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Preliminary report

Estimation of the impact of various scenarios of reduction of alcohol use in Brazil

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Summary

Alcohol use is one of the main risk factors for noncommunicable diseases, which generates direct and indirect economic costs to countries and their populations, considering health expenses and productivity losses to economies.

This study continues the comparative risk analysis methodology presented in 2024, which estimated the direct and indirect costs of alcohol use in Brazil. The model was expanded to analyze the impact of reducing alcohol use by 10% and 20% in the country, with 2019 as a reference year.

According to the new estimates, considering alcohol use adjusted by the market estimates of the World Health Organization, we had 102,300 deaths attributable to alcohol use, and the costs of premature deaths reached the figure of 20.6 billion Brazilian reais (R$) in 2019. The differences in relation to the previously presented estimates are explained by the disaggregation of use ranges, allowing a more detailed assessment of the epidemiological and economic burden, reflecting the differences in small ranges of alcohol use by age and sex.

In the modeled scenarios, a 10% reduction in use by the entire population would lead to a 5.5% reduction in attributable mortality (about 5,600 deaths), corresponding to a 5.0% reduction in the costs of premature mortality (R$1.0 billion) per year. Meanwhile, a 20% reduction in alcohol use by the population would result in a 11.2% reduction in attributable mortality (about 11,400 deaths), which would correspond to a 10.1% decrease in costs (approximately R$2.1 billion).

These results indicate the need to strengthen and expand policies to address this public health issue and may encourage the discussion of selective taxation of alcoholic beverages to seek the greatest epidemiological and economic impact for this measure, as well as for the entire set of policies aimed at reducing this risk factor.

1. Introduction

Alcohol use is a significant cultural element worldwide, generating high direct and indirect economic costs. Direct costs include health care expenses, while indirect costs involve loss of productivity, crime, and deaths (Pan American Health Organization, 2021). According to the WHO, in 2019, the global average use was 5.5 liters per capita, with emphasis on Europe (9.2 liters) and the Americas (7.5 liters). Even though 56% of the adult population does not consume alcohol, drinkers ingest an average of 27 grams of pure alcohol per day, increasing risks of disease and mortality.

In Brazil, binge drinking among adults rose to 20.8% in 2023, with marked growth among women (Ministry of Health, 2023). Globally, alcohol was responsible for 2.6 million deaths in 2019 (4.7% of the total), mainly affecting men. About 400 million people live with alcohol use disorders, more than half of whom are dependent. In the US, annual costs reach $249 billion, including treatments for diseases such as cirrhosis and cancer, as well as emergencies and rehabilitations (Centers for Disease Control and Prevention, 2019).

Indirect impacts of alcohol include loss of productivity, absenteeism, and workplace accidents. Alcohol use is also linked to increased crime, such as domestic violence and drink driving, accounting for 40% of violent crimes in the US. These factors put pressure on health, justice, and security systems, amplifying social costs. Global data highlight the need for public policies to reduce the economic and social harms associated with alcohol.

Addressing these costs, therefore, requires a multifaceted approach that combines public health interventions, regulatory measures, and community initiatives aimed at reducing binge drinking and promoting healthier behaviors. For example, among the most cost-effective policies recommended by the WHO to address alcohol use are taxes on alcoholic beverages, banning and restricting their advertising, and restricting their availability, through policies such as reduced sales hours (World Health Organization, 2023).

Therefore, estimates of the economic and health burden of alcohol use in Brazil can help in advocating for more robust policies to address this public health issue, such as stricter regulatory and fiscal policies.

2. Objectives

The general objective of this preliminary study is to estimate the impact of different scenarios of reduction of alcohol use in Brazil on attributable mortality and indirect costs of premature deaths. The following sections present a more detailed evaluation of the impacts of these reductions on the direct and indirect costs attributable to alcohol use per year in Brazil. These are, respectively, the health costs generated for the Unified Health System (the public health system available to all in Brazil) and the costs for production losses due to hospitalizations and consultations, and for pensions and paid leave, per year in Brazil.

3. Methods and data analysis

This study was based on estimates from a comparative risk analysis model considering the direct and indirect costs attributable to alcohol use in Brazil in 2019, using the prevalence of alcohol use by the population according to sex and age group and relative risks from meta-analyses on the dose-response relationship of alcohol use with different health outcomes. All epidemiological, population, use, and cost data were disaggregated according to sex and age group (with ranges from 20 years to over 80 years).

The same epidemiological and cost variables from the original study were considered, with the same data sources, considering also the same set of 24 diseases associated with alcohol use, whose codes from the International Classification of Diseases (ICD-10) are detailed in Table 1.

Table 1. Diseases associated with alcohol use and their codes in ICD-10.

