



**Original Article**

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## **Seroprevalence of Toxoplasmosis and associated risk factors in pregnant women at the Protestant Hospital, Mbouo-Bandjoun, Cameroon**

<sup>1</sup>Guemgne Tadjom, F., <sup>1</sup>Makou Tsapi, E., <sup>1</sup>Gamago, G. A., <sup>2</sup>Vignoles, P.,  
<sup>3</sup>Wabo Pone J., and <sup>4</sup>\*Djuikwo Teukeng, F. F.

<sup>1</sup>Evangelical University of Cameroon, BP 127, Bandjoun, Cameroon

<sup>2</sup>INSERM U 1094, Tropical Neuroepidemiology, Institute of Neuroepidemiology and Tropical Neurology, 2, rue du Docteur Raymond Marcland, 87025 Limoges, France

<sup>3</sup>Research Unit of Biology and Applied Ecology, Faculty of Science, BP 067, Dschang, Cameroon

<sup>4</sup>Faculty of Health Sciences, Université des Montagnes, BP 208, Bangangté, Cameroon

\*Correspondence to: Dr. F. F. Djuikwo Teukeng ([ffnouboue@yahoo.fr](mailto:ffnouboue@yahoo.fr))

### **Abstract:**

**Background:** Toxoplasmosis is a common worldwide infection caused by the protozoan *Toxoplasma gondii*. In Cameroon, several recent studies have reported high seroprevalence of this parasitosis in various hospitals (Douala, Limbe, Njinikom and Yaoundé). The aim of this study was to determine whether this high prevalence of toxoplasmosis might occur in other regions of the country.

**Methodology:** Serological tests by the indirect Enzyme Linked Immunosorbent Assay (ELISA) for IgG and IgM were carried out on 200 pregnant women (36 HIV-positive and 164 HIV-negative) at the Protestant Hospital of Mbouo-Bandjoun in western Cameroon to determine the presence of *Toxoplasma gondii* infection and to identify the risk factors associated with seropositivity of the subjects.

**Results:** The overall seroprevalence of anti-*Toxoplasma* antibodies was 45.5%. The prevalence rate was 80.5% in the HIV-positive group (47.2% IgG, 22.2% IgM and 11.1% IgG + IgM) and 37.8% in the HIV-negative group (25.6%, 9.7% and 2.4% respectively). Using a multivariate logistic regression analysis, the secondary level of educational, presence of HIV infection, and frequency of close contacts with cats were significantly associated with the prevalence of IgG and/or IgM antibodies.

**Conclusion:** Compared with previous reports of human toxoplasmosis in Cameroon, the prevalence in our study showed a decrease in the disease occurrence. Further studies are needed to determine whether this decrease is localised to our study or a general phenomenon currently affecting the country.

**Keywords:** Cameroon, IgG, IgM, pregnant women, seroprevalence, *Toxoplasma gondii*

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## **Séroprévalence de la toxoplasmose et facteurs de risque associés chez des femmes enceintes à l'Hôpital Protestant de Mbouo-Bandjoun, Cameroun**

<sup>1</sup>Guemgne Tadjom, F., <sup>1</sup>Makou Tsapi, E., <sup>1</sup>Gamago, G. A., <sup>2</sup>Vignoles, P.,  
<sup>3</sup>Wabo Pone J., and <sup>4</sup>\*Djuikwo Teukeng, F. F.

<sup>1</sup>Université évangélique du Cameroun, BP 127, Bandjoun, Cameroun

<sup>2</sup>INSERM U 1094, Neuroépidémiologie tropicale, Institut de neuroépidémiologie et de neurologie tropicale, 2, rue du Docteur Raymond Marcland, 87025 Limoges, France

<sup>3</sup>Unité de recherche en biologie et écologie appliquée, Faculté des sciences, BP 067, Dschang, Cameroun

<sup>4</sup>Faculté des sciences de la santé, Université des Montagnes, BP 208, Bangangté, Cameroun

\*Correspondance à: Dr. F. F. Djuikwo Teukeng ([ffnouboue@yahoo.fr](mailto:ffnouboue@yahoo.fr))

## Résumé:

**Contexte:** La toxoplasmose est une infection répandue dans le monde entier et causée par le protozoaire *Toxoplasma gondii*. Au Cameroun, plusieurs études récentes ont signalé une forte séroprévalence de la parasitose dans divers hôpitaux (Douala, Limbé, Njinikom et Yaoundé). Le but de cette étude était de déterminer si cette forte prévalence de la toxoplasmose pouvait se produire dans d'autres régions du pays.

