

**VOLUME OF ALCOHOL CONSUMPTION, PATTERNS OF DRINKING
AND BURDEN OF DISEASE IN SUB-SAHARAN AFRICA, 2002**

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ABSTRACT

The aim of this study was to provide an overview of the volume of alcohol consumption, type of beverage, patterns of drinking and alcohol-attributable burden of disease among adults in sub-Saharan Africa (SSA) for the year 2002. Exposure data were taken from surveys, the World Health Organization (WHO) Global Status Report on Alcohol and the WHO Global Alcohol Database. Mortality and disability data were obtained directly from WHO. The results showed that adult per capita alcohol consumption (population 15 years and above) in SSA was higher than the global consumption rate (7.4 L vs. 6.2 L) and that alcohol consumption per adult drinker was 42% higher than the global rate. Alcohol was responsible for a considerable disease burden: 2.2% of all deaths and 2.5% of all DALYs could be attributed to this exposure. Intentional and unintentional injuries accounted for 53% of all alcohol-attributable deaths and almost 57% of alcohol-attributable disease burden. Among men 70% of all alcohol-attributable injury deaths occurred among 15-44 year olds (52% among women). This first attempt to quantify the health burden attributable to alcohol in SSA provides evidence of the direct health costs associated with drinking in the continent. In light of known effective and cost-effective measures, there is urgent need to implement interventions aimed at reducing levels of risky drinking and the high burden of alcohol-related harm in African countries.

KEY WORDS: alcohol consumption, patterns of drinking, sub-Saharan Africa, burden of disease

INTRODUCTION

Alcohol consumption is an important risk factor for burden of disease and social harm worldwide (Rehm et al., 2004; Rehm et al., 2003b). Being a causal factor for more than 60 diseases and conditions, alcohol consumption

globally accounted for 3.2% of all deaths and 4.0% of all disability adjusted life years (DALYs) in 2000, with considerable variation in consumption and related harm by region (Rehm et al., 2004).

The World Health Organization (WHO) Comparative Risk Assessment Study in 2000

(CRA 2000; Rehm et al., 2004; Rehm et al., 2003b) showed that alcohol plays a significant factor in determining burden of disease in Africa. Despite high abstention rates in some parts, Africa showed the highest average alcohol consumption per drinker worldwide, and detrimental drinking patterns second only to Eastern Europe (Rehm et al., 2004). Being traditionally part of the culture in many African countries for a long time, alcohol consumption and resulting damage seem to have increased recently, especially among youths (Morojele, Flisher.A.J., & Parry, 2005; Obot, 2005).

Compared to Western Europe and North America, psychoactive substance use (especially alcohol) epidemiology is a recent research tradition in most African countries, and one that is still lacking in many ways. Though interest in different categories of psychoactive substances has grown in recent years, most attention has traditionally been devoted to alcohol, with a focus mainly on surveys of drinking among young people (especially students in secondary or tertiary institutions) and clients of psychiatric or general hospitals (Obot, 2005). These studies and a few surveys in the general population have helped to confirm the observations that high proportions of sub-Saharan Africans abstain from drinking (e.g., Obot, 1993; Obot, 2007); of those that use psychoactive substances, alcohol is the most used of all psychoactive substances (Gureje et al., 2007; Parry, 2005), and those who drink often drink to intoxication (Obot, 1993; Pan, 1975; Partanen, 1990). This pattern of heavy episodic drinking, often associated with

negative impact on population health, remains the defining feature of alcohol consumption in most of Africa today. Yet lacking in the literature on the culture of drinking in Africa are studies that relate this deleterious drinking pattern to health and social problems. In terms of specific health and social consequences of harmful consumption, reports from a few countries point to links with problems like crime, injury, violence and chronic disease conditions (Gureje et al., 2007; Obot, 2007; Parry, 2005). However, with South Africa being the exception (Schneider et al., 2007), little is known about the nature and strength of these associations and reliable population level estimates are sorely lacking.

Based on an update of the Global Burden of Disease Study estimates (Rehm et al., 2004), this study reports the latest estimates of alcohol consumption and attributable harm in terms of mortality, years of life lost (YLLs) and disability adjusted life years (DALYs) in sub-Saharan Africa in comparison to worldwide estimates for the year 2002 (Rehm et al., 2006).

METHOD

Definition of Regions

The regional distribution used in this study was defined by the WHO (2000) on the basis of very high, high, low, or very low levels of adult and of infant mortality. The relevant regions for sub-Saharan Africa are displayed in Table 1.

