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RISK FACTORS ASSOCIATED WITH HIV PREVALENCE IN PREGNANT WOMEN IN BURKINA FASO, FROM 2006 TO 2014

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ABSTRACT

Purpose of the study: To determine the socio-demographic factors influencing the dynamics of HIV prevalence among pregnant women in Burkina Faso.

Material and methods: A total of 66,597 pregnant women from the 13 health regions of Burkina Faso were included in this study conducted between 2006 and 2014. Venous blood samples were collected and analyzed for the detection of HIV antibodies according to WHO / UNAIDS strategy II, using the mixed test Vironostika HIV Uniform II Plus O (Bio-Mérieux) and the test discriminating ImmunoCombII HIV-1 & 2 BiSpot (Orgenics). Samples with discordant results between the two tests, as well as those positive to HIV-2 or HIV-1 + 2, were retested with HIV BLOT 2.2 (MP Diagnostics). Sociodemographic data collected from the participants were correlated with their HIV status to determine key risk factors influencing HIV infection prevalence in Burkina Faso.

Results: Sociodemographic data showed that the study population consisted mainly of married women (91.2%) at their first pregnancy (27.1%) with a large majority of them being housewives (86.2%) who did not attend any form of schooling (69.4%). About 88.4% had stayed longer than a year in the health region where they initially participated in the study and 55.8% were between 20 and 29 years of age. Overall HIV prevalence significantly dropped from 2.7 % in 2006 to 1.3% in 2014. However HIV seroprevalence in this study has varied significantly according to socio-demographic characteristics including marital status, parity, occupation, education, age group and the length of stay in the women's health community (p <0.0001). Factors sustaining HIV transmission included the status of being unmarried (OR=1.67 [1.42-1.97]), primigest (OR=1.64 [1.41-1.89]), having other occupations except being student (OR = 1.68 [1.20-2.33]), aged between 20-49 years (OR=3.14 [2.51-3.93]) and the duration of stay less than a year in their locality (OR=5.33 [4.61-10.16]) and these factors were identified as main risk factors associated with HIV prevalence.

Conclusion: Burkina Faso remains among the countries with concentrated epidemics despite a significant reduction in the prevalence observed in this study. The inclusion of identified risk factors in the national HIV program could improve the quality of the response to the epidemic.

Keywords: HIV-Pregnant Women-Risk Factors-Burkina Faso

FACTEURS DE RISQUE ASSOCIES A LA PREVALENCE DU VIH CHEZ LES FEMMES ENCEINTES AU BURKINA FASO, DE 2006 A 2014

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RESUME

But de l'étude: Déterminer les facteurs sociodémographiques influençant la dynamique de la prévalence du VIH chez les femmes enceintes au Burkina Faso.
Matériel et méthodes : Au total 66.597 femmes enceintes provenant des 13 régions sanitaires du Burkina Faso ont participé à cette étude, de 2006 à 2014. Leurs prélèvements sanguins ont été analysés pour la détection des anticorps anti-VIH selon la stratégie II de l'OMS/ONUSIDA, en utilisant le test mixte Vironostika VIH Uniforme II Plus O (Bio-Mérieux) et le test discriminant ImmunoCombII VIH-1&2 BiSpot (Orgenics). Les échantillons ayant donné des résultats discordants entre les deux tests, ainsi que ceux qui étaient positifs au VIH-2 ou au VIH-1+2 ont été soumis au test de confirmation HIV BLOT 2.2 (MP Diagnostics). Les données sociodémographiques recueillies chez les participantes ont été corrélées avec leur statut sérologique VIH pour déterminer les facteurs de risque.
Résultats : Les données sociodémographiques ont montré que la population d'étude était constituée principalement de femmes mariées (91,2%), primigestes (27,1%), ménagères (86,2%) et non alphabétisées (69,4%); 88,4% d'entre elles avaient séjourné 1 an ou plus dans la région sanitaire où elles ont participé à l'étude et 55,8% étaient âgées de 20 à 29 ans. La prévalence globale du VIH a baissé de 2,7% en 2006 à 1,3% en 2014. Elle variait significativement selon les caractéristiques sociodémographiques notamment la situation matrimoniale, la parité, l'occupation, la scolarité, la tranche d'âge et la durée de séjour dans la localité sanitaire des femmes *(p<0,0001)*. Les statuts de femmes non mariées (OR=1.67 [1.42-1.97]), primigestes (OR=1.64 [1.41-1.89]) ayant autres occupations que d'être élèves et étudiantes (OR=1.68 [1.20-2.33]), âgées de 20-49 ans (OR=3.14 [2.51-3.93]) et la durée de séjour <1an dans leur localité sanitaire (OR=5.33 [4.61-10.16]) constituaient des facteurs de risques associés à la prévalence du VIH.