**Méthodologie:** Des tests sérologiques pour quantifier les IgG et IgM par dosage indirect immunoenzymatique indirect selon la méthode ELISA ont été effectués sur 200 femmes enceintes (36 VIH-positives et 164 VIH-négatives) à l'hôpital protestant de Mbouo-Bandjoun, dans l'ouest du Cameroun, afin de déterminer la présence d'infection à *T. gondii* et d'identifier les facteurs de risque associés à la séropositivité des sujets.

**Résultats:** La séroprévalence globale des anticorps anti-*Toxoplasma* était de 45,5 %. Le taux de prévalence était de 80,5 % dans le groupe VIH-positif (47,2 % IgG, 22,2 % IgM et 11,1 % IgG + IgM) et de 37,8 % dans le groupe VIH négatif (25,6 %, 9,7 % et 2,4 %, respectivement). L'emploi d'une analyse de régression logistique multivariée a montré que le niveau secondaire d'éducation, la présence d'une infection par le VIH et la fréquence des contacts étroits avec les chats étaient significativement associés à la prévalence des anticorps IgG et/ou IgM.

**Conclusion:** Par rapport aux rapports précédents sur la toxoplasmose humaine au Cameroun, la prévalence dans notre étude a montré une diminution de la fréquence de la maladie. Des études complémentaires sont nécessaires pour déterminer si cette baisse est localisée dans notre étude ou est un phénomène général qui affecte actuellement le pays.

**Mots clés :** Cameroun, femmes enceintes, IgG, IgM, séroprévalence, *Toxoplasma gondii*

## Introduction

Toxoplasmosis is a common worldwide infection caused by the protozoan *Toxoplasma gondii*. In immunocompetent adults and children, this infection is usually asymptomatic or causes symptoms such as fever or malaise that spontaneously resolve (1, 2). Sometimes, it can induce foetal complications in pregnant women (2) and also cervical lymphadenopathy and/or ocular disease in immunocompromised patients infected with the human immunodeficiency virus (HIV) (3). This parasitosis can be contracted by ingestion of tissue cysts in undercooked contaminated meat, poorly washed raw vegetables or in contaminated drinking water (4). Cats and other members of the family Felidae are reported as the single definitive hosts because they excrete resistant oocysts in their faeces. Other mammals, including humans, serve as intermediate hosts in which the parasite can cause systemic infection that leads to the formation of tissue cysts (4).

Infection caused by *T. gondii* is considered a global zoonotic disease of public health importance. The distribution of this parasite depends on the countries and weather conditions where the oocysts survive in environment (4, 5). It is estimated that between 30% and 65% of all people in the world are infected with toxoplasma (6). Toxoplasmosis can be detected in these patients by the use of specific anti-*Toxoplasma* IgG and IgM antibodies. IgM antibodies increased from day 5 after an acute infection to reach a maximum after 1-2 months and then rapidly decreased to low or undetectable levels. In many cases, they persist for years after acute infection (7). IgG antibodies appeared later than IgM and are generally detectable within the first two weeks after infection. The peak levels of IgG occurred after a period ranging from 12 weeks to 6 months (7).

