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AN ASSESSMENT OF SOCIODEMOGRAPHIC AND BIO-CLINICAL CORRELATES OF HIV INFECTION IN PREGNANCY IN SOUTHERN NIGERIA: A RETROSPECTIVE STUDY.

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ABSTRACT:

Human immunodeficiency virus (HIV) infection is a global pandemic with frightening mortality and morbidity, no effective vaccine and curative treatment though it is preventable. Globally heterosexual and vertical transmissions remain the leading means of its spread. The sub Saharan African female adults are the most affected and most of the world HIV positive children were from vertical transmission. Therefore an in-depth knowledge of the women HIV risk factors is crucial to its effective prevention and control. The general objective of this study was to investigate the association between sociodemographic and bio-clinical variables and HIV infection in pregnancy. The specific objectives were to determine the prevalence of HIV infection among pregnant women and to compare the sociodemographic profiles and the bio-clinical variables of HIV seropositive mothers and matched seronegative counterparts. This was a retrospective case control analysis of 116 HIV positive mothers as study group and 232 HIV negative mothers as control group. The data used was obtained from the records of women that delivered between 2009 and 2013 in a mission hospital, in Benin City, Edo state, South-south, Nigeria. Statistical analyses of the data were done, P-value of 0.05 was considered as significant. Our results indicated that the prevalence of HIV seropositivity in pregnancy in this setting was 2.94%. HIV Seroprevalence was statistically significant different among women aged 25-29 years (p=0.048) and 30-34 years (p=0.01), with low (primary) educational attainment (p=0.048) and in government employment (OR.0.25, P=0.006). The seropositive mothers had significantly lower haematocrit (P=0.0015), higher incidence of anemia at booking (P=0.0023) and reduced weight gain at term (P=0.013). Their newborns significantly weighed less at birth (P=0.0032), suffered intrauterine growth restriction (P=0.0002) and low birth weight (P=0.0017). HIV infection in pregnancy is still a significant burden. It appears to have social predictors and materno-fetal health implications. We therefore recommend sustained efforts at personal level especially behavioral and lifestyle adjustment, collective and at government level female gender empowerment to control the scourge.

Key words: HIV infection, pregnancy, socio-clinical, correlates, Nigeria
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INTRODUCTION:

Acquired immune deficiency syndrome (AIDS) is a pandemic of acquired defect of the cellular immune system [1] caused by human immunodeficiency viruses (HIV) 1 and 11 [1-3]. It was first diagnosed in 1981 and the first case was reported in Nigeria in 1986. HIV currently affects all races, ages and genders. HIV is the global leading infectious killer. Estimated 36 million people have died from it since its onset and 1.6 million people died in 2012 alone according to World Health Organization (WHO) [4]. In 2009, 22.5 million (68%) of an estimated 33.3 million people living with HIV/AIDS were in sub-Saharan Africa. 1.8 million of the 2.6 million global new infections were in sub-Sahara Africa [5] and 1.8 million of 2.1million peak of 2004 AIDS-related mortality was in the sub region. Adult prevalence among people aged 15-49 years was 5% in sub-Saharan Africa [5] while global figure was 0.8%. This stems from high heterosexual transmission coupled with high male-female ratio and high total fertility rate in the sub region. Currently some 35.3 million people globally are living with HIV/AIDS; about 95% of new infections affect individuals living in low and middle income nations particularly in sub-Saharan Africa with about 69% of global HIV/AIDS burden [4].

As at 2009 Nigeria along with Ethiopia, South Africa, Zimbabwe and Zambia were the countries with leading HIV/AIDS epidemics in sub-Saharan Africa. Data from Nigeria showed increasing incidence since its onset with 2.98 million people currently living with HIV/AIDS and national prevalence of 4.6% [6]. The Nigerian national demographic health survey of 2013 revealed that 93-96% of Nigerians aged 15-49 years were aware of HIV/AIDS. It noted some reduced knowledge among rural dwellers, the uneducated and that the women from the South–South region of the country were among those more likely to have multiple sex partners. A researcher reported poverty, illiteracy, economic-driven-migration activities and unemployment as some of the socioeconomic risk factors for vulnerability of women to clandestine risky sexual exposure to HIV/AIDS [7]. There were conflicting reports of effects of educational attainment [8] and socio-economic status [9] on HIV from some parts of sub-Saharan Africa and suggestions that the partner's socio-economic status measured by education or income/employment may be a stronger predictor of female HIV serostatus than measures of female socio-economic status [9].

