

# HIV/AIDS and Syphilis Sero-prevalence Among Pregnant Women Attending Antenatal Care Center in Rwanda

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**Abstract:** Sexually transmitted infections pose a global challenge. Mostly, human immunodeficiency virus (HIV) and syphilis which are both transmitted sexually, infect a substantial number of people where female are at front line of exposure and high risk. Additionally, pregnant women experience more vulnerability exposing their infants to increased risk of dying from prematurity, low-birth-weight, stillbirth and congenital diseases. Therefore, continued surveillance of this co-infection is of paramount to establish the status of the diseases and increase the awareness. The current study has evaluated sero-prevalence of HIV and syphilis among pregnant women attending antenatal care center in Rwanda. In total, 1672 pregnant women who visited antenatal care center from 1<sup>st</sup> January to 31<sup>st</sup> December 2017 were included in the study. First, retrospectively, 1320 patient's files were reviewed and all HIV and syphilis serological status and demographic characteristics were recorded from 1<sup>st</sup> January 2017 to 30<sup>th</sup> September 2017. Second, prospectively, from 1<sup>st</sup> October to 31<sup>st</sup> December 2017, 352 participants who accepted to participate in the study, gave blood sample for HIV and syphilis testing. The data were entered in SPSS version 22 and frequencies, percentage and chi-square tests were performed. As results, HIV and syphilis sero-prevalence were 71 (4.2%) and 29 (1.7%) respectively. In addition, 20 (1.2%) had HIV/syphilis co-infection. The cohabitant women exhibited higher HIV/syphilis co-infection than other women. HIV/syphilis co-infection exhibited a statistical significant association P.value 0.000. This finding suggest continued surveillance and special intervention for pregnant women to reduce their increased risk of sexually transmitted infection. In addition, cohabitant women need special intervention to reduce their increased risk of infection.

**Keywords:** HIV/AIDS, Syphilis, Sero-prevalence

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## 1. Introduction

Sexually transmitted infections (STIs) pose a global challenge. In 2017, there was around 1.3 billion STIs where syphilis and Human Immunodeficiency Virus (HIV) seemed to be the most reported STIs. In the same year, 940 000 people died from HIV related acquired immunodeficiency syndrome (HIV/AIDS) globally. There were approximately 36.9 million people living with HIV with 1.8 new infections [1]. Syphilis

and HIV are both transmitted sexually and substantial number of people are infected with both agents [2].

Women have increased risk of contracting this infection compared to their counterpart [3] Sometime, female experience sexual abuse and rape rendering them STI vulnerability [4, 5]. Indeed, there is an estimated 18 million of women infected with syphilis worldwide while those with pregnancy have approximately 305 000 fetal and neonatal deaths yearly [2]. Thus, pregnancy is added risk of vulnerability due to

physiological changes during the course of pregnancy, such as congestion of the cervix, edema of the vaginal mucosa, and alterations in the vaginal flora [6, 7]. Additionally, pregnant women may be less likely to have partners who use condoms, and may have fewer options to leave unsafe relationships. The infected pregnant women have risk of miscarriage, prematurity birth, low-birth-weight or congenital disease [2]. Therefore, increased risk of STI in pregnant women at the same time exposes the fetus and newborn.

It was previously reported that 215000 infants are at increased risk of dying from prematurity, low-birth-weight or congenital disease due to HIV/Syphilis co-infection in pregnant women especially in low-income countries [8]. Given the consequences of HIV/Syphilis co-infection in pregnant women in addition to being high-risk group [9, 10], the continued surveillance of this co-infection is of paramount to establish the status of the diseases and increase the awareness. Therefore, current study aimed at evaluating sero-prevalence of HIV and syphilis among pregnant women attending one antenatal care center in Rwanda

## 2. Methods and Materials

### 2.1. Setting and Participant Recruitment

The current study was conducted at Biryogo Health center located in Kigali City, serving around 35580 population. In our study, we have recruited all pregnant women attending antenatal care center (ANC) service during their first term. Firstly, we retrospectively, collected data from 1<sup>st</sup> January to 30<sup>th</sup> September 2017 (9 months). The data were collected from 1320 archived patient files where all demographic characteristics and serological status (HIV and syphilis) were recorded. Secondly, we prospectively enlarged 352 pregnant women who voluntarily accepted to participate in the study from 1<sup>st</sup> October 2017 to 31<sup>st</sup> December 2017. In this category, we have enrolled all participants who accepted to give blood sample for HIV and syphilis serological testing. In total, this study has included 1672 pregnant women.

