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PREVALENCE OF MALARIA AND DETERMINANTS OF COVERAGE OF BASIC ANTI-MALARIA INTERVENTIONS 18 MONTHS AFTER A MASS DISTRIBUTION CAMPAIGN FOR INSECTICIDE TREATED MOSQUITONET IN THE TSHOPO PROVINCE IN THE DRC

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SUMMARY

Introduction: The objective of the study was to determine the coverage of basic malaria control interventions in the Tshopo province.

Methods: A descriptive cross-sectional study was conducted from August 24 to December 24, 2022 among 820 women with a child under 5 years old, selected using the multistage probability sampling technique, in the Wanyerukula , Bengamisa , Tshopo health zones and Mangobo in Tshopo province .

Results: The results of this study showed that poor knowledge of malaria by pregnant women did not favor the use of Mosquito Nets Impregnated with Long-Lasting Insecticide the day before the survey (P: 0.01), the number of prenatal consultations ≥ 4 and taking at least 3 doses of SP as part of IPT less than 3 doses. Low newborn birth weight was statistically linked to low SP3 consumption.

Conclusion:

The prevalence of malaria among children under 5 years old remains high. Despite the WHO recommendations concerning means of prevention against malaria in pregnant women, this study shows significantly associated factors in particular: the level of study, marital status, occupation of the woman and low consumption of MS during ANC, occupancy still remains a problem. These determinants hamper

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the achievement of the objectives of the malaria indicators. Therefore, antenatal care visit strategies should be strengthened with emphasis on sulfadoxine-pyrimethamine use. Despite the limitations, our results achieved the objectives of the study.

KEYWORDS: Prevalence, Determinants, Coverage, Intervention, Control, Antimalarial, Pregnant woman, Child, Tshopo, DRC

INTRODUCTION

THE Malaria continues to pose a huge public health problem, representing considerable risk for mothers and children under 5 years of age. In sub-Saharan Africa, the number of estimated deaths due to malaria increased by 12% in 2020 compared to 2019. This figure highlights the consequences of even moderate disruption of malaria services within a population at risk [2].

The World Health Organization (WHO) Global Malaria Report found that 627,000 people (mostly children under five in Africa) died from malaria last year, three times more than the number of people recorded as having died from coronavirus in Africa [3].

95% of malaria cases and 96% of deaths are concentrated in sub-Saharan Africa, and 80% of all malaria deaths in Africa are among children aged under five. The economic, social and human consequences of malaria on the continent are enormous, and urgent action is needed to achieve the targets set by the WHO Global Technical Strategy for Malaria to 2030 [3].

Malaria is responsible for 3% to 15% of sometimes severe maternal anemia leading to maternal death which contributes, with intrauterine growth retardation and prematurity to low birth weight which varies from 8 to 14% in newborns at term and from 8 to 36% in prematurities [3-5].

In 2018, nearly 11 million pregnant women living in the moderate-high transmission zone were estimated to have been exposed to malaria infection in Africa. That same year the prevalence of exposure to malaria infection during pregnancy was highest in the sub-regions of West and Central Africa (each with 35%), followed by the region of East Africa and Southern Africa (20%) [3-5].

In the Democratic Republic of Congo, a survey by the Kinshasa School of Public Health, malaria constitutes the leading cause of infant and child morbidity and mortality. It is responsible for 67% of outpatient consultations and 47.3% of deaths of children under 5 years old. In fact, a Congolese child under 5 years old experiences between 6 to 10 episodes of fever of malaria origin per year. [3-5].

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49.1% of children living in the Tshopo province are affected by malaria, acute respiratory infections and measles, indicates an information note from the office of the United Nations Children's Fund (UNICEF). This high frequency of these diseases is linked to the low appropriation of hygiene and sanitation practices, the low coverage of drinking water as well as a fairly high rate of diseases preventable by vaccination. The infant and child mortality rate is 60 out of 1000, 79.3% of children between 12 and 23 months are not fully vaccinated, 43.9% of children under 5 suffer from malnutrition and 73. 8% are not registered in the civil registry [7].

