

# Seroprevalence of Chlamydia in Pregnancy in a Northwestern Nigerian Teaching Hospital

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**Submitted:** 2 October, 2023. **Published:** 25 Nov. 2023

## ABSTRACT

**Background:** *Chlamydia trachomatis* (Ct) is now being considered an “obstetric pathogen” due to its potential in causing adverse pregnancy and perinatal outcomes. Consequent to being the commonest bacterial sexually transmitted infection, screening is recommended at the initial visit of antenatal care, but few countries have routine pregnancy screening and treatment programmes. This study aimed to determine the seroprevalence of Ct infection among pregnant women, and to describe sociodemographic characteristics and reproductive profile of seropositive pregnant women attending the antenatal clinic in a tertiary hospital in Nigeria. **Methodology:** Socio-demographic characteristics and reproductive profiles were sought from 90 consenting pregnant women that were conveniently sampled using a proforma in a cross-sectional descriptive study from January to March of 2018. Their sera were assayed for the presence of Ct immunoglobulin G (IgG) using ELISA. Data were analysed using SPSS version 21. Categorical variables were represented using frequency and percentages while associations between categorical variables were determined using Fisher's exact test with  $p < 0.05$  considered significant. **Results:** The prevalence of Ct infection was found to be 3.3% (3/90). The mean age of infected women was  $34.3 \pm 4.6$  years. All seropositive women had a personal source of income and had tertiary education. The mean parity was 3 and only 1 (33.3%) of the seropositive women had prior pregnancy loss. **Conclusion:** This study found a low prevalence of Ct infection among pregnant women. Seropositive pregnant women were aged over 25 years, well educated, had a personal source of income, and had a favourable reproductive profile similar to seronegative women.

**Keywords:** *Chlamydia trachomatis*, prevalence, pregnant women, ELISA .

### Access to the article



Website: [www.jmbsr.com.ng](http://www.jmbsr.com.ng)

eISSN: 2971-7833

pISSN: 2971-7108

 10.5281/zenodo.10445304

### How to cite this article

Aliyu R.M., Adesiyun A.G., Sada S.I., Aliyu S., Olorukooba A.A. Seroprevalence of Chlamydia in Pregnancy. *J Med & Bas Sci Res.* 2023;4(3-4):33-42. DOI: 10.5281/zenodo.10445304

## INTRODUCTION

Globally, sexually transmitted infections (STIs) are a major public health problem affecting the quality of life and causing serious morbidity.<sup>[1]</sup> *Chlamydia trachomatis* (Ct) is the most common bacterial STI worldwide.<sup>[2]</sup> Globally, the prevalence of Ct among pregnant women is similar or even higher than among nonpregnant women as suggested by some studies, though limited data are available.<sup>[3]</sup> In sub-Saharan Africa, pooled prevalence rates range from 0-31.1%, with West Africa having a pooled prevalence of 6.1%.<sup>[3]</sup> Prevalence rates of 2%-13.2% have been reported among pregnant women in Nigeria.<sup>[4]-[7]</sup>

The infection is largely asymptomatic in women, which perpetuates an ongoing source of efficient disease transmission and also results in silent disease, which can result in an adverse reproductive outcome.<sup>[3]</sup> *Chlamydia trachomatis* is now being considered an “obstetric pathogen” due to its potential in causing adverse pregnancy and perinatal outcomes.<sup>[8]</sup> Pregnant women are regarded as a special population because Ct infection in pregnancy is associated with additional morbidity. This is because intrauterine or perinatally transmitted Ct infection has grave consequences on pregnant women, their partners, and their fetuses.<sup>[9]</sup> Studies have reported Ct infection to cause miscarriage, prelabour rupture of membranes, stillbirths, puerperal endometritis, preterm birth, low birth weight, neonatal conjunctivitis, and neonatal pneumonia.<sup>[3],[10]</sup>

Screening and treatment of STIs in pregnancy represents an overlooked opportunity to improve the health of mothers and their babies.<sup>[3]</sup> Because Ct infection is associated with substantial morbidity and economic cost worldwide, this makes screening and treatment of Ct effective measures in reducing the burden of Ct.

Prevalence assessment is a core component of the World Health Organisation Sexually Transmitted Infection-surveillance programme, which

estimates the burden of an STI and enables a country to monitor trends of this infection and implement preventive measures.<sup>[12]</sup> Presently, knowledge of Ct prevalence in pregnancy is scarce in most countries and is largely responsible for the lack of interventions to address this largely asymptomatic infection.<sup>[12]</sup> The Centre for Disease Control (CDC) recommends Ct screening at the initial visit of antenatal care in pregnant women aged less than 25 years or in those with risk factors.<sup>[11]</sup> However, despite Ct being the commonest treatable bacterial STI, few countries have routine pregnancy screening and treatment programmes.<sup>[3]</sup> Nigeria is yet to adopt Ct screening during antenatal care. The determination of the prevalence of Ct in pregnancy will guide policymakers and/or hospital managers to adopt proactive measures in the control of this infection in this special population. This study aimed to assess the prevalence of Ct infection among pregnant women and to describe the sociodemographic characteristics and reproductive profile of seropositive pregnant women.

