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Mortality due to cirrhosis, liver cancer, and disorders attributed to alcohol use: Global Burden of Disease in Brazil, 1990 and 2015

Mortalidade por cirrose, câncer hepático e transtornos devidos ao uso de álcool: Carga Global de Doenças no Brasil, 1990 e 2015

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ABSTRACT: *Introduction*: Alcohol use is one of the main preventable risk factors affecting mortality and premature disability. *Objective:* To describe the estimates of mortality and years of life lost as a result of premature death (YLL) due to cirrhosis, liver cancer, and disorders attributed to alcohol use in Brazil and its federated units in 1990 and 2015. *Methods:* Descriptive study using data from the Global Burden of Disease Study (2015) and the Mortality Information System (SIM). Statistical models were used to obtain corrected mortality estimates for selected causes. Rates were standardized by age. *Results:* In 1990, 16,226 deaths were estimated for the three conditions (17.0/100 thousand inhabitants), while in 2015 there were 28,337 deaths (15.7/100 thousand inhabitants). There was a reduction in mortality (per 100 thousand) due to cirrhosis (from 11.4 to 9.5), stability in mortality rates related to liver cancer (1.5 and 1.9), and stability in mortality rates caused by alcohol use disorders (4.1 and 4.3). Mortality rates were 5.1 times higher among men, and the five states with the highest mortality rates and YLL were from the Northeast Region: Sergipe, Ceará, Pernambuco, Paraíba, and Alagoas. Mortality and YLL rates for the three conditions studied increased in the ranking of causes of death in both sexes, with the exception of cirrhosis in the female population. *Conclusion:* The three conditions studied are responsible for a significant burden of premature mortality in Brazil, especially among men and residents of the northeast region. These results reinforce the urgent need for public policies that address harmful alcohol consumption in Brazil.

Keywords: Ethanol. Liver cirrhosis. Liver neoplasms. Alcohol-related disorders. Mortality, premature. Epidemiology, descriptive.

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RESUMO: *Introdução:* O uso de álcool é um dos principais fatores de risco preveníveis para mortalidade ou incapacidade prematuras. *Objetivo:* Descrever as estimativas de mortalidade e anos de vida perdidos por morte prematura (YLL) por cirrose, câncer hepático e transtornos devidos ao uso de álcool no Brasil e suas unidades da federação (UFs), em 1990 e 2015. *Métodos:* Estudo descritivo com dados do estudo de Carga Global de Doenças (2015) e do Sistema de Informações sobre Mortalidade (SIM). Modelos estatísticos foram empregados para obter estimativas corrigidas de mortalidade pelas causas selecionadas. As taxas de mortalidade foram padronizadas por idade (TMPI). *Resultados:* Em 1990, foram estimados 16.226 óbitos para as 3 condições (17,0 / 100 mil habitantes), enquanto em 2015 foram 28.337 (15,7 / 100 mil habitantes). Houve redução da mortalidade (por 100 mil habitantes) por cirrose (de 11,4 para 9,5) e estabilidade por câncer hepático (1,5 e 1,9) e transtornos devidos ao uso de álcool (4,1 e 4,3). As TMPI foram 5,1 vezes maiores entre os homens, e as 5 UFs com maiores TMPI e YLL foram da Região Nordeste: Sergipe, Ceará, Pernambuco, Paraíba e Alagoas. As taxas de mortalidade e de YLL pelas três condições estudadas ascenderam no *ranking* das causas de óbito, em ambos os sexos, exceto a cirrose no feminino. *Conclusão:* As três condições estudadas são responsáveis por importante carga de mortalidade prematura no Brasil, principalmente entre homens e residentes na região nordeste. Esses resultados reforçam a necessidade de políticas públicas para o enfrentamento ao consumo nocivo do álcool no Brasil.

Palavras-chave: Etanol. Cirrose hepática. Neoplasias hepáticas. Transtornos relacionados ao uso de álcool. Mortalidade prematura. Epidemiologia descritiva.

INTRODUCTION

The harmful use of alcohol is responsible for a high burden of disease, with important social and economic consequences. In countries with lower income, the risks of morbidity and mortality are higher per liter of alcohol consumed than in those with higher income[1]. Data from the Global Burden of Diseases (GBD) study in 2015 indicate that, from 1990 to 2015, alcohol abuse rose from eleventh to ninth position in the ranking of the leading risk factors to disability-adjusted life years (DALYs)[2]. Of the total deaths in 2012, 5.9% were attributable to alcohol, with 7.6% among men and 4.0% among women. Of the total DALYs, it is estimated that 5.1% were attributable to alcohol, with a higher proportion of alcohol-related burden of disease among men (7.4%) compared with women (2.3%)[1].

