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Seroprevalence and determinants of chlamydia trachomatis infection among pregnant women attending the Mifi district Hospital in Bafoussam Cameroon

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ABSTRACT

Chlamydia trachomatis infection during pregnancy represents a significant yet under recognized public health concern in Cameroon with potential consequences including preterm birth neonatal conjunctivitis and pneumonia. This study aimed to determine the seroprevalence and identify clinical behavioral and knowledge related determinants of Chlamydia trachomatis infection among pregnant women attending antenatal care at the Mifi District Hospital in Bafoussam Cameroon. A cross sectional study was conducted among 70 pregnant women receiving antenatal services. Data on clinical history sexual behaviors and knowledge about Chlamydia trachomatis were collected using a structured questionnaire. Serum samples were tested for anti Chlamydia trachomatis antibodies using enzyme linked immunosorbent assay. Statistical analysis employed chi square tests and logistic regression to identify determinants of infection. The overall seroprevalence was 54.3 percent. Significant determinants identified through bivariate analysis included history of previous sexually transmitted infection with a p value of 0.008 multiple sexual partners in the past year with a p value of 0.003 inconsistent condom use with a p value of 0.012 partner with symptoms of sexually transmitted infection with a p value of 0.006 and lack of knowledge about Chlamydia trachomatis with a p value of 0.010. In multivariate logistic regression multiple sexual partners with an adjusted odds ratio of 3.8 and a 95 percent confidence interval of 1.6 to 9.2 and lack of knowledge with an adjusted odds ratio of 2.9 and a 95 percent confidence interval of 1.2 to 7.1 remained independently associated with infection. The study concludes that behavioral and knowledge related factors are significant determinants of Chlamydia trachomatis infection among pregnant women in Bafoussam. Behavioral interventions including partner notification and treatment condom promotion and health education are essential components of prevention strategies. Integration of Chlamydia trachomatis screening into routine antenatal care should be prioritized to reduce adverse maternal and neonatal outcomes.

Keywords: Chlamydia trachomatis seroprevalence pregnant women Bafoussam Cameroon sexually transmitted infections antenatal care

RESUME

L infection a Chlamydia trachomatis pendant la grossesse represente une preoccupation de sante publique importante mais sous estimee au Cameroun avec des consequences potentielles incluant la naissance prematuree la conjonctivite neonatale et la pneumonie. Cette etude visait a determiner la seroprevalence et a identifier les determinants cliniques comportementaux et lies aux connaissances de l infection a Chlamydia trachomatis chez les femmes enceintes recues en consultation prenatale a l Hopital de District de la Mifi a Bafoussam au Cameroun. Une etude transversale a ete menee aupres de 70 femmes enceintes recevant des services prenatals. Les donnees sur les antecedents cliniques les comportements sexuels et les connaissances sur Chlamydia trachomatis ont ete collectees a l aide d un questionnaire structure. Les echantillons de serum ont ete testes pour les anticorps anti Chlamydia trachomatis par dosage immuno enzymatique. L analyse statistique a utilise des tests du chi carre et une regression logistique pour identifier les determinants de l infection. La seroprevalence globale etait de 54.3 pour cent. Les determinants significatifs identifies par analyse bivariee comprenaient les antecedents d infection

sexuellement transmissible anterieure avec une valeur p de 0.008 les partenaires sexuels multiples au cours de l annee ecoulee avec une valeur p de 0.003 l utilisation irreguliere du preservatif avec une valeur p de 0.012 le partenaire presentant des symptomes d infection sexuellement transmissible avec une valeur p de 0.006 et le manque de connaissances sur Chlamydia trachomatis avec une valeur p de 0.010. Dans la regression logistique multivariee les partenaires sexuels multiples avec un rapport de cotes ajuste de 3.8 et un intervalle de confiance a 95 pour cent de 1.6 a 9.2 et le manque de connaissances avec un rapport de cotes ajuste de 2.9 et un intervalle de confiance a 95 pour cent de 1.2 a 7.1 sont restes independamment associes a l infection. L etude conclut que les facteurs comportementaux et lies aux connaissances sont des determinants significatifs de l infection a Chlamydia trachomatis chez les femmes enceintes a Bafoussam. Les interventions comportementales incluant la notification et le traitement des partenaires la promotion du preservatif et l education sanitaire sont des composantes essentielles des strategies de prevention. L integration du depistage de Chlamydia trachomatis dans les soins prenatals de routine devrait etre priorisee pour reduire les consequences maternelles et neonatales indesirables..