Conclusion: Le Burkina Faso demeure parmi les pays à épidémie concentrée malgré une baisse significative de la prévalence observée dans cette étude. La prise en compte par le programme national de lutte contre le VIH des facteurs de risque qui ont été identifiés pourrait améliorer la qualité de la lutte contre cette épidémie.

Mots-clés : VIH-Femmes enceintes-Facteurs de risque-Burkina Faso

INTRODUCTION

Women represent a vulnerable fringe of the population that is more at risk to sexually transmitted infections (STI) particularly the human immunodeficiency virus (HIV) (1, 2). This is due in one hand to their genital anatomy exposing them to more infections during the sexual intercourse and in the other hand to their low socio-cultural and economic status (3, 4). Studies have shown that several factors, including age, multiple sexual partners, poverty, literacy and occupation, were associated to the occurrence of HIV infection (5, 6, 7, 8, 9, 10). Control programs that target these factors should help reduce the incidence of the infection.

In Burkina Faso, initial serosurveys reported a continuing downward trend in the seroprevalence of HIV infection over time with 7.17%, 6.15%, 4.2% and 2% in 1998, 2003, 2004 and 2005, respectively (11). In the absence of antiretroviral therapy, initial infection control programs focused on prevention of HIV transmission through screening in the general population, the etiologic diagnosis in patients, and on raising awareness through information, education and communication. Serosurveillance activities were already used to determine the national HIV prevalence and to track its dynamic over time. Certainly, the advent of highly active antiretroviral therapy (HAART) and especially its accessibility to populations of countries with limited resources have significant impacted on the circulation of HIV in most sub-Saharan African countries. However, non-compliance to antiretroviral therapy leading to treatment failure in patients proved to be an additional risk factor associated with the spread of the virus or even death of patients.

The aim of this study was to determine the socio-demographic factors contributing to the dynamics of HIV prevalence among pregnant women in Burkina Faso.

MATERIAL AND METHODS

Sites and period of study

The study was carried out in the 13 health regions of Burkina Faso: Boucle du Mouhoun, Cascades, Center, Center-East, Center-North, Central-West, East, South-Central, Hauts-Bassins, North, Central Plateau, Sahel and Southwest. Antibodies detection serological analyzes were carried out at the National Reference Laboratory for HIV/AIDS and Sexually Transmitted Infections (NRL-HIV/AIDS-IST) in the Department of Bacteriology-Virology of the University Teaching Hospital (UTH) Yalgado Ouédraogo in Burkina Faso. The study covered a nine-year period from 2006 to 2014.

Study population

Pregnant women between 15-49 years-old attending antenatal care visits in the selected health centers of the 13 heath regions of the country were enrolled consecutively until the recommended sample size was completed: 800 in Ouagadougou in Central Region and in Bobo-Dioulasso respectively, and 400 in each of the other sites.

Collection of sociodemographic data and serum samples

A questionnaire was administered to all enrolled women to collect sociodemographic data. Ten milliliters of venous whole blood taken in sterile dry tubes from each pregnant woman were centrifuged to collect the serum, which was aliquoted in a sterile cryotube labeled and stored at -20°C before transfer to NRL-HIV/AIDS-IST.

Serological analyzes

Sera were analyzed according to the WHO/UNAIDS HIV detection strategy II (12). Briefly, each serum was analyzed by a first very sensitive mixed test, Vironostika HIV Uniform II Plus O (Bio-Merieux, France). Any negative sample to this test was classified as "negative". Those found positive were re-analyzed by a second and discriminating assay, ImmunoCombII HIV-1&2 BiSpot (Orgenics) to identify the virus type (HIV-1, HIV-2 or HIV-1+2). Any discordant results between the two tests were classified as "indeterminate" temporarily. These sera, as well as those found positive to HIV-2 or both HIV-1/2 were submitted to a confirmatory assay, HIV BLOT 2.2 (MP Diagnostics): the results obtained by Western blotting were interpreted according to the WHO criteria (12). The final results were reported as negative or positive to HIV-1, HIV-2, both HIV-1/2, or indeterminate.