Consistent use of condom and limiting sexual intercourse to one uninfected partner evidently reduce the risk of heterosexual transmission. Evidence revealed too that positive behavior changes tend to alter the course of epidemic while stigma and discrimination, lack of access to services and bad laws worsen the epidemic [5]. Treatment, prevention, care and support

are the key responses to people living with HIV/AIDS.

In Sub- Saharan Africa more women than men are living with HIV/AIDS. More than half of HIV-positive adults in the region are females [10] making the African women the most vulnerable and worst hit by the pandemic. In this region, women aged 15-24 years are 8 times more likely than men to be HIV positive [5]. According to the 2003 data about half of them are aged 15-24 years

The relative increase vulnerability of women include their increased physiological susceptibility and gender inequalities like increased vulnerability to rape, sex with older men, unequal access to education, socioeconomic and political opportunities, violence and fear of violence [5, 11]. Young women mostly in sub-Saharan Africa therefore have lower level of accurate and comprehensive HIV knowledge than men of their age [11]. They are less likely to report use of condom in sex [11] as they have little capacity to negotiate safer sex [5,12], access the services they need and utilize the opportunities for empowerment [5] .This is because women especially in low and middle income countries face significant barriers to accessing services due to economic constraints and gender related discriminations [11].

According to WHO some 3.34 million children globally are currently living with HIV/AIDS and most of them were due to vertical transmission from their HIV-positive mothers during pregnancy, labor or breastfeeding [4]. More than 700 children are newly infected daily [4]. Since heterosexual contact followed by mother to child transmission remain the leading means of HIV transmission, then deeper understanding of the epidemiological factors in women will ensure more effective planning, implementation and monitoring of prevention and control strategies of HIV/AIDS. The objective of this study is to determine the socio-demographic and bio-clinical characteristics of women who were HIV seropositive in pregnancy. It is hoped that data from this study will add to the already existing pool of evidence in furthering the concerted efforts at combating the HIV/AIDS scourge.

SUBJECTS AND METHODS:

ST Philomena Catholic Hospital (SPCH) was selected as the site for this project. SPCH is located at the center of Benin City in Edo state in South–south region of Nigeria. Benin City is the capital of Edo state which has an estimated population of over 4 million with about 1.2 million residents in Benin City. SPCH is a 120 bedded secondary tier mission health facility with over 70 years' obstetric services to the communities in and outside Edo state. It also offers laboratory and pediatrics services including prevention of mother to child transmission (PMTCT) of HIV/AIDS program. There are about a thousand deliveries annually. The records of pregnant women that

attended SPCH were retrospectively reviewed for the HIV positive mothers that had their delivery between 2009 and 2013.

For each mother that tested positive to HIV the next two mothers that tested negative were recruited to serve as the control. The files were traced from the Labor ward records and retrieved with the assistance of the medical records staff. Relevant data on sociodemographic and bio-clinical variables were extracted into the computer using a designed proforma. For the purpose of this study, the main sociodemographic variables were maternal age, parity, occupation, educational attainment, marital status and social class; while the bio-clinical variables included prenatal care attendance, booking and last prenatal weight, booking and last prenatal haematocrit, neonatal birth weight, preterm labor and delivery, Apgar score at 5 minutes and perinatal deaths. All the files of those who declined HIV testing and incompletely documented files were excluded from the analysis.

The social classification was based on the educational attainment of the women and the occupation of their husbands [13]. The husband occupation was classified into professionals, middle level and unskilled with allocated scores of 1, 2 and 3 respectively. The education of the women was scored 0, 1 and 2 respectively for university, secondary and primary levels of education .The aggregate of the two scores was the social class.