In Brazil, data from the National Health Survey (2013) showed that the prevalence of heavy drinking was 13.7% in the adult population – 3.3 times higher among men (21.6%) than in women (6.6%)[3]. Data from the World Health Organization (WHO) for Brazil in 2010 indicate a prevalence of alcohol abuse / dependence of 5.6% for both sexes, 8.2% among men, and 3.2% among women[1]. In 2015, alcohol ranked fifth in risk factors with the most significant contribution to DALYs for both sexes in Brazil[4].

Rehm et al.[5] argue that the higher mean volume of alcohol consumed is associated with an increased risk for many chronic and infectious diseases. In addition, the consumption

pattern (i.e. heavy drinking) adds an additional risk to the mean volume for certain categories of diseases and injuries. The authors argue that alcohol is a necessary cause (conditions that occur only as a result of alcohol consumption) for more than 30 conditions listed in the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). In addition, alcohol can be a component cause for more than 200 conditions listed in ICD-10, among them cardiovascular diseases and neoplasias, besides being an important risk factor for transportation accidents and other types of accidents, violence, injuries, suicides, and so forth[1,6,7].

Among the diseases attributed to alcohol consumption, liver cirrhosis must be highlighted as a significant chronic fatal morbidity. It is estimated that 48% of deaths and 47% of DALYs due to cirrhosis are attributed to alcohol consumption[8-10]. Liver cancer is, in turn, a neoplasm in which alcohol consumption is an important component cause[8,10]. According to the study "GBD Brazil 2010", alcohol use disorders and lower back pain were the causes of DALYs that demonstrated the greatest growth among men from 1990 to 2010[11].

Considering the relevance of these diseases as causes of death, the objective of this study is to describe the estimates of mortality and years of life lost due to cirrhosis, liver cancer, and disorders due to alcohol use in Brazil and its 27 states (heretofore referred to as Federated Units, or FUs) in 1990 and 2015.

METHODS

A descriptive analysis was performed with data from the GBD 2015 study coordinated by the Institute for Health Metrics and Evaluation (IHME) of the University of Washington. Estimates of disease loads were obtained according to the method defined by the IHME and were applied in 2015.

The GBD study included the mapping of data sources for diseases, risk factors, and injuries. The main source of information on mortality in Brazil is the Ministry of Health's Mortality Information System (acronym in Portuguese – SIM), which uses the ICD to codify causes of death. To calculate GDB estimates, ill-defined causes (IDC) and other garbage codes are employed so that deaths classified under these codes are redistributed to defined causes of death to minimize underestimation of the indicators. Details of the clustering of causes using the ninth and tenth revisions of the ICD (ICD-9 and ICD-10, respectively) were previously described[12].

Cause of Death Ensemble Modeling-CODEm (CODEm) is used to estimate indicators by age, sex, country, year, and cause, and is an analytical tool that tests several possible statistical models of causes of death and creates a combined set of models that offers the best predictive performance. The software DisMod-MR 2.1, a meta-regression tool, is used for simultaneous estimates of incidence, prevalence, remission, disability, and also mortality, attributable to risk factors, such as alcohol[13,14]. The results of these models were used to

proportionally distribute deaths from cirrhosis and hepatic cancer from all causes in order to obtain the specific estimates for these diseases due to alcohol use[15].

In this study, the main causes of death related to alcohol use identified in GBD 2015 were initially investigated; among them the three main conditions were selected: cirrhosis, liver cancer, and disorders due to alcohol use. Deaths among individuals aged 15 years and older classified in the following ICD-10 (2015) codes and their correlates in ICD-9 (1990) were included:

1. Cirrhosis due to alcohol use: ICD-10: B18-B18,9, I85-I85,9, I98,2, K70-K70,9, K71,3-K71,51, K71,7, K72,1-K74,69, K74,9, K75,8-K76,0, K76,6- K76,7, K76,9 e ICD-9: 070.22-070.23, 070.32-070.33, 070.44, 070.54, 456.0-456.21, 571-571.9, 572.3-572.9, 573.0-573.3, 573.8-573.9;

2. Liver cancer due to alcohol use: ICD-10: C22-C22.9, D13.4 e ICD-9: 155-155.9, 211.5;

3. Alcohol use disorders: ICD-10: mental and behavioral disorders related to alcohol use (F10-F10.99), alcoholic myopathy (G72.1), degeneration of the nervous system due to alcohol (G31.2), fetus and newborn affected by alcohol use by the mother (P04.3), fetal alcohol syndrome (dysphoric) (Q86.0), presence of alcohol in the blood (R78.0), poisoning (intoxication) by exposure to alcohol (X45-X45.9), and ICD9: 291-291.9, 303-303.93, 305.0-305.03, 357.5, 790.3, E860-E860.19.

