Cross-sectional Study of HIV Infection and Implication of Demographic Dependent Risk among People in Three Local Government Area in Rivers State,Nigeria

ABSTRACT

Background:HIV poses a substantial global health challenge, particularly in sub-Saharan Africa, where Nigeria grapples with a disproportionate burden. ThreeLocal Government Area of Rivers State, Nigeria, known for distinctive HIV patterns, is the focus. In Nigeria, South-South presents with the highest rate of HIV infection in Nigeria.

Aim: This study aims to understand the relationships between HIV infection and various social, demographic, and non-HIV-specific modifiable factors.

Methodology: A cross-sectional study (N = 392) was carried out to explore these dynamics, examining marital status, education, employment, physical environment, age, sex, and non-HIV-specific factors like fever, weight loss, alcohol consumption, Hepatitis B surface antigen (HBsAg) status, and tuberculosis (TB). Chi square was used to test the hypothesis at alpha level of 0.05.

Results: It revealed no significant relationship between age and HIV infection ($p<0.05$), and similarly, no significant gender association at $p<0.05$. However, marital status emerged as a significant factor ($p<0.05$), while educational status did not show significance at $p<0.05$. Modifiable non-HIV-specific factors, including Hepatitis, Fever, Weight Loss, HBsAg, and TB, exhibited significant associations with HIV at $p<0.05$.

Conclusion: This study has provided valuable insights into the complex interplay of social, demographic, and modifiable factors influencing HIV vulnerability in Nigeria's South-South region. The findings have implications for tailoring focused prevention and intervention strategies to mitigate HIV transmission risks in this specific region.

***Keywords**: Cross-sectional study, demographic factors, HIV infection, modifiable risk factors, social determinants.*

Introduction

Human Immunodeficiency Virus (HIV) infection is still a major health concern worldwide, with sub-Saharan Africa bearing a disproportionate share of the infection [1]. Nigeria, one of the most populated nations on the continent, struggles with the intricate dynamics of HIV transmission, especially in the South-South region, which is notable for having unique patterns of HIV transmission and prevalence [2]. Globally, the prevalence of people living with HIV is 0.7%, in Nigeria, among adults it is 1.3% and the South-South region has the highest rate of 3.1% [3].

By conducting a cross-sectional study to elucidate the complex relationships between HIV infection and different health determinants among individuals in South-South Nigeria, this study fills a significant research gap. Age and sex are two demographic variables that are traditionally considered immutable and have been linked to HIV infection susceptibility and progression [4]. Differences in healthcare access, physiological changes, and behavioural factors could cause age-related differences in risk. Furthermore, variations in HIV transmission based on sex underscore the intricate interaction between biological and social factors [5].

Health outcomes are significantly influenced by social determinants, such as employment status, marital status, and education [5]. These variables affect social networks, healthcare access, and health-related behaviours, all of which can affect the dynamics of HIV transmission. They also function as indicators of socioeconomic status.

Modifiable factors, including fever, alcohol intake, hepatitis, weight loss, and tuberculosis (TB), have been linked to the development and course of HIV infection [5]. Customizing public health interventions requires an understanding of the complex interactions between these variables and HIV prevalence.

A thorough cross-sectional analysis of the interactions between demographic-dependent risk factors, social determinants of health, and modifiable non-HIV specific factors in the unique context of South-South Nigeria is conspicuously lacking, despite the fact that some studies have focused on the demographic and behavioural determinants of HIV. By offering a comprehensive understanding of the various factors influencing HIV prevalence in the area, this study seeks to close this knowledge gap.

The primary aim of this study is to investigate, using a snapshot approach, the relationship between HIV infection and social determinants of health, demographic-dependent modifiable risk factors, and non-modifiable risk factors among people in South-South Nigeria. Specifically, the objectives are to show how HIV infection is related to some traditionally non-modifiable demographic-dependent risk factors, such as age and sex; to find out how social determinants of health, like education, marital status, and employment status/occupation, affect HIV infection; to find out how modifiable non-HIV specific factors, like alcohol consumption, fever, hepatitis, weight loss, and tuberculosis, are related to HIV infection; and to estimate the risk of HIV infection using odds ratio and relative risk, providing quantitative measures of the associations found.

This study holds significant implications for public health policy, HIV prevention strategies, and healthcare delivery in South-South Nigeria. By clarifying the complex relationships among demographic variables, social determinants, and modifiable risk factors, the results will provide important information for customizing interventions that cater to the community's individual needs. The study intends to support evidence-based decision-making, which will ultimately help to lower HIV transmission and enhance general health outcomes in the area.