For the purpose of this study the social class I and II was the upper class, class III middle class while IV and V formed the lower class. Unmarried referred to state of being single, separated, divorced or widowed at the time of delivery. Unbooked referred to a pregnant woman that never had the benefit of prenatal care at the facility before presentation in labor irrespective of her doing so elsewhere.

Preterm labor or delivery was labor or childbirth before 37 completed weeks of gestation; stillbirth was intrauterine fetal death any time after 24 weeks of gestation while perinatal death was stillbirth or neonatal death within the first seven days of birth. Parity was the number of previous childbirths to neonates alive or dead after 24 completed weeks of gestation. Maternal age was the age of the woman in completed years at the day of her childbirth. Women who were in government paid employment were classified as civil servants; those employed in private organization were classified as private employees while those in their private business were classified as self-employed. Those training for job or studying in educational institution were students and those not in any paid job (self or private organization or government) were classified as housewives. The center collaborates with other organizations in HIV/AIDS prevention and control programs in the country. The study was

approved by SPCH research and ethics committee.

Statistical analyses were with EPI INFO Version 3.5.1 and INSTAT software. Statistical testing was done with Chi square (X^2) and Fisher's exact test, while means were compared by Student t-test with $P<0.05$ considered as statistical significance.

RESULTS:

One hundred and sixteen 116 (2.94%) of the 3951 women who had their child birth at SPCH within the period of this study tested positive to HIV testing. The age range of the 116 women in the study group was 19-43 years, mean age of 29.7±4.6 years; for the 232 women in the control group the corresponding values were 19-40 years and 29.3 ± 4.6 years. The difference in mean age between the two groups was not statistically significant (P=0.45). The women in age range of 25-29 years statistically significant tested less positive to HIV infection in pregnancy (OR 0.61, P 0.04) while those aged 30-34 years were about 90% increased HIV seropositive in pregnancy (OR1.91, P 0.01). There was no statistical significant linear relationship between the age of the women and HIV infection during pregnancy (X^2 =0.7283, P=0.39).

Educational attainment has a significant inverse association with the odds of HIV seropositivity in pregnancy (P=0.01). The mothers with primary and secondary levels of education from table 1 had increased odds of being infected with the former worse and significantly infected (OR=2.2, P 0.048). Those without formal education were too few for comment. From Table 1, there was significantly reduced HIV seropositivity among the married mothers (OR 0.1212, P 0.0441). The women who were unbooked for prenatal care but presented in labor were twice HIV positive relative to their booked counterparts. The difference however was not statistically significant (OR: 1.99; P: 0.098). The nulliparous women were 20% at increased odds of being HIV positive (OR: 1.19, P: 0.4919). The parous ones were some 10% less likely to test HIV positive in pregnancy. The differences were not statistically significant.

There was some 40% reduced prevalence of HIV infection among the women from the upper social class and increase of similar magnitude among those from the lower class (OR=1.43, P=0.15) .The differences were not statistical significant. Occupation of the women appeared to have significant influence on HIV seropositivity in pregnancy.

The data in Table 1 showed that the civil servant mothers were statistically significant about 50% less HIV seropositive in pregnancy (OR=0.5141, P=0.049).The women employed in the private organization and those self–employed were 40% and 50% respectively associated with increase HIV seropositivity in

pregnancy .The differences however, were not statistically significant. The students were 30% less HIV infected in pregnancy (OR: 0.6719, P: 0.3152) but the difference was not statistically significant.

From Table 2, significantly more than twice of the HIV-positive women were anemic at commencement of prenatal care (OR.2.13, P=0.0023).The study group had a significant lower mean booking haematocrit (P=0.0015) which later became similar to that of the control group at term. Both the study group and the control group were similar in mean booking weight (P=0.31) but the study group weighed significantly less at term relative to the control counterparts (P=0.0013).The study group had relatively more antepartum hemorrhage though the difference was not statistically significant. Again, the study group ruptured their fetal membranes more frequently than the control group but the difference was not statistically significant. (OR=1.34, P=0.44).