In Cameroon, several recent studies have reported high seroprevalence of toxoplasmosis in various hospitals. A prevalence of 69.9% (out of 133 men and women) was reported among HIV

patients at Yaoundé (8). The same study reported a rate of 70% among 110 pregnant women at Douala (9) within the same year. In the coastal region of Cameroon, a rate of 71.8% (out of 170 pregnant women) was reported in the health district of Limbe (10). Values close to the rates reported above were also recorded in 2016; 54.5% (out of 178 women of child-bearing age) at Njinikom, north-western region (11) and 78.6% (out of 327 pregnant women) in Douala (12). All these studies emphasize the need to sensitize pregnant women to the disease and its mode of transmission during their prenatal follow-up, in order to reduce the risk of first infection during their pregnancy.

In view of the results from these studies, it becomes necessary to investigate whether this high prevalence of toxoplasmosis might occur in other regions of Cameroon with the following two research questions; (i) what is the prevalence of this parasitosis in mountainous area located at 2000m altitude such as Western Highlands?, and what are the risk factors associated with this disease?

## **Materials and methods:**

### **Study population**

The study population consists of pregnant women attending the Protestant Hospital, Mbouo-Bandjoun (West Cameroon) for antenatal clinic and medical check-ups, enrolled by simple random sampling between June and September 2016. As about 20% of the women followed up in this hospital are HIV-positive (F. F. Djuikwo Teukeng, personal communication), patient enrolment was based on a sample size of 200 subjects in order to have a significant number of HIV-positive women ( $n > 31$ ). No exclusion criteria were used in the choice of pregnant women recruited into the study.

The subjects were from Bafoussam ( $n=103$ ), Bandjoun ( $n=55$ ) and 11 other municipalities located in the West region ( $n=19$ ). Nineteen others from Douala ( $n=14$ ) or Yaoundé ( $n=5$ ) have also consulted in this hospital. The detection of *T. gondii* antibodies was

carried out during the course of their first pregnancy for 40 of the subjects.

### **Study protocol**

Each participant in this study completed a structured questionnaire. This questionnaire contained simple questions about known risk factors of *T. gondii* exposure in addition to clinical and socio-demographic information. Blood samples were collected from each participant into two pre-labelled tubes. The blood from the EDTA-containing tube was immediately tested for the presence of anti-HIV antibodies using test strips (Alere Determine™ HIV-1/2) according to the manufacturer's recommendations. The second blood sample was centrifuged at 3000 rpm for 15 minutes to obtain the serum. The serum was stored at  $-20^{\circ}\text{C}$  and then tested for the presence of *T. gondii* antibodies using the indirect Enzyme Linked Immunosorbent Assay (ELISA) method and anti-*Toxoplasma* IgG and IgM antibody ELISA kits (Golden Bio Technologies Corporation, Upland, California, USA).

### **Ethical consideration**

Ethical clearance was obtained from the Evangelical University of Bandjoun (2016/0017) and authorization to collect and analyse blood samples was also given by the Protestant Hospital administrative authorities. All participants were informed of the study goals, procedures and finality, and all signed the informed consent form. Informed consent was provided for subjects less than 21 years by their parents or guardians.

### **Sociodemographic and risk factors**

Information about the main behavioural factors known for toxoplasmosis such as contact with cats and garden soil, consumption of undercooked and smoked meat sold along roads, raw unwashed vegetables and fruits, drinking unfiltered water, and hand washing practices (4), were collected into a structured questionnaire. Socio-demographic and clinical histories such as age, educational level, marital status, profession, place of residence, number of previous pregnancies,

gestational age of present pregnancy, and HIV status were also collected. The professions of the subjects were classified according to the criteria defined by the National Institute of Statistics in Cameroon (13).

### Statistical analysis

The overall seroprevalence of toxoplasmosis took into account the different types of antibodies studied and was assessed using the ratio between the numbers of serologically positive anti-*T. gondii* samples and that of all samples. The same protocol was used to calculate the prevalence of infection for each antibody type (IgG, IgM or IgG + IgM). These prevalence rates were given with their 95% confidence intervals. The Pearson's Chi square test was used to establish levels of significance between HIV-positive and HIV-negative groups.

