

Original Research

The role of alcohol in the spread of the Human Immunodeficiency Virus (HIV) in Côte d'Ivoire: Case Abidjan

Authors:

Koffi Mathias YAO<sup>1</sup>,  
Niangoran François BAKOU<sup>2</sup>,  
Kobenan Fiéni Jean-Baptiste ADOU<sup>1</sup>,  
Abdoulaye BÂ<sup>1</sup>,  
Pékani Antoine CAMARA<sup>1</sup>,  
Némé Antoine TAKO<sup>1</sup> and  
Bialli SERI<sup>1</sup>

Institution:

1. Laboratoire de Neurosciences, UFR Biosciences, Université Félix Houphouët-Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire.

2. Unité de physiologie animale, Université Jean Lorougnon GUEDE de Daloa, BP 150 Daloa, Côte d'Ivoire.

ABSTRACT:

This study aimed to assess a proportion of Abidjan population that had unprotected sex while under the influence of alcohol. A survey of alcohol consumption in relation to the unprotected sex had been conducted on 6235 subjects with 3429 men and 2806 women in the ten municipalities of the city of Abidjan. The results indicated that among the non-drinkers, men have more possibilities for unprotected sex than women; it is the same in mild alcohol consumers and among moderate alcohol consumers. But in heavy consumers, women and men were exposed to the same risk of contamination. The most affected age group through unprotected sexual intercourse in connection with alcohol is between 19-25 years and 36-45 years. Excessive alcohol consumption increases the risk of sexually transmitted diseases, including HIV in the analysed subjects. For these reasons, awareness campaigns on HIV must consider the limits of alcohol that impose alertness in the body. Strong instruction should be framed so that people should not drink beyond the recommended levels.

Keywords:

Alcohol, Acquired Immune Deficiency Syndrome, Sex, AIDS, Human Immunodeficiency Virus.

Corresponding author:  
Koffi Mathias YAO

Email Id:

yaomathias@gmail.com

Article Citation:

Koffi Mathias YAO, Niangoran François BAKOU, Kobenan Fiéni Jean-Baptiste ADOU, Abdoulaye BÂ, Pékani Antoine CAMARA, Némé Antoine TAKO and Bialli SERI.

The role of alcohol in the spread of the Human Immunodeficiency Virus (HIV) in Côte d'Ivoire: Case Abidjan.

Journal of Research in Biology (2015) 5(8):1896-1908

Dates:

Received: 03 Sep 2015 Accepted: 11 Oct 2015 Published: 26 Dec 2015

Web Address:

<http://jresearchbiology.com/documents/RA0573.pdf>

This article is governed by the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which gives permission for unrestricted use, non-commercial, distribution and reproduction in all medium, provided the original work is properly cited.

## INTRODUCTION

Since 1981, the Acquired Immuno Deficiency Syndrome (AIDS) was recognized all over the world. The discovery of the HIV virus that causes AIDS made the mankind to fight against this disease, which has become a pandemic (Bryant *et al.*, 2010). Despite the evolution of knowledge about the nature of the virus, transmission routes, strategies to stop viral replication and progression of the disease, the epidemic continues unabated, particularly in the least developed countries (Bryant *et al.*, 2010). Indeed, in 2013, of the 35 million people living with HIV in the world, sub-Saharan Africa alone has 24.7 million (71%).

In Côte d'Ivoire, according to UNAIDS, with a 2.7% prevalence rate in an average of 370,000 people living with HIV in 2013 (UNAIDS, 2013). Of these, there are approximately 70,000 children from 0-14 years and 300,000 adults aged 15 and older. Having of approximately 170,000 individuals, women at the age of 15 and older are the most affected. All this causes 28,000

### Deaths annually

Furthermore, in 2007, UNAIDS declared that about 80% of the Population (over 60 million people) was infected with HIV virus since the beginning of the epidemic have been infected through sexual intercourse (UNAIDS, 2007). Ironically, this mode of transmission are mostly preventable. Indeed, some studies have estimated the rate of sexual transmission of HIV to less than 1/2000 of coital acts for with an infected partner (Royce *et al.*, 1997). Obviously, certain sexual practices facilitate transmission of HIV than others. For example, receptive anal intercourse may have a transmission capacity of over 1/10, even if all studies are not unanimous on the subject (Shattock and Moore, 2003).

For now, prevention is the most exploited choice to safeguard new people from getting infected. Unfortunately, the consumption of alcohol and / or drugs make it difficult to prevent because of the huge reduction of vigilance capacity by the individual consumer. Thus,

this study was conducted to evaluate the effects of alcohol consumption on the sexual decision-making among Ivorians.

## MATERIALS AND METHODS

### Study population

The survey, which took place in the city of Abidjan, Côte d'Ivoire, November 10, 2014 to April 30, 2015 focused on 6235 subjects, including 3429 men and 2806 women aged 13-85 years. The survey took place in homes, in the outlets of alcoholic drinks and on campuses.

### Methods

#### Survey

The sampling data (list of residents and telephone numbers) are not reliable for the cities of Côte d'Ivoire, the selection of respondents was done according to the Areal method (Statistique Canada 2003). Thus, in each of the ten municipalities of the city of Abidjan, a district was drawn. The ten districts explored were segmented into defined areas and constituting units. These were drawn randomly, and the populations included in the units drawn were interviewed. To perform this survey, a questionnaire was developed and twenty volunteers were recruited and trained to carry out this investigation, whose contents are as follows:

1. Gender, please. (Male/Female).
2. How old are you ?
3. Do you consume alcohol?
4. Have you consumed alcohol at least once in the last 30 days?
5. If yes, how many drinks did you have maximum consumed per occasion?
6. How often you go for a drink? Once in a week? or month?
7. Have you ever had or tried to have unprotected sex (not with your spouse) after consuming too much alcohol? If yes, How many times ? (Never; 1 to 3 times; more than 3 times).