## METHODOLOGY

The study was conducted in the Antenatal clinic (ANC) of Ahmadu Bello University Teaching hospital (ABUTH), Zaria, Kaduna state. Ahmadu Bello University Teaching Hospital, Zaria, is a tertiary hospital that has various specialist departments among which is the Obstetrics and Gynaecology department, which offers maternal health services including ANC and delivery to clients. The ANC is conducted every weekday by a different Obstetric unit. Each pregnant woman is assigned a particular day to attend ANC. Antenatal clinic attendees are not screened for Ct infection in ABUTH.

A cross-sectional study design was employed. The study population included all pregnant women attending the ANC clinic in the hospital during the period of study. Non-consenting pregnant women were excluded. The sample size was determined using Cochran's formula for sample size

determination for cross-sectional studies. The prevalence of pregnant women with Ct from a previous study was 6.2% was used.<sup>[7]</sup> With a 95% level of confidence and an absolute precision of 5%, a sample size of 90 was obtained. Using a convenience sampling method, 90 pregnant women were sampled from January to March of 2018. A structured proforma developed by the Authors was used to obtain the socio-demographic characteristics and reproductive profiles and to document the IgG result.

About 3mls of venous blood was collected under an aseptic technique from a peripheral vein and transferred into a plain bottle for assay of immunoglobulin G (IgG) to Ct. The blood was centrifuged at 4500rpm to obtain serum. The sera were kept frozen at -70°C till all samples have been pooled. The IgG detection was done using *Chlamydia trachomatis* IgG ELISA catalogue No: IB19202 obtained from Immuno-Biological Laboratories (IBL-America), Minneapolis. The assay was carried out according to the manufacturer's instructions.<sup>[13]</sup> Data were analysed using SPSS version 21. Descriptive summary statistics such as frequency and percentage were used to represent categorical variables while mean and standard deviation were used to represent numeric variables Fishers-Exact test was used to test for associations between Ct status and other independent variables with  $P < 0.05$  considered significant. Ethical approval was sought and obtained from the Health Research and Ethics Committee of Ahmadu Bello University Teaching Hospital, Zaria (ABUTHZ/HREC/B03/2017). Informed consent was obtained from all participants in the study after assuring them of confidentiality. Permission to carry out this study was obtained from the Clinic management. Data collected from the study were anonymised and stored in a password-protected computer which was only accessible to the Researchers to ensure data security. The three seropositive women were counselled on their results and given treatment with an oral stat dose of 1g of Azithromycin.

## RESULTS

A total of 90 pregnant women were studied. The mean age and standard deviation (SD) of the participants was 29.4±6.8 years. All participants were married and the majority were parous with only 20% been primigravidae. Their parity ranged between 0 to 8 with a median parity of 2.

Table 1: Socio-demographic characteristics of study participants, in a study of prevalence of Ct infection among pregnant women attending antenatal clinic in ABUTH, 2018

Characteristic	Frequency n = 90	Percentage (%)
<b>Age (years)</b>		
15-19	5	5.6
20-24	19	21.1
25-29	24	26.7
30-34	16	17.8
35-39	18	20.0
40-44	8	8.9
<b>Tribe</b>		
Hausa	61	67.8
Yoruba	5	5.6
Others*	24	26.7
<b>Religion</b>		
Islam	75	83.3
Christianity	15	16.7
<b>Income</b>		
Don't have a personal source	42	46.7
Have a personal source	48	53.3
<b>Woman's education</b>		
Primary	15	16.7
Secondary	29	32.2
Tertiary	43	47.8
Quranic	3	3.3

\*: Igbo, Egbira, Fulani. Nupe

The prevalence of Ct IgG seropositivity was 3.3% (3/90). All seropositive women were aged >24 years with a mean age of 34.3±4.6 years. All seropositive women had tertiary education and all the seropositive women had a personal source of income. The socio-demographic characteristics are shown in Table 2. All seropositive women were married and parous with a mean parity of 3. Two third had no history of previous miscarriage, and no seropositive woman has had a prior stillbirth. Reproductive profile of seropositive women did

**Table 2: Socio-demographic characteristics of pregnant women seropositive for Ct IgG**

Characteristic	IgG Positive n=3	IgG Negative n=87	P-value
<b>Age (years)</b>			
15-19	0 (0.0)	5(5.7)	0.41
20-24	0(0.0)	19(21.8)	
25-29	1(33.3)	23(26.4)	
30-34	0(0.0)	16(14.9)	
35-39	2(66.7)	16(14.9)	
40-44	0(0.0)	8(16.1)	
<b>Tribe</b>			
Hausa	0(0.0)	61 (70.1)	0.03
Igbo	0(0.0)	1(1.1)	
Yoruba	0 (0.0)	5 (5.7)	
Others	3(100)	20 (23.0)	
<b>Religion</b>			
Islam	2(66.7)	74(85.1)	0.02
Christianity	1(33.3)	13(14.9)	
<b>Income</b>			
No personal source	0(0.0)	45(51.7)	0.39
Have personal source	3(100)	42(48.3)	
<b>Woman's education</b>			
Primary	0(0.0)	15(17.2)	0.34
Secondary	0(0.0)	29(33.3)	
Tertiary	3 (100)	40(46.0)	
Quranic	0(10.0)	3(3.4)	

