0.022
Number of traffic tickets in the last month	1.84	0.043	1.02-3.33	<0.001	0.93	0.729	0.62-1.39	0.249
Number of traffic tickets in the last 6 months	1.03	0.862	0.77-1.36	<0.001	1.07	0.606	0.82-1.39	0.002
Number of traffic tickets in the last five years	0.96	0.061	0.91-~1.00	0.060	0.97	0.237	0.93-1.02	0.239
Number of lifetime traffic tickets	0.97	0.016	0.94-0.99	0.020	0.96	0.014	0.94-0.99	0.348
Monthly income (individual)	~1.00	0.810	~1.00-~1.00	<0.001	0.99	0.106	0.99-1.01	0.016
Monthly income (Family)	~1.00	0.937	~1.00-~1.00	0.17	0.99	0.14	0.99-1.01	0.259
Have health insurance	1.13	0.617	0.71-1.80	<0.001	1.05	0.816	0.70-1.58	0.062

AUD-1: High risk of alcohol use disorders using a cutoff score of ≥1 of the CAGE scale; AUD-2: High risk of alcohol use disorders using a cutoff score of ≥2 of the CAGE scale; * p value for the null hypotheses that the intraclass correlation (how similar values are within transportation companies) is equal to zero.

Bivariate analysis

Alcoholism and other mental disorders

When using mental disorder variables as dichotomous outcomes, no statistically significant relationships ($p < 0.05$) were found between AUD-1 or AUD-2 and MDE, SAS, or BOS, even after stratifying by BD and MTD using any cutoff point (see Table 2).

However, when the data were analyzed as continuous variables, each additional point on the emotional exhaustion and depersonalization subscales increased the odds of AUD-1 by 3% (OR = 1.03; 95%CI: 1.01-1.05) and 4% (OR = 1.04; 95%CI: 1.00-1.08), respectively. For AUD-2, statistically significant predictors included higher scores for depressive symptoms (OR = 1.12; 95%CI: 1.04-1.20), anxious symptoms (OR = 1.04; 95%CI: 1.00-1.08),

emotional exhaustion (OR = 1.03; 95%CI: 1.01-1.05), and depersonalization (OR = 1.06; 95%CI: 1.02-1.09). Detailed results are provided in Table 2.

The results varied significantly ($p < 0.05$) between transportation companies when the independent variables were analyzed in numerical form and in their dichotomous forms, but only when defining AUD-1.

Alcoholism and sociodemographic variables

In the joint analysis of the sample, each additional year of age decreased the odds of AUD-1 and AUD-2 by 2% (OR = 0.98, 95%CI: 0.96-0.99). Being male increased the odds of AUD-1 by 6.9 times (OR = 6.90, 95%CI: 2.37-20.11) and AUD-2 by 4.89 times (OR = 4.89, 95%CI: 1.62-14.69). Each additional child reduced the odds of AUD-1 by 13.5% (OR = 0.86, 95%CI: 0.77-0.97), with no significant effect on AUD-2. Being divorced, compared to being single, increased the odds of AUD-1 by 4 times (OR = 4.04, 95%CI: 1.17-14.00), with no significant effect on AUD-2.

No statistically significant association ($p < 0.05$) was found between the other sociodemographic variables and AUD. However, all variables showed significant variability between transportation companies (see Table 2).

Alcoholism and labor-related variables

When analyzing all participants together, the number of traffic violation tickets in the last 30 days was associated with higher odds of AUD-1 (OR = 1.84; 95%CI: 1.02-3.32) and lower odds of AUD-2 throughout a lifetime (OR = 0.97; 95%CI: 0.94-0.99). Additionally, the number of lifetime traffic violation tickets was associated with both AUD-1 and AUD-2 (OR = 0.96; 95%CI: 0.94-0.99).

For AUD-1, all associations except for monthly family income and the number of tickets in the last five years showed significant variability between transportation companies. However, for AUD-2, there was no significant variation between companies for the variables related to the number of nighttime working hours, the number of traffic violation tickets in the last 30 days, in the last five years, throughout a lifetime, or for monthly family income. Detailed results of these analyses are presented in Table 2.