8. If not, have you ever had or tried to have unprotected sex (without alcohol and extra-marital affair)? If yes, How many times ? (Never; 1 to 3 times; more than three times).

**Consumer classification (Cahalan and Cisin 1968)**

The subjects are first classified into three groups according to the classification of Cahalan and Cisin (1968). Indeed, these authors classified alcohol consumers according to their consumption levels. They are distinguished as follows,

- Light drinker (consumes one to two drinks per occasion at least once a month)
- Moderate drinker (consumes three to four drinks per occasion at least once a month)
- Heavy drinker (consumes five or more drinks on one occasion or five or more drinks on several occasions in a week).

**Statistical analysis**

Data collected from this survey are processed through the STATISTICA software 10.0. In each subject, the information was grouped according to the gender and age group. It was also a question of comparing each sub

**Table 1. Categories of subjects distributed according to the classification of Cahalan and Cisin (1968)**

<b>Overall</b>				
Subject category	Not drinkers	Light drinkers	Moderate drinkers	Heavy drinkers
Total	1999	1003	1076	2157
<b>By sex</b>				
Men	908	401	405	1715
Women	1091	602	671	442
<b>By age</b>				
13-18	834	183	137	87
19-25 years	415	229	308	473
26-35 years	319	228	137	512
36-45 years	160	223	170	594
46-60 years	221	103	214	339
61 and over	50	37	110	152

category of non-consumers to consumers of the corresponding sub-group, according to the obtained classification of Cisin and Cahalan (Table 1). For example, consumers will compare the non-men who never had a relationship outside torque consumers - Men (mild, moderate, and excessive). They have never had a relationship off torque too. Comparisons were performed using the Chi square test ( $\chi^2$ ). The lower limit value of the accepted  $\chi^2$  is 4, and the differences are significant (Schwartz, 1978). To improve the approximations, the  $\chi^2$  with Yates correction, which makes the most conservative estimate (Hays, 1988) was used. In other words, if  $\chi^2 < 4$ , the difference is not significant; by cons if  $\chi^2 \geq 4$ , the difference is significant and the level of significance p is inferior or equal to 0.05.

**RESULTS**

**General risk**

The different categories of subjects were grouped according to the classification of Cahalan and Cisin (1968). As indicated in Table 2, for all the populations surveyed (overall), regarding unprotected sex between couples and out siders, 94.9% of light drinkers have never had this kind of relationship. This rate was 95.1% among the non-consumers ( $\chi^2=0$ ; p = 0.99). The difference was not significant. Similarly, 3% light alcohol consumers had three unprotected sex and 2.9% of the non-consumers had done the same ( $\chi^2=0$ ; p = 0.99). The difference was not significant. Also, 2.1% of light consumers have had more than three unprotected sex and 2% of non-consumers had done the same ( $\chi^2 = 0.01$ ; p = 0.90). This difference was also not significant.

Among moderate drinkers, 84.5% of them have never had unprotected sex outside the couple. This rate was 95.1% among non-consumers ( $\chi^2 = 4.51$ ; p = 0.03). The difference was significant. Similarly, 7% of moderate drinkers had a three unprotected sex and 2.9% of non-consumers have done the same ( $\chi^2 = 24.45$ , p<0.0001). The difference was very significant. By cons,

Table 2. Numbers and percentages of the total population and gender responses

General Staff	Not drinkers			Light drinkers			Moderate drinkers			Excessive drinkers																	
	Effective	Never	1 to 3 times	more than 3 times	Effective	Never	1 to 3 times	more than 3 times	Effective	Never	1 to 3 times	more than 3 times															
	n	%	n	%	n	%	n	%	n	%	n	%															
6235	1999	95.1	58	2.9	2.0	1003	952	94.9	30	3.0	21	2.1	1076	909	84.5	75	7.0	92	8.6	2157	1718	79.6	248	11.5	191	8.9	
3429	908	93.2	36	4.0	2.6	401	368	91.8	19	4.7	14	3.5	405	299	73.8	48	11.9	58	14.3	1715	1383	80.6	186	10.8	146	8.5	
Female	2806	1056	96.8	22	2.0	1.3	602	584	97.0	11	1.8	7	1.2	671	610	90.9	27	4.0	34	5.1	442	335	75.8	62	14.0	45	10.2

Table 3. Number and the percentage of responses depending on the age

Age (Years)	General Staff	Effective	Non consumers			Light consumers			Moderate consumers			Excessive consumers																	
			Never	1 to 3 times	more than 3 times	Never	1 to 3 times	more than 3 times	Never	1 to 3 times	more than 3 times	Never	1 to 3 times	more than 3 times															
			n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%			
13-18	1242	834	828	99.3	4	0.5	2	0.2	183	181	98.9	1	0.5	137	131	95.6	2	1.5	4	2.9	87	66	75.9	11	12.6	10	11.5		
19-25	1425	415	402	96.9	7	1.7	6	1.4	229	219	95.6	6	2.6	4	1.7	308	273	88.6	16	5.2	19	6.2	473	378	79.9	52	11.0	43	9.1
26-35	1196	319	273	85.6	23	7.2	23	7.2	228	214	93.9	8	3.5	6	2.6	137	102	74.5	15	10.9	20	14.6	512	366	71.5	86	16.8	60	11.7
36-45	1147	160	155	96.9	4	2.5	1	0.6	223	216	96.9	4	1.8	3	1.3	170	126	74.1	15	8.8	29	17.1	594	485	81.6	68	11.4	41	6.9
46-60	877	221	200	90.5	17	7.7	4	1.8	103	91	88.3	8	7.8	4	3.9	214	180	84.1	19	8.9	15	7.0	339	297	87.6	23	6.8	19	5.6
61 and over	348	50	44	88.0	3	6.0	3	6.0	37	31	83.8	3	8.1	3	8.1	110	97	88.2	8	7.3	5	4.5	152	126	82.9	8	5.3	18	11.8

