



## SEROPREVALENCE OF SYPHILIS AMONG PREGNANT WOMEN RECEIVING ANTENATAL CARE AT MEDICAL CENTRE, MARARABA, NASARAWA STATE

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### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. Authors LYA and CEA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors CEA and LYA managed the analyses of the study. Author ABJ managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

This study was carried out to determine the seroprevalence of syphilis among pregnant women receiving antenatal care (ANC) at the Medical Centre, Mararaba, Nasarawa State. Three hundred (300) pregnant women were recruited for this cross-sectional descriptive study carried out from June to July, 2017. 2ml of blood sample was collected via venipuncture, transferred into EDTA bottles and centrifuged at 1,500rpm for 5 minutes. The screening for syphilis was carried out using qualitative Rapid test kits. The prevalence rate of 4.3% at 0.05 confidence limit was obtained from this study. The prevalence of 2% was recorded among pregnant women within the age range of 22-29. There was no significant relationship between syphilis infection and age ( $P = 0.432$ ). The infection was more prevalent among pregnant women in their second trimester with the prevalence rate of 2.3%. There was no significant relationship between syphilis infection and trimester ( $P = 0.432$ ). 1% prevalence was recorded among pregnant women who had a history of blood transfusion. There was no significant relationship between syphilis infection and history of blood transfusion ( $P = 0.432$ ). The prevalence rate recorded in this study was high when compared to the national prevalence of 0.7% reported in 2014. Maternal syphilis puts the foetus at risk of congenital syphilis, therefore routine screening for syphilis in antenatal clinics should be encouraged to prevent mother to child transmission of syphilis.

**Keywords:** Antenatal care; foetus; maternal syphilis; pregnant women; trimester.

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## 1. INTRODUCTION

Syphilis is a sexually transmitted infection (STI) caused by the spirochete *Treponema pallidum* subsp. *Pallidum*. The organism is a motile Gram-negative, spiral-shaped spirochete that possesses a cytoplasmic and outer membrane. It is solely a human pathogen hence; syphilis can only be contracted from humans [1].

Syphilis is a multistage disease that has evident and different manifestations that occur at each stage. The four stages of manifestations attributed to syphilis include primary syphilis, secondary syphilis, tertiary syphilis and latent syphilis [2].

The bacterium passes through the mucous membranes or compromised skin [1,3] and can be transmitted by kissing near lesion or wound as well as through oral, vaginal and anal sex [1]. Syphilis can also be transmitted by blood products and through blood transfusions [1]. *Treponema pallidum* can be transmitted from the bloodstream of an infected pregnant woman to her developing foetus at any time during pregnancy, through the placenta and also during child birth and this is referred to as congenital syphilis. Risk of foetal infection is much higher during early maternal syphilis (the first year of infection) than during later stages [4]. The risk of syphilis to the foetus is dependent upon the stage of maternal infection and the stage of pregnancy at which the foetus is exposed [5]. Congenital syphilis can be avoided if a pregnant mother undergoes early diagnosis and treatment.

Diagnosis is achieved through various serological methods as *Treponema pallidum* cannot be cultured on laboratory media. Penicillin still remains the drug of choice in the treatment of syphilis. The Centre for Disease Control and Prevention specify oral doxycycline, tetracycline, ceftriaxone or erythromycin as alternative treatments in the case of penicillin allergy except for pregnant women [6]. There is no vaccine for syphilis. However, several studies are ongoing but researchers have suggested that a successful vaccine should involve both the Delayed type hypersensitivity response and opsonic antibodies/phagocytosis [7].

In Nigeria, syphilis screening and treatment is included in the national antenatal care guidelines on HIV, prevention of mother-to-child transmission (PMTCT) of HIV, and STIs. Nigeria's Integrated Maternal, Newborn and Child Health Strategy (2007), lists detection and management of syphilis in pregnancy as a key preventive health intervention. New National Guidelines for Maternal, Perinatal

Deaths, Surveillance and Response in Nigeria (2015) captures information on syphilis screening and confirmation. After de-prioritizing data collection on syphilis, the federal government is working on strengthening data collection. In 2014, syphilis screening was included once again in the Antenatal care HIV seroprevalence sentinel survey. Syphilis indicators are now included in the Nigeria Health and Information Management System [8].

