VIH/Aids and alcohol: re-examination of the relation from african data

Kodila-Tedika, Oasis

University of Kinshasa (Democratic Republic of Congo), Institute of African Economics

1 June 2012

VIH/Aids and Alcohol: Re-Examination of the Relation from African Data

Oasis Kodila-Tedika

Department of Economics, University of Kinshasa, Democratic Republic of Congo.
Institute of African Economics
oasiskodila@yahoo.fr

Abstract

This article re-examines the relationship alcohol and VIH/Aids, while resorting to another methodological approach that utilized by Fisher et al., (2007) and Kalichman et al. (2007). We confirm a direct relation of alcohol to the AIDS.

Keyword : Africa, Alcohol, Determinant, HIV/Aids prevalence

JEL Code: I10, I12, I19, O15

0. Introduction

Sub-Saharan Africa is by far the world region most affected by AIDS. It is estimated, according to UNAIDS, 2.2 million people were newly infected with HIV/AIDS in 2008, bringing to 24.1 million people living with HIV/AIDS in the worst case. Because there seems to be a link between AIDS and poverty in Africa, and a link between poverty and bad institutions, the epidemic raises the question of the quality of institutions, and after all, it can appear as an incentive to improve institutions.

Two thirds of the world total of 32.9 million people living with HIV / AIDS live in this region, and three quarters of all AIDS deaths in 2007 occurred there. The 21 countries with the highest prevalence of HIV in the world are all located in this part of the world. There are approximately more than 14 million orphans because of HIV/AIDS.

In face of has this human disaster, it got clear two ways in the literature devoted to the AIDS: on the one hand that which insists on the consequences and on the other hand that which wants to know the determinants of the epidemic. Indeed, the AIDS cost in macroeconomic terms (e.g. Theodore, 2000; ONUSIDA, 2000; Over, 1992; Bloom, Reddy and River Path, 2001), reduced the life expectancy means (e.g. Arndt and Lewis, 2000). It has negative effects so much on the enterprise (e.g. Biggs and Shah, 1997; Rugalema, 1999) that on the households (e.g. the World Bank, 1997; ONUSIDA, 2000; Bloom, River Path and Sevilla, 2001a).

In the register of determinants, Bloom and al., (2001) insists on the role of information. For Sewankambo and al. (2000), the instruction leads to a more responsible behavior vis-a-vis the AIDS, so much so that in time, the rate of infection drops appreciably in the category of educated people. The inequalities can facilitate also the propagation of the sexually transmitted diseases (Farmer, 1999; Deininger and Squire, 1999). The Commission Macroeconomics and Health (2003) admit that the process of development also can, in certain cases, to feed the epidemic, but the SIDA/revenu report is rather ambiguous. For a rather broad review, Tsafack Temah (2008 and 2009) proposes interesting texts.

In order to better understand and possibly prevent the transmission of HIV/AIDS, it is necessary to examine such relevant factors (Tsafack Temah, 2008). Alcohol consumption and alcohol abuse have been identified as potential behavioral risk factors for the transmission of HIV/AIDS, in the form of drinking before risky sexual events or frequent binge drinking as associated with HIV incidence (Fisher et al., 2007; Kalichman et al., 2007). Alcohol has also been frequently associated with unprotected sexual behavior and subsequent acquisition of HIV.

Several work, in other disciplines, established a relation between the two variables (Shuper et al., 2010), especially at the individual level. Recently, Fisher et al. (2007) observed a significant relationship between alcohol and HIV in African studies, in which drinkers had a 70% greater chance of being HIV positive (95%

confidence interval (CI) = 45-99%) than non-drinkers in the bivariate case and a 57% (95% CI = 42-72%) increased risk of HIV when potential confounders were controlled in multivariate analysis. This association also remained after adjustment for possible publication bias. Fisher et al. (2007) measured the association between alcohol consumption and HIV across studies with varied methodologies (e.g. meta-analysis, prospective). Similarly, Kalichman et al. (2007), who also reviewed sub-Saharan African studies, provide additional support to these observations by assessing a consistent association between alcohol use and sexual risks for HIV infection.