Table 1. Classification of countries in WHO African sub-Saharan regions by childhood and adult mortality (WHO, 2000)

Africa D	Africa E
<i>high child mortality and high adult mortality</i>	<i>high child mortality and very high adult mortality</i>
Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Togo	Botswana, Burundi, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

Note: The regional sub-groupings used were defined by WHO (World Health Report 2000) on the basis of high, medium or low levels of adult and of infant mortality; sub-Saharan region excludes Algeria.

Within Africa, only categories D (high child and high adult mortality) and E (high child and very high adult mortality) are relevant here, as WHO categorized Africa into these two sub-regions (World Health Organization, 2002). Due to heterogeneity within African sub-regions, this paper deals only with countries in sub-Saharan Africa, therefore excluding Algeria, which is part of WHO African sub-region D.

Exposure Estimates: Key Indicators of Alcohol Consumption at Country and Regional Levels

There are three principal sources of data for adult (people 15 years old and above) per capita estimates: national government data, data from the Food and Agriculture Organization of the United Nations (FAO) and data from the alcohol industry (Rehm et al., 2003a). Where available, the best and most reliable data generally stem from national governments, usually based on sales figures, tax revenue, and/or production data. Generally, sales data are considered the most accurate, provided that sales of alcoholic beverages are separated from sales of any other possible items sold at a given location, and that sales data are beverage specific. One of the drawbacks of production data is that they are always dependent on accurate export and import data, as otherwise the production figures will yield an under- or an overestimation. The main preferred beverage and its volume of recorded consumption were obtained from the Global Alcohol Database (GAD; World Health Organization, 2006). Beverage information for unrecorded consumption was taken from the Global Status Report on Alcohol (country profiles; World Health Organization, 2004). Unrecorded consumption stems from a variety of sources: home production of alcoholic beverages; illegal production and sale of alcoholic beverages; illegal and legal import of alcoholic beverages; other production and use of alcoholic beverages, not taxed and/or part of the official production and sales statistics (Giesbrecht, Greenfield, Lemmens, & Österberg, 2000).

Two dimensions of alcohol with relevance to disease outcome were included: average volume of alcohol consumption - using age- and sex-

specific estimates - and a summary score for patterns of drinking. Sex-specific estimates of drinking pattern scores were not available for the present study. The exact procedures used to estimate exposure to alcohol are described in detail elsewhere (Rehm et al., 2004; Rehm et al., 2001; Rehm et al., 2003a).

In brief, prevalence of average volume of drinking was estimated in four sex-specific drinking categories by age and country. These were defined as: abstainer; drinking category I: women 2.5 to <20g/day; men 2.5 to <40g; drinking category II: women 20 to <40g; men 40 to <60g; drinking category III: women >40g; men >60g. Average volume of alcohol consumption prevalence rates were estimated by country using a triangulation of adult per capita data and general population survey results (Rehm et al., 2004; Rehm et al., 2001; Rehm et al., 2003a), mostly taken from the GAD (World Health Organization, 2006).

Overall, we had the following data available on exposure: per capita consumption data from all countries, mainly based on FAO estimates from statistics on production, export and import (Rehm et al., 2003a; Rehm, Klotsche, & Patra, 2007). Survey data were available at least on abstinence and some indicator of drinking volume for 55% on the countries covering 62% on the population. Pattern data from surveys which allowed optimal scaling (see Rehm et al., 2004), were available from 11% of the countries covering 29% of the population. Expert judgments on patterns of drinking were available from more of the countries for a total of 39% of the population. Data on unrecorded consumption was estimated based on surveys for about 1/4 (24%) of the countries. A score reflecting riskiness of cultural drinking pattern was calculated for each country using triangulation of general population results and key informant surveys relating to the extent that alcohol was consumed in heavy drinking occasions, without meals and in public places (Rehm et al., 2004; Rehm et al., 2001; Rehm et al., 2003a). Uncertainty of the estimates for each dimension was also quantified (World Health Organization, 2002), consistent with the general approach of the GBD in 2000 (Rehm et al., 2004)

Disease Outcome Categories and Estimates

Three main outcomes were considered: number of deaths and burden of disease as measured in years of live lost due to premature mortality (YLLs) and disability adjusted life years (DALYs). The latter measure combines years of live lost because of premature death with years of life lived with a disability (YLD) to obtain a summary measure (for general definitions see Murray, 1996). To give an example: if a male dies at age 40, one would assign the number of years up to his expected life expectancy as YLLs, where for reasons of comparability the life expectancy of Japan was used. Similarly, if a person had an accident and would be paraplegic for the rest of his life, he would lose every year 0.5 DALYs, based on the specific disability weight for this disease. Estimates for mortality and direct disease burden for the year 2002 were directly obtained from WHO Headquarters (Dr. C. Mathers) and population data were obtained from United Nations (2004).