8.6% of moderate drinkers had more than three unprotected sex and 2% of non-consumers had done the same ( $\chi^2 = 1.29$ ;  $p = 0.26$ ). This difference was not significant.

In abusers, 79.6% of them have never had unprotected sex outside the couple. This rate was 95.1% among non-consumers ( $\chi^2 = 15.10$ ,  $p = 0.0001$ ). The difference was very significant. Similarly, 11.5% of abusers had a three unprotected sex and 2.9% of non-consumers have done the same ( $\chi^2 = 96.26$ ,  $p < 0.0001$ ). This difference was also very significant. Also, 8.9% of abusers had more than three unprotected sex and 2% of non-consumers have done the same ( $\chi^2 = 83.73$ ,  $p < 0.0001$ ). This difference was also very significant.

#### **Risk assessment in men**

In this group of subjects, 908 respondents are non consumers where as, 2521 subjects consume alcohol; out of which 401 are light consumers, 405 are moderate consumers and 1715 are excessive consumers. The comparison between the consumer and non consumers gave the following results:

In light consumers, 91.8% of them have never had unprotected sex outside the couple. This rate was 93.2% among non-consumers - men ( $\chi^2 = 0.02$ ;  $p = 0.90$ ). The difference was not statistically significant. Similarly, 4.7% of mild consumers had three unprotected sex and 4% of non-consumers have done the same ( $\chi^2 = 0.22$ ;  $p = 0.64$ ). The difference was not significant. Also, 3.5% of mild consumers had more than three unprotected intercourse against 2.9% for non-consumer men ( $\chi^2 = 0.17$ ;  $p = 0.68$ ). This difference was also not significant.

Among moderate drinkers, 73.8% of them have never had unprotected sex outside the couple. This rate was 93.2% among non-consumers ( $\chi^2 = 6.47$ ;  $p = 0.01$ ). The difference was significant. Similarly, 11.9% of moderate drinkers had three unprotected intercourse against 4% for non-consumers ( $\chi^2 = 23.73$ ,  $p < 0.0001$ ). The difference was very significant. Also, 14.03% of moderate drinkers men had more than three unprotected

intercourse against 2.9% of non-consumers ( $\chi^2 = 50.29$ ,  $p < 0.0001$ ). This difference was also very significant.

Among men abusers, 80.6% of them have never had unprotected sex outside the couple. This rate was 93.2% among non-consumers men ( $\chi^2 = 5.67$ ;  $p = 0.02$ ). The difference was significant. Similarly, 10.8% of abusers had a three unprotected sex and 4% of non-consumers did the same ( $\chi^2 = 30.43$ ,  $p < 0.0001$ ). This difference was also very significant. Also, 8.5% of abusers had more than three unprotected sex and 2.9% of non-consumers did the same ( $\chi^2 = 26.72$ ,  $p < 0.0001$ ). This difference was also very significant.

#### **Risk evaluation in women**

In this group of subjects, 1091 respondents are non consumers where as, 1715 subjects consume alcohol; out of which 602 are light consumers, 671 are moderate consumers and 422 are excessive consumers. The comparison between the non-consumers and different categories of consumers gave the following results:

Among women consuming light alcohol, 97% of them have never had unprotected sex outside the couple. This rate is 96.8% among non-consumptive women ( $\chi^2 = 0$ ;  $p = 1$ ). The difference was not significant. Similarly, 1.8% of consuming women and 2% for non consuming women had one to three unprotected sex ( $\chi^2 = 0.01$ ;  $p = 0.94$ ). The difference was not significant. Also, 1.2% of women with minor alcohol consuming habit had more than three unprotected sex and the same percentage is observed in non-consumptive women ( $\chi^2 = 0.03$ ;  $p = 0.85$ ). This difference was also not significant.

Among women consuming moderate alcohol, 90.9% of them have never had unprotected sex outside the couple. This rate is 96.8% among non-consumptive women ( $\chi^2 = 0.73$ ;  $p = 0.39$ ). The difference was not significant. By cons, 4% of moderate consuming women had three unprotected sex against 2% in non-alcohol consuming women ( $\chi^2 = 5.13$ ;  $p = 0.02$ ). This difference was significant. Similarly, 5.1% of women had moderate consumers more than three unprotected intercourse

against 1.2% for non-consumptive women ( $\chi^2 = 21.17$ ,  $p < 0.0001$ ). This difference was very significant.

Among women consuming excessive alcohol, 75.8% of them never had unprotected sex outside the couple. This rate is 96.8% among non-consumptive women ( $\chi^2 = 8.19$ ;  $p = 0.004$ ). The difference was significant. Similarly, 14% of women had excessive consuming women had one to three unprotected sex against 2% for non-alcohol consuming women ( $\chi^2 = 73.01$ ,  $p < 0.0001$ ). The difference was very significant. Also, 10% of the women had excessive consuming, more than three unprotected intercourse against 1.2% for non-consumptive women ( $\chi^2 = 60.27$ ,  $p < 0.0001$ ). This difference was very significant.