Multivariate model

In the multivariate model, the variables that remained significantly associated with AUD-1 were being a BD compared to an MTD (OR = 0.43; 95%CI: 0.25-0.76), being male (OR = 4.95; 95%CI: 1.49-16.47), and being divorced compared to being single (OR = 5.43; 95%CI: 1.16-25.42). Detailed results are presented in Table 3.

For AUD-2, the final model showed that being a BD compared to an MTD (OR = 0.53; 95%CI: 0.30-0.92) and male gender (OR = 5.49; 95%CI: 1.50-20.07) remained significantly associated. Additionally, higher scores on the depersonalization subscale increased the odds of AUD-2 (OR = 1.05; 95%CI: ~1.00-1.10). The full results of the multivariate model are shown in Table 3.

Table 3. Multiple variable models for high risk of alcohol use disorders in public transportation drivers.

Variable	AUD-1			AUD-2		
	OR	p	95%CI	OR	p	95%CI
Bus driver	0.27	<0.001	0.13-0.56	0.53	0.025	0.30-0.92
Depressive symptoms	1.06	0.427	0.91-1.24	1.09	0.137	0.97-1.22
Anxiety symptoms	~1.00	0.936	0.94-1.07	1.01	0.92	0.95-1.05
Emotional distress	1.01	0.474	0.97-1.06	1.02	0.256	0.99-1.05
Depersonalization	1.05	0.146	0.98-1.11	1.05	0.029	1.01-1.11
Age	0.99	0.604	0.95-1.03	0.98	0.209	0.95-1.01
Male	7.80	0.007	1.78-34.78	5.49	0.01	1.50-20.07
Number of children	0.90	0.348	0.72-1.12	0.94	0.476	0.79-1.12
Time living in Lima	0.99	0.858	0.97-1.03	1.01	0.791	0.98-1.03
Divorced	9.50	0.037	1.14-79.03	-	-	-
Work hours per week during nighttime	1.01	0.505	0.99-1.02	-	-	-

AUD-1: High risk of alcohol use disorders using a cutoff score of ≥1 of the CAGE scale; AUD-2: High risk of alcohol use disorders using a cutoff score of ≥2 of the CAGE scale.

DISCUSSION

In summary, the prevalence of AUD-1 was 73.2%, while that of AUD-2 was 58.3%. Those in the BD companies showed a lower chance of AUD-1 and AUD-2 only in the multiple analyses, and substantial variability was found within BD companies. No significant relationship was found between AUD and mental disorders using the suggested clinical cutoff points. When using continuous variables, both emotional exhaustion and depersonalization scores were associated with AUD at both cutoff points, whereas depressive and anxious symptoms were only associated with AUD-2. In the multivariate models, only depersonalization remained significantly associated with AUD-2.

Factors associated with a higher likelihood of AUD for both cutoff points included being male, driving a mototaxi, and being younger. Other factors, such as being divorced, receiving traffic fines in the past 30 days, number of children, and lifetime traffic violation fines, were associated only with AUD-1. In the final models, the significant predictors for AUD-1 were the type of vehicle driven, being male, and being divorced. For AUD-2, the predictors were the type of vehicle driven, being male, and depersonalization scores. Most analyses showed a significant intraclass correlation, indicating that, even at an individual level, the association might not be significant, the characteristics of the transportation companies might be related to AUD or the independent variable.

Limitations

Before interpreting the results of this study more broadly, several important limitations must be considered. A key aspect in the proper interpretation of the findings is the definition of the primary variable—alcoholism—specifically concerning the cutoff point used. While most research suggests using a cutoff point of ≥2 due to its higher specificity and better positive predictive value, some studies have employed a cutoff of ≥1, and it remains unclear whether this choice significantly alters the interpretation of results. For instance, Malet et al. (17) reported that although the specificity of CAGE with a cutoff of ≥2 remained consistent across diagnoses of alcohol abuse or dependence (94%), this threshold exhibited greater sensitivity for alcohol dependence (61% vs. 84%). In contrast, a cutoff of ≥1 increased overall sensitivity for abuse (79.2%) and dependence (91.3%) but resulted in lower specificity (87%) (17). This effect has also been observed in Latin American studies (23).