Ethical Considerations

All enrolled pregnant women were informed of the purpose of the study and verbally consented for their participation. The study used the WHO uncorrelated anonymous tests. The identification of each sample was correlated with the sociodemographic questionnaire of the corresponding participant.

Statistical analysis of data

Associations between patient sociodemographic characteristics and their serologic testing results were established to identify key exposing factors influencing the prevalence of the infection. Data analyses were conducted using statistical packages EPI INFO version 7 and the MedCalc software. The statistical significance threshold was set at *0.05*.

RESULTS

Sociodemographic characteristics of the study population

In total, 66,597 pregnant women were recruited over the study period with an average of 7399.66 inclusions per year. The inclusion rates ranged from 6,093 in 2013 to 7,872 in 2010 (Table I).

Married women were the most represented marital status with 91.2% compare to 8.6%, of single women, less than 1% of widows and less than 1% divorced women. Considering the number of children, women without children (27.1%) and those with single child (23.3%) were the most represented. According to their occupation, housewives (86.2%) were the most represented.

Study participants who attended school had predominantly elementary educational level (16.7%) between 2006 and 2011 and secondary educational level (16.6%) from 2012 onwards. Average number of women participating to the study that stayed in their health region over a period longer than a year was about 88.4%.

The median age of the study participants was 24 years (range from 15 to 49). Considering the study population as a whole, women in the age group 20-29 (55.8%) were the most represented follow by those in the age group 15-19 with 17.8%.

TABLE I: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

Parameters	2006	2007	2008	2009	2010	2011	2012	2013	2014
Marital status									
-Married	6,722 (90.8)	6,806(90.4)	6,977(88.7)	6,541(90.0)	7,208(91.5)	7,171(92.8)	6,693(91.8)	5,573(91.5)	7,046(93.2)
-Single	671(9.1)	665 (8.8)	888 (11.3)	688 (10)	658 (8.4)	546(7.1)	590 (8.1)	515 (8.5)	509(6.7)
-Widow	4 (0.1)	4(0.1)	0	3 (0.0)	5 (0.1)	5 (0.1)	4 (0.1)	2(0.0)	1(0.0)
-Divorced	0	2 (0.0)	1 (0.0)	0	1 (0.0)	0	1 (0.0)	2(0.0)	5 (0.1)
-Cohabiting	0	49 (0.7)	0	0	0	0	0	0	0
-Unspecified	0	0	0	0	0	0	0	4 (0,06)	0
Total	7,400 (100)	7,526 (100)	7,866 (100)	7,232 (100)	7,872(100)	7,724(100)	7,288(100)	6,092(100)	7,560 (100)

