Original Article

The prevalence of syphilis in pregnant women in Akwa Ibom State, Southern Nigeria

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ABSTRACT

Background: *Treponema pallidum*, the causative organism of syphilis has been a public health challenge for centuries. Syphilis is a significant cause of morbidities and mortalities in pregnant women, and information regarding its prevalence in Nigerian pregnant women is scanty particularly from the south-south zone.

Objective: To determine the prevalence of syphilis in women receiving antenatal care in twelve health care centres in Akwa Ibom State, Nigeria.

Methodology: Pre-coded structured questionnaires were administered to 911 participants over an eight week period. Venous blood samples were collected from each participant and tested with a Treponema pallidum immunochromatographic test.

Results: There were about 18 women (1.98%) tested positive to syphilis. Prevalence rates in urban and rural areas were 2.63% and 1.32% respectively. The women from urban areas had a 3.22 (95% CI 1.05-9.85) increased risk of acquiring syphilis when compared to the rural dwellers. Women with tertiary level of education had a significantly reduced risk of acquiring syphilis compared to those with primary level education while having an unemployed husband increased the risk of acquiring the infection by 10 times.

Conclusion: Though VDRL is part of routine antenatal care screening, a policy of its use in the screening of all women receiving antenatal care in Akwa Ibom state should emphasized and it should be incorporated into the state Government's free antenatal care program. Preferably, a single rapid test should be employed for screening, so that women testing positive could be treated at same clinic visit. Economic empowerment of women should be accorded priority and the practice of safe sex and use of contraception, especially barrier methods should be promoted.

Key words: Akwa Ibom state; antenatal attendees; prevalence; syphilis.

Introduction

In Nigeria, the overall picture about syphilis is still unclear as there are no reliable statistics on its prevalence.[1] The clinical impression is however based on diminishing number of patients presenting with symptoms of the disease at urban hospitals, and the rarity of cardiovascular and neuro-syphilitic manifestation.[1]

Different prevalence rates were found in Nigeria, reflecting a wide geographical variation in the prevalence of the disease even within same country. At the University of Ilorin Teaching Hospital in North Central Nigeria, a prevalence of 1.7% was found among antenatal clinic attendees.[2] Other researchers working in different parts of the country have reported prevalence rates of 1.5%,[3] 0.4%,[4] 5.0%[5] and 10.0%.[6]

Access this article online	
Website: www.tjogonline.com	Quick Response Code
DOI: 10.4103/TJOG.TJOG_97_18	

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How to cite this article: Opone CA, Abasiattai AM, Utuk MN, Bassey EA. The prevalence of syphilis in pregnant women in Akwa Ibom State, Southern Nigeria. Trop J Obstet Gynaecol 2019;36:224-31.

Untreated syphilis is a significant cause of morbidities and mortalities in pregnant women. Maternal syphilis results in abortions, still births, non-immune hydrops, intra-uterine growth restriction, peri-natal death and congenital syphilis, and this remains an increasing problem in many countries of sub-Saharan Africa.[7] While appropriate treatment of pregnant women often prevents such complications, the major deterrent to treatment has been the inability to identify the infected women.

In parts of the world where the traditional 'venereal diseases' have not been controlled, like in sub-Saharan Africa, the magnitude of the problems associated with congenital syphilis is reminiscent of those faced in the Western World during the early 1900s. Scarce data on congenital syphilis in Africa suggested that 1-3% of the neonates and infants less than 6 months of age are sero-reactive and/or have signs of congenital infection.[7,8] In Ethiopia, an estimated 5.0% of all pregnancies were reported to be lost each year through syphilis induced abortions (75,000 pregnancy loses).[9] In that same country, the stillbirth among sero-reactive women was 5 times more common than in sero-negative women.[9] In Zambia, 24.0% of all stillbirths could be attributed to syphilis, and congenital syphilis was implicated in 30.0% of all peri-natal mortality.[10]

