

# Alcoholic Beverage Sales and Alcoholic Liver Disease Rates in Colombian Departments

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## Abstract

**Objective:** The purpose of this study was to determine the statistical association between the diagnosis of alcoholic liver disease and alcohol sales by department based on the Individual Records of the Health Care Services (Registros Individuales de Prestaciones de Servicios de Salud - RIPS) for 2012. **Methods:** This was a cross-sectional ecologic study conducted to compare prevalence rates of alcoholic liver disease estimated by RIPS (ICD K700-9) in the over 18 population (DANE) with sales, according to the National Federation of Departments, of domestic and imported spirits, liquors and beers, converted into alcohol units. **Results:** The national rate of alcoholic liver disease was 10.7 per 100,000 with higher rates in Santander (27.1), Risaralda (19.9) and Boyacá (15.0). After removing the data from departments with unreliable or incomplete results, the Pearson correlation rate of illness and alcohol unit sales was 0.6. **Conclusions:** There is a positive correlation between the rate of alcoholic liver disease and alcohol sales in each department.

## Keywords

Liver cirrhosis, alcoholic liver disease, alcoholic beverages, record system.

## INTRODUCTION

The consequences of chronic alcohol consumption on the body are less well known to the average person than the consequences of acute intoxication. Part of the reason is that it can go unnoticed for a long time. The association of liver cirrhosis, one of the best known disorders, with alcohol intake along with the histological changes entailed by it were established by Frank Burr Mallory in 1910 (1).

Consumption of alcoholic beverages is an integral part of the lifestyle of many people to the point that it is sometimes considered to be more “normal and desirable” than abstinence, especially in the Western world (2, 3). Colombia is no exception: alcohol consumption is widespread in this country. The figures show that between 70% and 90% of the population has tried alcohol (4). This means that inappropriate consumption of alcohol is a socially relevant pro-

blem whose consequences broadly affect the strengthening of human capital and social capital (5).

Colombian studies of the association of liver disease with the consumption of alcoholic beverages are few and anecdotal (6, 7). To date, no studies have been published in Colombia that study rates of liver disease and their correlations with alcohol consumption. The aim of this study is to perform a relational analysis of cases of diagnosed alcoholic liver disease according to the individual records of the Individual Records of the Health Care Services (Registros Individuales de Prestaciones de Servicios de Salud - RIPS) and consumption of alcohol by department.

## MATERIAL AND METHODS

This research is a cross-sectional ecological study of multiple groups. The units of analysis are geographically well-

defined populations in Colombia and people in those populations with one of the following diagnoses (ICD-10 codes) in the RIPS: alcoholic cirrhosis (K703), NAFLD (K700), alcoholic hepatitis (K701), alcoholic fibrosis and sclerosis of the liver (K702), alcoholic liver failure (K704), and unspecified alcoholic liver disease (K709). The information was filtered according to “primary diagnosis” and “people attended”. Data from 2012 was chosen because it is the most recent year available and because the authors considered that it provides better quality information than earlier surveys. (8, 9) Unfortunately, RIPS does not contain information about the methods used to make diagnoses.

Unpublished data was provided by the National Federation of Departments (FND - Federación Nacional de Departamentos) for the number of standard 300 ml to 750 ml bottles of liquor and beer on which taxes were paid and collected by departments. The data differentiates between domestic and imported liquor. These data were converted to units of alcohol units based on beer with 4% alcohol by volume and liquor with 40% alcohol by volume. To calculate alcohol sales per capita and rates of alcoholic liver disease by department, DANE population projections for each department for individuals over the age of 18 in 2012 were used.

Variables included in the study’s analyses were age, sex, department in which health care was received, and sales of alcohol (an indirect measure of consumption). The 32 departments were taken as categories (data from Bogotá and Cundinamarca were pooled) and the other variables were studied separately within each department.

## RESULTS

In 2012 a total of 3,285 adults, 848 women and 2,437 men, were treated in Colombia for the diseases and disorders covered by this study: alcoholic liver cirrhosis, alcoholic fatty liver, alcoholic hepatitis, alcoholic fibrosis and sclerosis of the liver, alcoholic liver failure, and unspecified alcoholic liver disease. The resulting rate is 10.7 cases per 100,000 people. Most of these patients were seen in Cundinamarca (1,046), Antioquia (451), Santander (387), Valle del Cauca (301) and Atlántico (160). If only patients diagnosed with alcoholic liver cirrhosis had been included in the analysis, the total number of patients would have been 2,276 (443 women and 1833 men).