In order to fight against this endemic, the national malaria control program in the DRC (PNLP) has implemented different strategies for the control of malaria as proposed by the WHO. Despite the availability of funds and the existence of means of control, malaria continues to fill hospitals and kill children under 5 years old [8]. The objective of the study was to determine the coverage of basic malaria control interventions in the Tshopo province.

2. MATERIAL AND METHODS

a. Study framework

This study took place in four health zones in the Tshopo province in the DRC. It concerned all households whose respondents were mothers who had already given birth at least once.

b. Type and period of study

Our study was of the transversal type with an analytical aim which took place during the period from August 24 to December 24, 2022.

c. Sample size

To determine the coverage of the interventions, we will work in 4 health zones of the DPS Tshopo having integrated activities to combat malaria.

At the household level, the size will be calculated based on the following formula:

$$n \geq \frac{(Za^2 \times p \times q)}{d^2} \text{x } 2 \text{ where:}$$

n: desired sample size

α: the 1st type error

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p: (i) for LLIN coverage, proportion of households with an LLIN for 2 people, (ii) for SP coverage, a proportion of pregnant women having taken at least 3 doses of SP during pregnancy, (iii) proportion of children under 5 years of age having received a correct dose of CTA in a CS or SSC among febrile children under 5 years of age

q= 1-p, complement of p
Z $^{\alpha}$: confidence coefficient = 1.96 for a risk of error
d: desired degree of absolute precision
2: cluster effect.

We calculated the sample size with the proportion p the availability of households in ITN which was 79%

$$\frac{(1.96^2\times0,79\times0,7)}{0,05^2}=\frac{(1.96^2\times0,79\times0,21)}{0,05^2}=255$$

We calculated the sample size with the proportion p Intermittent preventive treatment against malaria during pregnancy which was 10%

$$\frac{(1.96^2\times0,10\times0,9)}{0,05^2}=138$$

We calculated the sample size with the proportion p Malaria treatment given to children under 5 years old which was 59%

$$\frac{(1.96^2\times0,59\times0,0,41)}{0,05^2}=373$$

Comparing the sample size, the largest was for malaria treatment given to children under 5 years old. We therefore retained the minimum sample size of 373 people. Considering a non-response rate of 10%: 37.3+ 373= 410.3 or 410 women having completed pregnancy with a child under 5 years old, multiply by 2 we will have a total of 820 women per household.

a. Swimming sample technique

To obtain the choice of our units from the group constituting the population of our study, we used multi-stage probability sampling.

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1. **Choice of health zone (ZS)**: the use of simple first-stage random sampling allowed us to establish the list of urban and rural health zones. By drawing without replacement we drew 2 urban health zones including Tshopo , Mangobo and 2 rural health zones Bengamisa , Wanierukula , which is worth 205 households per health zone.
2. **Choice of health areas (AS)**: At the second level in each health zone, 4 health areas/health facility having integrated malaria control activities were drawn, households per health area including: Saint Joseph, Saint Pierre, Tshopo1, Tshopo 2, Maman Mwilu, Matete, Aspiro, Marie Antoinette, Pont - lindi, Bambane, Bayanguma, Bawi, Mokana, Madula, Kipokoso and Mobi.
3. **Choice of villages/Avenue**: For each health area (AS) selected, the exhaustive list was obtained from the head nurse. A village selected was by simple random sampling.
4. **Household choice**: Each village/avenue selected was the subject of a plot survey in order to determine the number of housing units constituting the village/avenue. A sampling step was calculated by dividing the total number of housing units by the number of households to be surveyed in this village (26 households).