Disease	Code
1 - Tuberculosis and sequelae of tuberculosis	A15–A19. 9, B90-B90.9
2 - Lower respiratory infections	J09– J22.9, J85.1
3 - Esophageal cancer	C15–C15.9
4 - Liver cancer from alcohol use	C22–C22.9
5 - Laryngeal cancer	C32–C32.9
6 - Breast cancer	C50–C50.929
7 - Colon and rectal cancer	C18–C21
8 - Cancer of the lips and oral cavity	C00–C08.9
9 - Nasopharyngeal cancer	C11–C11.9
10 - Other pharyngeal cancers	C09–C10.9, C12-C13.9
11 - Ischemic heart disease	I20–I25.9
12 - Intracerebral hemorrhage	I60–I62.9, I69.0–I69.2
13 - Fibrillation and atrial flutter	I48–I48.9
14 - Cirrhosis and other chronic liver diseases from alcohol use	K70–K70.9
15 - Pancreatitis	K85–K86.9
16 - Epilepsy	G40–G41.9
17 - Traffic accidents	V01–V99
18 - Accidental injuries	W00-X29.9, X40-X40., X58.99, X43–X43.9, X46–X48.9
19 - Intentionally self-inflicted injuries and their sequelae	X60–X64.9, X66-X84.9, Y87.0
20 - Interpersonal violence and sequelae	X85–Y08.9, Y87.1, Y87.2
21 - Alcohol use disorders	F10, G31.2, X45–X45.9, X65–X65.9, Y15–Y15.9
22 - Hypertensive diseases	I11
23 - Alcoholic cardiomyopathy	I42.6
24 - HIV/AIDS	B20

In this new study, estimates of attributable deaths and the costs of premature mortality were generated from two scenarios of reduction in use, aligned with national and international commitments (10% and 20% reduction). For this purpose, the same percentage of reduction was assumed for all use ranges using the PNS 2019 microdata, adjusted according to the estimates of average per capita use according to market data by the WHO.

Compared to the previous report, the methodology for estimating deaths and attributable costs was adjusted to replace the use ranges (from 12g to 12g of alcohol per day) with more disaggregated ones (from 1g to 1g per day). This change was necessary to allow a more accurate understanding of changes in alcohol use in view of the reduction targets of 10% and 20%, because part of the changes would not be captured within the broader ranges.

For this purpose, the model had to be expanded from seven to 74 use ranges, in the same way as the prevalences of use by sex and age group. Then, the values of the ranges were considered for the midpoints of the relative risks per use range for each outcome, and the intermediate values, per gram, were estimated by regression to calculate the relative risk for the new use ranges.

4. Results

4.1. Attributable deaths and reduction scenarios

It was estimated that, in 2019, about 102,300 Brazilians died from causes attributable to alcohol use, representing a magnitude similar to that found in the first study. Again, attributable deaths are significantly higher among men (92,500) than among women (9,800), as a function of differences in alcohol use and associated causes of death (Table 2).

It has also been observed that most of these deaths are premature (of individuals under 70 years of age), for both sexes. The distribution of causes of death was similar to that described in the first study. The most relevant, in descending order of participation, were accidents and violence, cardiovascular diseases, and cancers among men, and cardiovascular diseases, cancers, and accidents and violence among women.

In relation to the new scenarios analyzed, in the first scenario of reduction of alcohol use (10%), it is observed that the number of attributable deaths is reduced by 5.5%, representing 5,600 deaths prevented or postponed per year (Table 3), while in the second scenario, with an even greater reduction (of 20%) in use, there would be a 11.2% reduction in attributable mortality, corresponding to approximately 11,400 deaths prevented or postponed per year (Table 4).

Table 2. Deaths attributable to alcohol use in Brazil according to sex and age, and disease groups, in 2019.

	Respiratory diseases	Cancers	Cardiovascular diseases	Diseases of the digestive system	Epilepsy	Accidents and violence	Alcohol use disorders	HIV/AIDS	Total
Men									
20 to 24 years	58	19	63	30	27	2,039	56	40	2,332
25 to 29 years	100	33	115	99	39	2,126	141	82	2,735
30 to 34 years	135	63	218	263	47	1,860	324	109	3,020
35 to 39 years	306	246	656	950	111	2,879	551	137	5,836
40 to 44 years	724	1,146	2,075	2,940	214	4,496	790	141	12,526
45 to 49 years	481	1,284	1,912	2,243	126	2,056	980	132	9,214
50 to 54 years	628	2,396	3,274	3,001	125	1,861	1,088	118	12,490
55 to 59 years	752	3,599	4,855	3,673	122	1,677	1,048	87	15,813
60 to 64 years	403	2,108	3,284	1,880	50	718	804	57	9,304
65 to 69 years	335	1,508	2,978	1,249	34	446	639	42	7,230
70 to 74 years	236	859	2,047	639	19	256	360	23	4,441
75 to 79 years	262	650	2,052	445	18	211	198	13	3,850
80 years or older	367	467	2,156	270	16	202	180	9	3,668
Total Men	4,789	14,377	25,686	17,682	948	20,829	7,158	990	92,459
Women									
20 to 24 years	18	9	17	6	11	144	10	16	230
25 to 29 years	21	22	27	10	12	135	20	32	279
30 to 34 years	25	59	55	24	13	136	46	53	410
35 to 39 years	31	107	98	43	13	125	74	71	561
40 to 44 years	35	161	172	68	12	106	95	81	731
45 to 49 years	31	192	231	75	10	80	105	66	790
50 to 54 years	38	274	349	101	9	72	106	55	1,004
55 to 59 years	38	269	378	98	7	51	90	40	972
60 to 64 years	40	261	469	101	6	44	70	27	1,019
65 to 69 years	48	240	559	101	6	42	48	24	1,069
70 to 74 years	45	196	498	73	5	40	31	10	898
75 to 79 years	43	131	436	48	3	33	24	5	722
80 years or older	94	157	722	41	5	68	34	6	1,127
Total Women	507	2,078	4,010	790	114	1,077	751	487	9,811

Table 3. Deaths attributable to alcohol use in Brazil, considering a 10% reduction in use, according to sex and age, and disease groups, in 2019.