The study group twice as their control counterparts had preterm births (OR=2.016, P=0.059) and newborns with Apgar score of <7 at 5 minutes (OR=2.12, P=0.11) though the differences were not statistically significant. The mean weight of the newborns of the study group was 0.20kg less than the control group (P=0.0032). Their neonates were significantly more than 7 times likely to suffer intrauterine growth restriction (OR=7.19, P=0.0002) and more than thrice to be low birth weight (OR=3.23, P=0.0017). The fetuses of the study group were twice as likely as those of the control group to suffer intrauterine death (IUFD) (OR=2.07, P=0.18) and perinatal death (OR=2.08, P=0.13) respectively. These differences were not statistically significant.

DISCUSSION:

The prevalence of HIV in pregnancy in this study was 2.94% which was lower than the national prevalence of 4.6%.The prenatal sero-prevalence in Nigeria has stabilized from 4.4%-4.1% from 2005 to 2010 [18]. The report also noted the variation in prevalence among the states and sites [18]. Another report from Benin City was 5.2% [14], and other South-south regional reports ranged 3.5-10.9% [15-19]. Reports from other regions of Nigeria were 5.4-8.6% from South East [18, 20, 21], 0.7-5.1% from South West [18, 22], 2.0-5.8% from North East [18, 23], 2.2-12.7% from North central [18,19, 24] and 1.0-5.1% from North West [18].

Literature from other sub-Saharan African countries reported HIV sero-prevalence in pregnancy of 6.9 -8.7% in Tanzania [25-26], 30.0% in Blantyre Malawi [27]. A national prevalence of 0.45% was reported in USA [27] while zero HIV seroprevalence was reported among Afghanistan obstetric women [29] and 0.19% prevalence among over 500 female sex workers [30].

Table1: Socio-demographic Characteristics by HIV Status

Variables		HIV-Positive n=116 (%)	HIV-negative n=232 (%)	OR	95% Confidence interval	P-value
Maternal age(years)	≤19	1(0.9)	2(0.9)	1.0	0.09-11.15	1.0
	20-24	15(12.9)	30(12.9)	1.0	0.51-1.94	1.0
	25-29	37(31.9	101(43.5)	0.61	0.38-0.97	0.04*
	30-34	47(40.5)	61(26.3)	1.91	1.19-3.06	0.01*
	≥35	16(14.9)	38(16.4)	0.82	0.43-1.54	0.64
Educational attainment	nil	1(0.9)	1(0.43)			
	Primary	16(13.8)	16(6.9)	2.16	1.038-4.49	0.048*
	Secondary	47(40.5)	84(36.2)	1.20	0.76-1.90	0.48
	Tertiary	52(44.8)	131(56.5)	0.63	0.40-1.0	0.053
Marital status	Married	112(96.6)	231(99.6)	0.12	0.013-1.1	0.0441*
	Unmarried	4(3.4	1(0.4)			
Parity	0	54(46.6)	98(42.2)	1.191	0.76-1.87	0.4919
	1-4	61 (56.6)	129 (55.6)	0.8856	0.57-1.39	0.6481
	≥5	1(0.9)	5(2.2)			
Occupation	Civil servant	15(12.9)	52 (22.4)	0.5141	0.28-0.96	0.0429*
	Private-organization	7 (6.0)	9 (3.9)	1.591	0.58-4.39	0.4182
	Self-employed	66 (56.9)	108 (46.5)	1.516	0.97-2.38	0.0876
	Housewife	16 (13.8)	29 (12.5)	1.120	0.58-2.16	0.7370
	Students	12 (10.4)	34 (14.7)	0.6719	0.33-1.35	0.3152
Social class	Upper	27(23.3)	76(32.7)	0.62	0.37-1.04	0.08
	Middle	43(37.1)	83(35.8)	1.06	0.67-1.68	0.81
	Lower	46(39.6)	73(31.5)	1.43	0.90-2.28	0.15
Booking status	Booked	102(87.9)	217(93.5)	0.50	0.23-1.08	0.098
	Unbooked	14(12.1)	15(6.5)	1.99	0.92-4.27	0.098