The following indicators were estimated: absolute numbers of deaths, specific mortality rates and YLL – total data and sexes and age groups, for Brazil and its 27 FUs, in 1990 and 2015. The YLL expresses the effect of premature deaths on the population. This indicator is calculated by multiplying the number of deaths of specific cause by life expectancy in relation to the age of death, regardless of sex (for example: 85.69 years for deaths in children under 1 year of age, 23.79 years for individuals aged 65 years).

In order to produce standardized rates by age of mortality and YLL (per 100,000 inhabitants), the direct standardization method was used, based on the world population developed for GBD 2013[2].

To compare the indicators between 1990 and 2015, the ranking of the FUs was performed according to the values standardized by age of mortality and YLL of the three conditions studied[15].

In addition, the uncertainty intervals (95% UI) of the standardized rates of mortality due to cirrhosis, liver cancer, and disorders due to alcohol use were estimated for Brazil and FUs. The 95% uncertainty intervals are different from the confidence intervals and express the uncertainty derived from the sample sizes of the studies used as data sources, the adjustments to the general mortality sources, the parameter uncertainty in the estimation of the model, and the uncertainty specification for the models for causes of death[2].

The GBD Brasil 2015 study was approved by the Research Ethics Committee of the *Universidade Federal de Minas Gerais* (CAAE Project 62803316.7.0000.5149).

RESULTS

The number of deaths due to cirrhosis, liver cancer, and disorders due to alcohol use in 1990 was, respectively, 10,707, 1,088, and 4,431, totaling 16,226 deaths in Brazil. In 2015 the rates were 18,923, 3,326, and 9,088 respectively, totaling 28,337 deaths in the country. There was a 75% increase in the absolute number of deaths by the three conditions. In 2015, the age group with the highest number of deaths from these causes was 50 to 59 years (n = 8,011, 28.3%). In 1990, the same age group registered 3,607 deaths (22.3%). Comparing mortality rates by age (IMR) between 1990 and 2015, it is observed that in 1990, individuals were dying earlier because of these conditions, with the highest mortality rates in the 40 years age group. In 2015, higher mortality rates are observed after 50 years of age. The peak of mortality alcohol use disorders occurs earlier in the 40–49 age group compared to cirrhosis (50–54 years) and liver cancer (65 years and over) (Figure 1).

Table 1 shows age-standardized mortality rates (ASMR) for both sexes. Data from 1990 to 2015 suggest a reduction in ASMR for all three causes of death from 17.0 to 15.7 / 100 thousand inhabitants (7.9%). This decline was due to the reduction in ASMR due to cirrhosis attributed to alcohol use (from 11.4 to 9.5) (16.9%), and there was stability in cancer mortality and alcohol use disorders. Although there were changes in the ranking of FUs with higher rates, northeastern states predominated in the first positions, in both years. In 1990, the five FUs with the highest ASMR due to disorders, liver cirrhosis, and cancer due to alcohol use per 100,000 inhabitants were: Pernambuco (23.9), Maranhão (21.5), Alagoas (21.1), Acre (20.9), and Sergipe (19.9). In 2015, the FUs were Sergipe (25.0), Ceará (22.5), Pernambuco (21.7), Paraíba (20.7), and Alagoas (20.6). There is a significant increase in estimates for the three conditions from 1990 to 2015, mainly in the states: Ceará (64%, from 13.7 to 22.5 / 100 thousand inhabitants), Rio Grande do Norte (41%, 12.3 to 17.3 / 100 thousand inhabitants), and Paraíba (37%, from 15.0 to 20.7 / 100 thousand inhabitants). In 2015, the state that presented the lowest ASMR was Santa Catarina (12.0). The states with the greatest relative reductions in rates from 1990 to 2015 were Rio de Janeiro (28.8%, from 18.5 to 13.2 / 100 thousand inhabitants), São Paulo (27.7%, 18, 6 to 13.4 / 100 thousand inhabitants), and the Federal District (22.4%, from 18.2 to 14.1 / 100 thousand inhabitants). However, from 1990 to 2015, several states had ASMR growth of alcohol use disorders. Only São Paulo showed statistically significant reduction of ASMR of alcohol use disorders (Table 1).