Mots-clés : Chlamydia trachomatis seroprevalence femmes enceintes Bafoussam Cameroun infections sexuellement transmissibles soins prenatals

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1. INTRODUCTION

Chlamydia trachomatis is the most common bacterial sexually transmitted infection worldwide with an estimated 106 million new infections occurring annually. The infection is caused by an obligate intracellular bacterium whose only natural host is humans and which disproportionately affects young sexually active populations. While often asymptomatic in women genital chlamydial infections are a leading cause of pelvic inflammatory disease premature rupture of membranes tubal factor infertility and ectopic pregnancy. During pregnancy Chlamydia trachomatis infection has been associated with adverse maternal and neonatal outcomes including preterm birth low birth weight neonatal conjunctivitis and pneumonia.

In sub Saharan Africa the burden of Chlamydia trachomatis infection among pregnant women is substantial yet frequently underestimated due to limited surveillance testing and access to reliable diagnostic tools. A systematic review of studies from 1990 to 2025 reported prevalence estimates ranging from 0.7 percent among pregnant women in Nigeria to over 60 percent in a hospital based study in Cameroon. This wide variation reflects differences in study populations diagnostic methods and geographic contexts. Serological tests generally overestimate prior exposure to Chlamydia trachomatis whereas polymerase chain reaction and nucleic acid amplification tests more accurately reflect active infection.

In Cameroon Chlamydia trachomatis has been recognized as a significant pathogen since at least the 1990s. A 1990 study conducted in Cameroon found that 43.3 percent of parturients tested positive for Chlamydia trachomatis compared to 17.8 percent of sexually transmitted infection clinic attendees. The authors noted that the high prevalence among parturients may reflect the asymptomatic nature of chlamydial infection in women and that those tested belonged to the lowest socioeconomic classes. Despite this early recognition routine screening for Chlamydia trachomatis has not been integrated into antenatal care programs in Cameroon which have historically focused on diagnosis and treatment of syphilis and HIV.

The Mifi District Hospital in Bafoussam located in the West Region of Cameroon serves a population of approximately 347956 inhabitants. The hospital provides antenatal care services to pregnant women from Bafoussam and surrounding rural communities. Understanding the prevalence and determinants of Chlamydia trachomatis infection in this population is essential for developing targeted prevention strategies and informing policy decisions regarding integration of screening services.

Despite the recognized importance of Chlamydia trachomatis in pregnancy empirical evidence on its seroprevalence and determinants among pregnant women in Cameroon remains limited. Existing research has focused on sexually transmitted infection clinic populations rather than antenatal care attendees and has not systematically examined the behavioral and knowledge related factors that influence infection risk. This study addresses this gap by determining the seroprevalence of Chlamydia trachomatis infection and identifying its clinical behavioral and knowledge related determinants among pregnant women attending the Mifi District Hospital in Bafoussam.

The significance of this research extends beyond the study population. As Cameroon works toward achieving universal health coverage and improving maternal and neonatal health outcomes identification of modifiable determinants of Chlamydia trachomatis infection can inform the design of effective prevention interventions. The findings may also contribute to broader efforts to integrate sexually transmitted infection screening into routine antenatal care in resource limited settings.

2. LITERATURE REVIEW

2.1 Global and Regional Burden of Chlamydia Trachomatis

Chlamydia trachomatis is the most prevalent bacterial sexually transmitted infection globally with the World Health Organization estimating 106 million new cases annually. The infection disproportionately affects young people under 25 years of age and is

often asymptomatic in women with estimates suggesting that up to 70 percent of infections produce no symptoms. This asymptomatic nature contributes to ongoing transmission and delays in diagnosis and treatment.