Univariate logistic regression was first used to test whether potential risk factors were associated with the prevalence of infection. Variables with a *p* value less than 0.25 in univariate analysis were integrated into a multivariate logistic regression model to

control the possible effect of confounding factors. The relative risk of infection was measured using odds ratios (OR) with 95% confidence intervals. All analyses were performed with R 3.3.0 software (14).

### Results:

#### Seroprevalence of IgG & IgM antibodies

Of the 200 pregnant women involved in this study, 36 (18%) were HIV-infected while 164 (82%) were HIV-negative (Table 1). The table shows the distribution of the pregnant women in relation to HIV infection and the presence of anti-*Toxoplasma* antibodies. Overall seroprevalence rate of *T. gondii* infection was 45.5% (91/200). In the HIV-positive group, 29 of 36 (80.5%) were seropositive for toxoplasmosis; 17 (47.2%) for IgG, 7 (22.2%) for IgM and 4 (11.1%) for both antibody types. In the HIV-negative group, the seroprevalence rate was 36.5% (62 of 164) with 25.0% (42 of 164) for IgG, 9.1% (16 of 164) for IgM and 2.4% (4 of 164) for both antibody types.

Table 1: Seroprevalence of *Toxoplasma gondii* infections among pregnant women attending the Protestant Hospital, Mbouo-Bandjoun, Cameroon according to HIV status

Number of pregnant women	Population group: number of patients (prevalence in % (95% CI))		
	HIV-positive (n = 36)	HIV-negative (n = 164)	Total (n = 200)
Positive IgG	17 (47.22) (30.40-64.51)	42 (25.61) (19.10-33.00)	59 (29.50) (23.20-36.34)
Positive IgM	8 (22.22) (10.10-39.15)	16 (9.76) (5.67-15.36)	24 (12.00) (7.84-17.33)
Positive IgG + IgM	4 (11.11) (3.11-26.06)	4 (2.44) (0.67-6.13)	8 (4.00) (1.74-7.73)
Total of women with anti- <i>Toxoplasma</i> antibodies	29 (80.56) (63.90-91.81)	62 (37.80) (30.30-45.70)	91 (45.50) (38.40-52.67)

n = number of women per group; CI = confidence interval

Table 2 shows significant differences between the two groups of subjects. The number of women positive for IgG antibodies was significantly higher in the HIV-positive group than in HIV-negative patients ( $p < 0.05$ ), and the same was observed for IgM and both IgG and IgM antibodies. In each group considered separately (Table 2), the number of IgG-positive women was significantly higher than those patients positive for IgM antibodies or both types of antibodies.

Fig 1 shows the distribution of the

91 seropositive women through their pregnancy period in relation to the type of antibodies. Women with positive IgG antibodies were more in the second and third trimesters (25 and 21 subjects respectively, compared to 15 in the first trimester). The distribution of the 23 women with positive IgM antibodies was roughly uniform during the three trimesters, and the same was noted for the 8 women with both types of antibodies.

Table 2: Differences between groups of subjects or antibody types (Chi<sup>2</sup> test)

Difference between	Parameter or group studied	$\chi^2$ value	<i>p</i> value
HIV positive and HIV negative	IgG <sup>+</sup>	6.63	< 0.05
	IgM <sup>+</sup>	5.33	< 0.05
IgG <sup>+</sup> and IgM <sup>+</sup>	IgG <sup>+</sup> , IgM <sup>+</sup>	5.78	< 0.05
	HIV-positive	4.96	< 0.05
IgG <sup>+</sup> and IgG <sup>+</sup> , IgM <sup>+</sup>	HIV-positive	14.16	< 0.001
	HIV-negative	11.36	< 0.001
IgM <sup>+</sup> and IgG <sup>+</sup> , IgM <sup>+</sup>	HIV-positive	36.51	< 0.001
	HIV-negative	1.60	NS
	HIV-positive	7.66	< 0.01