For all three causes in 2015, men had a ASMR of 27.5 / 100 thousand inhabitants and women of 5.4 / 100 thousand inhabitants, that is, the ratios between the rates indicated a 5.1-fold higher risk for men when compared to women. When this ratio is observed for each condition studied, the risk is, respectively, 9.0; 4.7 and 3.0 times greater among men for alcohol use disorders, liver cirrhosis, and cancer than for women (Figure 2).

The ranking of causes of death according to the ASMR by the three conditions in Brazil indicate that cirrhosis due to alcohol use was in the nineteenth position in the ranking in

1990 and rose to the eighteenth position in 2015, while liver cancer due to alcohol use rose from 77th to 71st position, and alcohol use disorders were in the 44th position and ascended to the 37th position in the same period (Table 2).

Source: http://www.healthdata.org/results/data-visualizations
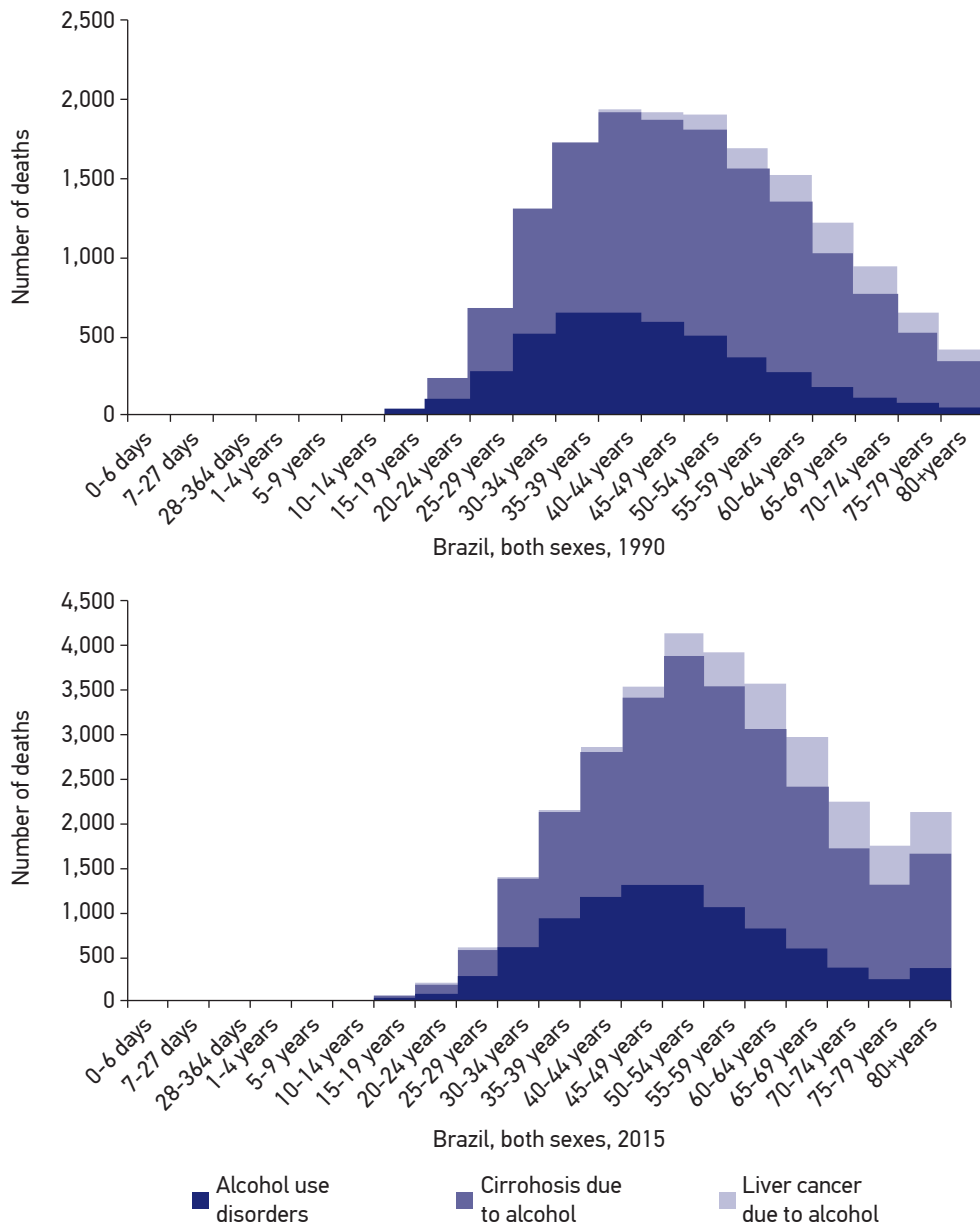
Figure 1. Number of deaths due to cirrhosis, liver cancer, and disorders due to alcohol use, according to age groups, Brazil, 1990 and 2015.