(*) The number of households corresponds to the number of women surveyed

Our sampling step was calculated based on this formula:

$$I = \frac{n}{nombre\ de\ ménage} = \frac{820}{205} = 4 \text{ Clusters}$$

a. Inclusion criteria

Included in this study was any pregnant woman with a child under 5 years old residing in the health areas and avenues selected in the health zones of the provincial division of Tshopo who agreed to answer our questionnaire.

b. Collection of data

To collect the data, we used the interview technique using a questionnaire previously developed and which was administered to pregnant women with a child under 5 years old.

c. Variables of interest

- Sociodemographic characteristics: age, marital status, profession and level of education.
- Analysis of the determinants of LLIN use in children under 5 years old
- Analysis of the determinants of the use of SP3 in pregnant women
- Analysis of the determinants of low birth weight in newborns
- Analysis of TDR results carried out

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d. Data processing and statistical analysis

The collected data were encoded in Excel then imported into STATA 13 for analyses. The reduction statistics focused on the frequency measurement for qualitative variables and the mean ± SD for quantitative variables with symmetrical distribution.

The bivariate analyzes using ^{Pearson}'s.

e. Ethical considerations

Bengamisa health zone. Participation in the study was voluntary with free informed consent. The analysis and processing of the data were carried out anonymously.

3. Results

1.1.Sociodemographic characteristics of respondents

Table 1, distribution of respondents according to socio-demographic characteristics

Variables	Sociodemographic characteristics of the respondents	
	Number n= 820	**Proportion (%)**
Urban	561	68.42
Rural	259	31.58
AGE of mother		
14-18 years old	102	12.43
19-23 years old	213	25.97
24-28 years old	321	39.14
29-33 years old	97	11.46
34-38 years old	87	10.60
MARITAL STATUS		
Lives alone	312	38.04
Lives with spouse	508	61.96
LEVEL OF STUDY		
Primary or none	348	42.43
Secondary or university	472	57.57
OCCUPATION		
With occupation	330	42.25
Without Occupation	490	59.75

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It appears from this table 1 that 2/3 of the respondents were from an urban environment, the median age of the respondents was 28.04 ±9.2. It was noted that the majority of respondents lived with their spouse, the level of secondary education was more represented and most of the respondents did not have an occupation.

1.2.Distribution of subjects according to household coverage indicators for preventive and curative inputs against malaria

Table II. Indicators of household coverage of preventive and curative inputs against malaria

Variables	Coverage of preventive and curative inputs against malaria	
	Number n=820	Proportion (%)
Availability of cleaning in MII		
Household with at least 1 ITN	482	58.78
Household with at least 1 ITN for 2 people	338	41.22
Household pop with access to 1MII in the household		
1-2 people	234	28.53
3-4 people	387	47.19
5-6 people	145	17.68
7 and Up	54	6.59
Origin of ITNs		
CPN	513	62.56
CPS	24	2.94
Distribution campaign	241	29.39
Other (s) to be specified	42	5.12
Household members slept under ITN the night before		
Child under 5 years old slept under ITN the night before	645	79.75
Woman who slept under ITN the night before	491	59.87
Intermittent preventive treatment		
Women who have taken MS		
At least once	128	15.61
At least twice	513	62.56
At least three times	179	21.82
Supported	**n = 413**	
Child with fever in the last two weeks	312	75.54
Child who received a finger or heel prick for a test	298	72.15
Child having received any antibiotic	214	51.81

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Child who received a CTA	309	74.81
Seeking care in febrile children		
Hospital/Health Center	298	72.15
Traditional practitioner	87	21.06
Pharmacy	5	34.38
Self-medication	23	35.73

It appears from this table 2 that half of the household had at least one ITN in the household of 3-4 people. We noted that more than half of the ITNs came from the CPN and the distribution campaign. Half of the children under 5 years old had spent the night on ITN the night before the survey, followed by 1/3 of pregnant women having consumed at least twice the SP dose. Concerning care, more than half of children under 5 years old had had a fever in the last two weeks, the majority had received a heel injection in a hospital/health center followed by any antibiotic and ACT.