NS = not significant

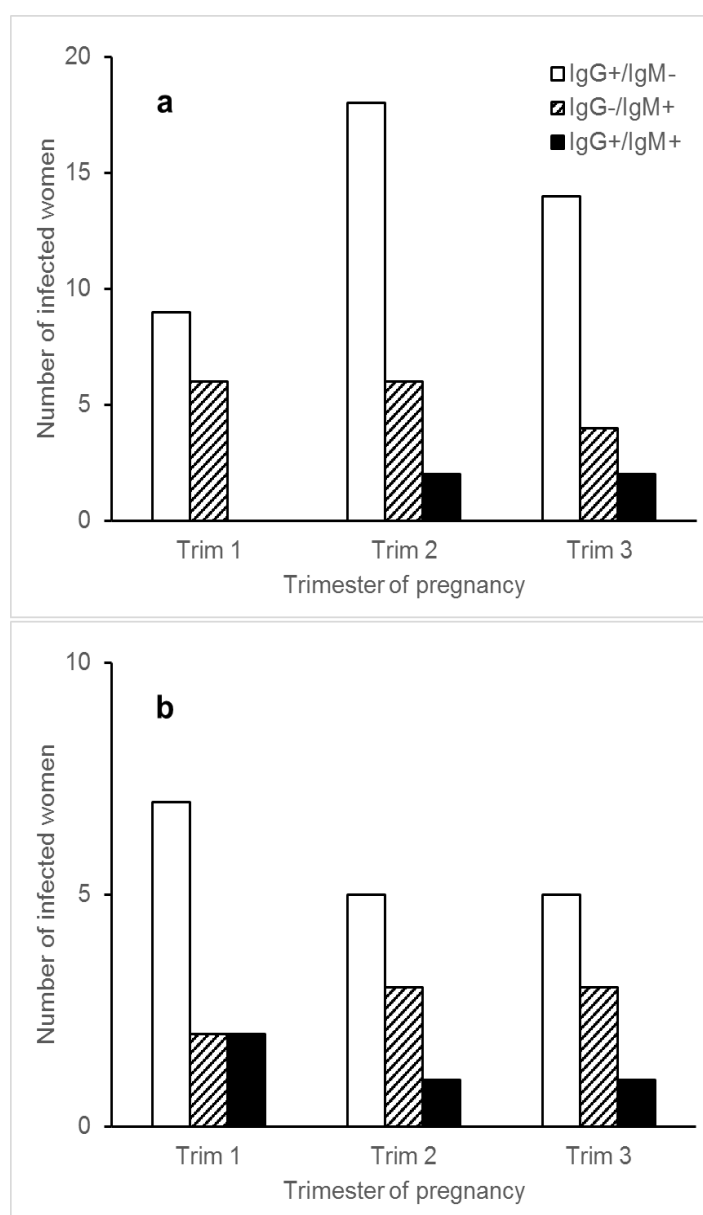


Fig 1: Distribution of 91 pregnant women infected with *Toxoplasma gondii* in relation to the antibody type: a = HIV-positive women; b = HIV-negative women

**Factors associated with *Toxoplasma gondii* seropositivity**

As shown in Tables 3 and 4, educational status at secondary level, HIV infection, and close contacts with cats were identified as possible risk factors associated with *T. gondii* infection. A multiple logistic regression analysis (Table 5) showed that these three variables were significantly associated with the prevalence of IgG and IgM antibodies in the subjects.

Compared to women without HIV infection, the HIV-infected women were 5.7 times more likely to develop *Toxoplasma* infection. Similarly, women with secondary level of education and those who had frequent close contacts with cats were, respectively 4.48 and 2.95 times more likely to be infected with this parasite when compared to women with a primary level of education and those without contacts with cats (Table 5).