#### **Comparison by gender: Men vs Women**

Among non-consumers, 93.2% of men never had unprotected sex outside their spouses. This rate is 96.8% among women ( $\chi^2 = 0.31$ ;  $p = 0.58$ ). The difference was not significant. By cons, 4% of men non-consumptive men had three unprotected sex against 2% of non-consumptive women having the same degree of sex ( $\chi^2 = 5.64$ ;  $p = 0.02$ ). The difference was significant. Similarly, 2.9% of non-consumptive men had more than three unprotected sex and against 1.2% among women in the same category ( $\chi^2 = 6.12$ ;  $p = 0.01$ ). This difference was significant.

In light consumers, 91.8% of men have never had unprotected sex outside the couple. This rate is 97% for women ( $\chi^2 = 0.31$ ;  $p = 0.58$ ). The difference was not significant. For against 4.7%, light consumers men had one to three unprotected intercourse against 1.8% for women consuming light alcohol ( $\chi^2 = 5.65$ ,  $p = 0.02$ ). The difference was significant. Similarly, 3.5% of mild consumers in men had more than three unprotected sex and against 1.2% among women in the same category ( $\chi^2 = 5.02$ ;  $p = 0.02$ ). This difference was also significant.

Among moderate drinkers, 73.8% of men have never had unprotected sex outside the couple. This rate is

90.9% among women ( $\chi^2 = 4.64$ ;  $p = 0.03$ ). The difference was significant. Similarly, 11.9% of moderate consumers in men had three unprotected intercourse against 4% for moderately consuming women ( $\chi^2 = 19.32$ ,  $p < 0.0001$ ). The difference was very significant. Also, 14.3% of moderate drinkers in men had more than three unprotected sex and against 5.1% among women in the same category ( $\chi^2 = 21.81$ ,  $p < 0.0001$ ). This difference was also very significant.

In abusers, 80.6% of men never had unprotected sex outside the couple. This rate is 75.8% among women ( $\chi^2 = 0.53$ ;  $p = 0.47$ ). The difference was not significant. Similarly, 10.8% of abusers in men had three unprotected intercourse against 14% among excessive consuming women ( $\chi^2 = 2.46$ ;  $p = 0.12$ ). The difference was not significant. Also, 8.5% of abusers in men had more than three unprotected sex against 10.2% among women in the same category ( $\chi^2 = 0.83$ ;  $p = 0.36$ ). This difference was not significant.

#### **Distribution of risk exposure by age**

The surveyed population were divided into several groups according to the age of the each subject. Thus, ages obtained are those of 13-18, 19-25, 26-35, 36-45, 46-60 and 61 years and over (Table 3).

#### **Age group of 13-18 years**

In this group of subjects, 834 respondents are non consumers where as, 408 subjects consume alcohol; out of which 183 are light consumers, 137 are moderate consumers and 87 are excessive consumers. The comparison between the non consumers and various categories of consumers gave the following results:

In subjects aged 13-18 years, 98.8% of light consumers have never had unprotected sex outside the couple. This rate is 99.3% for those in the same age group who are not drinkers ( $\chi^2 = 0$ ;  $p = 0.99$ ). The difference was not significant. Similarly, 0.5% of light consumers at 13-18 years old, had three unprotected intercourse against 0.5% of non-alcoholic user of the same age group ( $\chi^2 = 0.22$ ;  $p = 0.64$ ). The difference was not

significant. Also, 0.5% of the consumers of light alcohol from 13 to 18 years had more than three unprotected intercourse against 0.2% among non-users in the same age group ( $\chi^2 = 0$ ;  $p = 0.95$ ). This difference was also not significant.

In subjects aged 13-18 years, 95.6% of moderate drinkers never had unprotected sex outside the couple. This rate is 99.3% for those in the same age group who are not drinkers ( $\chi^2 = 0.05$ ;  $p = 0.83$ ). The difference was not significant. Similarly, 1.5% of young people in 13-18 years old who were moderate drinkers had three unprotected intercourse against 0.5% among non-users of the same group ( $\chi^2 = 0.57$ ;  $p = 0.45$ ). The difference was not significant. By cons, 2.9% of moderate consumers at 13-18 years old had more than three unprotected intercourse against 0.2% among non-consumers in the same age group ( $\chi^2 = 9.42$ ;  $p = 0.002$ ). This difference was significant.

In subjects aged 13-18 years, 75.9% of consumers never had unprotected sex outside the couple. This rate is 99.3% for those in the same age group who are not drinkers ( $\chi^2 = 2.24$ ;  $p = 0.13$ ). The difference was not significant. By cons, 12.6% of youth aged 13-18 years, abusers had three unprotected intercourse against 0.5% among non-users of the same group ( $\chi^2 = 57.63$ ,  $p < 0.0001$ ). The difference was very significant. Similarly, 11.5% of abusers of 13-18 years had more than three unprotected intercourse against 0.2% among non-users in the same age group ( $\chi^2 = 61.71$ ,  $p < 0.0001$ ). This difference was also very significant.

