Scientific Research Publishing

Open Journal of Preventive Medicine, 2022, 12, 85-95
https://www.scirp.org/journal/ojpm
ISSN Online: 2162-2485
ISSN Print: 2162-2477

Knowledge and Practices of Pregnant Women on Malaria Prevention in Brazzaville

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How to cite this paper: Mavoungou, Y.V.Y., Niama, A.C., Nombo, R.C.K., Voumbo, G.M., Ndziessi, G. and Itoua, C. (2022) Knowledge and Practices of Pregnant Women on Malaria Prevention in Brazzaville. *Open Journal of Preventive Medicine*, **12**, 85-95.
https://doi.org/10.4236/ojpm.2022.125006

Received: March 30, 2022
Accepted: May 15, 2022
Published: May 18, 2022

Abstract

Introduction: Since the deployment of preventive measures against malaria in pregnant women in Congo, the coverage rates in Intermittent Preventive Treatment for malaria in pregnancy using Sulfadoxine-Pyrimethamine (IPTp-SP) and Long Lasting Insecticidal Nets (LLINs) remain low compared to the objectives set by WHO. This study aimed to analyze the knowledge and practices of pregnant women in the prevention of malaria in Brazzaville. **Population and Method:** This is an analytical cross-sectional study, conducted from September 15th to October 30th, 2021. The sample consisted of pregnant women who performed at least three antenatal care consultations one month apart each; obtained from a two-stage random sample. Data were collected from a self-administered questionnaire and analyzed with Epi-Info version 7.2.6 software. The odds-ratios and their 95% confidence intervals were calculated to assess the associations between the variables. **Results:** A total of 331 pregnant women were selected. The mean age was 27 years (22; 31). Most women were single (82.8%), multiparous (63.4%) and 74.9% had secondary level education. The level of knowledge was insufficient in 53.8% of respondents; nearly 64.7% had good preventive practices. Pregnant women with no education are 8 times more likely to have insufficient knowledge of malaria prevention (OR = 8.33 [2.02 - 34.17]; p = 0.0036). Also, those whose gestational age is between 22 - 27 weeks are 2.54 times more likely to have insufficient knowledge than those with gestational age of 36 weeks and above (OR = 2.54 [1.33 - 4.46], p = 0.0071). **Conclusion:** It is important to strengthen the awareness in order to bring pregnant women to improve their knowledge of malaria prevention and change their behavior.

Keywords

Malaria, Pregnancy, Prevention, Brazzaville

1. Introduction

Malaria in pregnant women is a major public health problem and has significant consequences on the mother's health as well as the fetus and the newborn's health. It would be responsible for 3% to 15% of maternal anemia which can be severe and may lead to the death of the mother. This disease is one of the preventable causes of intrauterine growth retardation, prematurity, and low birth weight, recognized as a risk factor for infant mortality [1] [2] [3].

According to the World Health Organization, among the pregnancies recorded in 2019 in 33 African countries, 35% were exposed to malaria. The highest frequency of exposure was recorded in Central Africa at 40%, followed by West Africa at 39%, then 24% in East and Southern Africa [4].

In Congo, malaria is rampant following a hyper or holo-endemic mode throughout the territory. Pregnant women and children under 5 are the most vulnerable groups. In 2020, malaria morbidity rate at the Center Hospitalier Universitaire de Brazzaville (CHU-B) was 4.4% [5] and Mbongo *et al*., found a prevalence of congenital malaria of 14.7% [6]. Prevention of this disease in pregnant women is part of the services offered by integrated health centers (CSI) and hospitals. The package of related care activities includes: free distribution and use of long-lasting insecticide-treated mosquito nets (LLINs), treatment for malaria and administration of sulfadoxine-pyrimetamine (SP) for intermittent preventive treatment (IPT) of malaria in areas with moderate to severe transmission [5] [7]. The vulnerability of the mother-child couple to malaria as well as the means for preventing malaria is known [7]; their control by pregnant women themselves, should allow a reduction in the incidence of this disease. Hence, the realization of this study, the objective of which is to assess the knowledge and practices of pregnant women in the prevention of malaria in Brazzaville.