1.3.Distribution of subjects according to the prevalence of malaria in children under 5 years old in Kisangani

Figure 1. Prevalence of malaria in children under 5 years old

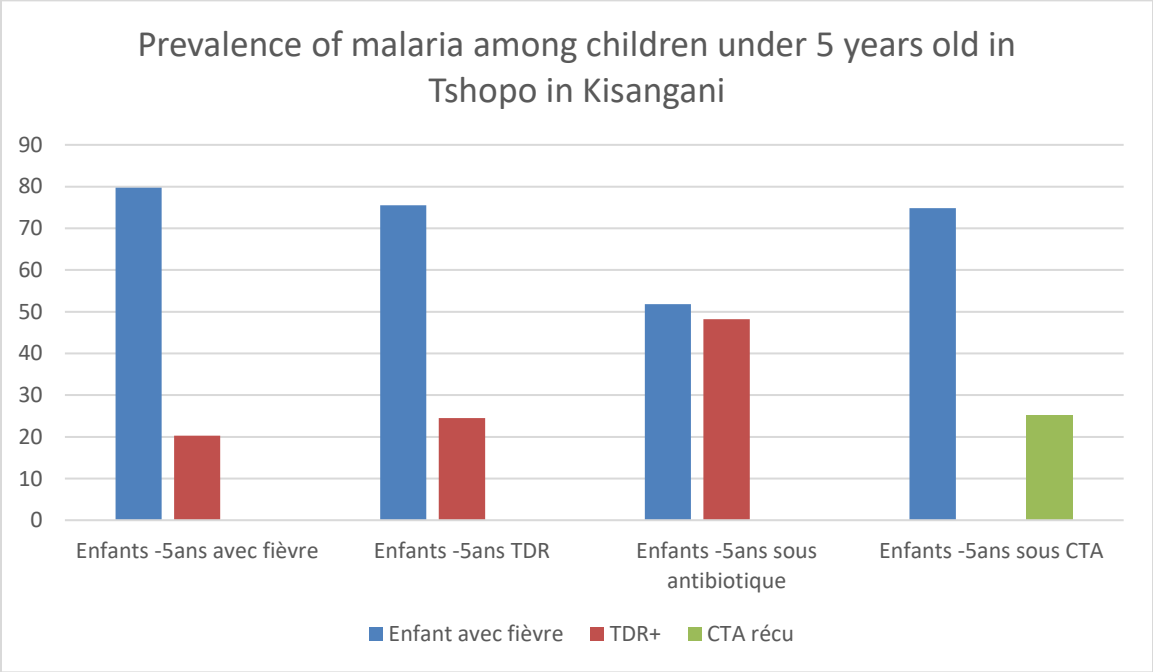

Figure n°1 shows us concerning the prevalence of malaria that, more than half of the children had had a fever in the last two weeks, i.e. 20.25% among the febrile children 1/3 had a positive rapid diagnostic test

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(RDT+) and had received an antibiotic and a CTA.

1.4.Bivariate analysis of factors associated with the use of insecticide-treated mosquito nets

Table 3: Factors associated with the use of insecticide-treated bed nets

Table 3: Factors associated with the use of insecticide-treated bed nets

Household characteristics	Use of ITNs in children under 5 years old n= 820				ITN use among pregnant women n= 820			
	Yes N(%)	Orb (95% CI)	p-value	OR a (95% CI)	Yes N(%)	Orb (95% CI)	p-value	OR a (95% CI)
Site (s								
Urban	561(68.42)	N / A	0.101	N / A	561(68.42)	N / A	0.101	N / A
Rural	259 (31.58)	N / A		N / A	259 (31.58)	N / A		N / A
Level of study								
Primary or None					348 (42.43)	1	0.0879	1
Secondary/University					472 (57.57)	0.43(0.1236-1.0011)		4.55(0.0936-1.0211)
Marital status								
Lives alone					312 (38.04)	0.55(0.3036-1.9211)	0.0126	0.33(0.0156-0.723)
Lives with spouse					508 (61.96)	1		1
Occupation								
With occupation					330 (42.25)	1	**<0.0001**	1
Unoccupied					490 (59.75)	0.3(0.001-0.008)		0.2(0.04-1.02)
Knowledge of malaria								
Good					559(68.17)	1	**<0.0001**	1
Bad					261(31.83)	13.3(73.167-234.85)		20.3(80.147-264.85)
IBD possession								
Household ≥1MII					586(71.46)	N / A	**<0.0000**	N / A
Household with 1MII for 2 people					234(28.54)	N / A		N / A