2.0 Materials and Method

2.1 Study Design

This was a cross-sectional study conducted in healthcare facilities, including clinics and hospitals, across the South-South region. to determine HIV infection and the implication of demographic-dependent risk among people in south-south Nigeria. 392 (three hundred and ninety-two) participants were recruited from different health facilities including clinics and hospitals, a standardized questionnaire was administered after which blood samples were collected aseptically from the participants and screened for HIV infection.

2.2 Study Location

The study was conducted in various locations within the South-South region of Nigeria, including but not limited to Eleme, Obio/Akpor, and Phalga local Governments. These locations were selected to ensure a representative sample of the South-South region's diverse demographic and socio-economic characteristics.

2.3 Eligibility Criteria

Inclusion Criteria

Participants eligible for inclusion in this study were males and females aged between 18 years and above residing in the South-South region of Nigeria. Individuals attending healthcare facilities and consenting to participate in the study were included.

Exclusion Criteria

Participants below 18 years of age and those unwilling to provide informed consent, and individuals with cognitive impairments were excluded from the study. Additionally, individuals with severe comorbidities, such as advanced stages of cancer or other life-threatening illnesses, were excluded.

2.4 Ethical Consideration and Informed Consent

The study adhered to ethical guidelines and obtained approval from the right authorities prior to commencing data collection. All participants were provided with detailed information about the study's purpose, procedures, potential risks, and benefits. Informed consent was obtained from each participant, ensuring their voluntary participation and right to withdraw at any time without repercussions.

2.5 Subject Selection

394 subjects were randomly selected from healthcare facilities, including clinics and hospitals, across the South-South region. The selection process ensured representation from urban and rural settings to capture the diverse demographic and socio-economic characteristics of the population.

2.6 Data Collection

Demographic information, including age, sex, education, marital status, and employment status/occupation, was collected through a structured questionnaire [6]. Clinical data related to HIV infection and modifiable non-HIV-specific factors were also gathered.

2.7 Sample Collection

Informed consent was obtained from each participant before sample collection. Blood samples were collected aseptically by trained healthcare professionals, ensuring adherence to ethical guidelines and participant comfort [6-8].

2.8 Sample Processing and Analysis

The collected blood samples underwent rigorous processing and analysis in a certified laboratory. The samples were tested for the presence of HIV antibodies using Rapid diagnostic tests (RDTs), following the manufacturer's instructions. Confirmation of positive results was performed using a second, different HIV antibody test (UNIGOLD).

2.9 Statistical Analysis

Statistical analysis was carried out using the statistical package for Social Science (SPSS). Statistical test included chi-square tests, and calculation of odds ratios and relative risk to assess the associations between HIV infection and various risk factors. Statistical significance was set at $p < 0.05$.

3.0 Results

Table 1 below presents a comprehensive frequency distribution of the study population based on various demographic and health-related factors. Regarding age distribution, the majority of participants (76.8%) were less than 40 years old, while 23.2% were 40 years and above. In terms of gender, the study included 154 males and 238 females.

The social determinants of health, such as marital status, revealed that 50.5% of participants were married, and 49.5% were unmarried. Educational status indicated that a substantial majority (95.4%) were educated, whereas a smaller proportion (4.6%) had no formal education. Employment status demonstrated that 93.9% of participants were employed, with the remaining 6.1% being unemployed.

Examining modifiable, non-HIV-specific factors, 4.1% of participants had Hepatitis, while the majority (95.9%) did not. Similarly, 8.4% reported experiencing fever, and 10.5% reported weight loss, while 91.6% and 89.5%, respectively, did not manifest these symptoms. A noteworthy percentage, 19.6%, acknowledged alcohol consumption.

The prevalence of HBsAg was 4.3%, indicating a positive status, while 95.7% tested negative. The incidence of TB was relatively low, with 0.8% testing positive and 99.2% negative. In the context of HIV detection, 1.0% tested positive, highlighting a relatively low prevalence within the studied population.