Table 1. Standardized mortality rates[1] for cirrhosis, liver cancer, and disorders due to alcohol use (per 100,000 inhabitants) and percentage variation of rates, by federated unit, 1990 and 2015.

Federated Units	Cirrhosis			Liver Cancer			Disorders			Total		
	1990	2015	Var.%	1990	2015	Var.%	1990	2015	Var.%	1990	2015[2]	Var.%
SE	12.1	13.8	14.0	1.6	2.2	40.5	6.2	9.0	44.0	19.9	25.0	25.5
CE	7.2	10.2	40.8	1.1	1.9*	69.8	5.4	10.4*	94.1	13.7	22.5	64.0
PE	18.5	13.9	-24.9	1.7	2.5	42.7	3.7	5.3	43.9	23.9	21.7	-9.3
PB	10.9	13.6	25.6	1.2	2.0*	70.6	3.0	5.0*	64.8	15.1	20.7	37.0
AL	17.2	14.6	-14.8	1.6	2.1	34.0	2.4	3.8*	62.3	21.2	20.6	-2.5
AC	14.4	12.7	-11.8	2.4	2.9	21.1	4.1	4.6	12.3	20.9	20.2	-3.3
BA	10.5	11.5	9.5	1.7	2.5*	46.3	3.2	5.8*	82.3	15.4	19.8	28.6
MA	14.4	11.6	-19.7	2.3	2.9	27.7	4.8	4.0	-16.4	21.5	18.5	-14.0
PI	8.2	9.5	16.5	1.8	2.7	52.5	3.7	5.6	50.4	13.7	17.8	30.4
RN	7.7	10.3	35.0	1.3	1.9	44.3	3.3	5.1*	53.9	12.3	17.3	41.1
AM	12.2	11.3	-7.7	2.2	2.8	25.8	2.4	2.8	18.9	16.8	16.9	0.5
PR	10.3	9.7	-6.4	1.8	1.9	7.5	4.2	4.8	15.4	16.3	16.4	0.7
TO	7.2	8.5	18.3	1.7	2.3	39.5	4.0	5.3	31.6	12.9	16.1	25.2
MG	9.6	7.9	-17.4	1.0	0.9	-9.0	6.0	6.6	11.3	16.5	15.4	-6.5
MT	9.6	8.9	-7.0	1.7	2.2	25.5	2.9	4.2*	47.8	14.2	15.4	8.0
RR	13.3	10.4	-21.7	2.4	2.6	9.1	2.3	2.2	-6.3	18.0	15.2	-15.6
GO	9.1	8.5	-5.9	1.5	1.8	19.5	3.7	4.6	26.5	14.3	15.0	5.1
AP	8.4	10.0	19.5	1.8	2.7	49.0	1.5	2.2	47.6	11.7	15.0	27.7
ES	9.6	8.0	-16.5	1.4	1.5	0.1	4.7	5.3	12.8	15.7	14.7	-6.2
MS	7.7	8.3	8.9	1.5	1.9	23.2	3.8	4.4	14.6	13.0	14.6	12.3
RO	13.1	9.4	-28.3	2.5	2.6	4.0	2.7	2.3	-14.5	18.2	14.2	-21.9
DF	11.1	7.7*	-30.2	3.2	2.8	-12.3	3.9	3.6	-8.4	18.2	14.1	-22.4
SP	12.4	9.1*	-26.9	1.5	1.7	17.7	4.7	2.6*	-44.4	18.6	13.4	-27.7
RS	10.0	8.0	-19.7	1.7	2.1	20.3	2.6	3.2	21.7	14.3	13.3	-7.3
RJ	13.4	8.6*	-35.7	1.5	1.5	3.0	3.7	3.1	-16.3	18.5	13.2	-28.8
PA	9.5	9.1	-4.3	1.9	2.3	21.5	1.4	1.7	20.5	12.8	13.1	2.3
SC	9.3	7.1	-23.8	2	2.2	10.1	2.5	2.8	12.0	13.7	12.0	-12.4
Brasil	11.4	9.5*	-16.9	1.5	1.9	21.1	4.1	4.3	6.5	17.0	15.7	-7.9

[1]Mortality rates standardized by sex and age, based on the world population developed for the Global Burden of Diseases 2013; var: variation; [2]federated units ordered from the highest to the lowest mortality rate due to alcohol use disorders, cirrhosis and cancer in 2015; * Rates with statistically significant changes in uncertainty intervals (95% UI).