**Table 1** shows alcohol sales per department in liters of alcohol per capita together with our estimates of alcoholic liver disease per 100,000 people for 2012. The FND does not have information about sales of alcohol for Amazonas, Guaviare, Guainia, Putumayo, San Andrés, Vaupes and Vichada, so they were excluded from the analysis. Data for Cundinamarca are grouped together with data for Bogotá.

Casanare’s sales data are very low with per capita sales two and a half times the national average.

**Table 1.** Per capita alcohol sales and alcoholic liver disease rate by department in Colombia in 2012

Departments	Per capita alcohol sales (liters)	Rate of cirrhosis (per 100,000 people)
Antioquia	4,42	10,47
Arauca	2,78	9,93
Atlántico	3,49	10,05
Bolívar	4,43	5,45
Boyacá	3,84	15,04
Caldas	3,65	8,15
Caquetá	4,52	5,88
Casanare	10,32	8,14
Cauca	2,69	4,54
Cesar	2,89	3,75
Chocó	2,01	0,76
Córdoba	3,20	7,30
Cundinamarca (with Bogotá)	5,67	14,80
Huila	4,02	5,27
Guajira	1,64	1,80
Magdalena	4,08	5,91
Meta	6,21	8,69
Nariño	2,30	4,61
Norte de Santander	4,00	10,51
Quindío	3,42	7,50
Risaralda	5,68	19,84
Santander	5,11	27,70
Sucre	3,28	4,03
Tolima	0,74	10,34
Valle del Cauca	3,26	9,61
National Total	4,15	10,67

The departments with the highest rates of alcoholic liver disease per 100,000 population for both sexes were Santander (27.1), Risaralda (19.9) and Boyacá (15.0). Among women, the highest rates were found in Atlántico (9.3) and Santander (9.3). The departments with the lowest rates of alcoholic liver disease for both sexes were Putumayo (0.52) and Choco (0.76). For women, the lowest rates are also found in these departments because there were no cases among women recorded in these departments in 2012.

Except for the atypical case of Casanare, the highest alcohol sales per capita were in Meta (6.21 liters of alcohol per inhabitant/year) followed closely by Risaralda (5.68 liters). The departments with the highest alcohol sales per capita had closely related high rates of alcoholic liver

disease while in Cauca and Nariño where sales per capita are lower, the rates of alcoholic liver disease are also lower. These departments have very low rates as shown graphically in Figures 1 and 2. The Pearson correlation coefficient obtained was 0.6.

In the departments of Antioquia, Atlántico, Caldas, Cauca, Córdoba, Nariño, Norte de Santander, Quindío and Valle del Cauca there were more direct correlations between the per capita alcohol sales and the cases diagnosed in the RIPS in 2012. In contrast, Santander, Boyacá, Risaralda and Tolima had higher rates of alcoholic liver disease in the RIPS statistics in relation to legal sales of alcohol.

The case of Meta is atypical because it has the highest alcohol sales per capita in Colombia, but its rates of alcoholic liver disease in 2012 were below the national average.

### DISCUSSION AND CONCLUSIONS

This was an ecological study based on observations of groups rather than observations of individuals. It did not include unique characteristics of the subjects (10). Because this study is based on officially registered data, the study has potential problems with underreporting that are accen-

tuated by the fact that many patients deny their histories of alcohol intake. In addition, there are possibilities of misdiagnoses and other sources of error. For these reasons this study is susceptible to reporting bias (11). The information provided both by RIPS and the National Federation of Departments should be analyzed with caution. In the first place the sales reports from the FDN obviously does not include contraband alcohol sales. Another potential source of bias is that patients who are seen by a medical clinic in a particular location do not necessarily reside in that department. Similarly, not all alcohol sold in one place is consumed locally. Furthermore, no one can demonstrate that the persons consuming the alcohol are the same as those diagnosed with alcoholic liver cirrhosis (10). Another confounding variable is the fact that the cirrhosis rates of today most likely reflect alcohol consumption from previous years rather than the current year (12). All of this must be added to genetic and lifestyle factors (13, 14). With the development of more specific laboratory tests, measurement of the association between alcohol and liver disease will become more reliable (15).