	Respiratory diseases	Cancers	Cardiovascular diseases	Diseases of the digestive system	Epilepsy	Accidents and violence	Alcohol use disorders	HIV/AIDS	Total
Men									
20 to 24 years	55	18	60	28	26	1,963	50	36	2.236
25 to 29 years	94	31	110	93	37	2,044	127	74	2.610
30 to 34 years	127	60	208	247	45	1,789	292	98	2.866
35 to 39 years	288	234	626	899	105	2,765	496	123	5.536
40 to 44 years	680	1,088	1,973	2,777	202	4,317	711	127	11.875
45 to 49 years	448	1,214	1,812	2,108	119	1,968	882	119	8.670
50 to 54 years	595	2,305	3,123	2,948	119	1,783	979	106	11.958
55 to 59 years	709	3,461	4,620	3,627	116	1,604	943	78	15.159
60 to 64 years	370	1,979	3,105	1,744	47	683	724	51	8.703
65 to 69 years	307	1,417	2,820	1,154	32	425	575	38	6.768
70 to 74 years	214	799	1,926	580	18	243	324	21	4.125
75 to 79 years	240	611	1,944	413	17	202	178	12	3.617
80 years or older	329	432	2,035	243	15	191	162	8	3.415
Total Men	4,456	13,649	24,362	16,862	897	19,977	6,442	891	87,536
Women									
20 to 24 years	17	8	16	6	10	137	9	14	217
25 to 29 years	19	21	25	9	11	128	18	29	260
30 to 34 years	23	57	51	22	12	130	41	48	384
35 to 39 years	28	102	91	40	12	118	67	64	522
40 to 44 years	33	155	162	65	12	101	86	73	686
45 to 49 years	28	183	215	68	9	76	95	59	733
50 to 54 years	35	261	326	95	8	68	95	50	938
55 to 59 years	34	256	352	91	7	49	81	36	906
60 to 64 years	36	246	433	91	6	42	63	24	941
65 to 69 years	45	227	524	95	5	40	43	22	1.001
70 to 74 years	39	183	456	64	4	37	28	9	820
75 to 79 years	38	123	404	43	3	32	22	5	669
80 years or older	81	146	662	36	4	64	31	5	1.029
Total Women	456	1,966	3,717	724	104	1,022	676	438	9,103

Table 4. Deaths attributable to alcohol use in Brazil, considering a 20% reduction in use, according to sex and age, and disease groups, in 2019.

	Respiratory diseases	Cancers	Cardiovascular diseases	Diseases of the digestive system	Epilepsy	Accidents and violence	Alcohol use disorders	HIV/AIDS	Total
Men									
20 to 24 years	51	17	57	27	24	1,893	45	32	2.146
25 to 29 years	90	30	105	91	35	1,975	113	66	2.504
30 to 34 years	120	57	199	239	43	1,720	259	87	2.724
35 to 39 years	272	225	596	888	100	2,654	441	110	5.285
40 to 44 years	637	1,038	1,864	2,700	191	4,121	632	113	11.296
45 to 49 years	414	1,144	1,707	1,990	111	1,877	784	106	8.133
50 to 54 years	554	2,191	2,954	2,812	113	1,707	870	94	11.296
55 to 59 years	653	3,265	4,353	3,424	109	1.531	838	70	14.243
60 to 64 years	336	1,849	2,923	1,620	43	650	643	46	8.110
65 to 69 years	280	1,328	2,659	1,075	30	405	511	34	6.322
70 to 74 years	193	744	1,807	535	17	231	288	18	3.833
75 to 79 years	218	568	1,829	374	16	192	158	10	3.366
80 years or older	295	401	1,921	221	14	183	144	7	3.186
Total Men	4,112	12,858	22,975	15,997	846	19,139	5.726	792	82.445
Women									
20 to 24 years	15	8	14	5	10	131	8	13	204
25 to 29 years	18	20	23	8	10	122	16	26	243
30 to 34 years	21	54	48	20	11	124	37	42	357
35 to 39 years	26	98	85	36	11	113	59	57	485
40 to 44 years	30	148	151	59	11	96	76	65	636
45 to 49 years	25	175	199	62	8	72	84	53	678
50 to 54 years	32	248	302	86	8	65	85	44	870
55 to 59 years	31	242	323	81	6	46	72	32	833
60 to 64 years	32	232	397	81	5	40	56	22	865
65 to 69 years	41	216	489	87	5	39	38	19	935
70 to 74 years	34	171	415	56	4	36	25	8	749
75 to 79 years	33	114	366	37	3	30	19	4	606
80 years or older	68	136	605	31	4	62	27	5	938
Total Women	405	1,862	3,415	650	96	975	601	386	8.390

4.2. Costs of premature mortality

The estimate for the indirect costs generated for the Brazilian economy by premature mortality attributable to alcohol use in 2019 was approximately R$20.6 billion per year, equivalent to 6.4 billion international dollars (Int$) per year (Table 5); these costs are caused by the withdrawal of individuals of productive age from the market. This value is higher than previously estimated (R$17 billion), but of the same order of magnitude, and the difference can be explained by the more detailed estimation of the differences in individual use using smaller use ranges (1g/day) instead of the wider ranges of 12g/day used in the first report.