It is important to consider that the ranking of causes of death differs between the sexes. From 1990 to 2015, ranking of cirrhosis, liver cancer, and disorders due to alcohol use among men rose, respectively, from the 15th to the 13th position, from the 38th to the 28th position, and from the 68th to the 60th position. Among women, positions are relatively lower than among men, but all rose in the same period, from 32nd to 30th position, from 83d to 76th, and from 85th to 79th position, respectively (Table 2).

In the ranking of YLL rates, from 1990 to 2015, we observed a rise in the causes studied. In both sexes, cirrhosis rose from the twentieth position to the seventeenth, hepatic cancer increased from the 98th to the 77th, and alcohol use disorders rose from the 42nd to the 35th position. Among men and women, there was also a rise in ranking positions, except for cirrhosis among women, which declined from 34th to 36th (Table 2).

The five states with the highest YLL standardized rates for the three conditions studied in 2015 were Sergipe, Ceará, Pernambuco, Paraíba, and Alagoas. The state with the highest YLL rate was Sergipe (1604.9 / 100 thousand inhabitants) and the lowest was Pará (695.1 / 100 thousand inhabitants). The impact of this indicator (YLL) among men is greater than among women. Among women, the five states with the highest YLL rates belong to the northeast region: Alagoas, Sergipe, Bahia, Pernambuco, and Maranhão, as well as among men (Figure 3).

DISCUSSION

The study indicates a reduction in the age-standardized mortality rate (ASMR) per 100,000 inhabitants for cirrhosis attributed to alcohol use (16.9%), which contributed
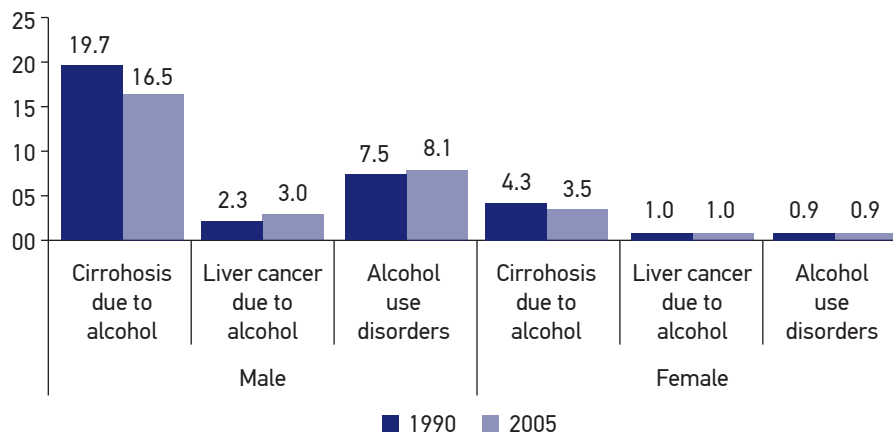
[1]Mortality rates standardized by sex and age, based on the world population developed for the Global Burden of Diseases 2013.

Figure 2. Standardized mortality rates[1] for cirrhosis, liver cancer, and disorders due to alcohol use (per 100,000 inhabitants), by sex, Brazil 1990 and 2015.

Table 2. Ranking of standardized[1] mortality rates and years of life lost due to cirrhosis, liver cancer, and disorders due to alcohol use (per 100,000 inhabitants) and percentage variation, in the total population and according to the sexes, Brazil, 1990 and 2015.

Cause	1990		2015		Variation (%)
	Position	Rate	Position	Rate	
Mortality					
Both sexes					
Cirrhosis due to alcohol	19	11.4	18	9.5	-16.9
Alcohol use disorders	44	4.1	37	4.3	6.5
Liver cancer due to alcohol	77	1.5	71	1.9	21.1
Female					
Cirrhosis due to alcohol	32	4.3	30	3.5	-17.9
Alcohol use disorders	83	1.0	76	1.0	5.5
Liver cancer due to alcohol	85	0.9	79	0.9	-3.4
Male					
Cirrhosis due to alcohol	15	19.7	13	16.5	-16.3
Alcohol use disorders	38	7.5	28	8.1	9.0
Liver cancer due to alcohol	68	2.3	60	3.0	28.8
Years of Life Lost Due to Premature Death (YLL)					
Both sexes					
Cirrhosis due to alcohol	20	352.3	17	277.2	-21.3
Alcohol use disorders	42	151.5	35	149.1	-1.5
Liver cancer due to alcohol	98	31.8	77	37.8	19.0
Female					
Cirrhosis due to alcohol	34	119.1	36	91.1	-23.5
Alcohol use disorders	84	34.1	75	29.4	-13.8
Liver cancer due to alcohol	111	19.6	88	20.0	1.9
Male					
Cirrhosis due to alcohol	17	607.1	13	483.4	-20.4
Alcohol use disorders	32	276.3	26	278.8	0.9
Liver cancer due to alcohol	89	46.7	66	59.4	27.3

Source: http://www.healthdata,org/results/data-visualizations
[1]Mortality rates and years of life lost due to premature death, standardized by sex and age, based on the world population developed for the Global Burden of Diseases 2013.