Health outcome categories followed the definitions used in the CRA 2000 and were defined to be consistent across several risk factors (Ezzati, Lopez, Rodgers, & Murray, 2004). They corresponded to the causes used for the 2000 GBD Study (Mathers, Vos, Lopez, Salomon, & Ezzati, 2001; Rehm & Gmel, 2001). The 2000 GBD disease categories used were broader than the International Classification of Diseases (ICD) codes.

Risk Relations

Alcohol consumption was found to be related to the following GBD categories: low birth weight, mouth and oropharyngeal cancer, oesophageal cancer, liver cancer, breast cancer, unipolar major depression, epilepsy, alcohol use disorders, hypertensive disorders, ischemic heart disease (IHD), cerebrovascular disease, diabetes mellitus, cirrhosis of the liver, motor vehicle accidents, drownings, falls, poisonings, self-inflicted injuries, and homicide (Mathers et al., 2001; Rehm et al., 2004; Rehm et al., 2003b).

For most chronic disease categories, alcohol-attributable fractions (AAFs) of disease were derived from combining prevalence of exposure

and relative risk estimates based on meta-analyses (Cho et al., 2004; Corrao, Bagnardi, Zambon, & La Vecchia, 2004; English et al., 1995; Gutjahr, Gmel, & Rehm, 2001; Rehm et al., 2003a; Ridolfo & Stevenson, 2001). The following formula was used to calculate the attributable fraction (Walter, 1976; Walter, 1980):

$$AF = \left[\frac{\sum_{i=1}^k P_i(RR_i - 1)}{\sum_{i=0}^k P_i(RR_i - 1) + 1} \right]$$

Where

i: exposure category with baseline exposure or no exposure $i=0$

RR(i): relative risk at exposure level i compared to no consumption

P(i): prevalence of the i^{th} category of exposure

Sex and age-specific prevalence of exposure to alcohol consumption for each disease were multiplied with the excess risk for disease derived from meta-analyses. The number of cases (deaths, YLLs or DALYs) were then summed up and divided by the number of all cases of a disease to derive the fraction of deaths, YLLs or DALYs attributable to alcohol exposure. As derived from the formula above, AAFs can be interpreted as reflecting the proportion of disease that would disappear if there had been no alcohol consumption. For depression and injuries, AAFs were taken from the CRA 2000 study (see Rehm et al. (2004) for a detailed description of underlying assumptions and calculations). Beneficial effects of alcohol consumption on ischaemic heart disease, strokes and diabetes were not estimated for African sub-regions due to the evidence that the pattern of drinking for most alcohol consumption is not beneficial in these regions (for physiological mechanisms: McKee & Britton, 1998; Puddey, Rakic, Dimmitt, & Beilin, 1999; Rehm, Sempos, & Trevisan, 2003; for epidemiological evidence: Gmel, Rehm, & Kuntsche, 2003; Rehm et al., 2004).

RESULTS

There was considerable variation in levels of overall per capita alcohol consumption among