Parity									
0	**1,981 (26.8)**	**1,950(26.3)**	**2,128(27.1)**	**1,915(26.5)**	**1,891(24.1)**	**1,999(26.0)**	**1,847(25.4)**	**1,519(24.9)**	**1,767(23.5)**
1	**1,586 (21.5)**	**1,611(21.7)**	**1,718(22.0)**	**1,512(20.9)**	**1,803(23.0)**	**1,749(22.7)**	**1,618(22.3)**	**1,338(22.0)**	**1,750(23.3)**
2	**1,234 (16.7)**	**1,153(15.5)**	**1,331(17.0)**	**1,226(17.0)**	**1,375(17.5)**	**1,310(17.0)**	**1,293(17.8)**	**1,145(18.8)**	**1,335(17.7)**
3	**913 (12.4)**	**939 (12.7)**	**988 (12.6)**	**936 (13.0)**	**975 (12.4)**	**937(12.2)**	**943 (12.9)**	**777 (12.8)**	**1,007(13.4)**
4	**627(8.5)**	**695 (9.4)**	**661(8.4)**	**661 (9.2)**	**701 (8.9)**	**681(8.8)**	**678 (9.3)**	**558 (9.2)**	**689(9.1)**
5	**403 (5.5)**	**456 (6.2)**	**472 (6.0)**	**414 (5.7)**	**460 (5.9)**	**441(5.7)**	**431 (6.0)**	**338 (5.5)**	**473 (6.3)**
6 to 14	**634 (8.6)**	**606 (8.2)**	**537 (6.9)**	**558 (7.7)**	**642(8.2)**	**582 (7.6)**	**454 (6.3)**	**416 (6.8)**	**502(6.7)**
Total	**7,378 (100)**	**7,410 (100)**	**7,835 (100)**	**7,222(100)**	**7,847(100)**	**7,699 (100)**	**7,264 (100)**	**6,091 (100)**	**7,523(100)**
Occupation									
-Housewife	**6,676 (90.2)**	**6,747(89.6)**	**7,047(89.7)**	**6,349(87.8)**	**6,888(87.5)**	**6,598(85.4)**	**6,018(82.5)**	**4,921(80.8)**	**6,153(81.3)**
-Pupil/student	**224 (3.0)**	**277 (3.7)**	**281 (3.6)**	**345 (4.8)**	**360 (4.6)**	**426 (5.5)**	**467 (6.4)**	**355 (5.8)**	**541(7.2)**
-Trader	**275(3.7)**	**218 (2.9)**	**235 (3.0)**	**183 (2.5)**	**248 (3.2)**	**349 (4.5)**	**338 (4.6)**	**282 (4.6)**	**430(5.7)**
-Public servant	**103(1.4)**	**115 (1.5)**	**119 (1.5)**	**105 (1.4)**	**133 (1.7)**	**140 (1.8)**	**182 (2.5)**	**128 (2.1)**	**178 (2.4)**
-Artisan	**33 (0.4)**	**105 (1.4)**	**24 (0.3)**	**56(0.8)**	**121 (1.5)**	**20 (0.3)**	**103 (1.4)**	**120 (2.0)**	**70 (0.9)**
-Stallkeeper	**20(0.3)**	**0**	**2(0.0)**	**1(0.0)**	**34(0.4)**	**0**	**22 (0.3)**	**19 (0.3)**	**2(0.0)**
-Other	**69(1.0)**	**65 (0.9)**	**151 (1.9)**	**192(2.7)**	**88 (1.1)**	**193 (2.5)**	**168 (2.3)**	**267 (4.4)**	**192(2.5)**
Total	**7,400 (100)**	**7,528 (100)**	**7,859 (100)**	**7,231 (100)**	**7,872 (100)**	**7,726 (100)**	**7,298 (100)**	**6,092(100)**	**7,566 (100)**
Level of instruction									
-Primary	**1,130 (15.3)**	**1,141(15.2)**	**1,311(16.7)**	**1,059(14.6)**	**1,191(15.1)**	**1,144(14.8)**	**1,001(13.8)**	**940 (15.4)**	**933 (12.3)**
-Secondary	**772 (10.4)**	**938 (12.5)**	**998(12.7)**	**1,048(14.5)**	**1,064(13.5)**	**1,080(14.1)**	**1,199(16.5)**	**1,004(16.5)**	**1,257(16.6)**
-High	**133 (1.8)**	**48 (0.6)**	**37 (0.5)**	**67 (0.9)**	**79 (1.0)**	**90 (1.2)**	**118 (1.6)**	**113 (1.9)**	**145 (1.9)**
-Alphabetized	**230 (3.1)**	**480 (6.3)**	**402 (5.1)**	**330 (4.6)**	**379 (4.8)**	**365 (4.8)**	**337(4.6)**	**243 (4.0)**	**383(5.1)**
-Not alphabetized	**5,129 (69.4)**	**4,919(65.4)**	**5,116(65.0)**	**4,727(65.4)**	**5,158(65.5)**	**5,002(65.1)**	**4,620(63.5)**	**3,791(62.2)**	**4,844(64.1)**
-Unspecified	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	**7,394 (100)**	**7,526 (100)**	**7,864 (100)**	**7,231 (100)**	**7,871 (100)**	**7,681 (100)**	**7,275 (100)**	**6,091 (100)**	**7,562 (100)**
Time spent in the health region									
<1 year	**992 (13.5)**	**1,031(13.7)**	**889 (11.3)**	**874 (12.1)**	**860 (11.0)**	**809(10.5)**	**890 (12.2)**	**651 (10.7)**	**684(9.0)**
≥1 year	**6,373 (86.5)**	**6,490(86.3)**	**6,970(88.7)**	**6,356(87.9)**	**6,976(89.0)**	**6,903(89.5)**	**6,396(87.8)**	**5441(89.3)**	**6,879(91.0)**
Unspecified	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	**7,368 (100)**	**7,521 (100)**	**7,859 (100)**	**7,230 (100)**	**7,836 (100)**	**7,712 (100)**	**7,286 (100)**	**6,092(100)**	**7,563 (100)**
Age groups (years)									
15-19	**1,460 (19.7)**	**1,474(19.6)**	**1,538(19.5)**	**1,277(17.7)**	**1,329(16.9)**	**1,347(17.4)**	**1,196(16.4)**	**943 (15.5)**	**1,328(17.6)**
20-24	**2,324 (31.4)**	**2,443(32.5)**	**2,495(31.7)**	**2,183(30.2)**	**2,542(32.3)**	**2,403(31.1)**	**2,284(31.3)**	**1,922(31.5)**	**2,164(28.6)**
25-29	**1,750 (23.6)**	**1,776(23.6)**	**1,885(23.9)**	**1,916(265)**	**1,907(24.2)**	**1,914(24.8)**	**1,869(25.6)**	**1,620(26.6)**	**1,953(25.8)**
30-34	**1,109 (15.0)**	**1,067(14.2)**	**1,177(14.9)**	**1,155(15.9)**	**1,249(15.9)**	**1,253(16.2)**	**1,205(16.5)**	**1,006(16.5)**	**1,317(17.4)**
35-39	**579 (7.8)**	**587 (7.8)**	**605(7.7)**	**564 (7.8)**	**658 (8.3)**	**647 (8.4)**	**585 (8.0)**	**481 (7.9)**	**659(8.7)**