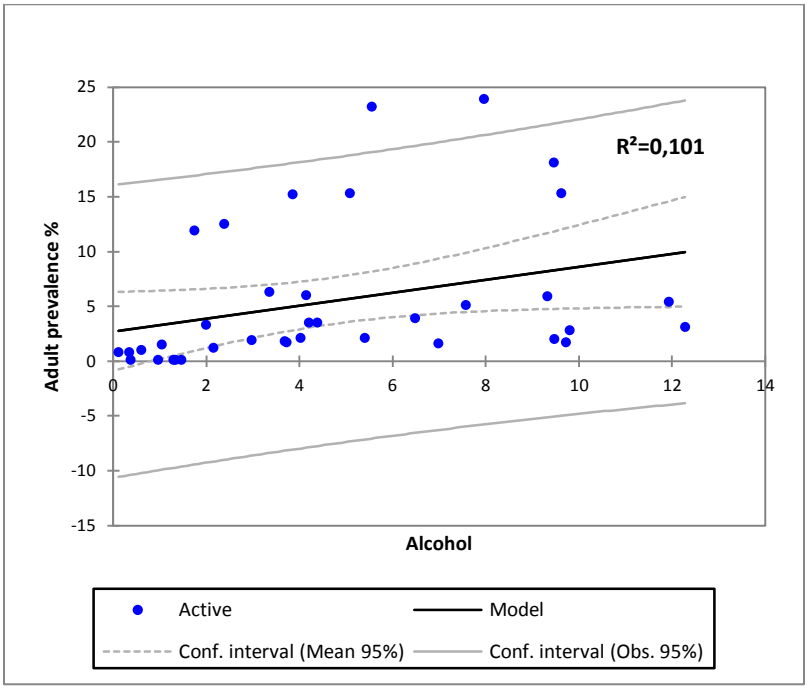
The objective of this paper is to systematically explore and determine whether alcohol consumption has a causal role in this association. We re-examine this conclusion of Fisher et al. (2007) and of Kalichman and al (2007), while resorting to another methodological approach. In addition, this work is recorded in those which seek to identify the determinants of the epidemic of VIH/Aids.

The paper is organized in five sections, including this introduction. The second section focuses on a graphical analysis and on the results from simple regressions of the relationship between each of the VIH/Aids prevalence rate and alcohol. The empirical model is discussed in section 3 and regression some comments on data are presented in section 4. Section 5 discusses the regression results while section 6 concludes.

2 A Graphical analysis

Figures 1 portray the relationship between adult prevalence rate (y-axis) and alcohol (x-axis) for the countries included in our sample. In Figure 1, adult prevalence (%) is plotted against alcohol. It appears from this figure that countries with higher alcohol enjoy higher adult prevalence. The estimated coefficient is positive (+0.590) and significant (p-value = 0.056), showing that high alcohol improve adult prevalence.

Figure 1. Regression of adult prevalence by alcohol



3 Empirical model

In this section, we describe the model we intend to use to study the effect of alcohol on HIV/AIDS epidemic. In doing so, we first precise the specification of the dependent variable, and the functional form we give to our model. We estimate the following empirical model:

(1)

where is the prevalence rate of VIH/Sida. is total adult per capita consumption among, 2005 (15+ years; in litres of pure alcohol), from World Health Organization Report (2011). $Z = (z_1,\ldots z_k)'$ is the vector of control variables, and is the error term that is assumed to be normally and independently distributed. Finally, is the intercept, captures the effect of adult per capita consumption among drinkers while = ( ) is the parameter vector for the control variables. Our parameter of interest is thus .

As control variables, we include school enrollment, secondary (% gross) like proxy of education for the year 2005 (from Word Development Indicators 2010),

the log of GDP per capita for the year 2005 (from Penn World Tables 6.3), growth population in % for the year 2005 (from Word Development Indicators 2010), genre and information (telephone and TI infrastructure) for the year 2005 (from data of Foundation Ibrahim 2010), urban population growth annual % like proxy of mobility (even proxy used by Tsafack Temah 2008 and 2009) form Word Development Indicators (2010), voice and accountability (VA) and government effectiveness (GE) form Word Development Indicators (2010) and geographical location. Following the trend in the literature, geographical location is captured by distinguishing between the West Africa (WA), East Africa (EA), Central Africa (CA), Southern Africa (SA) and North Africa (NA).