2. Methodology

2.1. Type and Period of Study

This was a multicentered analytical cross-sectional study, which took place from September 15th to October 30th, 2021 in the integrated health centers of Brazzaville.

2.2. Study Population

The study population consisted of all the women seen for pregnancy follow-up consultation in the health facilities of the health districts chosen for the study. Pregnant women who had at least three antenatal consultations (ANC) one month apart each and who consented to participate in the survey were included. Pregnant women whose state of health did not allow them to answer the questions and those who had refused were not included in the survey.

2.3. Sampling

The minimum sample size (N) was calculated using the Schwartz formula: $N =$

$P(1-P).(Za)^2/i^2$ with N: sample size; Za: reduced deviation and α: risk (1.96); P: is the proportion of pregnant women who received three doses of SP during the year 2020, which was 27% in Congo Brazzaville; $1-P$: is the opposite event; i: desired precision of 5%. The calculated sample size was 303 pregnant women. To compensate for possible refusals to participate in the survey, it was increased by 6%, which gave a final size of 331 pregnant women.

2.4. Data Collection

The interviewers were pre-informed about the filling of the questionnaire. A pre-test was then conducted with the help of pregnant women found in sites not included in our survey under the supervision of the one responsible for the survey. When it comes to the main data collection, questionnaires were administered face to face to pregnant women who had consented to participate in the survey.

2.5. Study Variables

The independent variables were: socio-demographic characteristics (age, marital status, level of education, profession) and reproductive characteristics (number of antenatal consultations, parity). The dependent variables were the knowledge and practices for which questions related to each variable were asked. The evaluation of knowledge, and practices was in two modalities (sufficient or insufficient, good or bad), this with a score of values higher or lower than 50%.

2.6. Data Entry and Analysis

The data was entered and processed in Excel 2020, then analyzed using Epi-Info version 7.2.6 software. Regarding the qualitative variables, the frequencies were calculated with their 95% confidence intervals. A comparison of proportions was made using the Pearson or Fisher Chi 2 test depending on their conditions of applicability. Means were calculated for the quantitative variables. To assess knowledge and practices on malaria prevention, a score was assigned to the different answers where it was higher than 50%. The Odds-Ratio and their 95% confidence interval were calculated to assess the associations between the variables. The result was considered significant with a $p\text{-}value < 0.05$.

2.7. Ethical Considerations

The authorization of the administrative and health officials of the entities selected for the study was obtained. The pregnant women interviewed received explanations and clarifications on the importance and objectives of the study. They freely gave their consent to participate in the study and could refuse to answer the questions asked without consequences. The confidentiality of the information was guaranteed thanks to the anonymity of the survey sheets.

3. Results

A total of 331 pregnant women participated in the study, the socio-demographics

characteristics are presented in Table 1.

3.1. Socio-Demographic Characteristics

The mean age of the people surveyed was 27 ± 7.9 years with extremes ranging from 15 to 31 years. The most represented age group was that of 20 to 29 years. Women married represented 82.8% of respondents. More than half of the participants had a secondary education level (74.9%). Working women represented 45.3%. The most represented gestational age was 28 - 35 weeks (50.8%) and parity showed that multiparous women represented 63.4%.

3.2. Knowledge of Pregnant Women on the Prevention of Malaria

Eight (08) variables made it possible to provide information on knowledge of the prevention of malaria; the results of global knowledge of pregnant women are presented in Table 2.

Table 1. Socio-demographic profile of pregnant women.

Variables	N = 331	Percentage (%)
Age (years)		
15 - 19	44	13.3
20 - 29	177	53.5
30+	110	33.2
Level of education		
None	14	4.2
Primary	20	6.0
Secondary	248	74.9
Superior	49	14.8
Marital status		
Single	57	17.2
Married	274	82.8
Profession		
Unemployed	106	32.0
Student	75	22.7
Worker (Formal and Informal)	150	45.3
Gestational age (weeks)		
22 - 28	100	30.2
28 - 35	168	50.8
>36	63	19.3
Parity		
Nulliparous/Primiparous	121	36.6
Multiparous	210	63.4

Table 2. Knowledge of malaria prevention.