Table 3: Univariate logistic regressions of the socio-demographic and clinical characteristics of pregnant women attending the Protestant Hospital, Mbouo-Bandjoun (West Cameroon)

Variable and group (total number of women per group)	Prevalence of toxoplasmosis in % (95% CI)	Odds ratio (95% CI)	p value
<b>Age category</b>			
20-25 years (52)	46.15 (32.20 - 60.53)		
26-30 years (82)	46.34 (35.20 - 57.70)	1.00 (0.50 - 2.03)	0.98
31-35 years (42)	45.24 (29.80 - 61.33)	0.96 (0.42 - 2.18)	0.92
≥ 36 years (24)	41.67 (22.10 - 63.36)	0.83 (0.30 - 2.20)	0.71
<b>Level of education</b>			
Primary (56)	55.36 (41.40 - 68.66)		
Secondary (68)	35.29 (24.00 - 47.83)	0.44 (0.21 - 0.90)	0.02 *
Higher (76)	47.37 (35.70 - 59.16)	0.72 (0.36 - 1.44)	0.36
<b>Marital status</b>			
Married (116)	47.41 (38.00 - 56.90)		
Single (84)	42.86 (32.10 - 54.13)	0.83 (0.47 - 1.46)	0.52
<b>Occupation</b>			
Artisans (43)	51.16 (35.40 - 66.70)		
Housewives (49)	46.94 (32.50 - 61.73)	0.84 (0.37 - 1.92)	0.69
Intermediate & higher professions (39)	41.03 (25.50 - 57.90)	0.66 (0.27 - 1.59)	0.36
Others (69)	43.48 (31.50 - 55.96)	0.73 (0.34 - 1.58)	0.43
<b>Residence</b>			
Bafoussam (106)	48.11 (38.30 - 58.03)		
Bandjoun (56)	48.21 (34.60 - 61.97)	1.00 (0.52 - 1.92)	0.99
Douala (14)	28.57 (8.38 - 58.10)	0.43 (0.11 - 1.38)	0.18
Other towns (24)	37.50 (18.70 - 59.41)	0.65 (0.25 - 1.58)	0.35
<b>Number of previous pregnancies</b>			
1 (41)	41.46 (26.30 - 57.89)		
2 (41)	56.10 (39.70 - 71.53)	1.80 (0.76 - 4.39)	0.19
3 (44)	54.55 (38.80 - 69.61)	1.69 (0.72 - 4.05)	0.23
4 (35)	31.43 (16.80 - 49.29)	0.65 (0.25 - 1.65)	0.37
≥ 5 (39)	41.03 (25.50 - 57.90)	0.98 (0.40 - 2.40)	0.97
<b>Miscarriages</b>			
No (135)	47.41 (38.70 - 56.18)		
Yes (65)	41.54 (29.40 - 54.44)	0.78 (0.43 - 1.42)	0.43
<b>Gestational age (present pregnancy)</b>			
Trimester 1 (55)	47.27 (33.60 - 61.20)		
Trimester 2 (83)	42.17 (31.40 - 53.51)	0.81 (0.41 - 1.62)	0.55
Trimester 3 (62)	48.39 (35.40 - 61.44)	1.05 (0.51 - 2.17)	0.90
<b>Knowledge of toxoplasmosis</b>			
No (130)	46.92 (38.10 - 55.87)		
Yes (70)	42.86 (31.00 - 55.25)	0.84 (0.47 - 1.52)	0.58
<b>HIV infection</b>			
No (164)	37.80 (30.80 - 45.70)		
Yes (36)	80.56 (63.90 - 91.81)	6.81(2.96 - 17.76)	0.0001 ***

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . CI = confidence interval

Table 4: Univariate logistic regressions of behavioural risk factors of pregnant women attending the Protestant Hospital, Mbouo-Bandjoun (West Cameroon)