Pregnant women who are at increased risk for syphilis infection include uninsured women, women living in poverty, sex workers, illicit drug users, and women in communities with high syphilis morbidity.[11] Evidence exists that screening tests can adequately detect syphilis infection.[11] The United States Preventive Services Task Force (USPSTF) found convincing observational evidence that universal screening of pregnant women decreases the proportion of infants with clinical manifestations of syphilis infection.[12] However, screening and treatment may result in false-positive results that require clinical evaluation, leading to unnecessary anxiety to the patient and potential antibiotic toxicity.[12] The USPSTF concluded that the harm from screening is no greater than small, and that the net benefit for screening is substantial to pregnant women. In 2004, USPSTF reviewed the evidence on screening for syphilis in pregnant women, and in 2008, a targeted literature review determined that the net benefit of screening pregnant women continues to be well established.[12]

Routine serological testing for syphilis during pregnancy has been performed in many countries for over fifty years and in a few tertiary health institutions in Nigeria since the 1960s.[13] Syphilis during pregnancy in the Western world today is rare,[14] and this is largely due to effective antenatal screening. However, maternal syphilis remains an increasing problem in many countries of sub-Saharan Africa.[15] Despite the cost effectiveness of screening,[15] there is no national policy for ante-natal screening in Nigeria.[15]

There is paucity of data on syphilis among pregnant women in southern Nigeria, and the few available studies were conducted only in tertiary hospitals which may not be entirely representative of what obtains in the community or general population. Hence, determining the prevalence of syphilis among pregnant women obtaining antenatal care in various hospitals in our environment will help strengthen the case for routine screening of all pregnant women in the state for syphilis. Again, determining the rural/urban prevalence pattern in the state, as well as the specific risk factors associated with syphilis in pregnant women would help the state government institute health friendly policies, which will be aimed at promoting women's reproductive and sexual health. This cross-sectional study aimed at determining the prevalence of, as well as specific risk factors for syphilis in pregnant women attending ante-natal clinics in Akwa Ibom state.

Methodology

Study design

This was a cross-sectional survey, involving twelve hospitals in Akwa Ibom state.

Sites of study

The University of Uyo Teaching Hospital, which is the only tertiary health facility in the state, and General Hospitals in Ikot Ekpene and Oron were used for the study. From a list of hospitals in the state, obtained from the Office of the Director of Health, Hospitals Management Board, nine Primary Health Centres (PHC) in the three senatorial districts, were selected.

Target population

For the purpose of this study, hospitals in the state were designated as being located in urban or rural areas based on the Nigerian Population Commissions' definition of urban and rural areas. Rural area is defined by the National Population Commission (NPC) as single geographic settings or communities with a population of less than 25,000 people, and urban as areas having population of greater than 50,000. Semi-urban is designated as areas with populations between 25,000 and 50,000 people.[16,17] For the purpose of this study, semi-urban areas were considered as rural.

Major urban centres in Akwa ibom state include Uyo, Eket, Ikot Ekpene, Abak, Ikot Abasi and Oron. Hospitals in these towns are designated as urban. UUTH and General Hospitals in Ikot Ekpene and Oron were used for the study because

they were the major hospitals located in the headquarters of each of the senatorial districts of the state.

All pregnant women attending antenatal clinics at the chosen hospitals during the period of the study were recruited.

All pregnant women attending their booking clinic were informed about the purpose of the study, and confidentiality of any information provided was assured, by the participants filling the questionnaire in the consulting rooms immediately after consultation with the attending physician. Trained assistants helped the non-educated participants fill the questionnaire in a dedicated room that ensured privacy. Confidentiality was further ensured by the participants appending their initials, instead of names on the questionnaire.

Participation in the study was voluntary, with the right to opt out at any point. All consenting pregnant women were made to sign an already prepared consent form. They were recruited into the study, and numbers were given to all consenting women. The non-educated participants who could not sign their signatures used their thumb prints.

Determination of sample size

An earlier study done at the University of Uyo Teaching Hospital gave a sero-prevalence of syphilis of 2.2% in pregnant women attending the antenatal clinic.[18] This survey was used as a pilot study in determining the minimum sample size for this study.