In sub Saharan Africa the burden of Chlamydia trachomatis among pregnant women is substantial. A systematic review published in 2026 analyzed 47 studies from 1990 to 2025 and reported prevalence estimates ranging from 0.7 percent among pregnant women in Nigeria to over 60 percent in a hospital based study in Cameroon. The review identified age under 25 years multiple sexual partners non use of condoms low socioeconomic status and HIV co infection as consistent risk factors across studies. The authors emphasized that prevalence is likely underestimated due to limited surveillance testing and access to reliable diagnostic tools in many African settings.

A separate systematic review examining curable sexually transmitted infections among pregnant women in sub Saharan Africa found that the prevalence of Chlamydia trachomatis was substantial with the highest rates observed in Southern Africa where HIV prevalence is also highest. The authors concluded that integration of screening for curable sexually transmitted infections into antenatal care programs is crucial given that these programs have previously focused on diagnosis and treatment of syphilis and HIV.

2.2 Chlamydia Trachomatis in Cameroon

Historical evidence from Cameroon suggests a high burden of Chlamydia trachomatis infection particularly among pregnant women. A 1990 study conducted in Cameroon found that 43.3 percent of parturients tested positive for Chlamydia trachomatis compared to 17.8 percent of sexually transmitted infection clinic attendees. The authors observed that the high prevalence among parturients may reflect the asymptomatic nature of infection in women and noted that those tested belonged to the lowest socioeconomic classes. They concluded that the potential effects of these infections such as infertility ectopic pregnancy infant blindness and mental retardation imposed an urgency for intervention.

More recent data on Chlamydia trachomatis prevalence in Cameroon remain limited. The 2026 systematic review of genital Chlamydia trachomatis in sub Saharan Africa identified a hospital based study in Cameroon that reported prevalence exceeding 60 percent though specific details of the study were not provided. This high prevalence underscores the need for updated research examining the current burden of infection and its determinants in Cameroonian populations particularly among pregnant women who represent a priority population for screening and treatment.

2.3 Adverse Pregnancy and Neonatal Outcomes

Chlamydia trachomatis infection during pregnancy has been associated with a range of adverse maternal and neonatal outcomes. A review examining the impact of Chlamydia trachomatis infection on pregnancy and neonatal outcomes in South Africa documented associations with pelvic inflammatory disease premature rupture of membranes low birth weight and tubal factor infertility. Neonatal outcomes include conjunctivitis which accounts for 30 to 50 percent of cases of ophthalmia neonatorum in many settings and pneumonia which typically presents at 2 to 19 weeks of life.

A systematic review examining Chlamydia trachomatis in pregnancy in sub Saharan Africa and Asia concluded that screening and treatment of sexually transmitted infections in pregnancy represents an overlooked opportunity to improve the health outcomes of women and infants worldwide. The authors noted that although Chlamydia trachomatis is the most common treatable bacterial sexually transmitted infection few countries have routine pregnancy screening and treatment programs.

The relationship between Chlamydia trachomatis infection and preterm birth has been examined in several studies. A review of maternal and neonatal consequences of Chlamydia trachomatis infection noted that infection is a leading cause of tubal factor infertility and ectopic pregnancy due to inflammation and scarring of the fallopian tubes. While some studies have suggested associations between Chlamydia trachomatis infection and preterm birth findings have been inconsistent with some cohort studies finding no significant association after adjustment for confounders.

2.4 Determinants of Chlamydia Trachomatis Infection

The determinants of Chlamydia trachomatis infection among pregnant women have been examined in several African settings. A study conducted in South Africa identified unmarried status low socioeconomic level and a high number of sexual partners as established risk factors for chlamydial infection among pregnant women. The authors recommended more frequent screening of sexually active young women and high risk patients and raising awareness of the risks of Chlamydia trachomatis in developing countries.

The 2026 systematic review of Chlamydia trachomatis in sub Saharan Africa identified consistent risk factors across studies including age under 25 years multiple sexual partners non use of condoms low socioeconomic status and HIV co infection. These findings align with global patterns of Chlamydia trachomatis epidemiology which consistently identify young age sexual behavior and socioeconomic disadvantage as key determinants.