40-44	159 (2.1)	154 (2.0)	144(1.8)	126 (1.7)	161(2.0)	143(1.9)	142 (2.0)	106 (1.7)	124(1.6)
45-49	19(0.3)	24 (0.3)	22 (0.2)	11 (0.2)	26 (0.3)	18 (0.2)	13 (0.2)	15 (0.2)	17(0.2)
Unspecified	0	0	0	0	0	0	0	6(0.1)	0
Total	7,400 (100)	7,524 (100)	7,866 (100)	7,232 (100)	7,872 (100)	7,725 (100)	7,294 (100)	6,093 (100)	7,562 (100)

Annually prevalence of HIV

Yearly HIV seroprevalence steadily decreased from 2.7% in 2006 to 1.3% in 2014 (Table II). However, a significant increase in seroprevalence was observed between 2008 (2.0%) and 2009 (2.2%) *(p = 0.000; Chi2 = 18)*.

The majority of sera were diagnosed with HIV 1 or HIV 2 infections (antibodies to these viruses were detected every year) contrary to HIV-1+2 co-infection (Table II).

TABLE II: ANNUALLY REPARTITION OF HIV PREVALENCE OVER THE STUDY PERIOD

Year of study	Number tested	HIV-positive				
		HIV-1	HIV-2	HIV-1+2	Total	Prevalence [IC95%]
2006	7,400	186	10	4	200	2.7 [2.4-3.1]
2007	7,576	160	7	0	167	2.2 [2.0-2.7]
2008	7,866	152	7	2	161	2.0 [1.8-2.4]
2009	7,232	146	8	6	160	2.2 [1.9-2.6]
2010	7,872	124	6	0	130	1.6 [1.4-2.0]
2011	7,702	124	6	0	130	1.7 [1.4-2.0]
2012	7,294	116	4	0	122	1.7 [1.4-2.0]
2013	6,093	81	5	4	90	1.5 [1.2-1.8]
2014	7,562	93	2	0	95	1.3 [1.0-1.5]

HIV seroprevalence according to the socio-demographic characteristics of the participants

Marital status

HIV seroprevalence was consistently higher (2.86) in single pregnant women than in married pregnant women (1.77) (Table III). This difference was statistically significant *(p<0.0001; Chi2=673.9)*, despite the general decline in rates of HIV infections over the years.

Parity

HIV seroprevalence varied significantly according to the parity of the women (Table III) and it appears higher in nulliparous women than multiparous women *(p<0.0001, Chi2=484.1)*.