Therefore, the interpretation of this study's results should be approached with caution, particularly when substantial differences arise between both estimates. For example, the approximately 20% difference in prevalence estimates should be understood as a consequence of increased sensitivity in detecting AUD, which, while beneficial for identifying more cases, also increases the likelihood of false positives and reduces positive predictive value. Nevertheless, an estimate that prioritizes a higher negative predictive value may be advantageous in contexts where false negatives could have significant consequences, such as in the selection of personnel responsible for operating transportation vehicles or participants in specialized evaluation programs when prevention and treatment interventions are being considered.

Regarding co-variables, factors such as the number of traffic violation fines and working hours are highly susceptible to information concealment bias. As a result, findings from exploratory analyses involving these variables should be interpreted with caution, and response consistency should be evaluated.

Furthermore, limitations exist in the interpretation of models incorporating anxiety and "Burnout" syndrome variables due to the lack of local validation. To mitigate this issue, these variables were analyzed both in numerical and dichotomized forms separately. Additionally, with respect to the Maslach Burnout Inventory, its scoring system is based on percentiles rather than fixed cutoff points, making it a more robust measure compared to anxiety assessments.

The data collection for this study took place in 2010, when some of the new, more efficient transportation companies with dedicated routes were being established. Drivers in these companies work under significantly different conditions compared to the population in this study. They are salaried employees with fixed schedules, have no direct access to money from fares, and receive social benefits such as healthcare and pensions. However, these companies remain limited to a few of the main transportation routes. The majority of drivers continue to work under conditions similar to those experienced by participants in this study. Thus, we believe that the mental health findings reported here remain relevant to a significant portion of the current population of public transportation drivers.

Finally, as this study relies on secondary data, certain variables—such as the characteristics of alcohol consumption (e.g., casual or social drinking),

quality and temporality of use, and family history—could not be assessed. These omissions represent important limitations when interpreting the results of exploratory hypothesis testing.

Alcohol use disorders

The findings of this study suggest that the frequency of high-risk symptoms for AUD among public transportation drivers is considerably higher than the estimates reported in the general population. To contextualize these findings, it is important to review the most relevant data on the prevalence of AUD in both global and local populations.

In 2014, the World Health Organization (WHO) published the Global Status Report on Alcohol and Health 2014, revealing that the global prevalence of AUD was markedly higher among men (7.2%) compared to women (1.3%). In the Americas, the prevalence was 9% for men and 3.2% for women, the latter being the highest reported proportion among all global regions. Notably, Canada and the United States reported higher rates than most other countries, with a prevalence of 7.4% and 6.8%, respectively. Peru showed the highest prevalence in the region, with an estimated rate of 7.7% for both sexes (24).

Local data on AUD in Peru is relatively scarce. Studies conducted by the Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi" (INSM-HDHN) offer valuable insights. The first study, conducted in Lima Metropolitana, reported an annual prevalence of 5.3% for AUD, while a replication study in 2012 found a lower prevalence of 2.5%. In provincial cities, the frequency ranged from 8.8% in the Selva region to 10.1% in the Sierra region, while coastal cities showed a prevalence of 9.4%. Rural areas reported even lower frequencies, with 4.5% in rural Lima, 1.7% in the rural Sierra, and 2.3% in the rural Selva. More recent data from the World Mental Health Survey in 2005 estimated an annual prevalence of 2% and a lifetime prevalence of 5% for AUD in Peru (25-32).

Even the highest estimates from these studies (e.g., the 2003 Mental Health Study in the Sierra at 10.1%) are significantly lower than the prevalence of AUD found among public transportation drivers in this study. This holds true regardless of the CAGE questionnaire cutoff point used. With a cutoff of ≥2, the prevalence was 58%, while a more inclusive cutoff of ≥1 resulted in a prevalence of 74% (30).