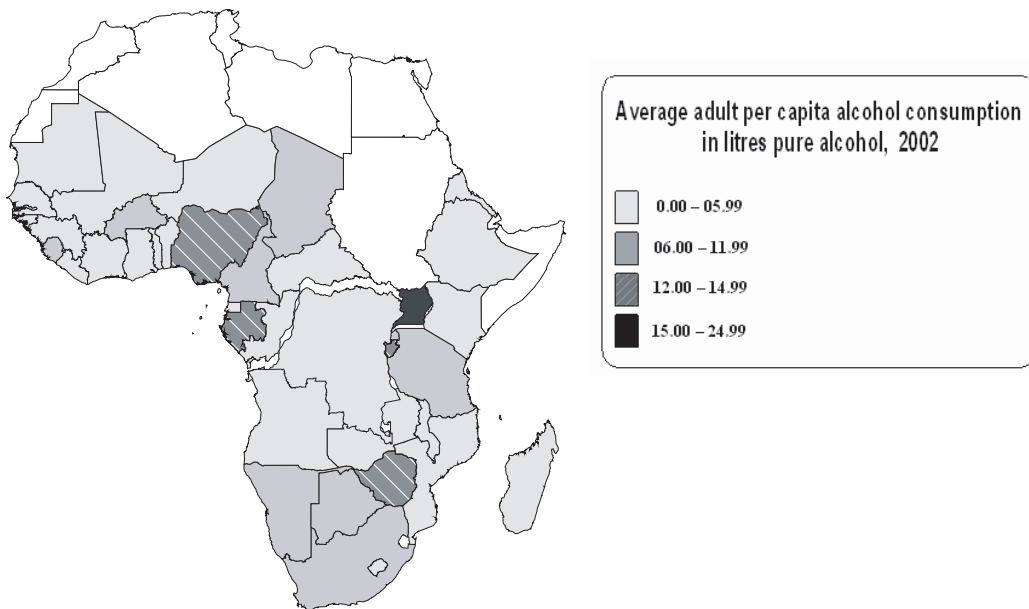


Figure 1. Adult per capita recorded and unrecorded alcohol consumption in litres of pure alcohol, sub-Saharan Africa, 2002

Note: Blank countries are not part of sub-Saharan Africa.

sub-Saharan African countries. As shown in Figure 1, the highest overall adult per capita recorded and unrecorded alcohol consumption for the year 2002 was estimated in Uganda (18.6 L) followed by Nigeria (14.1 L), Burundi (14.0 L), Zimbabwe (13.5 L), and Gabon (12.2 L). This contrasts with the lowest levels of alcohol consumption which were estimated in countries such as Mauritania (0.01 L), Niger (0.1 L) and Guinea (0.2 L).

Table 2 gives an overview of recorded and unrecorded per capita alcohol consumption and main type of beverage in the two African sub-regions comprising sub-Saharan Africa (SSA).

The population-weighted average per adult capita alcohol consumption in SSA was 7.4 L, slightly above the global value of 6.2 L. However, in terms of average consumption per drinker, SSA was far above the worldwide estimate (19.5 and 13.9 L, respectively). Unrecorded adult per capita consumption was relatively high in both sub-regions. A substantial portion of the alcohol consumed was

made up of home-made fermented beverages not consumed in other parts of the world. The estimated consumption of unrecorded alcohol was 2.5 L in Africa D (31% of total adult per capita alcohol consumption) and 2.7 L in Africa E (39% of total adult per capita alcohol consumption). Globally, the proportion of unrecorded consumption was estimated at 27%. Hence, on average, more unrecorded alcoholic beverages are consumed in sub-Saharan African countries than the global average.

The average drinking pattern score was typically high in both regions, that is, more detrimental. However, Africa D had a slightly lower estimate (2.9) compared to Africa E (3.1). This highly prevalent detrimental drinking pattern (e.g., heavy episodic drinking, drinking outside of meals) was the reason why no beneficial effect of alcohol consumption was estimated for SSA. Only one country had a pattern score of two, most were classified as three, and Zimbabwe had the highest score with four.

Table 2. Characteristics of adult alcohol consumption in sub-Saharan Africa (SSA) and the world in 2002 (population weighted averages across countries)

WHO Region (Definition see above)	Adult Population (in '000)	Beverage type mostly consumed	Total consumption ¹	% unrecorded of total ²	% male heavy drinkers ³	% female heavy drinkers ³	% abstainer males	% abstainer females	Consumption per drinker ⁴	Average drinking pattern ⁵
Africa D	149,050	Other fermented beverages	8.1	30.9 (2.5/8.1)	27.7	20.8	55.0	64.2	20.0	2.9
Africa E	208,662	Other fermented beverages	6.9	39.1 (2.7/6.9)	30.1	17.6	55.4	73.3	19.4	3.1
SSA (Africa D and E)	357,712	Other fermented beverages	7.4	35.1 (2.6/7.4)	28.9	19.1	55.2	68.8	19.5	3.0
World	4,388,297	Spirits (53%)	6.2	27.4 (1.7/6.2)	22.2	10.1	44.8	65.6	13.9	2.6

Note: Data presented are own estimates, based on surveys data for specific countries (see Method section), adjusted for adult per capita consumption. One standard drink equals 10-14 grams of pure alcohol, depending on the country.