Table 1: Demographic Characteristics of Participants

Variable	Classification	Frequency	Percentage (%)
Non Modifiabledemographic dependent Factors	**Age**		
	Less than 40years	301	76.8
	40years and Above	91	23.2
	Sex		

	Male	154	
	Female	238	
Social Determinant of Health	**Marital State**		
	Married	198	50.5
	Unmarried	194	49.5
	Educational Status		
	Educated	374	95.4
	Uneducated	18	4.6
	Employment Status		
	Employed	368	93.9
	Unemployed	24	6.1
Modifiable Non HIV Specific Factors	**Hepatitis**		
	Yes	16	4.1
	No	376	95.9
	Fever		
	Yes	33	8.4
	No	359	91.6
	Weight Loss		
	Yes	41	10.5
	No	351	89.5
	Alcohol		
	Yes	77	19.6
	No	315	80.4
	HBsAg		
	Positive	17	4.3
	Negative	375	95.7
	TB		
	Positive	3	.8
	Negative	389	99.2
HIV Detection	**HIV**		
	Positive	4	1.0
	Negative	388	99.0

Table 2 examines the association between HIV infection and age, revealing that among individuals less than 40 years old, 50.0% tested positive for HIV, while the remaining 50.0% were negative. In the group aged 40 years and above, an equal distribution of 50.0% tested positive and 50.0% tested negative for HIV. The overall HIV prevalence was 1.0% (4 out of 392). Statistical analysis using the Chi-Square test did not show a statistical significance association between HIV and age (Chi-Square=1.627, df=1, p=0.20), and this result was consistent when assessed with the Likelihood Ratio (Likelihood Ratio=1.370, df=1, p=0.24).

Table 2: Association between HIV and Age

			Age (Years)		Total
			Less than 40years	40years and Above	
HIV	Positive	Count	2	2	4
		% within HIV	50.0%	50.0%	100.0%
	Negative	Count	299	89	388
		% within HIV	77.1%	22.9%	100.0%
Total		Count	301	91	392
		% within HIV	76.8%	23.2%	100.0%

No Significant association between HIV and age. Chi-Square=1.627, df=1, p=0.20, N=392; Likelihood Ratio=1.370, df=1, p=0.24, N=392. P<0.05=Significant., p>0.05=Not Significant

Table 3 below which explores the association between HIV and gender, it reveals that among males, 75.0% tested positive for HIV, while 25.0% were negative. Among females, 38.9% tested positive, and 61.1% were negative. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test did not indicate a statistical significant association between HIV and gender (Chi-Square=2.161, df=1, p=0.14). This finding was consistent when examined using the Likelihood Ratio (Likelihood Ratio=2.127, df=1, p=0.15).

Table 3: Association between HIV Infection Rate andSex

			Sex		Total
			Male	Female	
HIV	Positive	Count	3	1	4
		% within HIV	75.0%	25.0%	100.0%
	Negative	Count	151	237	388
		% within HIV	38.9%	61.1%	100.0%
Total		Count	154	238	392
		% within HIV	39.3%	60.7%	100.0%

No Significant association between HIV and sex. Chi-Square=2.161, df=1, p=0.14, N=392; Likelihood Ratio=2.127, df=1, p=0.15, N=392.

2**. Association between some social determinants of health (education, marital status, employment status/occupation) and HIV infection**

Table 4 presents the cross-tabulation of HIV and marital status, indicating that among married individuals, 50.0% tested positive for HIV, while an equal percentage tested negative. In the unmarried group, the distribution was the same, with 50.0% testing positive and 49.5% testing negative. The overall HIV prevalence was 1.0% (4 out of 392). Surprisingly, the Chi-Square test and Likelihood Ratio both yielded a result of 0.000, with p-values of 0.98 for both tests, indicating no significant association between HIV and marital status. This unexpected result suggests that marital status may not be a determining factor for HIV infection in this population.

Table 4: Association between HIVInfection Rate and Marital Status

			Marital State		**Total**
			Married	Unmarried	
HIV	Positive	Count	2	2	4
		% within HIV	50.0%	50.0%	100.0%
	Negative	Count	196	192	388
		% within HIV	50.5%	49.5%	100.0%
Total		Count	198	194	392
		% within HIV	50.5%	49.5%	100.0%

Significant association exists between HIV and marital state, Chi-Square=0.000, df=1, p=0.98, N=392; Likelihood Ratio=0.000, df=1, p=0.98, N=392

Table 5 explores the relationship between HIV and educational status. Among the educated, 75.0% tested positive for HIV, while 25.0% tested negative. In the uneducated group, 95.6% tested negative, and only 4.4% tested positive. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test yielded a p-value of 0.05, suggesting a statistical significant association between HIV and education. However, the Likelihood Ratio test did not support this association (p=0.16).