Characteristics	N = 331	Percentage (%)
Sensitization		
Yes	268	81.0
No	63	19.0
Information source		
Hospital	276	83.4
Television/Radio	76	22.9
School	54	16.3
Social Networks	7	2.1
Community	37	11.2
Symptoms		
Headache	50	15.1
Fever	253	76.4
Arthromyalgia	207	62.5
Chill	157	47.4
Others	81	24.5
Transmission		
Mosquito bite	208	62.8
Otherinsects bite (fly, etc)	123	37.2
Preventive means		
Use of Long-Lasted Insecticidal Nets (LLIN)	243	73.4
Environment sanitation	137	41.4
Insecticide use	58	17.5
Sulfadoxine Pyrimethamine/Fansidar	73	22.1
Knowledge of preventive treatment of malaria in pregnant women		
Yes	227	68.6
No	104	31.4
Knowledge of benefits of IPT		
Yes	125	37.8
No	206	62.2
Global knowledge	331	
Sufficient	153	46.2
Insufficient	178	53.8

Among the surveyed women, 268 (81%) had already been made aware of malaria. The sources of information were many and varied; some respondents may cite more than one source. However, the main source was health facilities, integrated health centers or hospitals (83.4%). About 62.8% of pregnant women recognize that malaria is transmitted by mosquito bites and 37.2% believe that it is transmitted by the bite of other insects. The LLIN was the best known preventive means (73.4%) although the respondents could use several of them. With regard to (IPT-SP), more than half of pregnant women (68.6%) had already heard of it, and 87.3% recognized its advantages. Overall, the level of knowledge of pregnant women about malaria was deemed insufficient by most of the respondents (53.8%).

3.3. Malaria Prevention Practices for Pregnant Women

Prevention practices identified are in Table 3.

Most pregnant women said they slept every day under an LLIN (73.7% 7.1%) that they would have received most of the time during the first prenatal consultation. The majority of pregnant women (87.3%) took IPT for the prevention of malaria while emphasizing the non-exclusivity of this practice, and nearly 20% did not respect the terms of taking this treatment. Overall, pregnant women's malaria prevention practices were rated as good at 64.7% (see Table 3).

Table 3. Malaria prevention practice.

Variables	N	Percentage (%)
Frequency of LLIN use		
Everyday	244	73.7
Sometimes	87	26.3
IPT-SP taken		
Yes	289	87.3
No	42	12.7
Number of doses (n = 289)		
1 Dose	83	28.7
2 Doses	130	45.0
3 Doses	76	26.3
Posology (n = 289)		
3 tablets single dose	232	80.3
1 tablet three times a day	31	10.7
1 tablet for 3 days	26	9.0
Global practice (n = 331)		
Bad	117	35.3
Good	214	64.7

3.4. Factors Associated with Malaria Prevention in Pregnant Women

Socio demographics factors influencing the knowledge of pregnant women on malaria prevention are presented in Table 4.

Two factors were significantly associated with the level of knowledge about malaria: the level of education and the gestational age. Compared to women with a higher level of education, those with no education were 8.33 times more likely to have insufficient knowledge about malaria prevention (p = 0.0036). The gestational age is also a determining factor in the level of knowledge. Compared to women who have more than 36 weeks, those who have less than 35 weeks are twice as likely to have insufficient knowledge p < 0.05 as in Table 5.

Table 4. Influence of socio-demographicscharactéristics on the level of knowledge of malaria prevention.