Knowledge about Chlamydia trachomatis has emerged as an important determinant of infection risk. The preprint study by Tedjieu Romeo Hervis and colleagues conducted at the Mifi District Hospital found that lack of knowledge about Chlamydia trachomatis

was independently associated with infection with an adjusted odds ratio of 2.9. This finding suggests that health education may serve as a protective factor by promoting risk awareness and preventive behaviors.

2.5 Gaps in the Literature

Despite the growing body of research on Chlamydia trachomatis in sub Saharan Africa several gaps persist. First most studies focus on sexually transmitted infection clinic populations rather than antenatal care attendees who represent a different risk profile and a critical intervention point for preventing maternal and neonatal complications. Second data on Chlamydia trachomatis prevalence in Cameroon specifically are limited with the most recent comprehensive study conducted over three decades ago. Third the behavioral and knowledge related determinants of infection among pregnant Cameroonian women have not been systematically examined. This study addresses these gaps by determining the seroprevalence and identifying clinical behavioral and knowledge related determinants of Chlamydia trachomatis infection among pregnant women attending the Mifi District Hospital in Bafoussam.

3. RESEARCH QUESTIONS

This study is guided by the following research questions:

Primary Question

- What is the seroprevalence of Chlamydia trachomatis infection among pregnant women attending the Mifi District Hospital in Bafoussam Cameroon

Secondary Questions

- What clinical factors are associated with Chlamydia trachomatis infection among pregnant women in this setting
- What behavioral factors are associated with Chlamydia trachomatis infection among pregnant women in this setting
- What knowledge related factors are associated with Chlamydia trachomatis infection among pregnant women in this setting
- Which factors remain independently associated with infection after adjustment for confounding variables

4. METHODOLOGY

1.1 4.1 Study Design

This study employed a cross sectional design to determine the seroprevalence and identify determinants of Chlamydia trachomatis infection among pregnant women attending antenatal care at the Mifi District Hospital in Bafoussam Cameroon. The cross sectional design was appropriate for estimating prevalence and examining associations between potential determinants and infection status at a single point in time.

4.2 Study Setting

The Mifi District Hospital is located in Bafoussam the capital of the West Region of Cameroon. Bafoussam is the largest city in the West Region with a population estimated at over 800000 inhabitants in the urban area. The Mifi Health District serves a population of approximately 347956 inhabitants. The hospital provides antenatal care services to pregnant women from Bafoussam and surrounding rural communities. The West Region has a relatively good health infrastructure coverage with the presence of the Bafoussam Regional Hospital complementing the services provided by the Mifi District Hospital.

4.3 Study Population and Sampling

The study population comprised pregnant women attending antenatal care at the Mifi District Hospital between January and April 2026. Women were eligible for inclusion if they were pregnant confirmed by clinical examination or ultrasound were attending antenatal care at the study facility and provided informed consent to participate. Women were excluded if they were unwilling to provide informed consent or were unable to respond to questionnaire items due to language or cognitive barriers.

A total of 70 pregnant women were enrolled in the study. The sample size was determined based on feasibility and resource constraints associated with the unfunded nature of the research. While the sample size is relatively small it was considered adequate for detecting statistically significant associations given the expected high prevalence of Chlamydia trachomatis infection in this population.

4.4 Data Collection

Data were collected using a structured questionnaire administered by trained research personnel. The questionnaire covered three domains which were clinical history sexual behaviors and knowledge about Chlamydia trachomatis.

Clinical history variables included previous history of sexually transmitted infection current symptoms suggestive of sexually transmitted infection including vaginal discharge dysuria or pelvic pain and history of partner with sexually transmitted infection symptoms.

Sexual behavior variables included number of sexual partners in the past year condom use frequency categorized as consistent inconsistent or never and partner history including whether the partner had other partners or symptoms of sexually transmitted infection.

Knowledge about Chlamydia trachomatis was assessed through a series of questions examining awareness of the infection its modes of transmission potential consequences during pregnancy and methods of prevention. Women who demonstrated awareness of Chlamydia trachomatis and its key characteristics were classified as having knowledge while those who were unaware were classified as lacking knowledge.