¹ Estimated total alcohol consumption per resident aged 15 and older in litres of absolute alcohol (recorded and unrecorded)

² Percentage of total adult per capita consumption (= column 4) which is estimated to be unrecorded

³ Estimated % of heavy drinking (males \geq 40g and females \geq 20g) among population 15 years and above

⁴ Estimated total alcohol consumption (in litres of absolute alcohol) per adult drinker aged 15 +

⁵ Estimated average pattern of drinking (1-4 with 4 being the most detrimental pattern)

Table 3. Deaths attributable to alcohol consumption in WHO sub-Saharan African Region (SSA), 2002 ('000)

Disease Category	AFR D ²		AFR E		SSA		World					
	M ¹	W	M	W	M	W	%M	%W	M	W	%M	%W
Maternal and perinatal conditions (low birth weight)	0	0	0	0	1	0	0.4	0.9	1	1	0.1	0.3
Cancer	8	4	12	4	20	9	11.1	17.8	361	105	18.7	25.0
Diabetes mellitus	0	0	0	0	0	0	0.0	0.4	0	1	0.0	0.2
Neuropsychiatric disorders	7	3	9	4	16	7	8.9	14.4	106	25	5.5	5.9
Cardiovascular diseases	7	4	13	3	20	7	10.8	13.7	452	77	23.3	18.2
Cirrhosis of the liver	10	4	11	5	21	9	11.8	17.8	293	77	15.2	18.2
Unintentional injuries	24	5	45	7	69	12	38.0	23.8	501	96	25.9	22.7
Intentional injuries	8	2	26	4	35	6	19.1	11.2	220	40	11.4	9.6
Total 'detrimental effects' attributable to alcohol	65	23	116	27	182	50	100.0	100.0	1,934	421	100.0	100.0
Diabetes mellitus	0	0	0	0	0	0	0.0	0.0	-8	-5	7.7	3.5
Cardiovascular diseases	0	0	0	0	0	0	0.0	0.0	-90	-130	92.3	96.5
Total 'beneficial effects' attributable to alcohol	0	0	0	0	0	0	0.0	0.0	-98	-135	100.0	100.0
All alcohol-attributable net deaths	65	23	116	27	182	50	100.0	100.0	1,836	287	100.0	100.0
All deaths	2,281	2,202	3,045	2,963	5,326	5,165			29,891	27,138		
Percentage of all net deaths attributable to alcohol	2.9%	1.0%	3.8%	0.9%	3.4%	1.0%			6.1%	1.1%		

Note: Numbers are rounded to the nearest thousand. Zero (0) indicates fewer than 500 alcohol-attributable deaths in the disease category

¹ M=men, W=women

² excludes Algeria

The distribution of average alcohol consumption across countries in both sub-regions was heterogeneous. In Nigeria, the most populous country in Africa D with almost 40% of the total adult population in this sub-region, adult per capita alcohol consumption (14.1 L) was almost twice as high as the regional average (8.1), and more than twice as high as the global average (6.2 L). Overall, similar regional abstention rates were estimated for Africa D (59% for men, 69% for women) and Africa E (55% for men, 73% for women). However, the variation in abstention

rates in the sub-regions was quite high. For example, compare Nigeria (46% of men and 55% of women were abstinent), which had a very high consumption even when applying global standards, with Mali and Senegal, with abstention rates well above 90%.

With regard to the most populous countries in Africa E, average adult per capita alcohol consumption was lower in the Democratic Republic of the Congo (3.2 L) compared to Ethiopia (5.5 L) or South Africa (9.1 L). However, the proportion of unrecorded alcohol consumption was markedly higher in Ethiopia

(more than 80%). The proportions in South Africa and the Democratic Republic of the Congo were 24% and 39%, respectively.

Despite relatively high abstention rates, alcohol consumption caused considerable mortality and disease burden in sub-Saharan Africa. In total, 182,000 men and 50,000 women in SSA were estimated to have died prematurely due to alcohol consumption in 2002. Compared to the worldwide mortality burden due to alcohol consumption the two African sub-regions had proportionally lower estimates for men (about half the size of the global estimate) but showed similar estimates for women (Table 3). Men accounted for about three times as much mortality burden due to alcohol compared to women in Africa D, and more than four times in Africa E. These differences were mostly driven by intentional and unintentional injuries, the categories with the most deaths attributable to alcohol among men in both sub-regions. Both types of injuries combined accounted for about half the mortality burden due to alcohol in each sub-region for men. In women, the relative importance of injuries is much less pronounced. The relative contribution of alcohol-attributable injury death estimates in SSA as a whole compared to the world was markedly higher for men and almost equal for women. The relative estimate for cardiovascular disease deaths due to alcohol for men is lower than in the rest of the world, presumably due to the lower life expectancy in SSA. In addition, the lower life expectancy in Africa is reflected in lower mortality burden due to cancer, which also mainly occurs later in life.