Occupation of pregnant women

Rates of HIV infections were higher in traders, public servants and artisan respectively (3.20%, 3.15%, 3.98%) (Table III), than in pupil/student (1.12%) or in housewife (1.77%). The differences observed between HIV seroprevalence by type of occupation were statistically significant (p<0.0001). HIV prevalence was significantly higher (1.80) among other occupations than among pupil/students (1.12) and the difference was statistically significant *(p<0.0001; Chi2=1007.8)*.

Level of education of pregnant women

HIV seroprevalence varied significantly between in secondary (2.71%), primary (2.68%), tertiary (1.92%), literate (1.52%) and not alphabetized (1.60%) *(p<0.0001; Chi2=34.0.)* The difference between literate and not alphabetized was not statistically significant (*p*=0.69, *Chi2*=0.157).

Residency time in health regions

The rate of HIV infection varied according to the women length of stay in their locality. Rate was higher

(3.16%) in women who stayed for a shorter duration year (1.71%) over the study time. This difference was statistically significant *(p<0.0001, Chi2=465.7)*.

Age of pregnant women

The results obtained during the serosurveillance years showed that HIV infections were more pronounced in women of 35 to 39 years old (3.09%) than in the other age groups (Table III). The lowest seroprevalence (0.68%) was found in the 15-19 years age groups. The observed difference in prevalence between the age groups was statistically significant *(p<0.0001; Chi2=872.8)*.

in their locality than those who stayed longer than a

TABLE III: GLOBAL HIV SEROPREVALENCE BY SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PREGNANT WOMEN, 2006-2014.

Parameters	Positive	Negative	Total (n)	Prevalence (%)
Marital status				
Married	**1,081**	**59,656**	**60,737**	**1.77**
Single	**164**	**5,566**	**5,730**	**2.86**
Widow	**3**	**25**	**28**	**10.71**
Divorced	**0**	**0**	**0**	**0**
Cohabiting	**4**	**45**	**49**	**8.16**
Parity				
0	**221**	**16,776**	**16,997**	**1.30**
1	**304**	**14,381**	**14,685**	**2.07**
2	**267**	**11,135**	**11,402**	**2.34**
3	**194**	**8,221**	**8,415**	**2.30**
4	**120**	**5,170**	**5,290**	**2.26**
5	**80**	**3,808**	**3,888**	**2.05**
6 to 14	**72**	**4,859**	**4,931**	**1.46**
Occupation				
Housewife	**1,019**	**56,378**	**57,397**	**1.77**
Pupil/student	**37**	**3,239**	**3,276**	**1.12**
Trader	**82**	**2,476**	**2,558**	**3.20**
Public servant	**38**	**1,165**	**1,203**	**3.15**
Artisan	**26**	**626**	**652**	**3.98**
Stallkeeper	**1**	**99**	**100**	**1.00**
Other	**56**	**1,329**	**1,385**	**4.04**
Level of instruction				
Primary	**264**	**9,586**	**9,850**	**2.68**
Secondary	**227**	**8,135**	**8,362**	**2.71**
High	**16**	**814**	**830**	**1.92**
Alphabetized	**48**	**3,101**	**3,149**	**1.52**
Not alphabetized	**697**	**42,609**	**43,306**	**1.60**

Time spent in the health region				
<1 year	**243**	**7,437**	**7,680**	**3.16**
≥1 year	**1,007**	**57,777**	**58,784**	**1.71**
Age groups (years)				
15-19	**82**	**11,810**	**11,892**	**0.68**
20-24	**235**	**20,525**	**20,760**	**1.13**
25-29	**452**	**16,138**	**16,590**	**2.72**
30-34	**292**	**10,246**	**10,538**	**2.77**
35-39	**166**	**5,199**	**5,365**	**3.09**
40-44	**22**	**1,237**	**1,259**	**1.74**
45-49	**2**	**163**	**165**	**1.22**

Risk factors associated with HIV infection

Unmarried women (single, cohabiting, widowed and divorced) were 1.67 times more likely to be infected with HIV than married women. Nulliparous women (women with no child) were 1.64 times more likely to be infected with HIV than those with one or more children.