With a 10% reduction in alcohol use by the Brazilian population, it is estimated that the cost of premature mortality will be reduced to around R$19.6 billion (Table 6), corresponding to an annual reduction of 5.0% in these indirect costs (i.e., R$1.0 billion/year). If the reduction in use for the population reached 20%, the attributable costs would fall to R$18.5 billion (Table 7), that is, a decrease of 10.1% in the costs of attributable premature mortality (indirect costs of about R$2.1 billion/year would be avoided).

Table 5. Costs of premature mortality in Brazil according to sex and age, in 2019.

	Reais (R$)	International dollars (Int$)
Men		
20 to 24 years	1.050.581.650,39	327.794.586,70
25 to 29 years	1.256.218.368,57	391.955.809,23
30 to 34 years	1.315.325.860,22	410.398.084,31
35 to 39 years	2.363.380.511,67	737.404.215,81
40 to 44 years	4.577.668.843,47	1.428.289.810,76
45 to 49 years	2.896.527.404,15	903.752.700,20
50 to 54 years	3.101.459.327,79	967.694.018,03
55 to 59 years	2.576.931.403,81	804.034.759,38
60 to 64 years	490.076.178,50	152.909.884,09
Total Men	19.628.169.548,57	6.124.233.868,51
Women		
20 to 24 years	78.909.329,17	24.620.695,53
25 to 29 years	95.430.278,09	29.775.437,78
30 to 34 years	131.303.208,69	40.968.239,84
35 to 39 years	163.105.087,96	50.890.823,08
40 to 44 years	185.014.072,33	57.726.699,64
45 to 49 years	161.322.221,86	50.334.546,60
50 to 54 years	141.889.551,64	44.271.310,96
55 to 59 years	58.170.333,26	18.149.869,97
Total Women	1.015.144.083,00	316.737.623,40
TOTAL	20.643.313.631,57	6.440.971.491,91

Table 6. Costs of premature mortality in Brazil, considering a 10% reduction in use, according to sex and age, in 2019.

	Reais (R$)	International dollars (Int$)
Men		
20 to 24 years	1.007.511.856,21	314.356.273,39
25 to 29 years	1.198.515.445,56	373.951.777,09
30 to 34 years	1.248.243.324,62	389.467.495,98
35 to 39 years	2.242.083.563,36	699.558.054,09
40 to 44 years	4.339.645.770,74	1.354.023.641,42
45 to 49 years	2.725.337.635,22	850.339.355,76
50 to 54 years	2.969.401.092,03	926.490.200,32
55 to 59 years	2.470.335.287,71	770.775.440,78
60 to 64 years	458.402.168,71	143.027.197,72
Total Men	18.659.476.144,15	5.821.989.436,55
Women		
20 to 24 years	74.453.234,46	23.230.338,36
25 to 29 years	88.974.012,47	27.761.002,33
30 to 34 years	122.869.925,11	38.336.950,11
35 to 39 years	151.604.295,44	47.302.432,27
40 to 44 years	173.655.228,45	54.182.598,58
45 to 49 years	149.698.061,17	46.707.663,39
50 to 54 years	132.492.698,85	41.339.375,62
55 to 59 years	54.233.984,96	16.921.680,17
Total Women	947.981.440,92	295.782.040,85
TOTAL	19.607.457.585,07	6.117.771.477,40

Table 7. Costs of premature mortality in Brazil, considering a 20% reduction in use, according to sex and age, in 2019.

	Reais (R$)	International dollars (Int$)
Men		
20 to 24 years	966.696.002,97	301.621.217,78
25 to 29 years	1.150.155.987,99	358.863.022,77
30 to 34 years	1.186.695.785,88	370.263.895,75
35 to 39 years	2.140.513.071,39	667.866.792,94
40 to 44 years	4.128.015.452,52	1.287.992.340,88
45 to 49 years	2.556.469.682,36	797.650.446,92
50 to 54 years	2.804.870.288,28	875.154.536,13
55 to 59 years	2.321.138.998,11	724.224.336,38
60 to 64 years	427.162.199,70	133.279.937,50
Total Men	17.681.717.469,20	5.516.916.527,05
Women		
20 to 24 years	69.795.626,41	21.777.106,53
25 to 29 years	83.083.508,18	25.923.091,48
30 to 34 years	114.264.871,78	35.652.066,08
35 to 39 years	140.993.448,30	43.991.715,54
40 to 44 years	160.853.721,22	50.188.368,56
45 to 49 years	138.443.642,88	43.196.144,42
50 to 54 years	122.872.533,81	38.337.764,06
55 to 59 years	49.864.138,49	15.558.233,54
Total Women	880.171.491,07	274.624.490,19
TOTAL	18.561.888.960,27	5.791.541.017,25

5. Discussion

In the new estimates presented, considering adjustments in the original model to detail the ranges of alcohol use in the population, it was calculated that we had, in 2019, approximately 102,300 deaths attributable to alcohol use in Brazil and that the costs of attributable premature deaths reached R$20.6 billion per year. Using the same model for scenarios of changes in alcohol use in Brazil, if it were reduced by 10%, attributable mortality would decrease by 5.5% (5,600 fewer annual deaths), and if the reduction in use was 20%, mortality would decrease by 11.2% (11,400 deaths).