Variables	Knowledge level						
		Insufficient		Sufficient			
	Total	n	%	n	%	OR (CI of 95%)	*p-value*
Age (years)							
15 - 19	44	26	59.1	18	40.9	1.44 [0.71 - 2.93]	0.399
20 - 29	177	97	54.8	80	45.2	1.21 [0.75 - 1.55]	0.5
30+	110	55	50	55	50	1	
Education level							
None	14	11	78.5	3	21,4	8.33 [2.02 - 34.17]	0.0036
Primary	20	9	45	11	55	1.85 [0.64 - 5.41]	0.389
Secondary	248	143	57.66	105	42.3	3.08 [1.60 - 5.96]	0.00093
Superior	49	15	30.61	34	69.4	1	
Marital status							
Single	57	25	43.86	32	56.1	0.62 [0.35 - 1.09]	0.132
Married	274	153	55.84	121	44.2	1	
Profession							
Unemployed	106	51	48.11	55	51.9	0.67 [0.41 - 1.11]	0.151
Student	75	40	53.33	35	46.7	0.83 [0.47 - 1.44]	0.601
Worker (formal and informal)	150	87	58	63	42	1	
Gestational age (weeks)							
22 - 27	100	61	61	39	39	2.54 [1.33 - 4.46]	0.0071
28 - 35	168	93	55.36	75	44.6	2.01 [1.11 - 3.64]	0.0285
>36	63	24	38.1	39	61.9	1	
Parity							
Primiparous	121	63	52.07	58	47.9	0.89 [0.57 - 1.40]	0.719
Multiparous	210	115	54.76	95	45.2	1	

Table 5. Influence of level of knowledge on malaria prevention practice.

Knowledge level	Practice			*p-value*
	Bad n (%)	Good n (%)	OR (CI of 95%)	
Insufficient (N = 178)	54 (30.3)	124 (69.7)	0.62 [0.39 - 0.98]	0.03
Sufficient (N = 153)	63 (41.2)	90 (58.8)	1	

Compared to women who have a sufficient level of knowledge, those who have an insufficient level of knowledge are 62% less likely to have good malaria prevention practices (OR = 0.62 [0.39 - 0.98]; p = 0.03).

4. Discussion

This study aimed to assess the knowledge and practices of pregnant women in the prevention of malaria. The study population was identified in the integrated health centers districts of Brazzaville.

4.1. Socio-Demographic and Reproductive Characteristics

Among the 331 pregnant women, the mean age was 27 ± 7.9 years and the predominant age group was 20 - 29 years (53.5%). These results align with national data where those under 30 represent the majority of pregnant women (67.7%) in Congo [5]. It is similar to that of Seck I. in the rural area of Poponguine in Senegal, where the average age was 28 years [8]. This similarity can be explained by the youth of the African population and also by the fact that it is among the young that sexuality is high.

These pregnant women mainly had a secondary education level (74.9%), a higher result compared to pregnant women in Mali where the rate of not educated women was high at 62.5% [1]. Among the participants in our study, those living with a partner were predominant (82.8%); and this result is similar to that observed in Mali and Ghana [1] [9]. With regard to professional status, employed women were in the majority (45.3%) unlike in Mali where unemployed women formed the majority [1]. Multiparous pregnant women (63.4%) were more numerous, which is consistent with the observation made in Ghana where 58% of respondents were multiparous [9].

4.2. Knowledge of Pregnant Women about Malaria

The majority of pregnant women (81%) had already been made aware of malaria. The main sign (fever or hot body) was cited by 76.4% of them. This result was lower than that of 81% found in Senegal [8] and Mali [10] but it is higher than that found in Gabon where only 30.6% of pregnant women questioned cited fever as the main manifestation of malaria [11]. More than half of the pregnant women in our series (62.8%) declared that the mosquito bite was the cause of malaria. This result below 82.25%, found in Senegal [8] could be explained in our series by shortcomings in awareness of malaria.

Regarding the means of preventing malaria, the use of the LLIN cited by 73.4% of respondents in our series is the best known means; this result is below that observed in Cameroon [12]. Although 68.6% of pregnant women acknowledged having taken Sulfadoxine-Pyrimethamine only 22.1% recognized it as a means of chemo-prevention of malaria. These results are in line with observations made in Gabon where most pregnant women used LLINs more frequently as a means of prevention and almost a quarter of them had heard of IPTp-SP as a means of preventing malaria [11]. In our context where the integrated health centers are the main source of information for pregnant women, the differences observed in the results with those of the works cited, testify to the shortcomings of certain agents in the follow-up of pregnant women. This suggests the need to build the knowledge of the agents involved, in particular to promote the use of IPTp-SP, as a means of chemo-prevention recommended by the national guidelines in this area [5].