**Table 3: Reproductive profile of women seropositive for Ct IgG, in a study of prevalence of Chlamydia trachomatis in pregnant women in ABUTH, 2018**

Parameter	IgG positive n=3	IgG Negative n=87	P-value
<b>No. of live births</b>	No. (%)	No. (%)	
0-1	1(33.3)	35(40.2)	0.64
≥2	2(66.7)	52(59.8)	
<b>No. of miscarriages</b>			
0	2(66.7)	12(13.8)	1.00
≥1	1(33.3)	53(60.9)	
<b>Stillbirth</b>			
0	3(100)	75(86.2)	1.00
≥1	0(0.0)		

## DISCUSSION

The prevalence of Ct widely varies from region to region, time to time, study population and type of laboratory diagnosis method employed. [14] The prevalence of Ct among pregnant women found in this study is low when compared to results obtained by other authors. [5]-[7] This includes the findings from a meta-analysis in 2018 that reported a pooled prevalence of Ct in women of reproductive age group in sub-Saharan Africa to be 7.8% and 7.6% in health facility studies. [14] This difference may be explained by the use of different diagnostic techniques and the type of population studied. In the same setting and using similar diagnostic technique but different study population, Koledade et al reported a prevalence of 31% among infertile women [15] and Aliyu et al found a prevalence of 8.4% among women with spontaneous miscarriage. [16] The finding from this study is however higher than that reported by Ankuma et al of 2% among a similar population using rapid chromatographic antigenic detection in cervical swabs, in a study that was conducted in another part of Northern Nigeria. [4] Some studies have reported no positive finding, as exemplified by Ghosh et al in India, in which they reported no positive case of Ct infection among 40 pregnant women using a similar ELISA technique. [17] The studies reporting a higher prevalence of Ct infection employed polymerase chain reaction (PCR) as the diagnostic technique which has been reported to be superior in Ct detection and used urogenital specimens. [18]-[20] This is exemplified by the study of Ige et al in the same location who found a higher prevalence of Ct infection among women of reproductive age using the PCR technique. [21] While nucleic acid amplification technique like PCR is the gold standard for diagnosis of Ct infection, [22] the ELISA test is more useful in sero-epidemiological studies and also valuable in the diagnosis of Ct when a test for direct detection of the bacteria is negative or difficult to perform as in upper genital infection. Though, its major drawback is its inability to distinguish current from past Ct

infections. [23]

Generally, a higher prevalence have been reported among infertile women [15],[24]-[28] thereby supporting the role of Ct in causing infertility. The prevalence of Ct obtained among pregnant women in this study is also lower than the prevalence obtained among infertile women in the same setting and other climes.[15],[24]-[28] The additional adverse reproductive outcomes reported to be associated with Ct infection include miscarriage and stillbirths. [29], [30] However, from our study, the seropositive pregnant women had similar parity and also reported similar miscarriage and stillbirth rates as seronegative women. This finding lends credence to the results of other workers that did not find Ct infection to be associated with miscarriage or stillbirth. [16],[31] Though it has been shown that young age ( $\leq 24$  years) to be significantly associated with Ct infection,[11],[32] all seropositive pregnant women in this study were found to be aged  $\geq 25$  years which is similar to the findings of Ige et al and Huai et al who reported a greater prevalence of Ct in women aged  $>24$  years [21], [33]The majority of study participants in our study as in the study of Huai et al were aged over 25 years and thus could account for higher seropositivity among this age group. The association found between religion and Ct infection is likely because the study population was largely of the Islamic faith. We found no association between chlamydial infection and level of education in our study. This contrasts with findings by Ige et al who reported educational level to be associated with Ct infection where women with a low level of education had over four-fold increased odds of having Ct infection.[21] Additionally, a report from a meta-analysis found a low educational level to nearly double the odds for Ct acquisition. [34]

This study provided information about the burden of Ct infection among a special population (pregnant women) that can cause maternal and perinatal morbidity. The study is however limited by the use of ELISA as the diagnostic test and not a molecular technique.

## CONCLUSION

Our study found a low prevalence of Ct infection among pregnant women attending antenatal care. Seropositive pregnant women were aged over 25 years, well educated, had a personal source of income, and had a favourable reproductive profile similar to seronegative women.

**Acknowledgement:** The authors acknowledge Nasiru Usman of Medical Microbiology, Ahmadu Bello University Teaching Hospital for performing the ELISA tests.

**Conflict Of Interest:** None

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