All other occupations combined were 1.68 times more likely to be infected than pupil/students. The risk of HIV infection was 3.14 times higher among women aged 20-49 than among those aged 15-19. The pregnant women with a residence time of less than one year in a health region was 5.33 times more likely to be infected with HIV than those with duration of stay of one year or more. Odds ratio were respectively for primary, secondary and high: 0.98[0.82-1.18]; 1.40[0.84-2.33]; 1.41[0.85-2.36] .These various risk factors to HIV infection are reported in Table IV.

DISCUSSION

Sociodemographic characteristics of the study population

Study participants were predominantly married women (91.2%), and primigravidae accounted for almost 27.1%, with a majority of them being housewives (86.2%), and not alphabetized (69.4%). Almost 90% of them stayed longer than a year in the initial heath region they were enrolled in the study, and about half of them were between 20-29 years of age. These rates are descriptive of the african context, as national HIV sentinel surveillance studies were generally conducted in pregnant women who are accessible during antenatal care visits (13).

Global HIV Prevalence

Overall HIV seroprevalence decreased significantly over time from 2.7% in 2006 to 1.3% in 2014. However, Burkina Faso remains one of the countries with "moderate prevalence" globally (1% -3.9%) and a generalized epidemic among pregnant women (>1%) according to the WHO classification (14). Such a decrease was also reported in the 15 to 49 years old pregnant women in other studies, particularly in West African countries from 4.3% to 2.9%, and Eastern African countries from 3.6% to 2.9% (15), in Malawi from 15.0% to 10.6% (16), and in Uganda from 28.3% to 25.1% (17) even though most of these countries had higher national prevalence than Burkina Faso.

HIV prevalence and marital status of pregnant women

Despite significant variations in HIV prevalence in the study population over the 9-years period, results showed that infection rates were consistently higher in single women (2.86%) than in married women (1.77%). In spite of the variation in the prevalence between the various statuses, it appears in this study that being unmarried represented an additional risk factor increasing the likelihood of getting infected with HIV in comparison to the married participants (OR=1.67 [1.42-1.97]). These results were significantly high in divorced women (18.9%) in Tanzania (18) and never-married women (6.8%) in Uganda (19). Santelli et *al*., (9) identified married status as a risk factor of HIV infection in 15-24 years old women [Adjusted IR Ratio (AIRR) = 0.55, 95%CI: 0.37-0.81]. The results were also different from those reported in Ethiopia, suggesting that married women were 3.29 times more at risk of infection with HIV (95% CI [0.43 -20.00]) than unmarried women (20). On the other hand, they are comparable to those found in Uganda (21) in 15-49 years old women that reported a lower risk of having HIV among brides compared to those never married (AIRR= 0.26, 95%CI: 0.16-0.42) and also comparable to those in Tanzania (22) where unmarried women (6.8%) were more likely to be infected with HIV than married women (5.4% 95% CI: 1.13-1.45, $p<0.05$) and divorced (5.1%).

TABLE IV: RISK FACTORS ODDS RATIO

Parameters		Number of samples		*p value*	Odds Ratio
		Positive	Negative		
Marital status	Unmarried	171	6,636	0.000	1.67 [1.42-1.97]
	Married	1,081	59,656		
Parity	1 children or more	1,037	48,611	0.000	1.64 [1.41-1.89]
	0 children	221	16,997		
Occupation	Other types of occupation	1,166	60,744	0.000	1.68 [1.20-2.33]
	Pupil and student	37	3,239		
Age group (years)	20-49	1,169	53,508	0.000	3.14 [2.51-3.93]
	15-19	82	1,810		
Length of stay	<1 year	243	7,437	0.000	5.33 [4.61-10.16]
	1 year or more	1,007	57,797		
Education level	Primary	264	9,586	0.88	0.98 [0.82-1.18]
	Secondary	227	8,135		
	Primary	264	9,586	0.19	1.40 [0.84-2.33]
	High	16	814		
	Secondary	227	8135	0.17	1.41 [0.85-2.36]
	High	16	814		

HIV Prevalence and women's occupation

The prevalence of HIV declined over the years in all occupational categories. However, it remained significantly lower in student (1.12%) when compared to other occupations considered all together (1.88%). Our results were comparable to those reported in Tanzania (18) with a higher prevalence among traders (13.1%) and the data reported by Mengistu et *al*., (20) in Ethiopia where women traders had 2.07 times more risk (95% CI [0.46-8.85]) of being infected with HIV. In addition, the study indicated that being student was not associated with the occurrence of infection conversely to all other occupations (OR = 1.68 [1.20-2.33]). However, a study in Uganda (9) showed that student status was a factor associated with a high risk of HIV infection among women aged 15-24 years (AIRR= 0.22).