#### **Age group of 19 to 25 years**

In subjects aged 19-25 years, 95.6% of light consumers have never had unprotected sex outside the couple. This rate is 96.9% among subjects in the same age group who are not drinkers ( $\chi^2 = 0$ ;  $p = 0.96$ ). The difference was not significant. Similarly, 2.6% of light consumers people at the age of 19-25 years had three unprotected intercourse against 1.7% among non-consumers of the same group ( $\chi^2 = 0.25$ ;  $p = 0.62$ ). The

difference was not significant. Also, 1.7% of light consumers from the age of 19 to 25 years had more than three unprotected intercourse against 1.4% among non-consumers in the same age group ( $\chi^2 = 0$ ;  $p = 0.95$ ). This difference was also not significant.

In subjects aged 19-25 years, 88.6% of moderate drinkers have never had unprotected sex outside the couple. This rate is 96.9% among subjects in the same age group who are not drinkers ( $\chi^2 = 0.05$ ;  $p = 0.83$ ). The difference was not significant. By cons, 5.2% of young people at the age of 19-25 years were moderate drinkers and had three unprotected intercourse against 1.7% among non-drinkers of the same group ( $\chi^2 = 0.57$ ;  $p = 0.45$ ). This difference was significant. Similarly, 6.2% of moderate consumers at the age of 19-25 years had more than three unprotected intercourse against 1.4% among non-users in the same age group ( $\chi^2 = 9.42$ ;  $p = 0.002$ ). This difference was significant.

In subjects aged 19-25 years, 79.9% of excessive consumers never had unprotected sex outside the couple. This rate is 96.9% among subjects in the same age group who are not drinkers ( $\chi^2 = 3.65$ ;  $p = 0.06$ ). The difference was not significant. By cons, 11% of young people at the age of 19-25 years, were abusers and had three unprotected intercourse against 1.7% of non-consumers of the same group ( $\chi^2 = 25.84$ ,  $p < 0.0001$ ). The difference was very significant. Also, 9.1% of abusers of 19-25 age had more than three unprotected intercourse against 1.4% of non-alcoholic consumers in the same age group ( $\chi^2 = 20.95$ ,  $p < 0.0001$ ). This difference was also very significant.

#### **Age group of 26-35 years**

In subjects aged 26-35 years, 93.9% of light consumers never had unprotected sex outside the couple.

This rate is 85.6% for those in the same age group who are not drinkers ( $\chi^2 = 0.45$ ;  $p = 0.50$ ). The difference was not significant. Similarly, 3.5% of young people at the age of 26-35 years were light consumers and had three unprotected intercourse against 7.2%

among non-consumers of the same group ( $\chi^2 = 2.44$ ;  $p = 0.12$ ). The difference was not significant. Also, 2.6% of light consumers from 26 to 35 years had more than three unprotected intercourse against 7.2% among non-users in the same age group ( $\chi^2 = 2.86$ ;  $p = 0.09$ ). This difference was also not significant.

In subjects aged 26-35 years, 74.5% of moderate drinkers never had unprotected sex outside the couple. This rate is 85.6% for those in the same age group who were not drinkers ( $\chi^2 = 0.68$ ;  $p = 0.45$ ). The difference was not significant. Similarly, 10.9% of moderate drinkers aged 26-35 years, had three unprotected intercourse against 7.2% among non-consumers of the same group ( $\chi^2 = 1.06$ ;  $p = 0.30$ ). This difference was not significant. By cons, 14.6% of moderate consumers at the age of 26-35 years had more than three unprotected intercourse against 7.2% among non-users in the same age group ( $\chi^2 = 4.21$ ;  $p = 0.04$ ). This difference was significant.

In subjects aged 26-35 years, 71.5% of excessive consumers never had unprotected sex outside their couple. This rate is 85.6% for those in the same age group who were not drinkers ( $\chi^2 = 2.65$ ;  $p = 0.10$ ). The difference was not significant. By cons, 16.8% of youth aged 26-35 years were abusers and had three unprotected intercourse against 7.2% among non-consumers of the same group ( $\chi^2 = 11.71$ ,  $p = 0.0006$ ). This difference was significant. By cons, 11.7% of abusers at the age of 26-35 years had more than three unprotected intercourse against 7.2% of non-consumers in the same age group ( $\chi^2 = 3.23$ ;  $p = 0.07$ ). This difference was not significant.

#### **Age group of 36-45 years**

Among the subjects aged 36 to 45 96.9% were light consumers and never had unprotected sex outside the couple. This rate is 96.6% among subjects in the same age group who were non drinkers ( $\chi^2 = 0.01$ ;  $p = 0.94$ ). The difference was not significant. Similarly, 1.8% of young people at the age of 36-45 years were light consumers and had three unprotected intercourse

against 2.5% among non-consumers of the same age group ( $\chi^2 = 0.01$ ;  $p = 0.92$ ). The difference was not significant. Also, 1.3% of light consumers at the age of 36 to 45 had more than three unprotected intercourse against 0.6% among non-consumers in the same age group ( $\chi^2 = 0.03$ ;  $p = 0.87$ ). This difference was also not significant.

In the subjects aged 36-45 years, 74.1% of moderate drinkers never had unprotected sex outside the couple. This rate is 96.9% among subjects in the same age group who are not drinkers ( $\chi^2 = 2.45$ ;  $p = 0.12$ ). The difference was not significant. By cons, 8.8% of moderate drinkers at the age of 36-45 years, had a three unprotected intercourse against 2.5% among non-users of the same group ( $\chi^2 = 4.38$ ;  $p = 0.04$ ). This difference was significant. Similarly, 17.1% of moderate consumers at the age of 36 years had more than three unprotected intercourse against 0.6% among non-users in the same age group ( $\chi^2 = 0$ ;  $p < 0.0001$ ). This difference was very significant.