The minimum sample size was determined, assuming 99% confidence interval, using the formula:

$N = Z^2\ 1\text{-}a \times Pq/d^2$

Where;

N = minimum sample size

$Z^2\ 1\text{-}a = 1.96$

P = Prevalence

Q = 1-P

d = degree of freedom (1%)

$$N = \frac{(1.96)^2 \times 0.022 \times 1 - 0.022}{0.01 / 0.01}$$

N = 826.5

N = 827

Assuming 10% attrition for the event of incomplete data collection, the minimum sample size for the survey was 910. To reduce potential for bias in the study, a ratio of 1:1 was assumed in allocating subjects to both urban and rural arms of the study.

From a minimum sample size of 910 subjects, a minimum of 455 participants were recruited into each arm of the study.

Multistage sampling was used to choose the rural centres for the survey in the three senatorial districts of the state.

Sampling techniques

The total population expected to register for antenatal care at UUTH within the study period was 560 ('N'). The desired sample size was 152. A systematic sampling technique was used. Every K^{th} number from the sampling frame was selected at every booking clinic day, where K is the sampling interval.

K = N/n

N = Total population,

n = proposed sample size

K = 560/152

K = 3.68

A sampling interval of 3 was used. The starting number was the first woman that presented for booking for that day if she met the inclusion criteria.

From the estimated 240 attendees in the General Hospitals, the first 152 women presenting for booking who met the criteria were recruited into the study.

A minimum sample size of 455 was obtained from an estimated total population of 504 in the Primary Health Centres, by recruiting participants who met the inclusion criteria on a 'first come' basis.

Exclusion criterion

Any pregnant woman who did not consent was excluded from the study.

This was a hospital based study, carried out at the booking clinic at the selected hospitals across the three

senatorial districts of Akwa Ibom state over an eight-week period (February 3rd, 2014-March 31st, 2014).

Trainings were organized for the assistants (nurses in the antenatal clinics) in each centre of the study on administration of the questionnaires, blood sample collection, sample handling and transportation to the laboratory.

A pilot study involving 100 antenatal clinic attendees was done to correct initially undetected errors in the interpretation of the questionnaire. In the pilot study, 50 attendees were each recruited into both urban and rural arms of the study.

A structured questionnaire was administered to each eligible respondent by trained assistants (nurses in the antenatal clinic) after the purpose; general content and confidentiality of the study were explained to them. Trained assistants assisted respondents (mainly the non-educated) having difficulties with the questionnaires.

Blood samples were collected from respondents by the trained assistants, who facilitated transportation of same to the microbiology laboratory of the University of Uyo Teaching Hospital.

The collected blood samples were allowed to clot and serum subsequently tested for syphilis with Acon Ultra Rapid Syphilis test strip (ACON laboratory Inc, USA),

Data analysis

Data were entered into and analysed using SPSS 20.

Categorical data were reported as frequency (and percentages), while continuous data were reported as mean +/- Standard Deviation (for normally distributed data), or median inter-quartile range for non-normally distributed data.

The Chi square was used in comparing proportions of categorical variables between the urban and rural populations, while the student *t*-test (or its non-parametric equivalent, the Mann Whitney U test) was used in comparing the continuous variables.

A multivariate logistic regression model was employed in determining the independent risk factors for syphilis infection.

Ethical consideration

The participation of subjects in this research was voluntary, and the principle of patient confidentiality was strictly adhered to. Each participant was duly counselled and a prepared consent form signed by her.

Participants with syphilis were treated with 2.4 million units of intramuscular Benzathine Penicillin G at whatever gestational age. They were re-tested at the beginning of the third trimester, and further treatment with intramuscular Benzathine Penicillin G was given, when necessary. The United States Centres for Disease Control and Prevention (CDC) recommends intramuscular Penicillin G as the only known effective treatment for preventing maternal transmission of syphilis to the fetus, and treating fetal infection when it occurs.[19]

Formal approval was obtained from the Research Ethical Committee of the University of Uyo Teaching Hospital, and written permission was granted by the Akwa Ibom State Ministry of Health for the other hospitals involved in the study.

Results

A total of 911 pregnant women receiving antenatal care in Akwa Ibom state were recruited into the study over an eight-week period, out of which 456 were recruited in the urban areas and 455 in the rural areas.

Table 1 shows the socio-demographic variables and rural urban prevalence of syphilis in women attending antenatal clinics in Uyo.