Alcohol-attributable YLLs for SSA are shown in Table 4. Sex differences among the two sub-regions for YLLs were slightly more pronounced compared to mortality estimates. Proportionally, YLLs among men were three times higher than for women in Africa D, and five times higher in Africa E. Nevertheless, the proportion of alcohol-attributable YLLs of all YLLs in SSA was about half of those seen worldwide for both sexes. Similar to alcohol-attributable mortality, unintentional and intentional injury categories among men

were twice as high in Africa E as in Africa D. The main differences for both sexes between the two sub-regions and also compared to worldwide estimates were the high proportion of intentional injuries in Africa E, more so among men than women. These differences were greatest when considering YLLs, because these deaths occurred at a relatively young age. In addition, premature mortality due to neuropsychiatric disorders in Africa was markedly higher among women from both sub-regions compared to the global proportion of all alcohol-attributable YLLs.

Table 5 shows the distribution of alcohol-attributable DALYs in the sub-Saharan African sub-regions in 2002. The proportion of alcohol-attributable neuropsychiatric disorders among all DALYs attributable to alcohol in both men and women was much higher in comparison to YLLs, resulting from the fact that alcohol use disorders (e.g., alcohol dependence) and to a lesser degree epilepsy, both of which constitute the majority of alcohol-attributable neuropsychiatric disorders, are less fatal than other chronic disease categories.

Intentional and unintentional injuries accounted for almost 53% of all alcohol-attributable deaths, 64% of YLLs, and 57% of DALYs in SSA. The population between 15-44 years was especially affected by alcohol-attributable injury deaths. In 2002, more than two-thirds (70%) of the all alcohol-attributable injury deaths in men and more than half in women occurred in this age group (see Table 6).

DISCUSSION

The average adult per capita consumption rate in SSA is slightly higher than the global rate, but lower compared to Western Europe. However, taking into account the relatively high abstention rates, average consumption per drinker in SSA (19.5 L) is among the highest in the world. Clearly, what distinguishes SSA from the world average is a detrimental drinking pattern and a high proportion of alcohol-attributable intentional injuries, but more so

Table 4. Years of life lost (YLLs) attributable to alcohol consumption in WHO sub-Saharan African Region (SSA), 2002 ('000)

Disease Category	AFR D ²			AFR E			SSA			World			
	M ¹	W	%W	M	W	%W	M	W	%M	M	W	%M	%W
Maternal and perinatal conditions (low birth weight)	8	6	14	10	21	15	0.5	1.5	13.2	4,510	1,368	13.5	20.4
Cancer	126	69	181	68	307	137	7.5	13.2	4,510	1,368	13.5	20.4	
Diabetes mellitus	0	2	0	2	0	3	0.0	0.3	0	12	0.0	0.2	
Neuropsychiatric disorders	161	77	190	82	350	159	8.5	15.4	2,005	484	6.0	7.2	
Cardiovascular diseases	97	53	158	49	255	102	6.2	9.9	5,003	791	15.0	11.8	
Cirrhosis of the liver	162	71	187	73	349	144	8.5	13.9	4,403	1,118	13.2	16.7	
Unintentional injuries	679	136	1,200	188	1,879	325	45.7	31.4	11,910	1,963	35.6	29.3	
Intentional injuries	226	47	725	102	951	149	23.1	14.4	5,540	934	16.6	13.9	
Total 'detrimental effects' attributable to alcohol	1,458	460	2,654	573	4,112	1,034	100.0	100.0	33,417	6,707	100.0	100.0	
Diabetes mellitus	0	0	0	0	0	0	0.0	0.0	-85	-41	9.8	3.8	
Cardiovascular diseases	0	0	0	0	0	0	0.0	0.0	-779	-1,041	90.2	96.2	
Total 'beneficial effects' attributable to alcohol	0	0	0	0	0	0	0.0	0.0	-864	-1,082	100.0	100.0	
All alcohol-attributable net YLLs	1,458	460	2,654	573	4,112	1,034	100.0	100.0	32,553	5,625	100.0	100.0	
All YLLs	59,872	58,991	78,459	77,632	138,331	136,623			496,059	426,418			
Percentage of all net YLLs attributable to alcohol	2.4%	0.8%	3.4%	0.7%	3.0%	0.8%			6.6%	1.3%			