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Table 3 shows us that regarding the Factors associated with the use of insecticide-treated mosquito nets had a statistically significant association with the level of secondary/university education (odds ratio 4.55 95% CI [0.0936-1, 0211] p= 0.0879), marital status (odds ratio 0.33 95% CI (0.0156-0.723) p= 0.0126 and knowledge of malaria (odds ratio 20.3 95% CI [80.147- 264.85] p= <0.0001).

1.5.Bivariate analysis of factors associated with taking SP for IPT in pregnant women

Table 4. Factors associated with taking SP for IPT in pregnant women

Variables	Use 3 DOSES SP and MORE in pregnant women			
	Yes N (%)	Raw OR (95% CI)	P-value	OR a (95% CI)
Site				
Urban	561(68.42)	N / A	0.101	N / A
Rural	259 (31.58)	N / A		N / A
Level of study				
None/Primary	348 (42.43)	1	0.0879	1
Secondary/University	472 (57.57)	0.43(0.1236-1.0011)		4.55(0.0936-1.0211)
Marital status				
Lives alone	312 (38.04)	0.55(0.3036-1.9211)	0.0126	0.33(0.0156-0.723)
Lives with spouse	508 (61.96)	1		1
Occupation				
Unoccupied	102(83.6)	1	0.741	N / A
With Occupancy	575(82.4)	0.91 (0.517-1.5607)		N / A
Age of pregnancy at CPN1				
≤ 4 months	330(79.1)	0.61 (0.415-0.8979)	**0.009**	N / A
≥5 months	347(86.1)	1		N / A
Number of CPNs				
≤ *3*	132(48)	77(17.7-333.4)	**<0.00001**	1.014(19.3-1.004)
≥4	545(100)	4(0.5-29.2)		0.06(0.015-0.2)
Knowledge about Malaria				
YES	483(80.8)	[0.6 (0.373-0.958)	**0.026**	N / A
No	194(87.4)	1		N / A
Sleep under LLIN				
Yes	597(83.8)	0.55 (0.336-0.92101)	**0.0126**	**0.33 (0.156-0.723)**

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No	80(74.1)	1		1

Table 4 shows us that, Taking at least 3 doses of SP was favored by the early start of CPN (odds ratio 0.06 95% CI [0.015-0.2] p= 0.001); by the number of ANC ≥ 4 (p = **<0.00001**) and by knowledge of malaria in pregnant women (p = 0.026).

1.6.Bivariate analysis of factors associated with low birth weight in newborns

Table 5 Factors associated with low birth weight in newborns

Variables	Low Birth Weights			
	Yes N(%)	Raw OR (95% CI)	P	OR a (95% CI)
Site				
Urban	561(68.42)	N / A	0.101	N / A
Rural	259 (31.58)	N / A		N / A
Level of study				
None/Primary	348 (42.43)	0.43(0.1236-1.0011)	0.0879	4.55(0.0936-1.0211)
Secondary/University	472 (57.57)	1		1
Marital status				
Lives alone	312 (38.04)	0.55(0.3036-1.9211)	0.0126	0.33(0.0156-0.723)
Lives with spouse	508 (61.96)	1		1
Occupation				
Unoccupied	102(83.6)	1	0.741	N / A
With Occupancy	575(82.4)	0.91 (0.517-1.5607)		N / A
SP DOSE				
≤ *2*	128(89.5)	1.6 (0.807-3.038)	**<0.0001**	N / A
≥ 3	631(93.2)	1		N / A
Number of CPNs				
≤ *3*	252(91.6)	N / A	**0.474**	N / A
≥4	507 (93.03)	N / A		N / A
Condition of the newborn				
Alive	694(92.9)	1	**0.23**	N / A
Deceased	65(89.04)	1.6 (0.633-3.606)		

Table 5 shows us that low birth weight of newborns was statistically associated with low intake of SP at least 2 doses (odds 1.6 95% CI [0.807-3.038] p=<0.0001).