Prevalence of HIV infection and level of education

HIV prevalence was not statistically significant between non-alphabetized participants and those with some level of literacy. Furthermore, school level (primary, secondary and high) was not a risk factor associated with HIV infection (OR=0.98[0.82-1.18]; 1.40[0.84-2.33]; 1.41[0.85-2.36]). Several studies conducted in other countries have reported contrasting results with high prevalence in non-alphabetized women 13.4% in Tanzania (18) and 3.9% in Uganda (19). This contrasted the results observed in Sekondi-Takoradi, Ghana (23), which reported that pregnant women at the secondary and tertiary levels were less likely to be infected with HIV than those who did not attend primary school (OR=0.53). It was different also from the data reported in India by Darak et *al*., (24) indicating that pregnant women with less than 11 years of schooling were significantly more at risk of contracting HIV [Adjusted Odds Ratio (AOR) = 2.4].

HIV prevalence and age participants

HIV seroprevalence was significantly higher *(p<0.0001)* in the 25-29, 30-34 and 35-39 years age-group. This age range corresponds to the most active period of sexual and fertility life for women in Burkina Faso. The very low prevalence (0.68%) in adolescents (15-19 years) during the nine years period of the study would indicate a behavioral change towards compliance with HIV prevention measures.

The study also found that the 20-49 years age group was a potential risk factor for HIV infection compare to the 15-19 years age group (OR=3.14 [2.51-3.93]; *p=0.000*). These results are similar to those obtained in Tanzania which showed that women of 25-34 years old (COR=1.97, 95%CI: 1.79-2.16, *p<0.05*) and those older than 35 years (COR=1.88, 95%CI: 1.62-2.17, *p<0.05*) were more at risk of being infected compared to those in the age group of 15-24 years (22). It was also similar to results revealed in India, which reported higher risk for HIV infection in women of 25 years old onwards (AOR: 1.38; 95% CI: 1.17 to 1.61) compare to those less than 25 years old (24). However, Mengistu and *al.*, (20) found no statistically significant difference between age groups and HIV prevalence.

Prevalence and parity of women

The prevalence significantly varied with parity *(p<0.0001)*. It exceeded 2% in women with 1 to 5 children and was less than 1% in nulliparous and the large multiparous (6 to 14 children) women. Primigradae were 1.64 times more likely to be infected with HIV than other parities combined (OR=1.64 [1.41-1.89]). These results were different from those reported in Uganda (19) where prevalence was higher (7.5%) in women with 3 children than women who had 1 child (4.1%) and in Ethiopia (20) with high prevalence (12.2%) in multipara than primipara (9.2%). This result could be useful to direct control efforts towards the most vulnerable groups for the prevention of mother to child transmission (MTCT) in Burkina Faso.

Prevalence and length of stay of women in the health region

Prevalence was significantly higher (3.16%) in women with a residence time less than a year in the initial enrollment health region *(p<0.0001)*. Consequently, a shorter duration appeared as a risk factor associated with HIV infection in the study population (OR=5.33 [4.61-10.16]). This result is different from that observed in Tanzania (22) where there was no significant difference between the risk of having HIV and the length of stay of women in their residency. Our results could convey the existence of high-risk sexual behavior in women with shorter duration of stay (26) and the mobility of people living with HIV (27). Migration is a phenomenon that can expose women to more risk of HIV infection (7, 8, 10, 28).

CONCLUSION

Based on the results of this study carried out in Burkina Faso over nine years period, it appears that HIV prevalence has significantly decreased in the country over time. This is an encouraging finding, and represents the will and expectations of all actors involved in the fight against HIV and also testifies for the adequacy of programs developed and implemented to control HIV transmission in the population of Burkina Faso. However, Burkina Faso still remains among the countries with generalized epidemics. Risk factors associated with HIV infection were unmarried, first pregnancy, occupation, age group 20-49, and population mobility.

Awareness raising programs for students and teenage women should be extended to other socioeconomic strata and older women to reduce risk factors independently of prevalence in Burkina Faso.

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