Note: Numbers are rounded to the nearest thousand. Zero (0) indicates fewer than 500 alcohol-attributable YLLs in the disease category

¹ M=men, W=women

² excludes Algeria

Table 5. Disability-adjusted life-years (DALYs)* attributable to alcohol consumption in WHO sub-Saharan African Region (SSA), 2002 ('000)

Disease Category	AFR D ²		AFRE		SSA		World					
	M ¹	W	M	W	M	W	%M	%W				
Maternal and perinatal conditions (low birth weight)	8	6	15	10	23	17	0.4	1.2	52	42	0.1	0.4
Cancer	127	71	182	68	309	139	5.4	9.9	4,593	1,460	8.2	12.9
Diabetes mellitus	0	3	0	2	0	5	0.0	0.3	0	20	0.0	0.2
Neuropsychiatric disorders	389	120	829	207	1,218	327	21.4	23.3	19,393	3,722	34.6	32.9
Cardiovascular diseases	105	59	171	54	276	113	4.9	8.1	5,711	887	10.2	7.8
Cirrhosis of the liver	206	97	241	100	447	197	7.9	14.0	5,415	1,468	9.7	13.0
Unintentional injuries	849	189	1,475	253	2,323	442	40.9	31.4	14,499	2,647	25.9	23.4
Intentional injuries	267	53	823	115	1,090	168	19.2	11.9	6,366	1,051	11.4	9.3
Total 'detrimental effects' attributable to alcohol	1,952	698	3,735	810	5,687	1,408	100.0	100.0	56,029	11,297	100.0	100.0
Diabetes mellitus	0	0	0	0	0	0	0.0	0.0	-225	-86	21.3	6.7
Cardiovascular diseases	0	0	0	0	0	0	0.0	0.0	-834	-1,205	78.7	93.3
Total 'beneficial effects' attributable to alcohol	0	0	0	0	0	0	0.0	0.0	-1,059	-1,291	100.0	100.0
All alcohol-attributable net DALYs	1,952	598	3,735	810	5,687	1,408	100.0	100.0	54,970	10,006	100.0	100.0
All DALYs	77,835	77,088	99,984	100,977	177,819	178,065			772,912	717,213		
Percentage of all net DALYs attributable to alcohol	2.5%	0.8%	3.7%	0.8%	3.2%	0.8%			7.1%	1.4%		

Note: Numbers are rounded to the nearest thousand. Zero (0) indicates fewer than 500 alcohol-attributable DALYs in the disease category

¹ M=men, W=women

² excludes Algeria

Table 6. Age and sex distribution (%) of alcohol-attributable injury deaths in WHO sub-Saharan African Region (SSA) and the world, 2002

Region	Age group							Total alcohol-attributable injury deaths ²
	0 to 4	5 to 14	15 to 29	30 to 44	45 to 59	60 to 69	70+	
Men								
AFR D ¹	3.6	7.8	38.9	31.4	12.4	3.6	2.3	33
AFR E	3.1	5.1	40.7	28.9	14.3	4.9	3.0	71
SSA	3.2	6.0	40.1	29.7	13.7	4.5	2.8	104
World	1.2	1.8	32.6	31.1	19.5	7.6	6.2	721
Women								
AFR D ¹	5.8	15.9	30.0	23.5	14.7	5.4	4.6	7
AFR E	6.8	14.9	27.3	23.2	15.5	6.4	5.9	11
SSA	6.5	15.3	28.3	23.3	15.2	6.0	5.4	17
World	2.4	3.5	21.0	24.1	20.9	10.4	17.8	136

Note: ¹ excludes Algeria

² Numbers are rounded to the nearest thousand.

unintentional injury death, in particular among young men. Our finding that African youth are particularly affected by alcohol-related-harm has also been found in other studies (Parry, 2005; Peltzer, 2003). On the other hand, the relative importance of alcohol-attributable burden of cancer and cardiovascular diseases was not as pronounced as in other regions due to a lower life expectancy generally observed in Africa. The effect of alcohol-related injuries is greatest when measured in YLLs (64%). It is higher compared to death alone (53%) because injury deaths usually occur earlier in life. When looking at DALYs (57%), the proportion is reduced compared to YLL because disease categories that result mostly in morbidity rather than mortality, such as neuropsychiatric disorders, have a stronger effect on DALYs than on YLLs.