*Indicates significant

Table 2: HIV status of women by Bio-clinical Variables

Bio-clinical Variables		Subjects		OR (95% Confidence Interval(CI)	t-test	P-value
		HIV-Positive N=116 (%)	HIV-negative N=232 (%)			
Maternal outcome variables	Anemia at booking	55(53.9)	76(35.5)	2.13 (1.32-3.43)		0.0023*
	Anemia at term	34(37.0)	50(25.8)	1.69 (0.99-2.87)		0.070
	Mean booking wt (kg)	71.92±13.85	73.69±14.62	-	1.024 (-1.63 to 5.17	0.31
	Mean wt at term (kg)	76.60±13.21	80.70±13.91	-	2.49 (0.86-7.34	0.013*
	Mean booking PCV	32.04±3.74	33.45±3.62	-	3.20 (0.54-2.28)	0.0015*
	Mean PCV at term	34.12±4.22	35.03±4.56	-	1.61 (-0.20-2.02)	0.11
	Antepartum hemorrhage(APH)	5 (4.3)	7 (3.0)	1.45 (0.45-4.67)	-	0.54
	Postpartum hemorrhage(PPH)	2 (1.7)	12 (5.2)	0.32 (0.071-1.46)	-	0.15
	Premature rupture of membranes	13 (11.2)	20 (8.6)	1.34 (0.64-2.80)		0.44
	Preterm labor/delivery	17 (15.7)	19 (8.5)	2.016 (1.001-4.057)		0.059
Perinatal outcome variables	Apgar score <7at5 min	12 (10.3	12 (5.2)	2.12 (0.92-4.87)		0.11
	IUGR	13 (11.6)	4 (1.7)	7.19 (2.29-22.60)		0.0002*
	Mean birth weight (Kg)	3.064±0.683	3.260±0.521		2.97 (66.07-326.35)	0.0032*
	Low birth weight	20 (17.4)	14 (6.0)	3.23 (1.59-6.27)	-	0.0017*
	Stillbirth	8 (6.9)	8 (3.4)	2.07 (0.76-5.68)		0.18
	Perinatal mortality	9 (7.8)	9 (3.9)	2.08 (0.80-5.40)		0.13

*Indicates significant,

The wide national, regional and global variations in HIV sero- prevalence is possibly a reflection of differences in the level of awareness about HIV/AIDS, sexual behavior, socio-cultural and religious practices and not racial or biological differences.

From our results, there was a lack of linear relationship of HIV infection in pregnancy by age .However contrary to global reports that majority of HIV positive women were of young age group of 15-24 years [5] the most affected in this study were aged 30-34 years. This compared favorably with a Nigerian nationwide survey report [18] and in contrast to another report from Niger Delta region of Nigeria [15]

Our data did not include the timing of the age at the contraction of the virus by the affected women. Again the pregnant women were a subset of the heterogeneous women population varying in age, parity and other characteristics coupled with the fact that HIV infection is a chronic disorder therefore our results may have been confounded by these factors. A well structured longitudinal study will define better the most vulnerable age group as it is more likely to time the age at seroconversion of each victim. If HIV prevalence among the pregnant women aged 15-24 years is used as a proxy for measuring rates of new infection in a population [15, 19], then our results appeared to suggest stabilizing or declining new infections. There was an evidence of consistent decline in HIV prevalence among young women aged 15-24 years [18]. With the increasing access and use of antiretroviral therapy and the anticipated increase survival of victims, increasing proportion of older sero-positive women would be expected as suggested by our results.