The differences in the results compared to the first study are explained by the adjustments in the original model, built with the evaluation of use ranges of every 12g/day, to detail use ranges for each gram of alcohol consumed, with the aim of more accurately capturing the impact of minor changes in use.

Most deaths and attributable costs occurred among men and, regardless of sex, most deaths and costs occurred in individuals younger than 60 years. Among the deaths and attributable costs, the main causes were cardiovascular diseases, accidents and violence, cancers, and diseases of the digestive system. For example, part of the changes in use with the reductions in the order of 20% or 10% could not be captured by the original model due to the changes in these percentages still being contained in the same use range. In this situation, an individual with a daily use of 10g/day who reduced their use to 9g or 8g/day would continue in the same use range (greater than zero and less than 12g/day), while in the new model we would have a differentiation between the three uses.

As in the previous study, this study has as its strengths the use of updated data on alcohol use in the Brazilian population (including disaggregation according to age and sex), an expanded set of diseases associated with alcohol use, and a greater set of variables for indirect costs compared to previous studies in Brazil. Generally speaking, a more conservative approach has been taken with respect to estimated attributable costs, so the estimates generated are likely to be an underestimate of actual costs. At the same time, it shares the same limitations with the previous study, such as the possible overestimation of alcohol use from the indirect data of the alcoholic beverage market and other limitations related to the assumptions that were incorporated in the statistical model, such as the portability of the relative risks obtained in studies of other populations. Additionally, it was not possible to incorporate all possible direct costs, such as those for primary health care, supplementary health costs and direct spending by families on health, in addition to indirect costs to society, such as productivity losses due to presenteeism.

6. Conclusion

It bears repeating that the epidemiological and economic impacts of alcohol use in Brazil are significant and, given the potential impact of reducing alcohol use that could be achieved with policies such as tax reform, it is necessary to seek the rates and coverage of selective taxes that most significantly reduce use. At the same time, it is necessary to strengthen the entire set of measures that contribute to the reduction of alcohol use in the country (such as informing the population, restricting points and times of sale and use, and improving labeling, among others), contribute to alter the perception of alcohol use and reduce its impact on health and the economy.

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Appendices

Supplementary Table 1. Deaths attributable to alcohol use in Brazil by sex and age group, in 2019.

Supplementary Table 2. Deaths attributable to alcohol use in Brazil if alcohol use were reduced by 10%, by sex and age group, in 2019.

Supplementary Table 3. Deaths attributable to alcohol use in Brazil if alcohol use were reduced by 20%, by sex and age group, in 2019.

Supplementary Table 4. Comparison of alcohol use reduction scenarios (10%, 18%, and 20%) on avoided deaths and premature mortality costs in Brazil

Supplementary Table 1. Deaths attributable to alcohol use in Brazil by sex and age group, in 2019.

	Tuberculosis	Lower respiratory infections	Esophageal cancer	Liver cancer	Laryngeal cancer	Breast cancer	Colon and rectal cancer	Cancer of the mouth and oral cavity	Nasopharyngeal cancer	Other pharyngeal cancers	Ischemic heart disease	Intracerebral hemorrhage
Men												
20 to 24 years	41	17	3	0	1	0	4	4	4	3	41	14
25 to 29 years	74	26	7	0	2	0	9	7	4	4	75	23
30 to 34 years	102	33	15	0	4	0	17	15	4	7	145	43
35 to 39 years	224	82	60	2	18	1	51	63	14	37	455	135
40 to 44 years	532	192	310	5	111	4	153	281	55	227	1.523	439
45 to 49 years	345	135	364	6	136	6	133	300	43	296	1.354	396
50 to 54 years	425	203	687	14	270	11	244	576	71	524	2.345	679
55 to 59 years	470	283	1.053	25	411	15	360	875	96	765	3.512	996
60 to 64 years	221	182	626	18	241	12	249	488	28	446	2.322	564
65 to 69 years	157	178	454	16	180	10	214	323	19	293	1.996	545
70 to 74 years	89	148	261	10	100	7	150	173	11	147	1.399	303
75 to 79 years	77	186	207	6	73	3	132	128	7	94	1.332	327
80 years or older	59	309	143	3	46	3	109	101	4	58	1.323	162
Total Men	2.815	1.973	4.190	106	1.593	71	1.823	3.334	361	2.900	17.822	4.627
Women												
20 to 24 years	11	7	1	0	0	3	2	1	1	1	8	7
25 to 29 years	14	7	1	0	0	11	4	3	1	1	14	10
30 to 34 years	16	9	2	0	0	40	9	5	1	2	29	18
35 to 39 years	21	10	3	0	1	76	15	7	2	3	50	32
40 to 44 years	22	13	8	0	2	108	23	12	3	5	91	52
45 to 49 years	17	13	14	1	3	120	29	15	3	8	125	68
50 to 54 years	20	18	28	1	6	154	43	25	4	14	194	95
55 to 59 years	18	19	35	1	7	136	45	26	4	15	225	90
60 to 64 years	16	24	35	2	7	122	50	28	3	15	285	104
65 to 69 years	15	33	33	2	7	102	53	27	3	14	331	128
70 to 74 years	12	33	29	1	5	82	43	24	2	10	319	75
75 to 79 years	8	34	21	1	3	50	32	17	1	6	269	68
80 years or older	9	85	25	1	3	58	38	25	1	7	417	57
Total Women	201	305	232	10	44	1.060	387	215	30	101	2.358	804

Supplementary Table 1 (continued).