The estimates presented in this analysis have several strengths and limitations which should be examined. Clearly, the major strength of the analysis is the standardized methodology developed originally for the CRA, as well as the use of standardized mortality and morbidity estimates (for general methodology to derive these statistics see Mathers et al., 2003). The resulting comparability between risk factors differentiates CRA-based risk factor analyses from other risk factor estimates, including the

estimates of the 1990 Global Burden of Disease Study, where results could not be compared between risk factors (Ezzati et al., 2004; for 1990 estimates see Murray & Lopez, 1999). On the negative side, however, caution should be used when interpreting details of alcohol consumption in SSA. The quality of African estimates was not as reliable as for other regions of the world. Mortality and disability data were taken from WHO, and the quality of these data has been discussed extensively in the literature since the first Global Burden of Disease Study (Cooper, Osotimehin, Kaufman, & Forrester, 1998). While the overall data availability improved since then, SSA certainly still is the part of the world with the highest uncertainty of data based on lack of birth and child registers in many countries (Mathers et al., 2006; Mathers, Lopez, & Murray, 2006). For many countries, only partial information on exposure to alcohol was available. Furthermore, the proportion of unrecorded adult per capita alcohol consumption was among the highest estimated worldwide. Unrecorded consumption in Africa is typically made up of traditional homemade alcoholic beverages, in this study mostly labelled as 'other fermented beverages'. These beverages can be produced from a number of agricultural products, including, for example, *burukutu*, made out of sorghum grains and fermented guinea corn

in the northern part of Nigeria, and palm wine produced from the sap of the palm tree in the southern part. These types of beverages are not comparable to the categories (beer, wine and spirits) usually used in other parts of the world; they are also mostly consumed by the poor, and vary greatly from region to region within Africa in terms of strength and ingredients (Obot, 2007). Estimates of this alcohol production are usually not covered by official statistics and this adds some uncertainty. For example, survey data on abstention rates in South Africa do not match well with recorded and unrecorded production figures (Schneider et al., 2007). Despite the long history of alcohol use in Africa, epidemiological and clinical data on alcohol consumption and related harm are still scarce (Obot, 2007; Obot, 2000). The risk relations on which we based our estimates of burden of disease (mainly taken from studies conducted in North America and Europe), may not hold true in Africa due to several reasons. First, the effect of alcohol on injuries may be over- or underestimated. These estimates were taken directly from the CRA 2000; however, it seems that these estimates can be quite influenced by culture and context (Rehm et al., 2004). Secondly, for some diseases, such as alcohol-attributable liver cirrhosis, the risk might be different from what it is in other parts of the world due to malnutrition (Bergheim, McClain, & Arteel, 2005; Caregaro et al., 1996; Everitt, Patel, & Tewfik, 2007; Isichei, Ikwuagwu, & Egbuta, 1994). In addition, we did not take into account the role of alcohol on the burden due to infectious diseases, for example HIV. Although alcohol does not play a role in the biological pathway, it seems to be a mediating factor in risky sexual behaviour and therefore enables the transmission of HIV (Mbulaiteye et al., 2000). In addition, heavy drinking may lead to people in HIV treatment not taking their medication properly (Talbot et al., 2002).

The amount per drinker and the pattern in which alcohol is consumed is a major public health concern in Africa that needs more attention than it has received in the past. The detrimental pattern of alcohol consumption common in SSA (and observed elsewhere in the developing world), presents a problem because

it also is an indicator of harm to a society and accounts for the fact that no beneficial effect of alcohol consumption was estimated in SSA. In light of the substantial diseases burden due to alcohol in SSA, prevention and treatment of alcohol-related harm should be a major public health priority in this region, and evidence-based interventions should be implemented where possible (see also Room, Babor, & Rehm, 2005). Parry & Bennetts (1998) already suggested policies to reduce alcohol-related burden of disease for South Africa. Otherwise, in agreement with economic development, alcohol consumption and its health and social consequences will most likely increase in the future (Room et al., 2003). Research in North America and Western Europe has shown that public policy measures such as tax increases, developing and enforcing drinking-driving laws, restricted licensing of outlets, or brief interventions in the primary care setting are effective and cost-effective interventions (Babor et al., 2003). Some of these measures might produce similar results if implemented in African countries, but because of data quality and availability issues, more research is warranted to guide and evaluate the implementation of intervention measures in SSA.

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