Among the subjects aged 36 to 45, 81.6% of excessive consumers never had unprotected sex outside the couple. This rate is 96.9% among subjects in the same age group who are not drinkers ( $\chi^2 = 1.61$ ;  $p = 0.20$ ). The difference was not significant. By cons, 11.4% of youth aged 36-45 years were abusers and had three unprotected intercourse against 2.5% among non-consumers of the same group ( $\chi^2 = 9.17$ ;  $p = 0.002$ ). This difference was significant. Similarly, 6.9% of abusers at the age of 36-45 years had more than three unprotected intercourse against 0.6% among non-consumers in the same age group ( $\chi^2 = 7.62$ ;  $p = 0.006$ ). This difference was also significant.

#### **Age group of 46-60 years**

In subjects aged 46-60 years, 88.3% of light consumers never had unprotected sex outside the couple. This rate is 90.5% among subjects in the same age group who are not drinkers ( $\chi^2 = 0$ ;  $p = 0.96$ ). The difference was not significant. Similarly, 7.8% of light consumers at



the age of 46-60 years, had a three unprotected intercourse against 7.7% among non-consumers of the same group ( $\chi^2 = 0.04$ ;  $p = 0.84$ ). The difference was not significant. Also, 3.9% of light consumers from 46 to 60 years had more than three unprotected intercourse against 1.8% among non-consumers in the same age group ( $\chi^2 = 0.50$ ;  $p = 0.48$ ). This difference was also not significant.

In subjects aged 46-60 years, 84.1% of moderate drinkers never had unprotected sex outside their couple. This rate is 90.5% among subjects in the same age group who are not drinkers ( $\chi^2 = 0.20$ ;  $p = 0.65$ ). The difference was not significant. Similarly, 8.9% of young people at 46-60 years old who were moderate drinkers had three unprotected intercourse against 7.7% among non-drinkers of the same group ( $\chi^2 = 0.06$ ;  $p = 0.81$ ). This difference was not significant. By cons, 7% of moderate consumers from 46 to 60 years had more than three unprotected intercourse against 1.8% among non-users in the same age group ( $\chi^2 = 5.31$ ;  $p = 0.02$ ). This difference was significant.

In subjects aged 46-60 years, 87.6% of excessive consumers never had unprotected sex outside the couple. This rate is 90.5% among subjects in the same age group who are not drinkers ( $\chi^2 = 0.04$ ;  $p = 0.85$ ). The difference was not significant. Similarly, 6.8% of youth aged 46-60 years, were abusers and had three unprotected intercourse against 7.7% among non-users of the same group ( $\chi^2 = 0.04$ ;  $p = 0.83$ ). The difference was not significant. Also, 5.6% of abusers of 46-60 years had more than three unprotected intercourse against 1.8% among non-drinkers in the same age group ( $\chi^2 = 3.66$ ;  $p = 0.06$ ). This difference was also not significant.

#### **Age group 61 years and over**

Among those aged 61 and over, 83.8% of light consumers never had unprotected sex outside their couple. This rate is 88% for those in the same age group who were not drinkers ( $\chi^2 = 0$ ;  $p = 1$ ). The difference was not significant. Similarly, 8.1% of light consumers at

the age of 61 and older, had three unprotected intercourse against 6% for non-consumers of the same group ( $\chi^2 = 0$ ;  $p = 0.95$ ). The difference was not significant. Also, 8.1% of light consumers at the age of 61 years and older had more than three unprotected intercourse against 6% for non-users in the same age group ( $\chi^2 = 0$ ;  $p = 0.95$ ). This difference was also not significant.

Among those aged 61 and over, 88.2% of moderate drinkers never had unprotected sex outside the couple. This rate is 88% for those in the same age group who were not drinkers ( $\chi^2 = 0.01$ ;  $p = 0.91$ ). The difference was not significant. Similarly, 7.3% of moderate drinkers at the age of 61 and older, had a three unprotected intercourse against 6% for non-consumers of the same group ( $\chi^2 = 0$ ;  $p = 0.95$ ). This difference was not significant. Similarly, 4.5% of moderate consumers at the age of 61 years and older had more than three unprotected intercourse against 6% for non-consumers in the same age group ( $\chi^2 = 0$ ;  $p = 0.99$ ). This difference was not significant.

Among those aged 61 and over, 82.9% of excessive consumers never had unprotected sex outside the couple. This rate is 88% for those in the same age group who are not drinkers ( $\chi^2 = 0.02$ ;  $p = 0.90$ ). The difference was not significant. Similarly, 5.3% of abusers at the age of 61 and older, had three unprotected intercourse against 6% for non-consumers of the same group ( $\chi^2 = 0.03$ ;  $p = 0.87$ ). This difference was not significant. Also, 11.8% of excessive consumers at the age of 61 years and older had more than three unprotected intercourse against 6% for non-consumers in the same age group ( $\chi^2 = 0.65$ ;  $p = 0.42$ ). This difference was also not significant.

#### **DISCUSSION**

In this study, we generally surveyed 32.1% of non-consumers and 67.9% of drinkers in the month preceding the survey. Among these consumers, 23.7%

were light consumers, 25.4% were moderate consumers and 50.9% were excessive consumers as classified by Cahalan and Cisin (1968). This distribution is consistent with the recent surveys in the same areas (Yao *et al.*, 2012 and 2014).