In 2015, syphilis had an incidence rate of 6 million new cases worldwide and 107,000 deaths [9] with the highest occurrence in homosexual men. A national survey conducted in Nigeria by the Department of Public Health and HIV/AIDS Division, Ministry of Health, revealed that the prevalence rate of syphilis nationwide as at 2005 was 1.5% and the prevalence rate dropped to 0.7% in 2014 [10]. It has also been recorded that the annual mortality rate per 100,000 people from syphilis in Nigeria has decreased by 56.4% since 1990, an average of 2.5% a year [11].

Nigeria has historically given low priority to elimination of congenital syphilis and continues to encounter barriers with elevating issues in policy and program implementation, especially at state level [12]. The infection still remains a major clinical problem in the northern region of Nigeria [13]. 40% of babies born to untreated infected women are either stillborn or die from the infection at birth while others suffer from several deformities from the first two years of life till death [14].

A study conducted by [15] in 2012, reveals that an estimated 930,000 maternal syphilis infections caused 350,000 adverse pregnancy outcomes including 143,000 early foetal deaths and stillbirths, 62,000 neonatal deaths, 44,000 preterm or low weight births, and 102,000 infected infants worldwide.

Similarly, a survey conducted in 2016 by Mamaye Evidence for Action and Program for Appropriate Technology in Health (PATH) revealed that 855,200 premature babies were being delivered in Nigeria and about 7,600 died due to complications of prematurity and 75,000 women are at risk of transmitting syphilis to their unborn children annually [13]. It is in view of this alarming data that this study aims to determine the seroprevalence of syphilis among pregnant women receiving antenatal care in Mararaba, Karu Nasarawa state, Nigeria.

## 2. MATERIALS AND METHODS

### 2.1 Area of Study

The area of study for this research was the Medical Centre, Mararaba, Karu Local Government Area,

Nasarawa state which lies between latitude 9° 2' North and longitude 7° 35' with an altitude of 448m (1,470ft), located in the middle belt of Nigeria. The LGA has an urban density of 500/km<sup>2</sup> and population of about 2 million people. It is about 22.76km from Abuja, the Federal Capital Territory [16].

## 2.2 Sample Size Determination

The sample size was determined using the following equation as described by [17].

$$N = \frac{t^2 + p(1-p)}{m^2}$$

Where;

t = statistics for 90% confidence interval; 1.645

p = previous prevalence rate. i.e. 0.5

m = precision; 0.05

Therefore, N = 270.6 this was however, approximated to 300 blood samples.

## 2.3 Study Population

Three hundred pregnant women who received antenatal care from June to July, 2017 at the Medical Centre, Mararaba, were recruited for this study.

## 2.4 Inclusion and Exclusion Criteria

Pregnant women who gave their consent were recruited for the study. Non pregnant women were excluded from the study. Pregnant women who did not give their consent were also excluded from the study.

## 2.5 Ethical Consideration

Ethical Approval for the study was obtained from the Ethics/Research Committee of the Medical Centre, Mararaba.

## 2.6 Specimen Collection

Five millilitres (5 ml) of blood sample was obtained by vein puncture into a vacutainer tube containing anticoagulant (Ethelene Diamine tetracetic acid (EDTA)).

Syphilis seropositivity was tested by using rapid plasma reagin (RPR) U-Lifsource®, U.S.A) following the manufacturer's instructions.

## 2.7 Data Collection

Informed consent was sought from each participant before recruiting them for the study. A health talk was

given on Mother-to-child transmission of syphilis and other infections and structured questionnaires were given to obtain their demographic and clinical information.

## 2.8 Statistical Analysis

All data analyses were done using SPSS version 20 computer software (SPSS Inc., Chicago IL, USA) and descriptive results of demographic and other obstetric characteristics were presented in percentages. The prevalence rates were compared using the Chi-Square statistics at 95% confidence limit.

## 3. RESULTS

A total of 300 pregnant women receiving antenatal care at Medical Centre Mararaba were tested for syphilis infection. Of these, 13 pregnant women tested positive to syphilis which resulted to a seroprevalence rate of 4.3% in the study population with 0.05 confidence limit as shown in Table 1.