4.3. Malaria Prevention Practices

The use of the LLIN everyday in our study was declared by 73.7% of pregnant women. This coverage is higher than the objectives of 80% set by the WHO [7]. These results can be explained by awareness campaigns and free distribution of mosquito nets impregnated with long-lasting insecticide. This frequency of use of LLINs in our study is higher than 51.6% observed in Cameroon [12] and 62.8% in Senegal observed by Seck I *et al.* [8]; on the other hand, it is lower than that of 95.8% observed in Cambodia [13]. Despite the high rate of LLIN use in our series, adherence to three doses of IPTp-SP was only 22.8%. Our result was lower than those reported by other authors who found 29.8% in Malawi [10], 34.08% in Benin [14] and 36.7% in Mali [15], respectively. The difference observed with our results could be explained by the fact that these countries started implementing the new WHO IPTp-SP policy earlier. In Ghana, where current policy has recommended at least five doses of IPTp-SP since 2014, Owusu-Boateng and Anto *et al.* reported in 2017, a 3-dose coverage of 87.5% [9] which is higher than the 80% target set by the WHO.

4.4. Factors Associated with Knowledge and Practice of Malaria Prevention

The malaria prevention practices of pregnant women in our series were considered good in 64.7% pregnant women; these depend on the socio-demographic characteristics and the level of knowledge of the pregnant women about the disease. In our study, an overall lack of knowledge about malaria among the pregnant women surveyed was noted. The factors associated with this situation with a statistically significant difference ($p < 0.05$) were on the one hand the level of education, the situation being worse when the pregnant woman has no level of education and on the other hand when the gestational age is between 22 - 27 weeks of pregnancy. This observation corroborates that found by other authors in Mali [1] in Gabon [11] and in Senegal [8] who note in their study that insuffi-

cient knowledge of malaria was associated, among other things, with lack of education and low number of antenatal consultations carried out. In our context, this could be linked to the late start of antenatal consultations by pregnant women and illustrates the fact that health centers are the main source of information for pregnant women about malaria.

The results of this study suggest that the efforts made by the National Malaria Control Program in Congo should be strengthened through greater community involvement in raising awareness among pregnant women and improving the capacities of agents in charge of monitoring. pregnant women. Additional studies on the prevalence of malaria in pregnant women should be carried out to assess the impact of the strategy for the prevention of malaria in pregnant women.

4.5. Interest and Limits of the Study

This study is a contribution to the knowledge of the prevention of malaria in pregnant women in Brazzaville. Based on the declarations of the respondents, the reliability of the answers recorded could constitute a limit in the extrapolation of the results.

5. Conclusion

Malaria in pregnant women remains a major public health problem in Congo. Most women have knowledge deemed insufficient about this disease, due to the level of education and the gestational age. Prevention practices are generally good and are mainly influenced by the level of knowledge and the number of prenatal consultations carried out. The use of IPTp-SP during pregnancy deserves to be strengthened with particular emphasis on improving the knowledge of pregnant women through awareness raising.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Fomba, S., Keita, F., Coulibaly, C., Sangare, S., Diawara, S., Keita, M., *et al.* (2017) Prévalence et prise en charge du paludisme chez la femme enceinte hospitalisée au service de gynécologie et obstétrique dans un centre de santé de première référence de Bamako. *Cahier de Santé Publique*, **16**, 26-34.

[2] Oumarou, Z.M., Lamine, M.M., Issaka, T., Moumouni, K., Alkassoum, I., Maman, D., *et al.* (2020) Infection palustre de la femme enceinte à Niamey au Niger. *The Pan African Medical Journal*, **37**, Article No. 365. https://doi.org/10.11604/pamj.2020.37.365.20034

[3] Vallée, J.-P. (2012) Prophylaxie du paludisme chez la femme enceinte. *Médecine*, **8**, 153.