	Atrial fibrillation and flutter	Cirrhosis	Pancreatitis	Epilepsy	Road crashes	Accidental injuries	Self-inflicted injuries	Interpersonal violence	Alcohol use disorders	Hypertension	Alcohol cardiomyopathy	HIV/AIDS	TOTAL
Men													
20 to 24 years	0	18	12	27	451	87	242	1.260	56	5	2	40	**2.332**
25 to 29 years	0	65	34	39	501	102	289	1.234	141	11	5	82	**2.735**
30 to 34 years	0	204	58	47	482	107	284	988	324	18	12	109	**3.020**
35 to 39 years	1	797	153	111	815	204	482	1.377	551	42	23	137	**5.836**
40 to 44 years	6	2.589	350	214	1.392	402	818	1.884	790	69	39	141	**12.526**
45 to 49 years	7	2.037	206	126	689	225	389	755	980	101	55	132	**9.214**
50 to 54 years	14	2.765	236	125	660	260	378	563	1.088	187	49	118	**12.490**
55 to 59 years	23	3.421	252	122	610	270	366	430	1.048	267	58	87	**15.813**
60 to 64 years	19	1.761	119	50	268	144	149	158	804	333	46	57	**9.304**
65 to 69 years	20	1.153	96	34	160	106	93	87	639	391	26	42	**7.230**
70 to 74 years	22	580	59	19	83	81	50	42	360	312	11	23	**4.441**
75 to 79 years	34	392	53	18	64	82	37	29	198	354	5	13	**3.850**
80 years or older	114	226	44	16	40	133	22	8	180	552	6	9	**3.668**
Total Men	259	16.009	1.674	948	6.214	2.202	3.598	8.815	7.158	2.641	337	990	**92.459**
Women													
20 to 24 years	0	1	5	11	49	8	36	51	10	1	0	16	**230**
25 to 29 years	0	4	6	12	44	8	34	50	20	3	0	32	**279**
30 to 34 years	0	14	10	13	44	9	35	49	46	7	1	53	**410**
35 to 39 years	0	31	13	13	39	9	35	41	74	13	2	71	**561**
40 to 44 years	1	53	15	12	35	10	30	31	95	24	4	81	**731**
45 to 49 years	1	61	13	10	27	9	24	20	105	34	4	66	**790**
50 to 54 years	2	87	14	9	25	11	21	14	106	50	8	55	**1.004**
55 to 59 years	3	84	14	7	18	11	13	9	90	56	4	40	**972**
60 to 64 years	4	87	14	6	15	14	10	6	70	74	2	27	**1.019**
65 to 69 years	5	86	15	6	14	17	7	4	48	91	4	24	**1.069**
70 to 74 years	8	61	12	5	11	22	4	3	31	94	2	10	**898**
75 to 79 years	10	38	10	3	7	22	2	2	24	88	1	5	**722**
80 years or older	46	28	13	5	5	60	2	1	34	201	0	6	**1.127**
Total Women	80	634	156	111	335	209	253	280	751	736	32	487	**9.811**

Supplementary Table 2. Deaths attributable to alcohol use in Brazil if alcohol use were reduced by 10%, by sex and age group, in 2019.

	Tuberculosis	Lower respiratory infections	Esophageal cancer	Liver cancer	Laryngeal cancer	Breast cancer	Colon and rectal cancer	Cancer of the mouth and oral cavity	Nasopharyngeal cancer	Other pharyngeal cancers	Ischemic heart disease	Intracerebral hemorrhage
Men												
20 to 24 years	39	16	3	0	1	0	4	3	4	2	39	13
25 to 29 years	70	24	7	0	2	0	8	7	4	3	72	22
30 to 34 years	97	31	15	0	3	0	16	14	4	7	138	40
35 to 39 years	213	75	57	1	17	1	48	60	14	35	433	126
40 to 44 years	504	176	295	5	105	4	144	266	53	217	1.450	410
45 to 49 years	325	123	345	6	127	6	124	283	41	282	1.283	367
50 to 54 years	408	187	660	13	256	10	231	557	69	509	2.235	639
55 to 59 years	450	258	1.009	24	390	14	339	847	93	745	3.340	934
60 to 64 years	207	163	591	17	224	12	232	455	26	421	2.189	519
65 to 69 years	146	161	429	15	168	9	200	302	18	277	1.880	504
70 to 74 years	82	132	245	9	93	6	140	159	10	137	1.304	278
75 to 79 years	71	169	195	6	68	3	123	119	7	89	1.249	304
80 years or older	54	275	133	3	43	3	101	93	4	53	1.224	148
Total Men	2.665	1.789	3.984	101	1.496	68	1.711	3.167	345	2.777	16.835	4.306
Women												
20 to 24 years	11	6	1	0	0	3	2	1	1	1	8	7
25 to 29 years	13	6	1	0	0	11	4	3	1	1	13	9
30 to 34 years	15	8	2	0	0	38	9	5	1	2	27	16
35 to 39 years	19	9	3	0	1	73	14	6	2	3	47	29
40 to 44 years	21	12	7	0	2	104	21	12	3	5	87	48
45 to 49 years	16	12	13	1	3	115	27	14	3	8	117	61
50 to 54 years	18	17	26	1	5	148	40	23	4	13	183	86
55 to 59 years	17	17	32	1	6	132	42	24	4	14	211	81
60 to 64 years	15	21	33	1	6	117	46	25	3	14	266	93
65 to 69 years	14	30	31	2	6	98	50	25	3	13	312	117
70 to 74 years	10	29	26	1	5	78	40	22	2	9	295	66
75 to 79 years	8	30	19	1	3	48	30	16	1	6	251	60
80 years or older	8	73	22	1	3	55	35	23	1	7	385	49
Total Women	186	270	216	9	41	1.021	359	198	28	95	2.201	723