The women of low parity (nullipara and primipara) appeared to be at increased vulnerability to HIV seropositivity in pregnancy. This compared with reports from other researchers [15], [18]. Wide bio-social gap seemed to be a risk factor in this group. The increased seropositivity among the nullipara and primiparous women appeared to suggest increased premarital infection especially for the nulliparous women and the possibility of combined premarital and marital infection for the primiparous ones. Our data suggested an inverse relationship of education on HIV infection contrary to report from other authors [15, 28]. Low educational attainment has been associated with reduced knowledge about HIV/AIDS and this has been reported as a possible socioeconomic risk factor for HIV infection [6, 7]. Our results suggested that the more educated women were less affected as reported by other authors [18, 31]. Evidence suggest that they may have adopted HIV/AIDS risk reducing behaviors more readily than the less educated as they were more privileged to be more exposed to health promoting information or more empowered to negotiate protective sexual behaviors with their sex

partners [31-32]. Evidently, HIV prevalence fell more consistently among highly educated groups than among less educated groups, in whom it was reported that HIV prevalence sometimes rose while overall population prevalence was falling [8]. More recent data suggest that greater HIV risk in the more educated at earlier period of the epidemic was giving way to more HIV risk reduction [8].

The women who presented for the first time in labor (unbooked) were twice as likely to be seropositive as their booked counterparts. Over a quarter of a cohort of unbooked obstetric women were reported HIV seropositive in a previous study in this region [34]. It was reasonable to assume that some seropositive women that were aware of their status out of the fear of stigmatization and discrimination may hide their status by either withdrawing from prenatal course, decline testing, or change their health facility only to be detected lately on presentation in labor or other pregnancy complications. It has been reported that the concerns regarding the possibility of stigma and discrimination, abuse and violence could deter women from seeking HIV testing or other essential health services [11]. The implication of this finding is to double the efforts to empathetically manage all unbooked obstetric patients as they present mostly in labor. This is expected to optimize maternal health and prevent mother to child transmission of HIV, an important route of its spread, by ensuring prompt HIV testing, antiretroviral therapy and other PMTCT interventions. The possibility of poverty [27] and lack of support as the reason for the failure of some of them to access prenatal care could not be ruled out too since some of the study group were unmarried, poorly educated and unemployed.

From our results, occupation of the mothers appeared to influence the odds of contracting HIV infection. Those who were gainfully employed especially the civil servants appeared less vulnerable to the infection. This was comparable to one other report [6] but contrasted with another [15]. The socioeconomic status did not strongly influence the acquisition of HIV infection from our results. A further analysis for linear tendency failed to strongly suggest this. This compared with evidence from other parts of Africa [31, 35, 36].

There was an increased incidence of anemia among the HIV positive mothers similar to other reports [1-3]. There has been a report of association of HIV infection and anemia [2]. Anaemia in this group is possibly from direct viral effect, bone marrow suppression from released cytokines and chronic inflammation from opportunistic infections and poor dietary intake of iron rich haematinics [2]. Again the setting is in malaria endemic zone and this possibly increased the susceptibility of the study group to malaria attack and consequent anemia [2]. They improved at term suggesting that quality prenatal interventions can ameliorate their anemic state. There was reduced weight gain in pregnancy among the

HIV-positive mothers. The loss of weight gain in pregnancy has been previously reported [1]. The study group as compared with another report [1] had increased incidence of preterm labor and delivery, intrauterine growth restriction, low birth weight and intrauterine fetal death. These possibly contributed to the increased perinatal mortality as suggested from our results and comparable to another reports [37]. Though it has been reported that HIV infection has little or no effect on pregnancy outcome [1-2] especially in a population with high maternal baseline immunity, adequate prenatal care, early diagnosis and antiretroviral therapy and reduced viral load [1], the reverse is true where these are lacking or poor as in sub-Saharan region as suggested by our results. Limitations of this study include its being a retrospective study. A well designed prospective study would have been better. A multicenter data will be more generalizable relative to an hospital based study .This study was based on first prenatal visit routine HIV testing results and this excluded the possible new infections in pregnancy and sero-conversions after booking due to window period phenomenon. This could introduce under reporting of seropositive prevalence in pregnancy as evidenced by other reports [30, 38]

CONCLUSION:

The prevalence of HIV seropositivity in pregnancy was still high. Quality education and gainful employment have significant influence on the sero-prevalence in pregnancy. HIV infection in pregnancy appeared associated with increased maternal and perinatal morbidities. Empowering women with quality education and occupation backed with sustained advocacy on HIV risk reduction will positively impact on obstetric HIV infection.

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