Table 5: Association between HIV and Educational Status

			Educational Status		Total
			Educated	Uneducated	
HIV	Positive	Count	3	1	4
		% within HIV	75.0%	25.0%	100.0%
	Negative	Count	371	17	388
		% within HIV	95.6%	4.4%	100.0%
Total		Count	374	18	392
		% within HIV	95.4%	4.6%	100.0%

No Significant association between HIV and education. Chi-Square=3.842, df=1, p=0.05, N=392; Likelihood Ratio=1.985, df=1, p=0.16, N=392. P<0.05=Significant., p>0.05=Not Significant

Table 6, examines the association between HIV and employment status, it reveals that among the employed, 75.0% tested positive for HIV, while 25.0% tested negative. Among the unemployed, 94.1% tested negative, and 5.9% tested positive. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test did not show a statistical significant association between HIV and employment status (p=0.11). The Likelihood Ratio also did not support a significant association (p=0.22).

Table 6: Association between HIV Infection Rate and Employment Status

			Employment Status		Total
			Employed	Unemployed	
HIV	Positive	Count	3	1	4
		% within HIV	75.0%	25.0%	100.0%
	Negative	Count	365	23	388
		% within HIV	94.1%	5.9%	100.0%
Total		Count	368	24	392
		% within HIV	93.9%	6.1%	100.0%

No Significant association between HIV and employment status. Chi-Square=2.506, df=1, p=0.11, N=392; Likelihood Ratio=1.493, df=1, p=0.22, N=392.

Table 7 shows the association between HIV and physical environment (Isolation Zones). Among individuals in Eleme, 25.0% tested positive for HIV, while no cases were reported in Obio/Akpor. In Phalga, 75.0% tested positive. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test (p=0.00) and Likelihood Ratio (p=0.02) both indicated a statistical significant association between HIV and Isolation Zones.

Table 7: Association between HIV Infection Rateand Physical Environment

			Zone/Physical Environment			Total
			Eleme	Obio/Akpor	Phalga	
HIV	Positive	Count	1	0	3	4
		% within HIV	25.0%	0.0%	75.0%	100.0%
	Negative	Count	7	189	192	388
		% within HIV	1.8%	48.7%	49.5%	100.0%

Total	Count	8	189	195	392
	% within HIV	2.0%	48.2%	49.7%	100.0%

Significant association exists between HIV and Isolation Zones. Chi-Square=12.905, df=2, p=0.00, N=392; Likelihood Ratio=7.611, df=2, p=0.02, N=392. P<0.05=Significant, p>0.05=Not Significant

Table 8 presents the association between HIV and Hepatitis. Among those with Hepatitis, 100.0% tested positive for HIV, while none tested negative. In the group without Hepatitis, 3.1% tested positive, and 96.9% tested negative. The overall prevalence of HIV in the sample was 1.0% (4 out of 392). The Chi-Square test and Likelihood Ratio both shows a statistical significant p-values (p=0.00).

Table 8: Association between HIV Infection Rate andHepatitisOccurence

			Hepatitis		Total
			Yes	no	
HIV	Positive	Count	4	0	4
		% within HIV	100.0%	0.0%	100.0%
	Negative	Count	12	376	388
		% within HIV	3.1%	96.9%	100.0%
Total		Count	16	376	392
		% within HIV	4.1%	95.9%	100.0%

Significant association exists between HIV and Hepatitis. Chi-Square=94.969, df=1, p=0.00, N=392; Likelihood Ratio=26.644, df=1, p=0.00, N=392.

Table 9, shows the association between HIV and Fever, it reveals that among those with Fever, 50.0% tested positive for HIV, and 50.0% tested negative. In the group without Fever, 8.0% tested positive, and 92.0% tested negative. The overall HIV prevalence was 1.0% (4 out of 392). Both the Chi-Square test (p=0.03) and the Likelihood Ratio (p=0.03) show a statistical significant association between HIV and Fever

Table 9: Association between HIVInfcetion Rate and Fever

			Fever		Total
			Yes	No	
HIV	Positive	Count	2	2	4
		% within HIV	50.0%	50.0%	100.0%
	Negative	Count	31	357	388
		% within HIV	8.0%	92.0%	100.0%
Total		Count	33	359	392
		% within HIV	8.4%	91.6%	100.0%

Significant association exists between HIV and Fever. Chi-Square=9.063, df=1, p=0.03, N=392; Likelihood Ratio=4.800, df=1, p=0.03, N=392.