### 2.2. HIV and Syphilis Serological Testing

Briefly, to screen HIV and syphilis, 5ml of venous blood sample were collected by sterile vein puncture procedure. The blood was allowed to retract and then centrifuged, and the serum sample was used for HIV and syphilis screening. HIV testing was done according to the national algorithm recommended by the Ministry of Health of Rwanda as previously used [11]. HIV screening was done by using immuno-chromatographic tests. The patients who were positive on Alere HIV Combo (Alere Medical Co.Ltd) as a screening test, were confirmed by stat pak (Chembio Diagnostic Systems. INC. Medford, New York 11763 USA) as a confirmatory test as per national algorithm. Syphilis sero-reactivity was tested using the Rapid Plasma Reagin (RPR) (Lab 21 Healthcare Ltd, UK) All positive samples on RPR, were subjected to the confirmatory test *Treponema pallidum* haemagglutination (TPHA) (SPINREACT,

S.A.U.Ctra Coloma Spain).

### 2.3. Data Analysis

Data were recorded in Microsoft Excel 2016 and were imported to SPSS version 22. The frequency and percentage were calculated. Chi-square test was performed to analyze the relationship of HIV serological status and syphilis serological status. P.value less than 0.05 was considered statistically significant.

### 2.4. Ethical Consideration

Ethical clearance to conduct this study was obtained from Institution Review Board (IRB) of INES-Ruhengeri and presented to the Head of Biryogo health center, who approved the request and authorized the study to take place. Furthermore, the participants were explained the nature of the study and gave a written consent. The participants were allowed to withdraw from the study at any time and participation in the study was voluntarily.

## 3. Results

### 3.1. Characteristics of the Participants

The current study has recruited 1672 pregnant women. According to age group, the group of 15-25 years old were 584 (34.9%). The age group of 26-35 years old were 862 (51.5%). The group of 36-45 years old were 226 (13.5%). According to marital status, single women, married women, cohabitant women and divorced women were 121 (7.2%), 334 (20%), 1212 (72.4%) and 5 (0.3%) respectively. According to education level, most of the participant have finished primary school 791 (47.3%), followed by secondary studies 782 (46.7%), those who finished university were 72 (4.3%) and illiterate were 27 (1.6). For the occupation, housewife were 945 (56.5%), employed women were 30 (1.8), non employed were 667 (40%) and students were 30 (1.8%) (Table 1).

*Table 1. Demographic characteristic of study participants.*

Variables		Frequency (%)
Age group in years	15-25	584 (35.0)
	26-35	862 (51.5)
	36-45	220 (13.5)
Mean age	28.43	
Marital status	Total	1672 (100)
	Single	121 (7.2)
	Married	334 (20.0)
	Single women	1212 (72.5)
Education	Divorced	5 (0.3)
	Primary	791 (47.3)
	Secondary	782 (46.7)
	University	72 (4.3)
	Illiterate	27 (1.6)
Occupation	Housewife	945 (56.5)
	Employed	30 (1.8)
	Non employed	667 (40.0)
	Student	30 (1.8)

The data are presented as frequency (%) unless otherwise indicated.

### 3.2. HIV Serological Status of Study Participants

In the group of 15-25 years old, there were 20 (1.2%) HIV positive women. The age group of 26-35 years old, 42 (2.5%)

were HIV positive. The age group of 36-45 years old, 9 (0.5%) were HIV positive. In general, among 1672 pregnant women, 71 (4.2) were HIV positive (Table 2).

Table 2. HIV and Syphilis serological status of study participants.

Age groups	HIV serological status			Syphilis serological status		
	Positive (%)	Negative (%)	Total (%)	Positive (%)	Negative (%)	Total (%)
15-25 years	20 (1.2)	564 (33.7)	584 (34.9)	16 (1.0)	568 (34.0)	584 (35.0)
26-35 years	42 (2.5)	820 (49.0)	862 (51.5)	12 (0.7)	850 (50.8)	862 (51.5)
36-45 years	9 (0.5)	217 (13.0)	226 (13.5)	1 (0.06)	225 (13.4)	226 (13.5)
Total	71 (4.2)	1601 (95.8)	1672 (100)	29 (1.8)	1642 (98.2)	1672 (100)

The data are presented as frequency and percentage unless otherwise indicated.

### 3.3. Syphilis Serological Status of the Participants

Furthermore, we have tested syphilis infection among all study participants. In general, sero-prevalence of syphilis was 1.7% in all participants. The majority of positivity were found in the cohabitant women (1.3%) while married women exhibited a lower syphilis sero-prevalence of 0.2% (Table 2).