Supplementary Table 2 (continued).

	Atrial fibrillation and flutter	Cirrhosis	Pancreatitis	Epilepsy	Road crashes	Accidental injuries	Self-inflicted injuries	Interpersonal violence	Alcohol use disorders	Hypertension	Alcohol cardiomyopathy	HIV/AIDS	TOTAL
Men													
20 to 24 years	0	17	11	26	434	84	229	1.216	50	5	2	36	**2.236**
25 to 29 years	0	61	31	37	481	98	274	1.190	127	11	5	74	**2.610**
30 to 34 years	0	193	54	45	463	103	269	954	292	18	11	98	**2.866**
35 to 39 years	1	756	143	105	783	197	456	1.329	496	42	21	123	**5.536**
40 to 44 years	5	2.453	324	202	1.337	389	772	1.819	711	69	35	127	**11.875**
45 to 49 years	6	1.920	189	119	660	217	365	726	882	101	50	119	**8.670**
50 to 54 years	13	2.726	223	119	633	250	359	541	979	187	44	106	**11.958**
55 to 59 years	21	3.389	237	116	584	260	346	413	943	267	52	78	**15.159**
60 to 64 years	18	1.637	107	47	255	138	139	151	724	333	41	51	**8.703**
65 to 69 years	19	1.067	87	32	152	101	87	83	575	391	23	38	**6.768**
70 to 74 years	20	527	53	18	79	77	47	40	324	312	10	21	**4.125**
75 to 79 years	31	364	48	17	61	79	34	28	178	354	5	12	**3.617**
80 years or older	105	204	39	15	37	126	20	8	162	552	5	8	**3.415**
Total Men	241	15.315	1.547	897	5.959	2.121	3.398	8.498	6.442	2.641	303	891	**87.536**
Women									0	0	0	0	**0**
20 to 24 years	0	1	4	10	47	7	34	49	9	1	0	14	**217**
25 to 29 years	0	4	6	11	42	7	31	48	18	3	0	29	**260**
30 to 34 years	0	13	9	12	42	9	32	47	41	7	1	48	**384**
35 to 39 years	0	28	12	12	37	9	32	40	67	13	2	64	**522**
40 to 44 years	1	51	14	12	34	9	28	30	86	22	4	73	**686**
45 to 49 years	1	56	12	9	26	9	22	19	95	32	4	59	**733**
50 to 54 years	2	81	13	8	24	11	20	14	95	47	7	50	**938**
55 to 59 years	3	78	13	7	18	10	12	8	81	53	4	36	**906**
60 to 64 years	4	78	13	6	14	14	9	5	63	69	2	24	**941**
65 to 69 years	5	80	14	5	13	16	7	4	43	86	4	22	**1.001**
70 to 74 years	7	54	11	4	10	21	4	3	28	87	2	9	**820**
75 to 79 years	9	34	9	3	7	21	2	2	22	82	1	5	**669**
80 years or older	42	24	12	4	5	57	1	1	31	185	0	5	**1.029**
Total Women	73	583	141	104	319	200	236	267	676	688	29	438	**9.103**

Supplementary Table 3. Deaths attributable to alcohol use in Brazil if alcohol use were reduced by 20%, by sex and age group, in 2019.