The mean age of participants in the study was 29.6 ± 5.37 years.

The mean gestational age of participants in the study was 21.3 ± 6.7 weeks. Women in urban areas booked for antenatal care at a slightly earlier gestational age of 20.5 ± 7.0 weeks, compared to 22.1 ± 6.3 weeks, ($P = 0.003$) for women in rural areas.

Majority of participants in both urban and rural areas were married; 856 (94.00%). However, more pregnant women who were single, 34 (7.49%) were found in rural areas, compared to 13 (2.9%) in the urban areas.

Most of the participants had tertiary level education in both rural and urban areas; 441 (48.51%). However, more women in the urban areas had tertiary level education compared to their rural counterparts; 280 (61.50%) against 161 (35.50%). 530 (59.09%) of the participants had husbands with tertiary level education, with husbands to urban dwellers having more tertiary education than those of their rural counterparts, 301 (66.90%) against 229 (51.20%), $P < 0.001$.

About half of the participants, 452 (50.39%) were married to professionals, with more of the urban respondents having

Table 1: The socio-demographic variables of women

	URBAN (*n*=456)	RURAL (*n*=455)	χ^2/t	*P*	Total (*n*=911)
Age in years (mean±sd)	29.8±5.10	29.3±5.10	-1.44	0.16	29.6±5.37
Gestational age in weeks (mean±sd)	20.50±7.00	22.10±6.30	3.58	0.003	21.3±6.70
Marital status *n* (%)					
Married	439 (96.3)	417 (91.7)	9.95	0.002*	856 (93.73)
Single	13 (2.90)	34 (7.49)			47 (5.16)
Divorced/separated	1 (0.24)	1 (0.20)			2 (0.22)
Widowed	3 (0.72)	3 (0.61)			6 (0.66)
Educational Status *n* (%)					
None	4 (0.90)	2 (0.40)	69.35	<0.001	6 (0.90)
Primary	21 (4.60)	38 (8.40)			59 (6.49)
Secondary	150 (32.90)	253 (55.70)			403 (44.33)
Tertiary	280 (61.50)	161 (35.50)			441 (48.51)
Occupation *n* (%)					
Unemployed	165 (36.30)	172 (38.00)	35.60	<0.001	337 (37.11)
Unskilled	21 (4.60)	36 (7.93)			57 (6.28)
Semi-skilled	96 (21.10)	147 (32.50)			243 (26.76)
Professional	173 (38.00)	98 (21.60)			271 (29.85)
Tribe *n* (%)					
Ibibio	183 (40.20)	159 (35.09)	44.60	<0.001	342 (37.62)
Annang	122 (26.80)	107 (23.60)			229 (25.19)
Oron	29 (6.40)	78 (17.20)			107 (11.77)
Eket	38 (8.40)	66 (14.50)			104 (11.44)
Others	83 (18.20)	44 (9.70)			127 (13.97)
Husband's education *n* (%)					
None	4.00 (0.73)	2.00 (0.40)	26.30	<0.001	6.00 (0.67)
Primary	12.00 (2.19)	10.00 (2.20)			22 (2.50)
Secondary	133 (29.50)	206 (46.10)			339 (37.79)
Tertiary	301 (66.90)	229 (51.20)			530 (59.09)
Husband's occupation *n* (%)					
Unemployed	31 (6.90)	32 (6.90)	35.50	<0.001	62 (6.91)
Unskilled	12 (2.70)	9 (1.85)			21 (2.34)
Semi-skilled	139 (30.90)	223 (49.90)			362 (40.36)
Professional	268 (59.50)	184 (41.98)			452 (50.39)
Multiple sex partners *n* (%)	374 (82.02)	442 (97.14)	1.32	0.52	816 (89.57)
Single sex partner *n* (%)	82 (17.98)	13 (2.86)	1.32	0.52	95 (10.43))

husbands that were professionals, 268 (59.50%), compared to rural respondents, 184 (41.20%).

In the urban areas, 374 (82.02%) pregnant women admitted to have had multiple sexual partners, while 442 (97.14%) reported same in the rural areas. 82 (17.98%) respondents in the urban areas reported having had a single sex partner, while 13 (2.86%) of their rural counterparts reported same. All the pregnant women who tested positive to syphilis reported a positive history of having had multiple sexual partners. Having multiple sex partners is a significant risk factor for syphilis infection.