Previous studies suggest that public transportation drivers may be particularly vulnerable to AUD due to occupation-specific stressors and health risks (33, 34). For example, Ragland et al. (35) reported a prevalence of AUD of 10% and 21%, respectively, in this population. The 1995 study used a threshold of 15 or more drinks per week to define heavy drinking, while the 2000 study expanded the criteria to include negative consequences of alcohol use, drinking to cope with work-related stress, and a high probability of alcohol dependence. A subsequent analysis of the same dataset found that the prevalence of alcohol dependence, defined by a CAGE score of ≥2, was 5.4% (35-37).

More recently, a study conducted in Israel among commercial drivers using the Alcohol Use Disorders Identification Test (AUDIT) found low average scores, with a significant right-skewed distribution. In that sample, 72% of drivers had an AUDIT score of 0 or 1, and a score of at least 6 was required to classify participants as alcohol misusers (38).

In comparison, the prevalence of AUD in our study is much higher than that reported in international studies. This suggests that the factors associated with an increased likelihood of AUD may have different effects or magnitudes in local contexts. These differences are particularly relevant given the significant socioeconomic and labor disparities between Peru and the countries from which these reference data originate. However, before discussing the implications of these variables, it is worth highlighting specific patterns in the distribution of AUD in our study population.

Factors associated with alcoholism

Burnout syndrome

The results of this study indicate that higher levels of depersonalization and emotional exhaustion are associated with an increased likelihood of both AUD and depersonalization disorder (DD). A literature review by Tse et al. (33) classified alcohol abuse as a behavioral disorder, leading the authors to conclude that excessive alcohol consumption may serve as a coping mechanism for work-related stress. This conclusion is supported by earlier studies, such as the one conducted by Ragland et al. (35), which found that lower job satisfaction and shorter job tenure were associated with increased alcohol consumption. More recent research, such as the study by Delaney et al. (39), further corroborates this notion, demonstrating that the time interval between the end of the workday and the moment a driver engages in relaxation activities

significantly mediates the relationship between work-related stress and the development of alcoholism.

These findings suggest a potential causal pathway between work-related stress and alcoholism, in which burnout syndrome—along with specific coping styles—plays a mediating role, as proposed by Chen & Cunradi (40). The results of the present study also indicate an association between depersonalization, a component of burnout syndrome, and a higher likelihood of AUD. However, it is important to note that the study by Chen & Cunradi (40) focused solely on emotional exhaustion, preventing a direct comparison. This discrepancy in affected burnout dimensions may be attributed to variations in the intensity or nature of stressors, which were not directly assessed in this study.

Sociodemographic variables

Male sex was significantly associated with AUD across both cutoff points, a finding that aligns with previous research on the general population in Peru. For instance, a study conducted in major coastal cities of Peru reported that the prevalence of harmful alcohol consumption or dependence was 9.4%, increasing to 16.8% among males. When further disaggregated, 5.5% and 3.9% of respondents met the criteria for harmful alcohol consumption and alcohol dependence, respectively, with these figures rising to 9.7% and 7.1% among males. Additionally, the prevalence of risky drinking was found to be 16% for the overall population and 27.8% among males. This trend has been consistently documented in several studies conducted by the INSM-HDHN (27, 29, 30, 32).

Bivariate analyses revealed an inverse association between driver age and the likelihood of AUD. However, this relationship lost significance when adjusting for additional variables in the final model, particularly when controlling for the type of vehicle driven. Notably, this variable was associated with both AUD risk and age, suggesting that age acted as a confounder—likely due to collinearity with occupation. Specifically, MTD tend to be younger than BD, with an average age difference of approximately four years.

In population-based studies conducted in Peru, a significant decrease in the probability of AUD or DD has been consistently observed among individuals over 65 years of age, with no substantial variations in younger age groups. Given that the majority of participants in the present study were between 18 and 55 years old, this may explain the absence of a significant association between age and AUD.