	Tuberculosis	Lower respiratory infections	Esophageal cancer	Liver cancer	Laryngeal cancer	Breast cancer	Colon and rectal cancer	Cancer of the mouth and oral cavity	Nasopharyngeal cancer	Other pharyngeal cancers	Ischemic heart disease	Intracerebral hemorrhage
Men												
20 to 24 years	37	14	3	0	1	0	4	3	4	2	38	13
25 to 29 years	67	22	6	0	1	0	8	7	3	3	69	21
30 to 34 years	92	28	14	0	3	0	15	13	4	7	131	38
35 to 39 years	204	69	55	1	16	1	46	58	13	34	411	118
40 to 44 years	478	159	281	5	98	4	135	255	51	209	1.370	381
45 to 49 years	304	110	326	5	118	6	116	266	39	267	1.208	337
50 to 54 years	385	169	629	13	241	10	216	529	66	488	2.114	592
55 to 59 years	422	231	956	23	363	14	316	797	88	708	3.149	859
60 to 64 years	192	144	556	16	207	11	215	424	25	396	2.054	473
65 to 69 years	136	144	404	14	156	9	186	282	17	261	1.762	463
70 to 74 years	75	118	229	9	85	6	130	148	10	128	1.211	254
75 to 79 years	66	152	183	6	63	3	115	110	6	83	1.163	278
80 years or older	49	246	124	3	39	3	94	85	4	50	1.131	135
Total Men	2.506	1.607	3.764	95	1.392	66	1.595	2.980	328	2.639	15.810	3.962
Women												
20 to 24 years	10	5	1	0	0	2	2	1	1	1	7	6
25 to 29 years	12	5	1	0	0	10	4	2	1	1	12	8
30 to 34 years	14	7	1	0	0	37	8	4	1	2	25	15
35 to 39 years	18	8	3	0	1	71	13	6	2	3	44	26
40 to 44 years	19	11	7	0	2	101	20	11	2	5	81	44
45 to 49 years	15	11	12	1	3	111	25	13	3	7	109	55
50 to 54 years	17	15	24	1	5	143	38	21	3	12	170	77
55 to 59 years	15	15	30	1	6	127	39	22	3	13	195	72
60 to 64 years	13	19	30	1	6	113	42	23	3	13	245	81
65 to 69 years	13	27	29	2	6	95	47	23	3	12	292	106
70 to 74 years	9	24	24	1	4	75	37	19	2	8	269	56
75 to 79 years	7	26	17	1	3	46	27	14	1	5	228	51
80 years or older	7	61	20	1	2	54	32	20	1	6	352	41
Total Women	170	235	200	9	37	987	334	181	26	88	2.033	639

Supplementary Table 3 (continued).

	Atrial fibrillation and flutter	Cirrhosis	Pancreatitis	Epilepsy	Road crashes	Accidental injuries	Self-inflicted injuries	Interpersonal violence	Alcohol use disorders	Hypertension	Alcohol cardiomyopathy	HIV/AIDS	TOTAL
Men													
20 to 24 years	0	17	10	24	419	82	218	1.174	45	5	2	32	**2.146**
25 to 29 years	0	61	30	35	466	96	261	1.152	113	11	4	66	**2.504**
30 to 34 years	0	188	50	43	446	100	254	920	259	18	10	87	**2.724**
35 to 39 years	1	753	135	100	752	191	432	1.279	441	42	18	110	**5.285**
40 to 44 years	5	2.398	302	191	1.278	375	726	1.743	632	69	31	113	**11.296**
45 to 49 years	6	1.818	172	111	630	209	341	696	784	101	44	106	**8.133**
50 to 54 years	12	2.608	204	113	607	242	337	520	870	187	39	94	**11.296**
55 to 59 years	20	3.208	216	109	559	251	324	397	838	267	46	70	**14.243**
60 to 64 years	17	1.524	97	43	243	133	129	145	643	333	37	46	**8.110**
65 to 69 years	17	996	79	30	146	98	81	80	511	391	21	34	**6.322**
70 to 74 years	19	487	48	17	76	74	43	38	288	312	9	18	**3.833**
75 to 79 years	29	331	44	16	58	76	32	26	158	354	4	10	**3.366**
80 years or older	98	186	35	14	36	122	18	7	144	552	5	7	**3.186**
Total Men	224	14.575	1.422	846	5.714	2.048	3.197	8.178	5.726	2.641	270	792	**82.445**
Women									0	0	0	0	**0**
20 to 24 years	0	1	4	10	45	7	32	47	8	1	0	13	**204**
25 to 29 years	0	3	5	10	40	7	29	46	16	3	0	26	**243**
30 to 34 years	0	12	8	11	40	8	30	45	37	6	1	42	**357**
35 to 39 years	0	26	10	11	36	9	30	38	59	12	2	57	**485**
40 to 44 years	1	46	13	11	32	9	26	29	76	21	3	65	**636**
45 to 49 years	1	51	11	8	25	8	21	18	84	30	3	53	**678**
50 to 54 years	2	74	12	8	23	10	18	13	85	45	6	44	**870**
55 to 59 years	2	70	11	6	17	10	12	8	72	50	3	32	**833**
60 to 64 years	3	70	11	5	14	13	8	5	56	65	2	22	**865**
65 to 69 years	5	74	13	5	13	16	6	4	38	82	3	19	**935**
70 to 74 years	7	47	9	4	10	20	4	3	25	81	2	8	**749**
75 to 79 years	8	29	8	3	6	20	2	2	19	76	1	4	**606**
80 years or older	38	21	10	4	5	56	1	1	27	172	0	5	**938**
Total Women	67	525	125	96	305	194	220	256	601	644	26	390	**8.390**

Supplementary Table 4. Comparison of alcohol use reduction scenarios (10%, 18%, and 20%) on avoided deaths and premature mortality costs in Brazil

Reduction in consumption	Avoided deaths	Costs averted from premature deaths
10%	5.6 thousand	R$1.0 billion
18%	10.2 thousand	R$ 1.8 billion
20%	11.4 thousand	R$ 2.1 billion

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