Prevalence of syphilis

From 911 pregnant women who participated in the study, 18 tested positive to syphilis, giving a prevalence of 1.98%.

The prevalence of syphilis from this study was 1.98% (prevalence of syphilis in urban areas was 2.63% while that in rural areas was 1.32%). There was no statistically significant difference in the prevalence of syphilis in urban compared to rural areas at univariate level.

Table 2 shows the logistic regression model for independent predictors of syphilis infection.

At multivariate analyses, the women from the urban areas had a 3.22 (95% CI 1.05 – 9.85) time increased risk of syphilis compared to the rural dwellers after adjusting for marital status, age, educational level, number of children and husband's occupation. Women with tertiary level education had a significantly reduced risk of syphilis infection, 0.08 (0.08-0.80) compared to those with primary education. Having a husband who was unemployed increased the risk of having syphilis by ten times, 9.79 (1.55-61.94) after adjusting for other variables in the model.

Discussion

Thus, the overall prevalence of syphilis in pregnant women attending ante-natal clinics in this study was 1.98%. This prevalence rate is similar to a rate of 2.2% obtained from an earlier study by Onwuezube *et al.* at the University of Uyo Teaching Hospital.[18] The prevalence rate of 1.98% in this

Table 2: The logistic regression model for independent predictors of syphilis infection

	Univariate models OR (95%CI) *P*	Multivariate models* OR (95%CI) *P*
Age (years)	0.93 (0.85-1.02) 0.14	1.04 (0.91-1.18) 0.54
Residence		
Rural	1	1
Urban	2.02 (0.75-5.44) 0.16	3.22 (1.05-9.85) 0.04
Marital Status		
Married	1	1
Single	3.82 (1.07-13.7) 0.04	0.88 (0.86-9.11) 0.92
Educational level		
Primary	1	1
Secondary	0.62 (0.17-2.25) 0.47	0.60 (0.12-3.00) 0.53
Tertiary	0.85 (0.01-0.52) 0.01	0.08 (0.08-0.80) 0.03
Number of children	0.78 (0.52-1.19) 0.25	0.77 (0.44-1.35) 0.36
Husband's occupation		
Professional	1	1
*Semi-skilled	6.39 (1.39-29.36) 0.017	3.09 (0.56-17.14) 0.18
Unemployed	15.51 (2.78-86.59) 0.002	9.79 (1.55-61.94) 0.02
Gestational age (weeks)	0.87 (0.65-1.16) 0.34	0.72 (0.50-1.05) 0.07

*Semi-skilled labour does not require advanced training or specialized skills, but it does require more skills than an unskilled labour job[20]

study is also similar to 1.7% reported in Ilorin[2] and 1.5% in Benin.[3] It is however higher than prevalence rates of 0.4%[4] in Yola, but lower than 5.0% in Yenagoa,[5] and 10.0% in Osogbo[6] respectively. In Nigeria, the overall picture of syphilis prevalence is still unclear as shown by this wide variation in prevalence rates amongst pregnant women. Varying prevalence rates were also found in other sub-Saharan countries; a rate of 2.5% was reported in Burkina Faso and 17.4% in Cameroon.[21,22]

The differences in the sero-prevalence of syphilis infection in the different populations of pregnant women within and outside Nigeria from the literature might be a reflection of the variation in sexual practices and sexual behaviour of the communities where the studies were carried out. It may also be due to geographical variation, differences in accessibility to treatment of STIs, cultural practices, and differences in the laboratory techniques employed to detect syphilis infection. The much higher sero-prevalence rates found for syphilis from Southern Africa[9,10] (i.e. Zambia, Malawi and Mozambique) might be due to the high rates of STIs and unsafe sexual practices as well as the higher prevalence rates of HIV/AIDS infection in that part of Africa.[23]

The wide variation in prevalence in Nigeria could also be due to most of the survey being conducted at tertiary hospitals located in urban areas. None of the above studies in Nigeria specifically addressed the prevalence of syphilis in pregnant women receiving antenatal care in rural settlements. This was addressed in this study.