As for unprotected sex, the results clearly indicated that, in general, light consumers behaved as same as non-consumers. This finding was also different in the two sexes (male and female), where differences were not significant. This seems logical since according to the classification used, these were people who consume more than two glasses in the month. It must be stressed that a standard glass corresponds to 13.6 grams of pure alcohol, or 341ml of beer at 5 degrees or 142ml of wine or 43 degrees to 12ml of spirits at 40 degrees (April, 2010). According to the methods of calculating the approximate blood alcohol by Widmark (1932); even two glasses, consumed on a single occasion or in a short time, would correspond to 0.56 g / l and 0.65 g / l of blood alcohol in men and women respectively. Thus, the alcohol induced in the individual category remains sufficiently below the controllable level because of the acute alcohol values (Parker *et al.*, 2008). By cons, moderate and excessive drinkers had significantly more unprotected sex than non-consumers. If the sexual behavior of abusers seems obvious, this is not the case for moderate consumers who paradoxically find themselves in this position. According to the classification and Cahalan and Cisin (1968), consumers are grouped as moderate when consumed four glasses of alcohol in the month. This amount seems small, but it is able to significantly alter alertness levels of an individual. While the four drinks are consumed on a single occasion in a sufficiently short time, this would correspond to a person of 70 kg at an approximate BAC of 1.11 g / l in men and 1.30 in the woman according to Widmark (1932). All these values are alcohol above acute alcohol (0.8 g / l blood).

This result is consistent with studies in

Kenya (Mackenzie and Kiragu, 2007) and indicates that drinkers were four times likely to have more sexual partners than non-consumers. Other studies have shown that alcohol consumption sites are often sexual partners meeting places, leading to the formation of sexual networks within which HIV can spread very quickly (Chersich and Rees, 2010). Also, some studies clearly indicated that excessive consumption of alcohol leads to easy sex unprotected (Kalichman *et al.*, 2007).

In this study, while among non-consumers, mild consumers and moderate consumers, men had significantly more unsafe sex than women, In heavy consumers, women and men had statistically the same behavior. But, overall, we observe that men significantly had more unprotected sex than women. Paradoxically, the infection rate is changing faster in women than in men. For example, in the United States, the proportion of women among new HIV cases increased from 7% in 1985 to 25% in 2000 and 27% in 2005. This is also the case in Côte d'Ivoire where we notice 300,000 people over 15 years living with HIV, in which 170,000 are women (56.7% of cases) (UNAIDS, 2013). These figures highlight the need to understand the evolution of the epidemic, particularly among women, in order to develop sustainable approaches to prevention and intervention. Indeed, the high transmission rates among women of reproductive age, means that the risk of mother to child transmission is also increasing, which requires tailored approaches to prevention and treatment (Bryant *et al.*, 2010).

These findings are explained by several studies showing that male circumcision reduces the risk of infection by about 50% in patients who were not yet infected (Gray *et al.*, 2007). This benefit does not exist in women who are more vulnerable to HIV (Gray *et al.*, 2007; Londish and Murray, 2008). However, alcohol consumption, even at moderate levels, can have an impact on the survival of people already infected with HIV through many

channels (Braithwaite and Bryant, 2010). Thus, alcohol may be responsible for changes in the vaginal flora; which can induce inflammation and increase HIV infection rates (Coleman *et al.*, 2007; Rebbapragada *et al.*, 2008; Theall *et al.*, 2008).

The results of this study indicated that the most relevant intervals of unprotected sex, in relation to alcohol consumption, are mainly found among the subjects of 19-25 years and those of 36-45 years. Indeed, these two group of subjects cumulatively have over unprotected intercourse (1 to 3 times and more than 3 times). This point was made also in the US in 2004 where HIV was the third leading cause of death for black women aged 35 to 44 years (CDC, 2008). Some studies showed that these age groups were more affected by the occasional excessive consumption known as "binge drinking" (Yao *et al.*, 2015). This could be explained by the fact that the subjects of 35-44 years were still relatively young and generally had autonomy related to their work. Moreover, the group of 19-25 years are usually students whose parents are involved and still have the ability to bypass any parental control because of uncontrollable academic programs.

## CONCLUSION

Alcohol, consumed even moderately, has a significant impact on risky behavior by altering the levels of vigilance and influence on decision making. This effect obviously increases the likelihood of unprotected sex. Excessive consumers in particular, in addition to unsafe sex would be able to increase the risk of exposure to HIV by injecting drugs with contaminated needles. Despite over thirty years of research, HIV remains one of the biggest challenges of global health and continues to wreak havoc. The combined efforts have enabled at least to find drugs to stop the virus from replicating and distributing the drugs to those in need. Alcohol consumption continues to play an important role in HIV transmission. Therefore, to reduce the number of

new cases and certainly improve the prognosis of those already infected with the virus, it is essential to bring together two areas of research: research on alcohol and HIV research on in order to allow progress in the prevention and treatment. Thus, the future prevention campaign approached must consider the role of alcohol as a risk factor for HIV transmission.