Table 10 shows the relationship between HIV and Weight Loss. Among those with Weight Loss, 75.0% tested positive for HIV, while 25.0% tested negative. In the group without Weight Loss, 9.8% tested positive, and 90.2% tested negative. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test (p=0.00) and Likelihood Ratio (p=0.00) both indicated a statistical significant association between HIV and Weight Loss.

Table 10: Association between HIV Infection Rate and Weight Loss

			Weight Loss		Total
			Yes	no	
HIV	Positive	Count	3	1	4
		% within HIV	75.0%	25.0%	100.0%
	Negative	Count	38	350	388
		% within HIV	9.8%	90.2%	100.0%
Total		Count	41	351	392
		% within HIV	10.5%	89.5%	100.0%

Significant association exists between HIV and Weight Loss. Chi-Square=17.975, df=1, p=0.00, N=392; Likelihood Ratio=9.455, df=1, p=0.00, N=392.

Table 11 explores the association between HIV and Alcohol consumption. Among those who consume Alcohol, 50.0% tested positive for HIV, and 50.0% tested negative. In the group that does not consume Alcohol, 19.3% tested positive, and 80.7% tested negative. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test (p=0.13) and Likelihood Ratio (p=0.17) both showed no statistical significant association between HIV and Alcohol consumption.

Table 11: Association between HIV Infection Rate and Alcohol

			Alcohol		Total
			Yes	no	
HIV	Positive	Count	2	2	4
		% within HIV	50.0%	50.0%	100.0%
	Negative	Count	75	313	388
		% within HIV	19.3%	80.7%	100.0%
Total		Count	77	315	392
		% within HIV	19.6%	80.4%	100.0%

No Significant association between HIV and alcohol. Chi-Square=2.359, df=1, p=0.13, N=392; Likelihood Ratio=1.864, df=1, p=0.17, N=392.

Table 12 shows the association between HIV and HBsAg. Among those with HBsAg, 75.0% tested positive for HIV, while 25.0% tested negative. In the group without HBsAg, 3.6% tested positive, and 96.4% tested negative. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test (p=0.00) and Likelihood Ratio (p=0.00) both indicated a statistical significant association between HIV and HBsAg.

Table 12: Association HIV Infection Rate and HBsAgOccurence

			HBsAg		Total
			Positive	negative	
HIV	Positive	Count	3	1	4
		% within HIV	75.0%	25.0%	100.0%

	Negative	Count	14	374	388
		% within HIV	3.6%	96.4%	100.0%
Total		Count	17	375	392
		% within HIV	4.3%	95.7%	100.0%

Significant association exists between HIV and HBsAg. Chi-Square=48.640, df=1, p=0.00, N=392; Likelihood Ratio=14.944, df=1, p=0.00, N=392.

Table 13 explores the relationship between HIV and TB. Among those with TB, 25.0% tested positive for HIV, while 75.0% tested negative. In the group without TB, 0.5% tested positive, and 99.5% tested negative. The overall HIV prevalence was 1.0% (4 out of 392). The Chi-Square test (p=0.00) and Likelihood Ratio (p=0.02) both revealed a statistical significant association between HIV and TB.

Table 13: Crosstab /Chi Square of HIV *TB

			TB		Total
			Positive	Negative	
HIV	Positive	Count	1	3	4
		% within HIV	25.0%	75.0%	100.0%
	Negative	Count	2	386	388
		% within HIV	0.5%	99.5%	100.0%
Total		Count	3	389	392
		% within HIV	0.8%	99.2%	100.0%

Significant association exists between HIV and TB. Chi-Square=31.253, df=1, p=0.00, N=392; Likelihood Ratio=5.653, df=1, p=0.02, N=392.

RISK ESTIMATE (ODD RATIO AND RELATIVE RISK)

Table 14 presents the Odds Ratios and associated 95% Confidence Intervals for various factors in relation to HIV infection.

Starting with non-modifiable demographic factors, the Odds Ratio for Sex is 4.709, with a wide confidence interval ranging from 0.485 to 45.684. For Age, the Odds Ratio is 0.298, with confidence interval of 0.041 to 2.143.

Moving to social determinants of health, Marital State has an Odds Ratio of 0.980, with a narrow confidence interval from 0.137 to 7.025. For Educational Status, the Odds Ratio is 0.137, with the confidence interval of 0.014 to 1.392. Employment Status has an Odds Ratio of 0.189, and confidence interval of 0.019 to 1.889.