Variable and group (total number of women per group)	Prevalence in % (95% CI)	Odds ratio (95% CI)	p value
Presence of cats at home			
No (147)	40.82 (32.70 - 49.22)		
Yes (53)	58.49 (44.10 - 71.86)	2.98 (0, NC)	0.98
Close contact with cats			
Never (96)	35.42 (25.90 - 45.84)		
Rarely (39)	38.46 (23.30 - 55.38)	1.14 (0.52 - 2.45)	0.74
Often (65)	64.62 (51.70 - 76.08)	3.33 (1.74 - 6.51)	0.0003 ***
Consumption of undercooked meat			
Never (168)	44.64 (36.90 - 52.50)		
Sometimes (32)	50.00 (31.00 - 68.11)	1.24 (0.58 - 2.66)	0.58
Consumption of smoked meat sold along roads			
Never (76)	38.16 (27.20 - 50.02)		
Rarely (50)	46.00 (31.80 - 60.68)	1.38 (0.67 - 2.86)	0.38
Often (74)	52.70 (40.70 - 64.43)	1.81 (0.95 - 3.48)	0.07
Consumption of raw and unwashed vegetables or fruit			
Never (157)	45.22 (37.20 - 53.35)		
Sometimes (43)	46.51 (31.10 - 62.35)	1.05 (0.53 - 2.07)	0.88
Consumption of water			
Forehole <sup>1</sup> (18)	55.56 (30.70 - 78.47)		
Source <sup>1</sup> (27)	37.04 (19.40 - 57.63)	0.47 (0.14 - 1.57)	0.22
Mineral water (15)	46.67 (21.20 - 73.41)	0.70 (0.17 - 2.77)	0.61
Tap water (140)	45.71 (37.20 - 54.34)	0.67 (0.24 - 1.81)	0.43
Hand washing			
Always (158)	43.67 (35.80 - 51.78)		
Sometimes (42)	52.38 (36.40 - 68.00)	1.42 (0.72 - 2.82)	0.31
Contact with garden soil			
No (9)	55.56 (21.20 - 86.30)		
Yes (191)	45.03 (37.80 - 52.37)	0.66 (0.16 - 2.55)	0.53

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . <sup>1</sup>, Unfiltered water, CI = Confidence interval

Table 5: Multivariate logistic regression with selected variables of pregnant women attending the Protestant Hospital, Mbouo-Bandjoun (West Cameroon)

Variable and group (total number of women per group)	Odds ratio (95% CI)	p-value
Level of education		
Primary (56)		
Secondary (68)	0.44 (0.20 - 0.97)	0.04 *
Higher (76)	0.62 (0.29 - 1.32)	0.22
Close contact with cats		
Never (96)		
Rarely (39)	1.41 (0.62 - 3.19)	0.41
Often (65)	3.00 (1.50 - 6.14)	0.002 **
HIV infection		
No (164)		
Yes (36)	5.98 (2.50 - 16.07)	0.0001 ***

The prevalence rates and their confidence intervals (CI) are given in Tables 3 and 4

## Discussion:

The present study shows significant difference between the overall seroprevalence of *Toxoplasma* infection among the HIV-positive group (77.7%)

and HIV-negative patients (36.5%). The high seroprevalence of 77.5% in the HIV-infected group in our study is in the range of 69.9% reported by Assob et al., (8) among 133 HIV-positive patients in Yaoundé and 77.7% reported by Wam et

al., (11) among 90 HIV-positive women in Njinikom, north-western Cameroon. However, these high *Toxoplasma* seroprevalence rates are not universal because the prevalence rate was only 27.8% among 72 HIV-positive women in Abuja, Nigeria (15).

The prevalence of 36.5% among HIV-negative women in our study however contrasts sharply the rates reported by other researchers in Cameroon. The prevalence rate of 70% (77 of 110 pregnant women) was reported in Douala (9), 71.8% (122 of 171) in the Limbe health district (10), 73.9% (54 of 73) in Njinikom (11) and 78.6% (257 of 327) by another study in Douala (12). Prevalence rates below 50% have also been reported for HIV-negative pregnant women in other African countries such as Nigeria with 44.5% (32 of 72) in Abuja (15), 29.9% (83 of 276) in Lagos (17), 48.9% (176 of 360) in Maiduguri (18), as well as 31.1% (98 of 316) in Bobo-Dioulasso (16).