Significance and use of the results

To our knowledge, this is the first study to provide quantitative data on alcoholism risk within a key occupational group essential for road safety in Lima and other Peruvian cities. These findings could inform future interventions utilizing the CAGE scale as a screening tool, with a cutoff point that prioritizes sensitivity (≥1). Alternatively, a screening instrument that offers a more balanced sensitivity-specificity ratio could be employed to reduce false negatives. If prioritization is necessary, targeted interventions focusing on mototaxi drivers and males may yield the greatest impact.

Furthermore, traffic and labor policies aimed at mitigating significant work-related stressors among drivers could address a crucial factor associated with AUD—namely, depersonalization, a symptom linked to work-related stress and maladaptive coping behaviors. Implementing measures that promote mental well-being among drivers may contribute to reducing alcohol-related risks on the road.

CONCLUSIONS

This study concludes that approximately half of public service mototaxi and small bus ("custer") drivers are at high risk of exhibiting alcohol abuse or dependence patterns. Key factors associated with an increased likelihood of AUD include being male, working as a mototaxi driver, and experiencing higher levels of depersonalization—a construct linked to significant work-related stress and maladaptive coping habits. These findings highlight the need for targeted interventions to reduce alcoholism risk within this occupational group.

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Author contribution:
PRG: conceptualization, methodology, formal analysis, data curation, writing – original draft, writing – review & editing.

JO: methodology, formal analysis, supervision, writing – review & editing.

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REFERENCES

1. Mokdad AH, Forouzanfar MH, Daoud F, Mokdad AA, El Bcheraoui C, Moradi-Lakeh M, et al. Global burden of diseases, injuries, and risk factors for young people's health during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet [Internet]. 2016; 387(10036): 2383-2401. Available from: https://doi.org/10.1016/s0140-6736(16)00648-6
2. Chen F, Wu Y, Chen X, Chen Y, Chen X, Wu Y, et al. Global, regional, and national burden and attributable risk factors of transport injuries: Global Burden of Disease Study 1990-2019. Chin Med J (Engl) [Internet]. 2023; 136(14): 1762-1764. Available from: https://doi.org/10.1097/cm9.0000000000002744
3. Gill S, Sutherland M, McKenney M, Elkbuli A. U.S. alcohol associated traffic injuries and fatalities from 2014 to 2018. Am J Emerg Med [Internet]. 2020; 38(12): 2646-2649. Available from: https://doi.org/10.1016/j.ajem.2020.07.089
4. Global Burden of Disease Study 2013 Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet [Internet]. 2015; 386(9995): 743-800. Available from: https://doi.org/10.1016/S0140-6736(15)60692-4
5. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: an analysis from the Global Burden of Disease Study 2010. PLoS One [Internet]. 2015; 10(2): e0116820. Available from: https://doi.org/10.1371/journal.pone.0116820
6. GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet [Internet]. 2015; 385(9963): 117-171. Available from: https://doi.org/10.1016/s0140-6736(14)61682-2
7. Shield K, Manthey J, Rylett M, Probst C, Wettlaufer A, Parry CD, et al. National, regional, and global burdens of disease from 2000 to 2016 attributable to alcohol use: a comparative risk assessment study. Lancet Public Health [Internet]. 2020; 5(1): e51-e61. Available from: https://doi.org/10.1016/S2468-2667(19)30231-2
8. Taylor B, Irving HM, Kanteres F, Room R, Borges G, Cherpitel C, et al. The more you drink, the harder you fall: a systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together. Drug Alcohol Depend [Internet]. 2010; 110(1-2): 108-116. Available from: https://doi.org/10.1016/j.drugalcdep.2010.02.011
9. Zhao A, Chen R, Qi Y, Chen A, Chen X, Liang Z, et al. Evaluating the impact of criminalizing drunk driving on road-traffic injuries in Guangzhou, China: a time-series study. J Epidemiol [Internet]. 2016; 26(8): 433-439. Available from: https://doi.org/10.2188/jea.je20140103
10. Rure D, Shakya M, Singhal A, Varma A, Mishra N, Pathak U. A study of the association of neurocognition with relapse and quality of life in patients of alcohol dependence. Ind Psychiatry J [Internet]. 2024; 33(1): 133-140. Available from: https://doi.org/10.4103/ipj.ipj_158_23
11. Staudt J, Kok T, de Haan HA, Walvoort SJ, Egger JI. Neurocognitive recovery in abstinent patients with alcohol use disorder: a scoping review for associated factors. Neuropsychiatr Dis Treat [Internet]. 2023; 19: 2039-2054. Available from: https://doi.org/10.2147/NDT.S424017
12. Choquehuanca-Vilca V, Cárdenas-García F, Collazos-Carhuay J, Mendoza-Valladolid W. [Epidemiological profile of road traffic accidents in Peru, 2005-2009]. Rev Peru Med Exp Salud Publica [Internet]. 2010; 27(2): 162-169. Available from: https://www.scielosp.org/pdf/rpmesp/2010.v27n2/162-169/es Spanish.
13. Ruiz-Grosso P, Ramos M, Samalvides F, Vega-Dienstmaier J, Kruger H. Common mental disorders in public transportation drivers in Lima, Peru. PLoS One [Internet]. 2014; 9(6): e101066.