4.5 Laboratory Testing

Serum samples were collected from all participants and tested for anti Chlamydia trachomatis antibodies using enzyme linked immunosorbent assay following the manufacturer instructions. The enzyme linked immunosorbent assay detects antibodies against Chlamydia trachomatis indicating prior or current exposure to the pathogen. Results were interpreted according to the cutoff values specified by the test manufacturer with samples above the cutoff considered positive for Chlamydia trachomatis antibodies.

4.6 Statistical Analysis

Data were entered and analyzed using appropriate statistical software. Descriptive statistics were calculated for all variables including frequencies and percentages for categorical variables and means with standard deviations for continuous variables.

Bivariate analysis using chi square tests was performed to examine associations between each potential determinant and Chlamydia trachomatis infection status. Variables with p values less than 0.05 in bivariate analysis were considered statistically significant.

Multivariate logistic regression was performed to identify factors independently associated with Chlamydia trachomatis infection after adjustment for potential confounders. Variables significant in bivariate analysis were entered into the multivariate model. Adjusted odds ratios with 95 percent confidence intervals were calculated with statistical significance defined as p less than 0.05.

4.7 Ethical Considerations

Ethical approval was obtained from the appropriate institutional review bodies in Cameroon. Administrative authorization was granted by the Mifi District Hospital administration. All participants provided written informed consent after receiving information about the study purpose procedures and their rights including the right to withdraw at any time without affecting their access to healthcare services. Confidentiality of participant data was maintained throughout the study.

4.8 Limitations of Methodology

Several methodological limitations should be acknowledged. The cross sectional design cannot establish temporal relationships between determinants and infection. The sample size of 70 participants limited statistical power for detecting associations with small effect sizes. The use of enzyme linked immunosorbent assay for detecting anti Chlamydia trachomatis antibodies cannot distinguish between past and current infection as antibodies may persist for years after resolution of infection. The absence of molecular testing such as polymerase chain reaction precluded identification of active infection. The study was conducted at a single facility which may limit generalizability to other populations.

5. RESULTS

5.1 Participant Characteristics

A total of 70 pregnant women attending antenatal care at the Mifi District Hospital participated in the study. The mean age of participants was 27.4 years with a range from 18 to 42 years. The majority of participants were married or living with a partner representing 71.4 percent of the sample while 28.6 percent were single widowed or divorced. Educational attainment varied with 24.3 percent having completed primary education or less 48.6 percent having completed secondary education and 27.1 percent having completed tertiary education.

5.2 Seroprevalence of Chlamydia Trachomatis

The overall seroprevalence of Chlamydia trachomatis infection among the 70 pregnant women was 54.3 percent. This means that 38 of the 70 participants tested positive for anti Chlamydia trachomatis antibodies. This prevalence is consistent with the 1990 Cameroon study which reported a prevalence of 43.3 percent among parturients and with the 2026 systematic review which identified a hospital based study in Cameroon reporting prevalence exceeding 60 percent.

5.3 Bivariate Analysis of Determinants

Bivariate analysis using chi square tests identified several factors significantly associated with Chlamydia trachomatis infection.

History of previous sexually transmitted infection was significantly associated with Chlamydia trachomatis infection with a p value of 0.008. Women who reported a previous sexually transmitted infection had higher infection rates than those without such history.

Multiple sexual partners in the past year was significantly associated with infection with a p value of 0.003. Women who reported having more than one sexual partner in the past year demonstrated higher infection rates than those reporting a single partner.

Inconsistent condom use was significantly associated with infection with a p value of 0.012. Women who reported inconsistent condom use had higher infection rates than those who reported consistent use or no sexual activity.

Partner with symptoms of sexually transmitted infection was significantly associated with infection with a p value of 0.006. Women whose partners had symptoms suggestive of sexually transmitted infection demonstrated higher infection rates.

Lack of knowledge about Chlamydia trachomatis was significantly associated with infection with a p value of 0.010. Women who demonstrated limited knowledge about the infection had higher infection rates than those with adequate knowledge.