Table 3. HIV/Syphilis co-infection among study participants.

		Syphilis serological status		Total	P. value
		Negative	Positive		
HIV serological status	Negative	1592 (95.2)	9 (0.5)	1601 (95.8)	0.000
	Positive	51 (3.0)	20 (1.2)	71 (4.2)	
Total		1643 (98.2)	29 (1.7)	1672 (100)	

The data are presented as frequency and percentage unless otherwise indicated. P. value less than 0.05 was considered statistically significant.

### 3.4. HIV and Syphilis Co-infection Among the Study Participants

Lastly, our study has evaluated HIV/syphilis co-infection among all participants. Generally, among 71 (4.2%) HIV positive cases, 20 (1.2%) participants were co-infected with syphilis. There were 9 (0.5%) participants who were HIV negative and syphilis positive while 51 (3%) were HIV positive and syphilis negative. Chi-square analysis showed a statistical significant association between HIV and syphilis infection P. value 0.000 (Table 3).

## 4. Discussion

This study aimed to determine sero-prevalence of HIV and syphilis infections in pregnant women in one health facility in Rwanda. Generally, HIV sero-prevalence was 4.2% in this study and HIV/Syphilis co-infection was 1.2%. This is similar to the previous study conducted in Rwanda among pregnant women attending ANC where syphilis prevalence was 2.0% [8]. Also our finding are in accordance with previous study conducted in Democratic Republic of Congo where HIV infection rate was estimated to be 3.6% [12]. Furthermore, the observed HIV prevalence of 4.2% and syphilis of 1.2% in this study are consistent with the study conducted at Gondar, Ethiopia 4.1% and 1.9% respectively [13]. However, HIV prevalence observed in this study is a bit higher compared to the national prevalence of HIV (3%) in general population and the prevalence of Syphilis was also a bit high compared to 1.4% found in pregnant women at national level in Rwanda [14, 15]. This findings explain and

support the previous findings of vulnerability and high risk of pregnant women to STIs [4, 5]. In addition to that, a slight higher or deferent prevalence of syphilis were reported by previous studies conducted in Republic of Congo 3.92% [12], in Tanzania 2.5% [16]. Ethiopia, Gondar 2.9% [17], Gondar, Ethiopia 3.7%, Sub Saharan Africa 2.87% and Nigeria 7.28% [13]. The variation in prevalence across studies might be attributed to the differences in method of diagnosis used, sample size, and study setting. The other factors attributed to the variation in prevalence might be due to the increased access to healthcare facilities for pregnant women for sexually transmitted disease screening at the ANC clinic [13].

In this study, we observed a relatively age-related downward trend of sero-prevalence of syphilis. The seroprevalence of syphilis decreased with increasing age. The women in age group of 15-25 years of old were the most syphilis seropositive (1.0%), followed by the age group of 26-35 years of old (0.7%). This is consistent with the study at Gondar, Ethiopia as previously discussed [17].

In addition to that, in current study, the age group of 26-35 year of age exhibited higher prevalence of HIV infection compared to other age groups. This is in agreement with study conducted in Tanzania where higher prevalence were found in the young age group [16]. Also, it is in accordance with Roch Fabien Niama et al, where in their finding, age group above 25 year of age had increased risk of infection than others [12]. This may be attributed to the increased risk of exposure to STIs, since this age group is very sexually active [13]

In this study, a bigger proportion of HIV and syphilis

positivity were seen in cohabitant women compared to the married women. This is similar to the previous studies suggesting them to be a high risk group compared to the married women or general population [12, 18, 19]. The bigger proportion of infection in cohabitant women could be associated to their marital status exposing them to having multi partners. In current study, chi-square analysis showed a statistically significant association between HIV serological status and syphilis serological status. This could be due to both infections share transmission route.

As limitation, the current study was a single center study, therefore, multicenter community-based study with larger sample size is solicited to establish the current epidemiological status of HIV/syphilis co-infection and investigate the possible risk factors associated with those infections.

## 5. Conclusion

To conclude, the current study has found HIV seroprevalence of 4.2% and syphilis seroprevalence of 1.8%. The prevalence of HIV/syphilis co-infection was 1.2 while cohabitant women exhibited higher HIV/syphilis infection than other groups. This finding has shown increased risk of acquiring HIV/syphilis infection in cohabitant group; suggest special intervention to protect them. In addition, continued surveillance and special interventions are required to protect pregnant women from acquiring HIV/Syphilis infections.

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