Although *T. gondii* is an opportunistic pathogen that more readily develops when HIV infection is present (3, 19), the difference in the prevalence rates in our HIV-positive and HIV-negative women, and in other studies cannot be solely explained by immunosuppression induced by HIV infection. Other plausible explanation for this difference may be related to the variation which exists in geographical and climatic conditions between different countries. High seroprevalence rate is associated with warmer and wetter climates, conditions that are favourable for sporulation of *Toxoplasma* oocysts (20, 21).

In HIV-positive and HIV-negative groups, the women with positive IgG antibodies were significantly more than those with positive IgM antibodies, while those positive for both antibodies were fewer. Similar observations have been reported by other researchers in sub-Saharan Africa; Ndassi and Kamga (10) and Wam et al., (11) in Cameroon, and Nasir et al., in Nigeria (18). Compared with rates reported by these authors, the prevalence rates in the present study for all women, regardless of HIV infection, were lower; 29.5% for IgG, 11.1% for IgM, and 4% for both. Although this

difference can be interpreted by relating it to the heterogeneity in the geographical origin of the women in this study, another hypothesis based on a current decrease in seroprevalence of toxoplasmosis in the population living in the West region of Cameroon cannot be totally excluded.

The large proportion of infected women with positive IgG antibodies in the second and third trimesters of pregnancy is surprising. However, these results are consistent with the kinetics of these antibodies during toxoplasmosis. As IgM antibodies were negative in these patients, it indicates that the infection must have occurred more than six months before the date of antibody detection (22, 23). The presence of IgM without IgG in 24 pregnant women may actually mean a recent infection of the pregnant women because IgM is the first immunoglobulin to be produced against any new infection. However, the presence of both IgG and IgM in 4 HIV-positive and 4 HIV-negative women is more difficult to explain though it may indicate either an evolving infection or re-infection or re-activation of an old infection or changing from acute to chronic stage or antibody switching occurring at molecular level. A similar rate (10.8%) has already been noted by Assob et al., (8) among 93 HIV-positive women in Cameroon and these authors explained this result by the fact that most toxoplasma cases in these women would probably be due to the reactivation of a latent infection. In contrast, the occurrence of such rates in HIV-negative women has not yet been satisfactorily explained.

The review of literature shows the existence of variability in the risk factors associated with toxoplasmosis. The nature of these varies according to the country and the place where each study was conducted (6). In the present study, the frequent contact with cats was significantly associated with the prevalence of toxoplasmosis. This finding is consistent with the report by Nissapatorn et al., (24) in Malaysia but disagrees with reports of three others; Wam et al., in Cameroon (11), Uttah et al., in Nigeria (15) and Agmas et al., in Ethiopia (25), as these researchers did



not find any significant association between contact with cats and the disease.

On the other hand, rare contact or mere ownership of cats did not show any significant relationship with the prevalence of the disease in the our study, whereas several authors such as Njunda et al., (9), Nasir et al., (17) and Wam et al., (11) in Cameroon reported a significantly higher prevalence of toxoplasmosis in cat owners. This variability was also noted in European studies as Hofhuis et al., (26) in the Netherlands reported an increased risk of toxoplasmosis for cat owners, while Petersen et al., (27) did not observe such association. To explain the difference between our results and those of these authors, the frequency of close contact with this mammal, especially when raised as a pet, is probably the main cause. The other risk factors analyzed in this study did not show significant association with the prevalence of the disease, and this may be related to the women population in our study.

In conclusion, the seroprevalence of *T. gondii* infection among pregnant women population at the Protestant Hospital of Mbouo-Bandjoun, Cameroon was 45.0% with more infected women in the HIV-positive group than in HIV-negative women. The frequency of close contact with cats was significantly associated with the prevalence of the disease. Compared with previous reports of human toxoplasmosis in Cameroon, our study reported a decrease in the prevalence of the disease. Further studies are needed to determine whether this decrease is localized to our study or a general phenomenon that currently affect the West region or other regions in Cameroon.

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### Competing interests:

No conflict of interest is declared

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