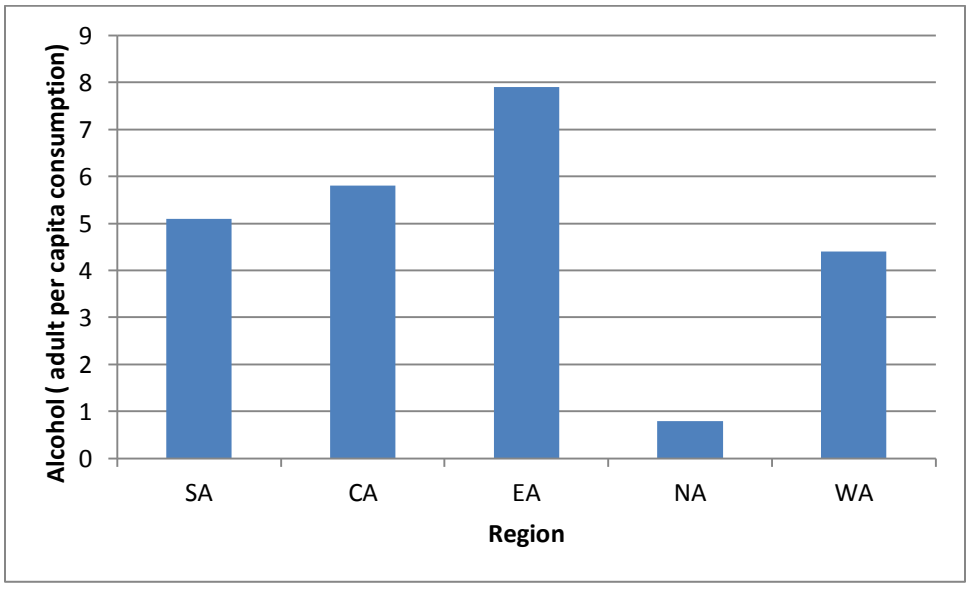
I estimate the model with ordinary least squares (OLS) and robust standard errors. The unavailability of the series on the variable alcohol obliges to use this approach

4 Some comment on the data

4.1 Interest variable and adult prevalent (%)

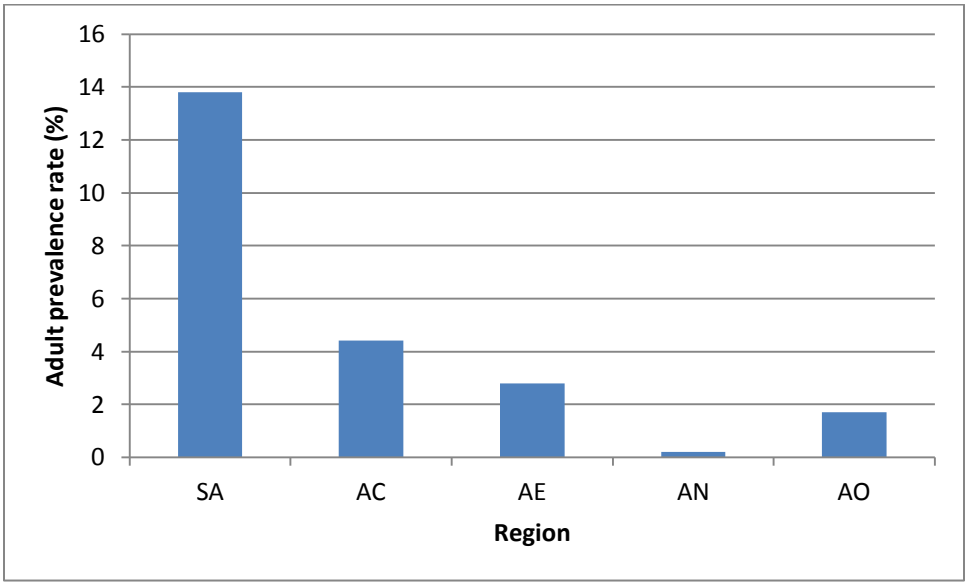
The two graphs next make it possible to have an idea of the geographical distribution of the consumption of alcohol and AIDS prevalence rate in Africa.

Figure 2. Alcohol and african region



A large variation exists in adult per capita consumption alcohol (Figure 2). The highest consumption levels can be found in the East Africa, Central Africa and Southern Africa, mostly beyond Equator, but also in Nigeria, Burkina Faso and Sierra Leone. Medium consumption levels can be found in West Africa, with Nigeria, Burkina Faso and Sierra Leone having the highest levels. Low consumption levels can be found in the countries of North Africa. These regions represent large populations of the Islamic faith, which have very high rates of abstention (World Health Organization, 2011).