Moving on to modifiable non-HIV specific factors, Fever has a high Odds Ratio of 11.516, with the confidence interval of 1.568 to 84.586. Weight Loss shows an Odds Ratio of 27.632, and a confidence interval of 2.804 to 272.259. Alcohol has an Odds Ratio of 4.173, and confidence interval of 0.578 to 30.109. HBsAg has a very high Odds Ratio of 80.143, and confidence interval of 7.835 to 819.768. TB shows an Odds Ratio of 64.333, and confidence interval of 4.519 to 915.762.

Table 14: Odd Ratio showing and associated Risks

Variables	Odds Ratio	95% Confidence Interval	
HIV (Positive / Negative)		Lower	Upper
Non Modifiabledemographic dependent Factors			
Sex	4.709	.485	45.684
Age	.298	.041	2.143
Social Determinant of Health			

Marital State	.980	.137	7.025
Educational Status	.137	.014	1.392
Employment Status	.189	.019	1.889
Modifiable Non HIV Specific Factors			
Fever	11.516	1.568	84.586
Weight Loss	27.632	2.804	272.259
Alcohol	4.173	.578	30.109
HBsAg	80.143	7.835	819.768
TB	64.333	4.519	915.762

Table 15 displays the Relative Risk (RR) and associated 95% Confidence Intervals (CI) for various factors in relation to HIV infection.

Starting with non-modifiable demographic factors, the Relative Risk for Sex shows that males have a higher risk (RR = 1.927) of being HIV positive compared to females, as the lower and upper bounds of the confidence interval (CI) are 1.080 and 3.440, respectively. Conversely, females have a lower risk (RR = 0.409) of being HIV positive compared to males, with a CI from 0.075 to 2.239.

For Age, individuals below 40 years old have a Relative Risk of 0.649, indicating a lower risk of HIV positivity compared to those above 40 years old (RR = 2.180). The CIs (0.243 to 1.731 for <40 years and 0.804 to 5.906 for ≥40 years.

Moving to social determinants of health, Marital State shows no substantial difference in risk for HIV infection between married (RR = 0.990) and unmarried individuals (RR = 1.010), with narrow CIs. Educational Status suggests that educated individuals have a slightly lower risk (RR = 0.784) compared to uneducated individuals, and the CI of 0.445 to 1.382. Employment Status displays similar findings, with employed individuals having a slightly lower risk (RR = 0.797) compared to unemployed individuals (RR = 4.217).

Moving on to modifiable non-HIV specific factors, Fever is associated with a higher risk of HIV infection (RR = 6.258), and the CI (2.220 to 17.644). Weight Loss is also significantly associated with higher HIV risk (RR = 7.658), with a CI of 4.033 to 14.542. Alcohol shows a higher risk of HIV infection (RR = 2.587) for individuals who consume alcohol, and CI of 0.951 to 7.037 indicates uncertainty and no significant association.

HBsAg has a very high Relative Risk (RR = 20.786) for HIV positivity, with a CI from 9.676 to 44.650. TB is also strongly associated with a higher risk of HIV infection (RR = 48.500), with a wide CI from 5.433 to 432.945.

Table 15: Relative Risk of HIV and Variables

	Variable Classification	Relative Risk	95% Confidence Interval	
			Lower	Upper
Non Modifiabledemographic dependent Factors	**Sex**			
	Male	1.927	1.080	3.440
	Female	.409	.075	2.239
	Age			
	< 40years	.649	.243	1.731
	≥40years	2.180	.804	5.906
	Marital State			
	Married	.990	.370	2.650
	Unmarried	1.010	.377	2.706
	Education			

Social Determinant of Health	Educated	.784	.445	1.382
	Uneducated	5.706	.982	33.161
	Employment			
	Employed	.797	.453	1.405
	Unemployed	4.217	.738	24.101
	Fever			
	Yes	6.258	2.220	17.644
	No	.543	.204	1.449
	Weight Loss			
	Yes	7.658	4.033	14.542
	No	.277	.051	1.514
	Alcohol			
Modifiable Non HIV Specific Factors	Yes	2.587	.951	7.037
	No	.620	.232	1.653
	HBsAg			
	Positive	20.786	9.676	44.650
	Negative	.259	.047	1.416
	TB			
	Positive	48.500	5.433	432.945
	Negative	.754	.428	1.328

4.0 Discussion

This study examined various factors influencing the risk of HIV infection among the studied population. Drawing on a rich tapestry of evidence from demographic, social, and health-related dimensions, the findings shed light on the nuanced interplay of both non-modifiable and modifiable factors in shaping HIV vulnerability.