67% of all deaths by the three causes studied in 2015. According to Mokdad et al.[9], a reduction of the standard rate for cirrhosis was also observed from 1980 to 2010, of which 22% was attributed mainly to population growth and aging. Excessive alcohol consumption is probably the leading cause of liver cirrhosis in most parts of Latin America. However, large reductions in mortality from cirrhosis in Mexico and Chile were observed without significant changes in alcohol consumption. The changes in patterns of alcohol consumption at meals and the type of alcohol consumed could explain these still unclear tendencies in Latin American societies[9].

In contrast, it is important to emphasize the stability of ASMR due to liver cancer and alcohol use disorders among the studied years, indicating the persistence of the impact of alcohol abuse under these conditions. In 2015, Brazil was the South American country with the highest ASMR caused by alcohol use disorders (4.31/100 thousand inhabitants)[4]. In addition, it ranks third in the mortality rate caused by alcohol-induced cirrhosis (9.48/100 thousand inhabitants), behind only Bolivia and Guyana[4]. In the GBD 2015 study, all three conditions had a reduction in global standardized mortality rates between 2005 and 2015, from -3.1% for liver cancer due to alcohol use and -11.0% for cirrhosis due
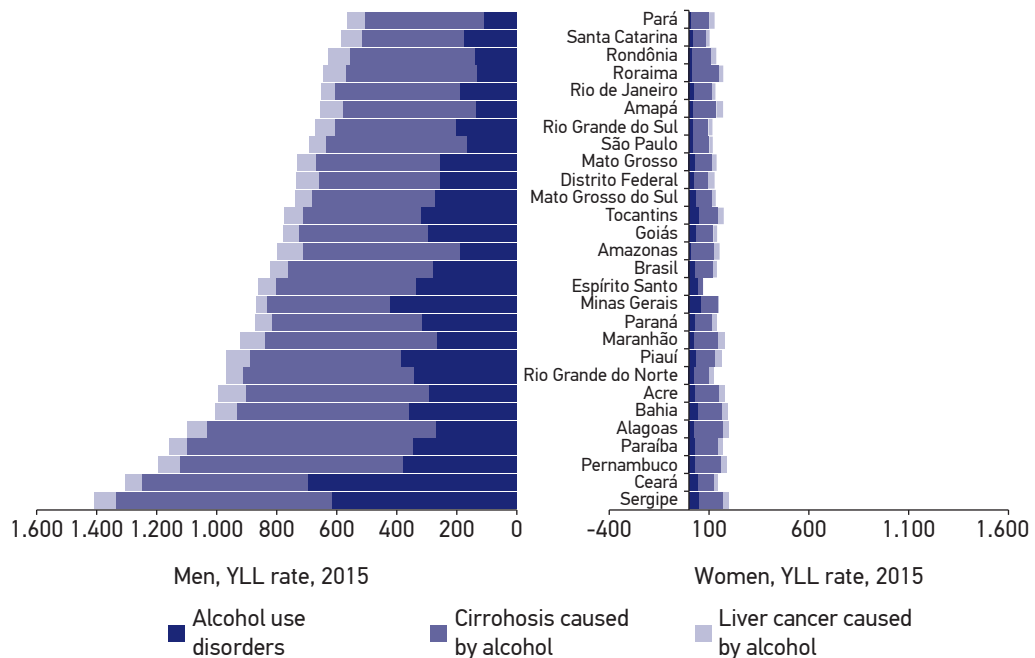
Source: http://www.healthdata,org/results/data-visualizations
YLL: years of life lost due to premature death.
[1]Rate of life years lost due to premature death standardized by sex and age, with the world population developed for the Global Burden of Diseases as a standard.

Figure 3. Standardized rates[1] of the years of life lost (YLL) due to premature death due to cirrhosis, liver cancer, and disorders due to the use of alcohol, by sex, by Federation Units in Brazil, 1990 and 2015.

to alcohol use. It is worth noting the reduction in the rate for alcohol use disorders in the world (-29.2%), whereas this study showed an increase in Brazil (+6.5%), especially in the northeast region[2]. Between 2006 and 2012, it was observed that although the number of people who drank alcohol in Brazil did not increase, the quantitiy and frequency of their drinking did in fact increase[16]. However, this aspect needs further investigation to clarify the variations in ASMR. While investigating mortality for which alcohol consumption is a necessary cause among the Americans between 2007 and 2009, Gawryszewski and Monteiro[17] found that Brazil belonged to the group of five countries with the highest mortality rates due to these causes, after Mexico, Guatemala, Nicaragua, and El Salvador.