Figure 3. Adult prevalence rate (%) and african region



The highest adult prevalence levels can be found in the Southern Africa, but also in Kenya and Uganda. Medium prevalence rate can be found in central Africa. Low VIH/Aids levels can be found in the countries of North Africa, East Africa and West Africa.

This geographical dimension, not taken into account in the recent studies on the determinants of the epidemy of VIH/Aids in Africa, must be considered (Tsafack Temah, 2008 and 2009).

4.2 Summary statistic

Table 1. Descriptive statistics

Statistic	Adult prevalence	Alcohol	NA	SA	WA	EA	CA	Log PIB per capita	Edus	Pop Growth	Genre	Info	GE	VA	Mobility
No. of observation	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
No. of missing values	1.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minimum	0.00	0.11	0.00	0.00	0.00	0.00	0.00	5.13	2.00	-0.26	0.00	0.00	-2.16	-2.10	0.61
Maximum	26.10	12.28	1.00	1.00	1.00	1.00	1.00	10.03	105.35	3.98	100.00	100.00	0.70	0.85	6.26
Mean	5.09	4.78	0.08	0.24	0.29	0.22	0.14	7.32	38.33	2.23	55.74	33.99	-0.77	-0.69	3.43
Standard dev.	6.59	3.50	0.27	0.42	0.46	0.41	0.34	1.09	25.53	0.92	21.29	25.56	0.65	0.73	1.28

Table 2. Proximity matrix (Pearson correlation coefficient)

	Adult prevalence	Alcohol	NA	SA	WA	EA	CA	Log PIB percapita	Edus	Pop Growth	Genre	Info	GE	VA	Mobility
Adult prevalence	1.00	0.40	-0.34	0.76	-0.35	-0.09	-0.11	0.02	0.13	-0.41	0.25	0.30	0.21	0.35	-0.09
Alcohol	0.40	1.00	-0.44	0.12	0.09	0.21	0.09	0.02	-0.04	0.01	-0.09	-0.01	-0.01	0.12	0.11
NA	-0.34	-0.44	1.00	-0.30	-0.24	-0.14	-0.14	0.41	0.42	-0.16	0.12	0.12	0.10	-0.39	-0.34
SA	0.76	0.12	-0.30	1.00	-0.43	-0.26	-0.26	0.05	0.19	-0.42	0.31	0.39	0.35	0.47	-0.24
WA	-0.35	0.09	-0.24	-0.43	1.00	-0.20	-0.20	-0.17	-0.29	0.38	-0.19	-0.18	-0.19	0.17	0.38
EA	-0.09	0.21	-0.14	-0.26	-0.20	1.00	-0.12	-0.20	-0.17	0.21	-0.19	-0.14	-0.07	-0.08	0.20
CA	-0.11	0.09	-0.14	-0.26	-0.20	-0.12	1.00	-0.22	-0.30	0.23	-0.25	-0.39	-0.40	-0.39	0.19
Log PIB per capita	0.02	0.02	0.41	0.05	-0.17	-0.20	-0.22	1.00	0.84	-0.40	0.61	0.46	0.74	0.29	-0.49
Edus	0.13	-0.04	0.42	0.19	-0.29	-0.17	-0.30	0.84	1.00	-0.67	0.49	0.61	0.75	0.25	-0.73
Pop Growth	-0.41	0.01	-0.16	-0.42	0.38	0.21	0.23	-0.40	-0.67	1.00	-0.24	-0.70	-0.45	0.01	0.77
Genre	0.25	-0.09	0.12	0.31	-0.19	-0.19	-0.25	0.61	0.49	-0.24	1.00	0.50	0.84	0.60	-0.25
Info	0.30	-0.01	0.12	0.39	-0.18	-0.14	-0.39	0.46	0.61	-0.70	0.50	1.00	0.60	0.29	-0.66
GE	0.21	-0.01	0.10	0.35	-0.19	-0.07	-0.40	0.74	0.75	-0.45	0.84	0.60	1.00	0.65	-0.49
VA	0.35	0.12	-0.39	0.47	0.17	-0.08	-0.39	0.29	0.25	0.01	0.60	0.29	0.65	1.00	0.01
Mobility	-0.09	0.11	-0.34	-0.24	0.38	0.20	0.19	-0.49	-0.73	0.77	-0.25	-0.66	-0.49	0.01	1.00

5 Empirical results

Table 3 presents the results of equation (1). The control variables display the expected signs and are statistically significant in several cases. Interest variable is positive and are statistically significant in all cases. What indicates certain robustness with the change of the variables. The coefficients of the Alcohol variable are statistically significant at the 5% level in all columns. Considering the four columns, among the strong predictors of the epidemic in the covariates, we can cite alcohol and geographical localization.