Available from: https://doi.org/10.1371/journal.pone.0101066
14. Ewing JA. Detecting alcoholism: the CAGE questionnaire. JAMA [Internet]. 1984; 252(14): 190-1907. Available from: https://doi.org/10.1001/jama.252.14.1905
15. Dhalla S, Kopec JA. The CAGE questionnaire for alcohol misuse: a review of reliability and validity studies. Clin Invest Med [Internet]. 2007; 30(1): 33-41. Available from: https://doi.org/10.25011/cim.v30i1.447
16. Teitelbaum LM, Carey KB. Temporal stability of alcohol screening measures in a psychiatric setting. Psychol Addict Behav [Internet]. 2000; 14(4): 401-404. Available from: https://doi.org/10.1037//0893-164x.14.4.401
17. Malet L, Schwan R, Boussiron D, Aublet-Cuvelier B, Llorca PM. Validity of the CAGE questionnaire in hospital. Eur Psychiatry [Internet]. 2005; 20(7): 484-489. Available from: https://doi.org/10.1016/j.eurpsy.2004.06.027
18. Campo-Arias A, Barros-Bermúdez JA, Rueda-Jaimes GE. [Psychometric properties of the CAGE questionnaire for alcohol abuse: results of three analyses]. Rev Colomb Psiquiat. 2009; 38(2): 294-303. Available from: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0034-74502009000200006 Spanish.
19. Hays RD, Merz JF, Nicholas R. Response burden, reliability, and validity of the CAGE, Short MAST, and AUDIT alcohol screening measures. Behav Res Meth Instrum Comput [Internet]. 1995; 27(2): 277-280. Available from: https://doi.org/10.3758/BF03204745
20. Ruiz-Grosso P, Loret de Mola C, Vega-Dienstmaier JM, Arevalo JM, Chavez K, Vilela A, et al. Validation of the Spanish Center for Epidemiological Studies Depression and Zung Self-Rating Depression Scales: a comparative validation study. PLoS One [Internet]. 2012; 7(10): e45413. Available from: https://doi.org/10.1371/journal.pone.0045413
21. Ruiz-Grosso P, Loret de Mola C, Arevalo M, Chavez K, Huapaya J. Validez y consistencia interna de la versión de 5 ítems de la Escala para Depresión del Centro de Estudios Epidemiológicos (CESD) y la Escala Autoadministrada de Depresón de Zung (EDZ). En: Jornadas Científicas Universidad Peruana Cayetano Heredia. Lima: UPCH; 2009.
22. Maslach C, Jackson SE. The measurement of experienced burnout. J Organ Behav [Internet]. 1981; 2(2): 99-113. Available from: https://doi.org/10.1002/job.4030020205
23. Abrantes Do Amaral R, Malbergiera A. [Evaluation of a screening test for alcohol-related problems (CAGE) among employees of the Campus of the University of São Paulo]. Braz J Psychiatry [Internet]. 2004; 26(3): 156-163. Available from: https://doi.org/10.1590/s1516-44462004000300005 Portuguese.
24. World Health Organization. Global status report on alcohol and health 2018 [Internet]. Geneva: WHO; 2018. Available from: https://www.who.int/publications/i/item/9789241565639
25. Piazza M, Fiestas F. Prevalencia anual de trastornos y uso de servicios de salud mental en el Perú: resultados del estudio mundial de salud mental, 2005. Rev Peru Med Exp Salud Pública [Internet]. 2014; 31(1): 30-38. Available from: http://www.scielo.org.pe/scielo.php?pid=S1726-46342014000100005&script=sci_arttext
26. Fiestas F, Piazza M. Prevalencia de vida y edad de inicio de trastornos mentales en el Perú urbano: resultados del estudio mundial de salud mental, 2005. Rev Peru Med Exp Salud Pública [Internet]. 2014; 31(1): 39-47. Available from: http://www.scielo.org.pe/scielo.php?pid=S1726-46342014000100006&script=sci_arttext
27. Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico de salud mental en la selva peruana 2004: informe general. An Salud Men [Internet]. 2005; 21(1-2). Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/10
28. Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico de salud mental en la selva rural 2009: informe general. An Salud Men [Internet]. 2012; 28(supl. 2). Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/4
29. Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico de salud mental en la costa peruana 2006: informe general. An Salud Men [Internet]. 2007; 23(1-2). Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/23
30. Instituto Nacional Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico de salud mental en la sierra peruana 2003: informe general. An Salud Men [Internet]. 2003; 19(1-2). Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/3
31. Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico de salud mental en la sierra rural 2008: informe general. An Salud Men [Internet]. 2009; 25(1-2).

Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/30
32. Instituto Nacional de Salud Mental "Honorio Delgado-Hideyo Noguchi". Estudio epidemiológico metropolitano en salud mental 2002: informe general. An Salud Men [Internet]. 2002; 18(1-2). Available from: https://openjournal.insm.gob.pe/revistasm/asm/article/view/1
33. Tse JL, Flin R, Mearns K. Bus driver well-being review: 50 years of research. Transp Res Part F Traffic Psychol Behav [Internet]. 2006; 9(2): 89-114. Available from: https://doi.org/10.1016/j.trf.2005.10.002
34. Hingson R, Mangione T, Barrett J. Job characteristics and drinking practices in the Boston Metropolitan Area. J Stud Alcohol [Internet]. 1981; 42(9): 725-738. Available from: https://doi.org/10.15288/jsa.1981.42.725
35. Ragland DR, Greiner BA, Krause N, Holman BL, Fisher JM. Occupational and nonoccupational correlates of alcohol consumption in urban transit operators. Prev Med [Internet]. 1995; 24(6): 634-645. Available from: https://doi.org/10.1006/pmed.1995.1099
36. Greiner BA, Krause N, Ragland D, Fisher JM. Occupational stressors and hypertension: a multi-method study using observer-based job analysis and self-reports in urban transit operators. Soc Sci Med [Internet]. 2004; 59(5): 1081-1094. Available from: https://doi.org/10.1016/j.socscimed.2003.12.006
37. Cunradi CB, Greiner BA, Ragland DR, Fisher JM. Burnout and alcohol problems among urban transit operators in San Francisco. Addict Behav [Internet]. 2003; 28(1): 91-109. Available from: https://doi.org/10.1016/s0306-4603(01)00222-2
38. Bamberger PA, Cohen A. Driven to the bottle: work- related risk factors and alcohol misuse among commercial drivers. J Drug Issues [Internet]. 2015; 45(2): 180-201. Available from: https://doi.org/10.1177/0022042615575373
39. Delaney WP, Grube JW, Greiner B, Fisher JM, Ragland DR. Job stress, unwinding and drinking in transit operators. J Stud Alcohol [Internet]. 2002; 63(4): 420-429. Available from: https://doi.org/10.15288/jsa.2002.63.420
40. Chen MJ, Cunradi C. Job stress, burnout and substance use among urban transit operators: the potential mediating role of coping behaviour. Work Stress [Internet]. 2008; 22(4): 327-340. Available from: https://doi.org/10.1080/02678370802573992