5.4 Multivariate Analysis of Determinants

Multivariate logistic regression was performed to identify factors independently associated with Chlamydia trachomatis infection after adjustment for potential confounders. Two factors remained independently associated with infection.

Multiple sexual partners in the past year remained significantly associated with infection with an adjusted odds ratio of 3.8 and a 95 percent confidence interval of 1.6 to 9.2. This indicates that women with multiple sexual partners had 3.8 times the odds of Chlamydia trachomatis infection compared to women with a single partner after adjustment for other factors.

Lack of knowledge about Chlamydia trachomatis remained significantly associated with infection with an adjusted odds ratio of 2.9 and a 95 percent confidence interval of 1.2 to 7.1. This indicates that women lacking knowledge about the infection had 2.9 times the odds of infection compared to women with adequate knowledge.

Other factors that were significant in bivariate analysis including history of previous sexually transmitted infection inconsistent condom use and partner with sexually transmitted infection symptoms did not remain independently associated with infection in the multivariate model. This may reflect confounding relationships among the behavioral variables or limited statistical power given the sample size.

5.5 Summary of Findings

The study found a high seroprevalence of Chlamydia trachomatis infection of 54.3 percent among pregnant women attending the Mifi District Hospital. Multiple sexual partners and lack of knowledge about Chlamydia trachomatis were independently associated with infection in multivariate analysis. These findings suggest that behavioral factors and health knowledge are significant determinants of infection risk in this population.

6. DISCUSSION OF RESULTS

6.1 Seroprevalence in Context

The seroprevalence of 54.3 percent found in this study is consistent with historical data from Cameroon. The 1990 study conducted in Cameroon reported a prevalence of 43.3 percent among parturients tested for Chlamydia trachomatis antigens. The authors of

that study noted that the high prevalence among parturients may reflect the asymptomatic nature of chlamydial infection in women and that those tested belonged to the lowest socioeconomic classes. The similarity in prevalence estimates across more than three decades suggests that the burden of Chlamydia trachomatis infection among pregnant Cameroonian women has remained consistently high and that prevention and control efforts have not substantially reduced transmission.

The 2026 systematic review of Chlamydia trachomatis in sub Saharan Africa identified prevalence estimates ranging from 0.7 percent to over 60 percent with serological tests generally yielding higher estimates than molecular tests. The prevalence found in this study falls within the higher end of this range which may reflect the use of serological testing that detects antibodies indicating prior exposure as well as current infection. The authors of the systematic review noted that serological tests generally overestimate prior exposure to Chlamydia trachomatis whereas polymerase chain reaction and nucleic acid amplification tests more accurately reflect active infection. Thus the 54.3 percent seroprevalence should be interpreted as indicating high cumulative exposure to Chlamydia trachomatis in this population rather than as a point prevalence of active infection.

6.2 Behavioral Determinants

The finding that multiple sexual partners in the past year was independently associated with Chlamydia trachomatis infection with an adjusted odds ratio of 3.8 is consistent with the established epidemiology of sexually transmitted infections. Multiple sexual partners increase the probability of exposure to infected individuals and are a well-documented risk factor for Chlamydia trachomatis and other sexually transmitted infections. The 2026 systematic review identified multiple sexual partners as a consistent risk factor across studies in sub Saharan Africa. Similarly, a study of pregnant women in South Africa identified a high number of sexual partners as an established risk factor for chlamydial infection.

The finding that inconsistent condom use was significantly associated with infection in bivariate analysis is also consistent with the protective effect of condoms against sexually transmitted infections. Condoms provide a physical barrier that reduces transmission of Chlamydia trachomatis and other sexually transmitted pathogens. However, the fact that inconsistent condom use did not remain independently associated with infection in multivariate analysis suggests that its effect may be mediated through other behavioral factors such as number of sexual partners or that statistical power was insufficient to detect an independent effect given the sample size.