The first column does not include our determinants. This variable explains to it 10% of variation of the prevalence rate in Africa. In two column, introducing geographical localization variables in the model increases its explicative power by 50% (R-squared was 0.10 and is now 0.60); they are thus critical determinants of the epidemic. But, all the variables of the geographical localization (with positive sign) are not significant. Only CA and SA are significant. It is also where the prevalence rate is highest (Figure 3). Most importantly, the results reported in Table 4 show that SA has a positive influence on HIV/Aids prevalence rate. The coefficients of the SA are very big.

The results in column (3) show that countries in NA, SA and CA have higher prevalence rate; this effect is statistically significant at the different level. On the other hand, income, education, information, government effectiveness, mobility are also predictors no significant of the epidemic, but carry a sign to the one expected. Surprisingly enough, this variables that are expected to influence the epidemic do not appear determinant in our model. Genre and Voice and accountability are not relevant in explaining the epidemic and carry a sign contrary to the one expected. A rather curious fact is: the increase in the demographic growth affects negatively VH/Aids.

Because the variables demographic growth and income can be affected by the HIV, we remove them in column 5. However, that does not change the sign nor

the significativity of variables SA and alcohol. And the 2 variables keep almost the same width of their coefficient.

CA and NA are not significant anymore and NA changes sign. One notes the same change of sign for education and mobility.

Table 3. Regression Results.

	(1)	(2)	(3)	(4)
Alcohol	0,59**	0,53**	0,47**	0,48**
	(0,28)	(0,21)	(0,20)	(0,19)
NA		1,45	4,65*	-0,42
		(1,27)	(2,65)	(2,20)
SA		11,49***	10,20***	10,21**
		(2,49)	(2,94)	(3,91)
WA		1,19	2,07	0,67
		(0,98)	(2,52)	(3,08)
EA		0,21	3,81	1,81
		(1,22)	(2,72)	(2,71)
CA		3,34***	5,42**	2,64
		(0,96)	(2,60)	(2,57)
Log PIB per capita			-0,58	
			(1,09)	
Education			-0,01	0,01
			(0,04)	(0,04)
Pop growth			-4,41**	
			(1,72)	
Genre			0,07	0,08
			(0,09)	(0,09)
Information			-0,04	-0,01
			(0,05)	(0,06)
Government effectiveness			-3,65	-2,81
			(2,53)	(2,95)
Voice and accountability			3,75	0,71
			(2,30)	(2,37)
Mobility			0,68	-0,77
			(0,86)	(0,75)
Constant	2,31**	-1,53	7,41	-4,28
	(1,24)	(1,35)	(9,33)	(8,32)
R^2	0,10	0,60	0,73	0,62
Obs.	37	37	37	37

Notes: Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

6 Conclusion

This paper was mainly concerned with the effect of alcohol on HIV/Aids prevalence rate. The main finding is that alcohol positively affects each of adult prevalence (%). Therefore, countries with higher average alcohol present higher prevalence rate. An important implication of the finding is to frame the consumption of the alcohol, because its abuse can have very negative consequences on the society.

The results in this paper line up with recent findings of Fisher et al., (2007) and Kalichman et al. (2007).

References

Amiri,A., Gerdham, U.-G. and Vnetelou, B. (2012), HIV/AIDS-GDP Nexus? Evidence from panel-data for African countries, *Economics Bulletin*, 32(1), p. 1060-1067.

Arndt, C. and Lewis, J. D. (2000), The macro implications of HIV/AIDS in South Africa: a preliminary assessment, *The South African Journal of Economics*, Édition spéciale: 68: 5.

Biggs, T. and Shah, M. (1997), The impact of the AIDS epidemic on African firms, RPED Discussion Paper No. 72, Regional Program on Enterprise Development, Word Bank.