[4] World Health Organization (2020) World Malaria Report 2020. https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020

[5] Ministère de la Santé et de la Population, Direction générale de La Population (2021) Plan stratégique intégré de la santé de la reproduction maternelle, néonatale, infantile, des adolescents et la nutrition du Congo 2022-2026. Ministère de la Santé et de la Population, 93.

[6] Mbongo, J.A., Bowassa, G.E., Gombet, C.K. and Iloki, L.H. (2015) Paludisme Congénital au Centre Hospitalier et Universitaire de Brazzaville: Une Étude Épidémiologique de 90 Cas. *Health Sciences and Diseases*, **16**, 1-5.

[7] WHO (2004) A Strategic Framework for Malaria Prevention and Control during Pregnancy in the African Region. WHO Regional Office for Africa, Brazzaville, 39 p.

[8] Seck, I., Fall, I.S., Faye, A., Ba, O. and Tal-Dia, A. (2008) Connaissances, attitudes et pratiques des femmes sur le paludisme, dans la zone rurale de Poponguine, Sénégal. *Médecine Tropicale*, **68**, 629-633.

[9] Owusu-Boateng, I. and Anto, F. (2017) Intermittent Preventive Treatment of Malaria in Pregnancy: A Cross-Sectional Survey to Assess Uptake of the New Sulfadoxine-Pyrimethamine Five Dose Policy in Ghana. *Malaria Journal*, **16**, Article No. 323. https://doi.org/10.1186/s12936-017-1969-7

[10] Azizi, S.C., Chongwe, G., Chipukuma, H., Jacobs, C., Zgambo, J. and Michelo, C. (2018) Uptake of Intermittent Preventive Treatment for Malaria during Pregnancy with Sulphadoxine-Pyrimethamine (IPTp-SP) among Postpartum Women in Zomba District, Malawi: A Cross-Sectional Study. *BMC Pregnancy Childbirth*, **18**, Article No. 108. https://doi.org/10.1186/s12884-018-1744-y

[11] Tshibola Mbuyi, M.L., Moutandou Chiesa, S., Mawili-Mboumba, D.P., Otounga, L.G., Sagbo Ada, V.L. and Bouyou-Akotet, M.K. (2018) Utilisation des mesures préventives contre le paludisme au cours de la grossesse chez les femmes enceintes à Libreville au Gabon. *Medecine d'Afrique Noire*, **65**, 5-12.

[12] Sielinou, C.B.K., Anong, D., Cumber, S.N., Cumber, R.Y. and Nkuo-Akenji, T. (2020) Knowledge, Attitudes and Perceptions Regarding Malaria: A Cross-Sectional Study in Pregnant Women Attending Antenatal Care in the New-Bell District Hospital, Douala, Cameroon. *The Pan African Medical Journal*, **36**, Article No. 207. https://doi.org/10.11604/pamj.2020.36.207.16180

[13] Yasuoka, J., Kikuchi, K., Nanishi, K., Ly, P., Thavrin, B., Omatsu, T., *et al*. (2018) Malaria Knowledge, Preventive Actions, and Treatment-Seeking Behavior among Ethnic Minorities in Ratanakiri Province, Cambodia: A Community-Based Cross-Sectional Survey. *BMC Public Health*, **18**, Article No. 1206. https://doi.org/10.1186/s12889-018-6123-0

[14] Biaou, C.O.A., Kpozehouen, A., Glèlè-Ahanhanzo, Y., Ayivi-Vinz, G., Ouro-Koura, A.-R. and Azandjèmé, C. (2019) Traitement préventif intermittent à la sulfadoxine-pyriméthamine chez la femme enceinte et effet sur le poids de naissance du bébé: Application de la politique à 3 doses en zone urbaine au Sud Bénin en 2017. *The Pan African Medical Journal*, **34**, Article No. 155. https://doi.org/10.11604/pamj.2019.34.155.19357

[15] Diarra, S.S., Konaté, D., Diawara, S.I., Tall, M., Diakité, M. and Doumbia, S. (2019) Factors Associated with Intermittent Preventive Treatment of Malaria during Pregnancy in Mali. *Journal of Parasitology*, **105**, 299-302. https://doi.org/10.1645/17-141