**Table 1. Prevalence of Syphilis among pregnant women in Medical Centre, Mararaba**

Results	Number screened	Prevalence (%)
Positive	13	4.3
Negative	287	95.7
Total	300	100.0

Table 2 shows the seroprevalence rate for syphilis in association with various age groups in the study population, with a mean age of 28.4 years (std. deviation ±8.7). The highest prevalence (2%) was recorded among pregnant women within the ages of 22-29 years, followed by 35-45 years with a prevalence of (0.7%) and the lowest prevalence (0.3%) was recorded among pregnant women between ages <18 and 30-34 years. There was no significant association ( $P = 0.432$ ) between age and syphilis infection.

Table 3 shows the prevalence rate of syphilis in relation to trimester in the study population. 7 out of 205 samples screened for syphilis infection were positive. The highest prevalence of (2.3%) was recorded among women in their second trimester. A low prevalence was recorded among pregnant women in the first trimester (1%) and third trimester (1%). There was no significant relationship ( $P = 0.432$ ) between trimester and syphilis infection.

Table 4 shows the prevalence rate of syphilis in relation to history of blood transfusion in the study population. The prevalence of (1%) was recorded among pregnant women who had a history of blood transfusion and a prevalence of (3.3%) was recorded

among pregnant women who had no history of blood transfusion. There was no significant relationship ( $P = 0.432$ ) between history of blood transfusion and syphilis infection.

#### 4. DISCUSSION

In this study, three hundred (300) consenting pregnant women were tested for the presence of syphilis infection. The results revealed that the prevalence rate of syphilis among pregnant women receiving antenatal care at the Medical Centre, Mararaba was 4.3%. This report is however lower than the prevalence rate of 5.8% among pregnant women in a study conducted by [18] in South-South region of Nigeria.

The prevalence rate of 4.3% obtained from this study is higher than the prevalence rates of 0.5% and 1.7% reported by [19] and [20] in studies among pregnant women in Nasarawa and Kwara states, North-Central Nigeria.

Similarly, in Adamawa and Borno states, North-East Nigeria, a prevalence of 0.4% and 1.9% was reported by [21,22] among pregnant women. A low prevalence of 0.08% and 0.16% among pregnant women was reported by [23,24]. In separate studies conducted by [25,26,27] prevalence rates of 2.2%, 1.2% and 1.0%

was recorded among pregnant women in Delta, Cross River and Osun states.

The finding of this study is also higher than reports from other countries such as 0.49% prevalence among pregnant women in India [28], 3.7% among pregnant women in Ethiopia [29], 0.8% among pregnant women in Tanzania [30], 0.1% among pregnant women in Sawangi, Meghe [31] and 2.5% among pregnant women in Gabon [30]. The difference in prevalence of *T. pallidum* infection in different populations of pregnant women within and outside Nigeria could be attributed to geographical variation, cultural practices, sexual practices, difference in accessibility to screening, treatment of infections and variation in the laboratory techniques employed for the detection of *T. pallidum*.

The prevalence of syphilis in relation to age reveals that pregnant woman within the age range of <18-21, 30-34 and 35-45 had the prevalence rates of 0.3%, 0.3%, and 0.7% respectively. There was no statistical relationship between syphilis infection and age ( $p = 0.432$ ). This could be attributed to the low sexual activity among pregnant women within the age range of <18-21 [32]. Sexual desires (libido) in women within the age range of 35-45 decrease with age, a condition that could limit their sexual activities between them and their husbands and thereby reduce their risks of being infected [32].

**Table 2. Prevalence of Syphilis among pregnant women in relation to age**

Age range	Number screened (%)	Number positive	Number Negative	Prevalence (%)
<18	6 (2)	1	5 (1.7)	0.3
18-21	22 (7.3)	1	21 (7)	0.3
22-25	63 (21)	3	60 (20)	1
26-29	90 (30)	3	87 (29)	1
30-34	86 (28.7)	1	85 (28.3)	0.3
35-39	24 (8)	2	22 (7.3)	0.7
40-45	9 (3)	2	7 (2.3)	0.7
Total	300 (100.0)	13	287 (95.7)	4.3

**Table 3. Prevalence of Syphilis among pregnant women in relation to trimester**

Trimester	Number screened (%)	Number positive	Number negative	Prevalence (%)
First	61 (20.33)	3	58 (19.33)	1
Second	205 (68.33)	7	198 (66)	2.3
Third	34 (11.33)	3	31 (10.33)	1
Total	300 (100)	13	287 (95.7)	4.3