In Brazil, the five states that presented the highest ASMR for the three conditions studied belong to the northeast region: Sergipe, Ceará, Pernambuco, Paraíba, and Alagoas. This finding may reflect the higher alcohol consumption in this region, as well as in the north, as evidenced by the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Inquiry (Vigitel) and the National Health Survey (acronym in Portuguese – PNS) 2013[3,18]. Garcia et al. [19] also found that, from 2010 to 2012, residents in smaller municipalities, and in the northeast and midwest regions had the highest mortality rates due to conditions in which alcohol was a necessary cause.

The results indicate that the ratios among standardized mortality rates were 5.1 times higher among men compared with women in 2015. Harmful use of alcohol was the major risk factor for the death of men in the age group of 15–59 years. However, there is evidence that women may be more vulnerable to alcohol-related harm at lower levels of consumption and at a younger age than men[20]. In Brazil, the PNS 2013 showed that the prevalence of heavy drinking at least once in the 30 days prior to the survey was higher among men (21.6%), compared with women (6.6%), and that men consume alcohol more frequently and in greater quantity than women[3]. In addition, abusive alcohol consumption is among the five highest risk factors among men in Brazil from the period between 1990 and 2010 (84%)[11].

ASMR has shown an increase in more advanced age groups from 1990 to 2015. It is argued that the increasing burden of alcohol-related diseases among the more advanced age groups is a growing public health problem due to the rapid aging of the population in many countries of the world[20]. This can be explained by the nature of these causes of death, which, with the exception of acute alcohol intoxication, have a long period of induction, such as cirrhosis of the liver[19,21].

The YLL ranking indicated that for all three conditions, there was an increase in the position for both sexes, indicating a greater impact of these conditions on early mortality from 1990 to 2015 in Brazil. Alcohol use disorders are an important risk factor for premature mortality. A meta-analysis study on general mortality in people with alcohol use disorders, which included 81 observational studies, indicated that men and women aged 40 years or less had a 9- and 13-fold higher risk than individuals without alcohol use disorders[10]. The disorders related to alcohol use were among the main causes of YLL, which increased by more than 40% from 1990 to 2010 in Brazil[11].

This study presents some limitations, especially those related to the coverage and quality of SIM, with inequalities among Brazilian FUs. Although the SIM has experienced marked improvements since the 1990s, some states in 2010, especially those located in the north and northeast regions, still had coverage of less than 90% and proportions of deaths classified as "ill-defined causes" greater than 10%. In this sense, despite the corrections of the estimates used in GBD 2015, there may be limitations depending on the methods involved. It should be noted that as GBD methods are constantly evolving, the estimates generated are not comparable to those of previous studies. In addition, the GBD methodology implies that the models of etiologic ratio for the subcauses of liver cancer depend on the availability of data sources that report on local patterns of liver cancer etiology, as well as age patterns, which may have interfered in the estimates for Brazil. Nevertheless, the GBD approach produces estimates that allow comparisons between regions and countries and can be useful in tracking the impact of problems related to alcohol use in Brazil.

CONCLUSION

Although the three conditions studied in this article are among the main necessary causes of death due to the consumption of alcohol, it is known that the mortality attributable to alcohol encompasses many more conditions for which alcohol is a necessary or component cause. In the world, the highest numbers of deaths related to alcohol use are cardiovascular diseases, followed by injuries (especially unintentional injuries), gastrointestinal diseases (mainly cirrhosis of the liver), and cancers[1]. Furthermore, the damages caused by alcohol also extend to family members, neighbors, and the greater community[23]. Therefore, these data urgently call for public policies in Brazil that address harmful alcohol consumption, one of the main preventable risk factors for mortality and premature disability. Little has been done in this field to combat the harmful use of alcohol, especially when compared to what was achieved in the fight against smoking in the country. Among the best practice policies recommended by WHO for alcoholic beverages are limiting availability, restricting advertising, and raising prices through taxation, as well as measures to combat the "alcohol and steering" combination[1,24]. In addition, authors[20] have discussed the urgent need to increase support for research to evaluate evidence, monitor progress, and reduce the gap between research, communities, and public policies. Only with advances in these areas can we hope to address alcohol abuse in Brazil.

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