Prevalence rate of syphilis found in this study was higher than an estimated prevalence of 0.37% (CI 0.1-1.1) in Akwa Ibom state, and overall national prevalence of 1.5% in the 2005 National HIV/Syphilis Sentinel Survey.[24] Workers in Ibadan at various times have reported progressively lower values on screening. Oyelese *et al.,* in 1990 reported 2.3%,[25] Adewole *et al.,* in 1997 reported 1.55%,[26] while Obisesan *et al.,* in 1999 reported 1.1%.[27] In Enugu, south-eastern Nigeria screening values of 3.06%, 1.3% and 0.125% have been reported by successive investigators.[28-30] Sero-prevalence during pregnancy is generally low in developed countries: it ranges from 0.02% in Europe to a nationwide incidence rate of 2.4 per 100,000 persons for primary and secondary cases of syphilis infection in the United States. This is due to increased screening during the antenatal period, and prompt treatment of detected cases.

These reports from Nigeria suggest a gradual reduction in the prevalence of syphilis in these obstetric populations. As a result of these, Obisesan *et al.* in 1999 suggested that screening for syphilis was no longer cost effective and recommended that the practice be discouraged.[27] However, Taiwo *et al.* also working in south-west Nigeria, more recently reported a prevalence of 9.9%,[29] and strongly advised that the practice continue. Watson-Jones *et al.* working in Tanzania noted wide variations in the values reported at various sites in that country, and attributed these to basic misunderstandings about the testing procedure among the health workers and a lack of refresher training and quality assurance of program activities.[30] It may thus be premature to discourage the practice of screening for syphilis without conclusively confirming these low rates in various obstetric populations in the country, using tests with higher sensitivity.

The implication of syphilis infection in pregnancy is the severe impact on pregnancy outcome, primarily as spontaneous abortion, still birth and vertical transmission resulting in congenital syphilis.

There was no statistically significant difference in the prevalence of syphilis in urban compared to rural areas following univariate analysis, and this was observed when other possible influencers to the risk of infection were disregarded. At multivariate analysis, there was increased risk of syphilis in the urban areas.

The higher prevalence of syphilis of 2.63% in the urban areas against 1.42% in the rural areas in this study accords findings in South Africa[31] but, was as at variance with findings by Kosambiya *et al.* in India, where a prevalence of 2.2% was found in both urban and rural areas.[32]

All the women who tested positive to syphilis in this study reported positive history of multiple lifetime sex partners in the past. This association however was statistically insignificant when confounders were adjusted for. Other associated risk factors for maternal syphilis were area of residence, level of education and husband's occupation. The women from the urban areas had a 3.06 time increased risk of syphilis compared to the rural dwellers after adjusting for marital status, age, educational level, number of children and husband's occupation. Women with tertiary level education had a significantly reduced risk of syphilis infection compared to those with primary education, and having a husband who was unemployed increased the risk of having syphilis by ten times after adjusting for other variables in the model. This accords findings in China, where multiple sex partners, lower educational status and low income were identified as risk factors for maternal syphilis.[33] Similar findings were also reported in Bolivia,[34] and South Africa.[30]

Limitation of the Study

Attempting to obtain information from recall of past events could be froth with errors. It was a hospital based study, thus may not be the exact picture of the prevalence of syphilis in Akwa-Ibom state.

Conclusion and Recommendations

The prevalence of 1.98% found in this study was higher than the estimated prevalence of syphilis of 0.37% amongst pregnant women in the state. This study also showed an increasing prevalence of syphilis in pregnant women attending antenatal clinics; and a higher prevalence in pregnant women residing in urban parts of the state was demonstrated. The important risk factors for syphilis in pregnant women were history of multiple lifetime sexual partners, urban residence, woman's educational level and husbands' employment status.

Hence, a policy of routine screening of all pregnant women receiving antenatal care in Akwa Ibom state should be incorporated into the state government free antenatal care program. Preferably, a single rapid test should be employed for screening, so that women testing positive could be treated at same clinic visit. Economic empowerment of women should be accorded priority and the practice of safe sex and use of contraception, especially barrier methods should be promoted.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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