The frequency distribution table provides a detailed snapshot of the demographic and health characteristics of the study population, categorized into non-modifiable demographic factors, social determinants of health, and modifiable non-HIV specific factors. The majority of participants were under 40 years old, married, educated, and employed, consistent with broader demographic trends in some regions, as supported by findings from the 2016 Ethiopian Demographic and Health Survey [9,10].

Interestingly, the prevalence of Hepatitis, Fever, Weight Loss, Alcohol consumption, and comorbidities like TB is also documented. However, it's crucial to consider these findings in the context of the study's limitations and variations in regional demographics. The World Health Organization's HIV prevalence data among adults aged 15 to 49 [11] supports the importance of understanding such factors to address the complexities of HIV dynamics.

Previous study by Alemu et al. [9] reported similar demographic patterns among HIV-positive individuals, underlining the relevance of age, marital status, and educational background in understanding HIV vulnerability. However, divergences might arise due to regional disparities, cultural nuances, or changes in the prevalence of risk factors over time. For instance, regional variations in Hepatitis prevalence might contribute to differences in the observed rates. Further exploration into these factors can enhance the robustness of the findings.

The crosstabulation in Table 2 explores the association between HIV and age categories, revealing that there is no statistical significant association between age and HIV infection at $p<0.05$. This finding contrasts with study by Alemu et al. [9] multilevel analysis of Ethiopian Demographic and Health Survey data and their work on gender disparities in HIV trends among reproductive-aged adults in Ethiopia [9, 12]. This divergence might be explained by the nuanced intersectionality of gender and age, as suggested by Dehne and Riedner [13] in their study on sexually transmitted infections among adolescents, emphasizing the need for a comprehensive understanding of HIV vulnerabilities in different demographic groups.

Similarly, Table 3 examines the relationship between HIV and sex, indicating no statistical significant association at $p<0.05$. This contradicts findings from previous studies [14,15], which underscores gender disparities in HIV trends among reproductive-aged adults in Ethiopia. Possible reasons for these disparities may be attributed to variations in socio-cultural contexts and sample characteristics. Furthermore, previous studies highlight the importance of addressing gender-specific factors in HIV prevention strategies [14,15].

Moving to social determinants of health, Table 4 investigates the association between HIV and marital status, revealing a statistical significant relationship at $p<0.05$. Marital status sssssemerges as a contributing factor to HIV prevalence, emphasizing the role of social dynamics in HIV transmission. This finding aligns with broader global studies [16-18] emphasizing the impact of relationship status on HIV vulnerability.

Contrarily, Table 5 examines the relationship between HIV and educational status, indicating no statistical significant association at $p<0.05$. This contradicts the study by Alemu et al. [9] and [19] that highlight education as a crucial determinant in HIV transmission. Discrepancies might be attributed to variations in the interpretation of educational levels or differences in the studied populations. There is a need for context-specific interventions to address educational disparities in HIV vulnerability.

Table 6 explores HIV in relation to employment status, revealing no statistical significant association at $p < 0.05$. While this finding deviates from some studies associating unemployment with increased HIV vulnerability [10,20-21], it underscores the complexity of these relationships that may vary across populations and contexts. Previous studies on HIV and AIDS in Nigeria [22] also acknowledge the multifaceted nature of socio-economic factors influencing HIV prevalence.

Table 7 delves into the association between HIV and the physical environment, particularly isolation zones. There was statistical significant association at $p<0.05$ which emphasizes the regional disparities in HIV prevalence, echoing the findings of the World Health Organization [11] and reports on HIV and AIDS in various African countries[23]. These reports highlight the importance of geographical context in understanding HIV prevalence and the need for targeted interventions.

The crosstabulations in Tables 8 to 13 explore the relationship between HIV infection and various modifiable non-HIV specific factors such as hepatitis, fever, weight loss, alcohol consumption, HBsAg, and TB. Table 8 reveals a significant association between HIV and hepatitis, indicating a higher prevalence of hepatitis among individuals with HIV. This aligns with previous research emphasizing the co-infection risks of HIV and hepatitis [24,25]. The implications suggest the importance of targeted interventions for individuals with HIV to manage and prevent hepatitis co-infection.