In addition to these limitations inherent in the available information, there is also the fact that some data are

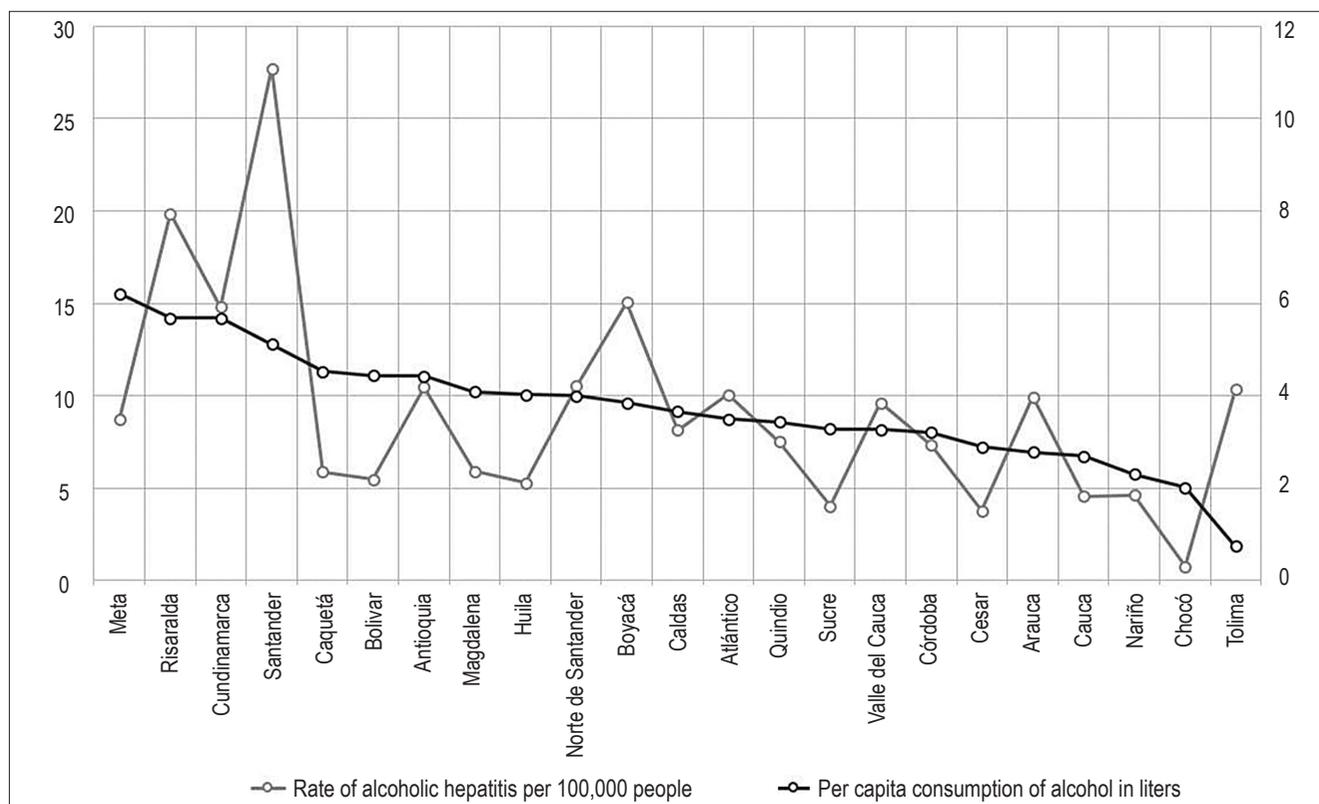
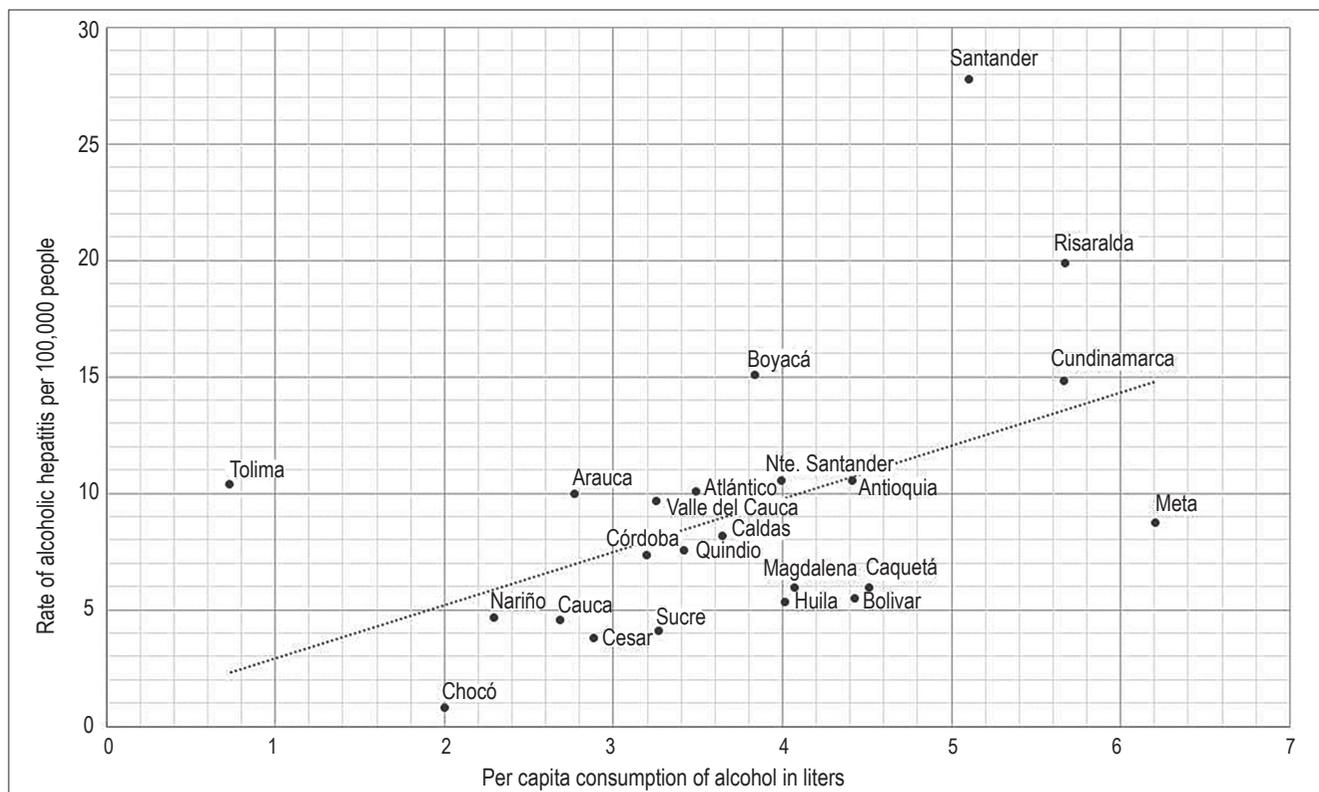


Figure 1. Alcoholic liver disease rates and alcohol sales per capita by department in 2012



**Figure 2.** Relationship between per capita sales of alcohol and alcoholic liver disease by department in 2012.

difficult to interpret as in the cases of the departments of Casanare, Meta, Santander and Tolima (see Table 1). These departments deviate from the patterns elsewhere in the country. Santander has the highest rate of alcoholic liver disease, but Meta and Casanare have the highest sales per capita. Tolima has high rates of disease despite reporting sales below the national average. The figures for Casanare match those found in the Profamilia National Demographic and Health Survey. Women surveyed in this eastern region of the country had the highest rate of positive responses to the question, “Does your spouse ever get drunk?” 35.2% answered, “occasionally” and 18.2% responded “very frequently” (16).

The absence of information about contraband alcohol affects the departments differently, adding another factor of uncertainty to our results. This information is important since it is estimated that one in four bottles consumed in the country is contraband (17).

Despite the aforementioned limitations, the results of this study show a statistical correlation between alcohol consumption and diagnoses of alcoholic liver disease. This opens up potential new areas of research, not only to give greater precision to our estimates, but to design public health interventions to address this social problem.

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## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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