Bloom, D, Mahal A, River Path Associates (2001b), HIV/AIDS and the private sector: a literature review, Rapport préparé pour la American Foundation for AIDS Research.

Bloom, D, River Path Associates and Sevilla J. (2001a), Health, wealth, AIDS and poverty—the case of Cambodia. BAD/ONUSIDA.

Bloom, D., Reddy, L., River Path (2000), Business, AIDS and Africa, In: *The Africa Competitiveness Report 2000–2001*. New York: Oxford University Press, 26–37.

Commission Macroéconomie et Santé, Santé, croissance économique et lutte contre la pauvreté, Rapport du Groupe de travail 1, Organisation mondiale de la Santé, 2003

Farmer, P. (1999), *Infections and inequalities—the modern plagues*, Berkeley, University of California Press.

Fisher, J.C., Bang H. and Kapiga, SH. (2007), The association between HIV infection and alcohol use: a systematic review and meta-analysis of African studies, *Sexually Transmitted Diseases*, 34, p. 856–63.

Kalichman, SC., Simbayi, LC., Kaufman, M. et al., (2007), Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings, *Prevention Science*, 8, p.141–51.

Kodila-Tedika, O. (2011), Africa, AIDS and governance, In *Telos*: URL : http://www.telos-eu.com/en/health/africa-aids-and-governance.html

ONUSIDA (2000), Putting HIV/AIDS on the business agenda, Genève, ONUSIDA; Nandakumar AK, Pia Schneider P, Butera D. *Use of and expenditures on outpatient health care by a group of HIV-positive individuals in Rwanda*. Partnerships for Health Reform Project. Bethesda, MD, Abt Associates.

Over, M (1992). The macroeconomic impact of AIDS in sub-Saharan Africa, Washington, DC, Banque mondiale, Africa Technical Department, Population, Health and Nutrition Division. Technical Working Paper No. 3.

Rugalema, G. (1999), HIV/AIDS and the commercial agricultural sector of Kenya: impact, vulnerability, susceptibility and coping strategies, Sustainable Development Department, Food and Agriculture Organization of the United Nations (FAO).

Sewankambo, NK et al. (2000), Mortality associated with HIV infection in rural Rakai District, Uganda, *AIDS*, 14(15), p. 2391–2400.

Shuper PA, Joharchi N, Irving H et al. (2009), Alcohol as a correlate of unprotected sexual behavior among people living with HIV/AIDS: review and meta-analysis, *AIDS Behav*, 13, p.1021–36.

Shuper, P.A., Neuman, M., Kanteres, F., Baliunas, D., Joharchi, N. and Rehm, J. (2010), Causal Considerations on Alcohol and HIV/AIDS — A Systematic Review, *Alcohol & Alcoholism*, 45(2), p. 159–166.

Theodore, K (2000), HIV/AIDS in the Caribbean: economic issues—impact and investment response, Document de travail préparé pour le Groupe de travail 1 de la Commission Macroéconomie et Santé (CMS).

Tsafack Temah, C., (2008), *The role of income and gender inequalities in the spread of The HIV/Aids epidemic: evidence from Sub-Saharan Africa*, Université d'Auvergne Clermont-Ferrand I, CERDI, Thèse de doctorat.

Tsafack Temah, C., (2009), Les déterminants de l'épidémie du VIH/Sida en Afrique sub-saharienne, *Revue d'économie du développement*, 23(1-2), p.73-106.

World Bank (1997), *Confronting AIDS: public priorities in a global epidemic*. New York, Oxford University Press.

World Bank (1999), *Intensifying action against HIV/AIDS in Africa: responding to a development crisis, Africa region*. World Bank.

World Health Organization (2011), Global status report on alcohol and health, WHO Press, Geneva, Switzerland.

Annexes

List of country

Algeria	Gabon	Niger
Angola	Ghana	Nigeria
Benin	Guinea-Bissau	Rwanda
Botswana	Kenya	Senegal
Burkina Faso	Lesotho	Sierra Leone
Burundi	Madagascar	South Africa
Cameroon	Malawi	Togo
Central African Republic	Mali	Tunisia
Chad	Mauritania	Uganda
Congo	Mauritius	Zambia
Cote d'Ivoire	Morocco	Zimbabwe
Egypt	Mozambique	
Ethiopia	Namibia	