Table 9 indicates a statistical significant association between HIV and fever at $p<0.05$. Individuals with HIV are more likely to experience fever compared to those without HIV. This aligns with existing literature and highlighting the role of fever as an early symptom of HIV infection [26,27]. The findings underscore the relevance of fever monitoring as part of routine health check-ups for individuals with HIV.

Table 10 examines the association between HIV and weight loss, revealing a statistical significant association at $p <0.05$. Weight loss is more prevalent among individuals with HIV. This concurs with previous studies emphasizing weight loss as an indicator of HIV progression and the need for nutritional support in HIV care[11,28]. The implications underscore the importance of nutritional interventions to address weight loss among individuals living with HIV.

In Table 11, no significant association is found between HIV and alcohol consumption at $p < 0.05$. This contrasts with some studies that associate alcohol use with increased HIV risk [14,27,29].

Discrepancies may be due to variations in the definition of alcohol consumption or cultural factors influencing drinking patterns. The implications highlight the need for context-specific interventions to address alcohol-related HIV risks.

Table 12 explores the relationship between HIV and HBsAg, revealing a statistical significant association at $p<0.05$. Individuals with HIV are more likely to have HBsAg. This aligns with research emphasizing the co-occurrence of HIV and hepatitis B infections [15,16]. The findings emphasize the importance of comprehensive screening for co-infections and tailored interventions for individuals with dual infections.

Lastly, Table 13 reveals a statistical association between HIV and TB at $p<0.05$. Individuals with HIV are more likely to have TB. This finding is consistent with the well-established association between HIV and increased susceptibility to TB [11]. The implications stress the necessity of integrated care models addressing both HIV and TB to improve health outcomes.

Table 14 provides odds ratios reflecting the risk estimates associated with various factors for HIV infection. Notably, the odds ratio for Sex is 4.709, suggesting that individuals of a certain gender have a higher likelihood of contracting HIV compared to the reference group. Previous studies, such as those by Kassaye *et al*. [16] have indicated gender-based disparities in HIV prevalence, emphasizing the importance of targeted interventions. The odds ratio for Age is 0.298, indicating a reduced likelihood of HIV infection in certain age groups [18], which suggest specific age cohorts may be more vulnerable.

Social determinants of health, such as Marital State and Educational Status, exhibit odds ratios of 0.980 and 0.137, respectively. These results imply that these factors may not significantly influence HIV risk in the studied population. However, it is crucial to note that the interpretation of these findings might be context-dependent, and studies like those by Mabaso et al. [30] emphasize the need for localized insights into social determinants.

Moving to modifiable non-HIV specific factors, the odds ratios for Fever, Weight Loss, Alcohol, HBsAg, and TB are 11.516, 27.632, 4.173, 80.143, and 64.333, respectively. These high odds ratios indicate a substantial association between these factors and the risk of HIV infection. For instance, the elevated odds ratio for Weight Loss is consistent with studies highlighting the link between advanced HIV disease and weight loss [15].The relative risk associated with Age indicates an increased risk among individuals aged 40 years and above, aligning with the notion that older age groups may face distinct HIV vulnerabilities [9,14]. Marital State, Educational Status, and Employment Status show varying relative risks, emphasizing the need for nuanced approaches to address these factors' impact on HIV risk.

Regarding modifiable non-HIV specific factors, the relative risks for Fever, Weight Loss, Alcohol, HBsAg, and TB indicate varying degrees of association with HIV risk. These findings underscore the multifaceted nature of HIV vulnerability, influenced by both non-modifiable and modifiable factors agreeing with studies previous studies [11,12]. These literatures support the idea that these factors can contribute to increased or decreased vulnerability, highlighting the need for comprehensive and context-specific interventions in HIV prevention and care strategies.

Conclusion

In conclusion, our study provides nuanced insights into the landscape of HIV risk in the South-south region of Nigeria revealing a complex interplay of demographic, social, and behavioural factors. Social determinants, notably marital status, emerge as influential factors, emphasizing the need for targeted interventions addressing relationship dynamics. Modifiable non-HIV-specific factors, including employment status and alcohol consumption, showcase the intricate nature of HIV transmission, requiring tailored approaches. Our study contributes to a more comprehensive understanding of HIV risk in South-south Nigeria paving the way for context-specific prevention strategies to effectively address the unique dynamics of HIV transmission in the studied population.

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