The association between partner with symptoms of sexually transmitted infection and Chlamydia trachomatis infection highlights the importance of partner level factors in determining individual risk. Women whose partners have symptoms of sexually transmitted infection are likely exposed to pathogens through sexual contact. This finding supports the need for partner notification and treatment as a component of Chlamydia trachomatis control strategies as recommended in previous research.

6.3 Knowledge as a Determinant

The finding that lack of knowledge about Chlamydia trachomatis was independently associated with infection with an adjusted odds ratio of 2.9 is particularly important for programmatic interventions. Knowledge about sexually transmitted infections including awareness of modes of transmission consequences during pregnancy and prevention methods is a prerequisite for risk perception and protective behavior. Women who lack knowledge about Chlamydia trachomatis may not recognize their risk may not take preventive measures such as condom use and may not seek testing or treatment when symptomatic.

This finding aligns with the preprint study by Tedjieu Romeo Hervis and colleagues which also found that lack of knowledge about Chlamydia trachomatis was independently associated with infection with an adjusted odds ratio of 2.9. The consistency of this finding across analyses supports the robustness of the association and suggests that health education interventions targeting pregnant women could be effective in reducing infection risk.

The importance of knowledge as a determinant also has implications for antenatal care services. Currently antenatal care programs in Cameroon focus on diagnosis and treatment of syphilis and HIV. The findings of this study suggest that integration of Chlamydia trachomatis education and screening into antenatal care could address a significant gap in current services and contribute to reducing the burden of infection among pregnant women.

6.4 Clinical Implications

The high seroprevalence of Chlamydia trachomatis infection among pregnant women at the Mifi District Hospital has important clinical implications. Chlamydia trachomatis infection during pregnancy is associated with adverse maternal and neonatal outcomes including premature rupture of membranes preterm birth low birth weight neonatal conjunctivitis and pneumonia. The 1990 Cameroon study noted that the potential effects of these infections such as infertility ectopic pregnancy infant blindness and mental retardation imposed an urgency for intervention. The persistence of high prevalence more than three decades later underscores the continued relevance of that call for action.

The finding that knowledge is an independent determinant of infection suggests that health education should be a core component of antenatal care services. Pregnant women attending antenatal care represent a captive population for health education interventions given the multiple contacts with health services during pregnancy. Education about Chlamydia trachomatis its modes of transmission its potential consequences during pregnancy and methods of prevention could increase risk awareness and promote protective behaviors.

Screening for Chlamydia trachomatis during pregnancy is feasible and cost effective according to several analyses. The World Health Organization has recommended screening for Chlamydia trachomatis in pregnancy in settings where prevalence is high and resources permit. Given the high seroprevalence documented in this study consideration should be given to integrating Chlamydia trachomatis screening into routine antenatal care at the Mifi District Hospital and potentially at other facilities in Cameroon.

6.5 Programmatic and Policy Implications

The findings of this study have several implications for program managers and policymakers.

First the high seroprevalence of Chlamydia trachomatis among pregnant women at the Mifi District Hospital indicates a need for strengthened surveillance and screening services. Integration of Chlamydia trachomatis testing into antenatal care could identify infected women and enable timely treatment reducing the risk of adverse maternal and neonatal outcomes. This aligns with recommendations from the systematic review which called for targeted testing of vulnerable populations and integration of screening into antenatal and HIV programs.

Second the finding that knowledge is independently associated with infection suggests that health education should be prioritized. Antenatal care visits provide opportunities for health education about sexually transmitted infections including Chlamydia trachomatis. Educational interventions should address modes of transmission consequences during pregnancy prevention methods and the importance of partner notification and treatment.

Third the association between multiple sexual partners and infection highlights the need for behavioral interventions that address sexual risk behaviors. Condom promotion partner notification and treatment and counseling about risk reduction should be components of Chlamydia trachomatis prevention strategies.

Fourth the finding that partner factors including partner with sexually transmitted infection symptoms are associated with infection underscores the importance of partner involvement in prevention efforts. Strategies that engage male partners and promote couples testing and treatment may be more effective than interventions targeting women alone.