**Table 4. Prevalence of Syphilis among pregnant women in relation to history of blood transfusion**

History of blood transfusion	Number screened (%)	Number positive	Prevalence (%)
Yes	29 (9.7)	3	1
No	271(90.3)	10	3.3
Total	300 (100)	13	4.3

Women at the extremes of the age groups youngest (<18) and oldest (40-45) had lower prevalence of the infections while the middle-age women in-between the two extremes (22-25) and (26-29) were infected more with the prevalence rates of 1% and 1% respectively. This agrees with the findings of [33] who reported highest prevalence of *T. pallidum* among pregnant women who were between 21 and 30 years old in Osogbo, Osun State, Nigeria and also [34] who reported the highest prevalence of 31.5% among age groups of 25-29 years in Plateau State, Nigeria.

The prevalence of syphilis in relation to trimester reveals that pregnant women in their second trimester had the highest prevalence (2.3%) of syphilis infection. There was no significant relationship between syphilis infection and trimester ( $p = 0.432$ ). This is similar to the findings of [35] who reported the highest seroprevalence of *T. pallidum* in women at their second trimester. This prevalence may be as a result of reduced immunity and susceptibility to infections at that stage of pregnancy. This could also be due to delay in registering for antenatal care. We observed from this study that most of the pregnant women were already in their second trimester before they registered for antenatal care. Early diagnosis and treatment of syphilis reduces the risk of infecting the unborn child, miscarriage and stillbirth.

A prevalence rate of 1% was recorded amongst women in their first and third trimester respectively. This is commendable especially as *T. pallidum* is highly transmissible in the third trimester and during birth. Detection and treatment of syphilis before the third trimester (28 weeks) can revert the risk of adverse outcomes to background rates. Transplacental transmission of syphilis, especially in the third trimester, is associated with high rates of adverse outcomes, but the risk can be significantly reduced with early detection and treatment in the first and second trimesters, along with careful management of the infant after birth [36]. This low prevalence could be attributed to awareness on prevention and treatment of STIs and increased adherence to therapy [32].

Out of 29 pregnant women who had a history of blood transfusion, 3 (1%) tested positive for syphilis infection which can be attributed to the strict adherence to routine screening before blood donation.

According to the Program for Appropriate Technology in Health (PATH), in Nigeria, syphilis screening and treatment are included in national antenatal care guidelines. Nigeria's Integrated

Maternal, Newborn and Child Health Strategy (2007), lists detection and management of syphilis in pregnancy as a key preventive health intervention. New National Guidelines for Maternal and Perinatal Deaths and Surveillance and Response in Nigeria (2015) capture information on syphilis screening and confirmation. Syphilis is also beginning to be integrated into many of Nigeria's guidelines on HIV, prevention of mother-to-child transmission (PMTCT) of HIV, and STIs. After de-prioritizing data collection on syphilis, the federal government is working to strengthen data collection. In 2014, syphilis screening was included once again in the Antenatal care HIV seroprevalence sentinel survey. Syphilis indicators are now included in the Nigeria Health and Information Management System [12].

## 5. CONCLUSION

This study revealed that the seroprevalence of syphilis among pregnant women in this locality was high when compared to the national prevalence of 0.7% reported in 2014. Particular attention should be paid to young pregnant women within the age range of 22-29 as this group seems to be most affected by syphilis infection. Based on scientific data available on the harmful effects of congenital syphilis, the need for continued screening for syphilis cannot be overemphasized. Prompt detection of infection as well as treatment of pregnant women and their spouses will go a long way to eliminate the occurrence of congenital syphilis.

## 6. RECOMMENDATION

Healthcare institutions should implement syphilis screening as part of routine checkups for pregnant women as well as their spouses.

## 7. LIMITATIONS OF THE STUDY AND FURTHER RESEARCH

Although the aim of the research study was achieved, there were some unavoidable limitations. Due to time constraints, this study was limited to small target population (pregnant women). Also due to insufficient funds, this study was limited to serological analysis. Further research should be conducted within a larger population and molecular techniques should be utilized for diagnosis.

## CONSENT

Patient's written consent was collected and preserved by the authors.

## ETHICAL APPROVAL

A written approval from the research and Ethics committee of the hospital was collected and preserved by the authors.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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