## REFERENCES

- April N. (2010).** Alcool et grossesse : épidémiologie, risque et recommandations aux femmes enceintes. Journées annuelles de santé publique, Québec 24 novembre, 8.
- Braithwaite RS and Bryant KJ. (2010).** Influence of alcohol consumption on adherence to and toxicity of antiretroviral therapy and survival. *Alcohol Research and Health*, 33(3): 280-287.
- Bryant KJ, Nelson S, Braithwaite RS and Roach D. (2010).** Integrating HIV/AIDS and alcohol research. *Alcohol Research and Health*, 33(3):167-78
- Cahalan D and Cisin IH. (1968).** American drinking practices: summary of findings from a national probability sample. I. extent of drinking by population subgroups. *Quarterly Journal of Studies on Alcohol*, 29: 130-51.
- [CDC] Centers for Disease Control and Prevention. (2008).** HIV/AIDS among women. CDC HIV/AIDS Fact Sheet. August 2008. Available at <http://www.cdc.gov/hiv/topics/women/resources/factsheets/women.htm>. Accessed June 13, 2015.
- Chersich MF and Rees HV. (2010).** Causal links between binge drinking patterns, unsafe sex and HIV in South Africa: It's time to intervene. *International Journal of STD and AIDS*, 21(1): 2-7.
- Coleman JS, Hitti J, Bukusi EA, Mwachari C and Muliro A. (2007).** Infectious correlates of HIV-1

- shedding in the female upper and lower genital tracts. *AIDS*, 21(6): 755–759.
- Gray RH, Kigozi G, Serwadda D, Makumbi F, Watya S, Nalugoda F, Kiwanuka N, Moulton LH, Chaudhary MA, Chen MZ, Sewankambo NK, Wabwire-Mangen F, Bacon MC, Williams CFM, Opendi P, Reynolds SJ, Laeyendecker O, Quinn TC and Wawer MJ. (2007).** Male circumcision for HIV prevention in men in Rakai, Uganda: A randomised trial. *Lancet*, 369: 657–666.
- Hays WL. (1988).** Statistics. 4<sup>th</sup> ed., New York: CBS College Publishing, 11-13 p.
- Kalichman SC, Simbayi LC, Kaufman M, Cain D, and Jooste S. (2007).** Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: Systematic review of empirical findings. *Prevention Science*, 8(2): 141–151.
- Londish GC and Murray JM. (2008).** Significant reduction in HIV prevalence according to male circumcision intervention in sub-Saharan Africa. *International Journal of Epidemiology*, 37(6): 1246–1253.
- Mackenzie C and Kiragu K. (2007).** Integrating alcohol risk reduction counseling into VCT services in Kenya: preliminary evaluation results. Presented at the Horizons/Population Council Kenya National Dissemination Workshop, Nairobi, Kenya, August 29.
- [ONUSIDA] Organisation des Nations Unies pour le Sida. (2007).** Epidemic update. Geneva: UNAIDS and the World Health Organization.
- [ONUSIDA] Organisation des Nations Unies pour le Sida. (2013).** Estimations VIH et SIDA (2013). Accessible à l'URL: <http://www.unaids.org/fr/regionscountries/countries/ctedivoire>. Consultée le 10 juin 2015.
- Parker AJ, Marshall EJ and Ball DM. (2008).** Diagnosis and management of alcohol use disorders. *BMJ*, 336: 496-501.
- Rebbapragada A, Howe K, Wachihi C, Pettengell C, Sunderji S, Huibner S, Ball TB, Plummer FA, Jaoko W and Kaul R. (2008).** Bacterial vaginosis in HIV-infected women induces reversible alterations in the cervical immune environment. *Journal of Acquired Immune Deficiency Syndromes*, 49(5): 520–522.
- Royce RA, Sena A, Cates WJ and Cohen MS. (1997).** Sexual transmission of HIV. *New England Journal of Medicine*, 336: 1072–1078.
- Schwartz G. (1978).** Estimating the dimension of a model. *Annals of Statistics*, 6(2): 461 - 464.
- Shattock RJ and Moore JP. (2003).** Inhibiting sexual transmission of HIV-1 infection. *Nature Reviews: Microbiology*, 1: 25–34.
- Statistique Canada (2003).** Plans d'échantillonnage. In : Méthodes et pratiques d'enquête. N° 12-587-X au catalogue, Ottawa, 97-131.
- Theall KP, Clark RA, Amedee A, Dumestre J and Kissinger P. (2008).** Alcohol consumption and HIV-1 vaginal RNA shedding among women. *Journal of Studies on Alcohol and Drugs*, 69(3): 454–8.
- Widmark EMP. (1932).** Die theoretischen Grundlagen und die praktische Verwendbarkeit der gerichtlichmedizinischen Alkohol Bestimmung. *Fortsch Naturw Forschung*, 11: 140.
- Yao KM, Camara PA and Adou KFJ-B. (2012).** Types de boissons alcooliques consommées en Côte d'Ivoire: Préférence et consommation effective. *Alcoologie et Addictologie*, 34(3): 185-93.
- Yao KM, Assi BD, Bâ A, Adou KFJ-B and Tako NA. (2014).** Epidémiologie de la consommation d'alcool par les femmes enceintes en Côte d'Ivoire : enquête sur 834

**YAO et al., 2015**

cas à Abidjan. *Journal of Applied Biosciences*, 80: 7024  
– 7030

**Yao KM, Badjo PC, Assi BD, Adou KFJ-B, Bâ A,  
Glin L, Camara PA, Tako NA and Séri B. (2015).**

Evaluation des consommations excessives d'alcool  
(binge drinking) en Côte d'Ivoire : cas de la ville  
d'Abidjan. *International Journal of Biological and  
Chemical Sciences*, 9(3): 1209-19.

Submit your articles online at  
[www.jresearchbiology.com](http://www.jresearchbiology.com)

**Advantages**

- **Easy online submission**
- **Complete Peer review**
- **Affordable Charges**
- **Quick processing**
- **Extensive indexing**
- **You retain your copyright**

---

[submit@jresearchbiology.com](mailto:submit@jresearchbiology.com)

[www.jresearchbiology.com/Submit.php](http://www.jresearchbiology.com/Submit.php)