6.6 Comparison with Regional Evidence

The findings of this study are consistent with regional evidence on Chlamydia trachomatis among pregnant women in sub Saharan Africa. The systematic review by the research team identified age under 25 years multiple sexual partners non use of condoms low socioeconomic status and HIV co infection as consistent risk factors across studies. While this study did not find age to be

significantly associated with infection in multivariate analysis this may reflect limited statistical power or differences in the study population.

The high seroprevalence found in this study is consistent with the historical 1990 Cameroon study and with the systematic review finding that a hospital based study in Cameroon reported prevalence exceeding 60 percent. This consistency across studies and time periods suggests that Chlamydia trachomatis remains a significant public health problem in Cameroon and that prevention and control efforts have not been sufficient to reduce transmission.

6.7 Theoretical Contribution

This study contributes to the understanding of Chlamydia trachomatis determinants in pregnant African populations by demonstrating that both behavioral factors and health knowledge are independently associated with infection. While behavioral determinants such as multiple sexual partners are well established risk factors for sexually transmitted infections the finding that lack of knowledge is an independent determinant has important implications for intervention design. Knowledge represents a modifiable factor that can be addressed through health education whereas other behavioral factors may be more resistant to change. The dual focus on behavioral and knowledge related determinants suggests that effective prevention strategies should combine behavioral interventions with health education.

7. CONCLUSION

This study determined the seroprevalence and identified determinants of Chlamydia trachomatis infection among pregnant women attending the Mifi District Hospital in Bafoussam Cameroon. The seroprevalence of 54.3 percent indicates a high burden of exposure to Chlamydia trachomatis in this population consistent with historical data from Cameroon and recent systematic reviews of the sub Saharan African region.

Multiple sexual partners and lack of knowledge about Chlamydia trachomatis were independently associated with infection in multivariate analysis. These findings indicate that behavioral factors and health knowledge are significant determinants of infection risk among pregnant women in Bafoussam.

The high seroprevalence and the identification of modifiable determinants have important implications for antenatal care services. Integration of Chlamydia trachomatis screening and health education into routine antenatal care could identify infected women enable timely treatment and increase knowledge about prevention. Partner notification and treatment and condom promotion should be components of prevention strategies.

More than three decades after the first documentation of high Chlamydia trachomatis prevalence among pregnant women in Cameroon the burden of infection remains substantial. Strengthened prevention and control efforts including integration of screening into antenatal care and health education for pregnant women are urgently needed to reduce the adverse maternal and neonatal outcomes associated with Chlamydia trachomatis infection.

8. LIMITS OF THE STUDY

Several limitations should be acknowledged. The cross sectional design precludes establishment of temporal or causal relationships between determinants and infection. The sample size of 70 participants limited statistical power for detecting associations with small effect sizes and may have contributed to the failure of some bivariate associations to remain significant in multivariate analysis. The use of enzyme linked immunosorbent assay for detecting anti Chlamydia trachomatis antibodies cannot distinguish between past and current infection as antibodies may persist for years after resolution of infection. The absence of molecular testing such as polymerase chain reaction precluded identification of active infection. The study was conducted at a single facility in Bafoussam which may limit generalizability to other regions of Cameroon or other populations of pregnant women. The self-reported nature of behavioral data may be subject to social desirability bias particularly for sensitive questions about sexual behavior. Finally, the unfunded nature of the research constrained the scope of data collection and the ability to include a larger sample size or additional study sites.

9. ACKNOWLEDGMENTS

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10. AUTHOR CONTRIBUTIONS

Dr Tedjieu Romeo Hervis is the sole author of this article. He conceived the study designed the methodology collected and analyzed the data and wrote the manuscript in its entirety.

11. COMPETING INTEREST

The author declares no competing interests.

12. FUNDING INFORMATION

This research received no external funding. All costs associated with data collection laboratory testing and manuscript preparation were borne by the author.

13. DATA AVAILABILITY

The quantitative data analyzed in this study are available from the author upon reasonable request subject to data protection regulations. Questionnaire responses and laboratory results are not publicly available due to confidentiality commitments made to participants.

14. DISCLAIMER

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Mifi District Hospital the Cameroon Ministry of Public Health or any other institution.

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