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1.7.Analysis of factors associated with the management of cases of fever in children under 5 years old

Table 6. Factors associated with the management of cases of fever in children under 5 years old

Variables	**Factors associated with the management of cases of fever in children under 5 years old n= 820**			
	Yes N(%)	Orb (95% CI)	p-value	OR a (95% CI)
Site (s				
Urban	561(68.42)	N / A	0.101	N / A
Rural	259 (31.58)	N / A		N / A
Level of study				
Primary or None	348 (42.43)	1	<0.0001	1
Secondary/University	472 (57.57)	0.43(0.1236-1.0011)		4.55(0.0936-1.0211)
Marital status				
Lives alone	312 (38.04)	0.55(0.3036-1.9211)	0.0126	0.33(0.0156-0.723)
Lives with spouse	508 (61.96)	1		1
Occupation				
With occupation	330 (42.25)	1	**<0.0001**	1
Unoccupied	490 (59.75)	0.3(0.001-0.008)		0.2(0.04-1.02)
Knowledge of malaria				
Good	559(68.17)	1	**<0.0001**	1
Bad	261(31.83)	13.3(73.167-234.85)		2.3(80.147-264.85)
IBD possession				
Household ≥1MII	586(71.46)	N / A	**<0.0000**	N / A
Household with 1MII for 2 people	234(28.54)	N / A		N / A
Finding treatment for fever				
Health care structure	413(50.36)	N / A	0.103	N / A
Performing a test	262(63.43)	N / A	5,007	N / A
Putting under CTA	259 (98.85)	N / A	0.567	**N / A**

It appears from this table 6 that, concerning the factors associated with the management of cases of fever in children under 5 years old, there is a statistically significant association with the mother's level of education (odds ratio 4.55 95% CI [0.0936-1.0211] p= <0.0001), mother's occupation (odds ratio 0.2 95% CI [0.04-1.02] p= < 0.0001) and the mother's level of knowledge (odds 2.3 95% CI [80.147-264.85] p=<0.0001).

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1.8.Analysis of factors associated with rapid diagnostic test (RDT) positivity

Table 7. Factors associated with RDT positivity

Variables	RDT Positive			
	Yes N(%)	Raw OR (95% CI)	p	OR a (95% CI)
Site				
Urban	22(4.3)		**<0.0000**	0.04 (0.0252-0.0739
Rural	126(40.7)			1
Knowledge of Malaria				
Good	99(16.6)	1	0.068	N / A
Bad	49(22.1)	0.7 (0.47-1.05)		N / A
LLIN availability in the household				
Yes	47(24.2)	1	**0.01**	0.5 (0.276-0.786)
No	101(16.13)	0.6 (0.4008-0.9116)		1
Child slept under MILD last night				
Yes	48(20.1)	0.82 (0.5562-1.24139)	0.331	N / A
No	100(17.2)	1		N / A
Concept of Fever				
Yes	49(23.8)	1.62 (1.0780-2.4239)	**0.013**	1.89 (1.1365-3.165)
No	99(16.1)	1		1
Temperature Taken In Child				
≤37.4°C	86(14.5)	1	**<0.0001**	1
37.5-37.4°C	4(2.45)	N / A		N / A
≥37.5°C	58(28.04)	2.29 (1.5456-3.38507)		4.9 (2.973-8.136)

Table 7 shows us that the factors associated with the positive RDT were the fact that the child under 5 years of age suffered from fever in the last two weeks preceding the survey, OR the fact that the child had fever (t °≥38°) during the investigation.

4. DISCUSSIONS

We noted that 2/3 of the respondents were from an urban environment, the median age of the respondents was 28.04 ±9.2. Our results are different from those found by BOUKAR H et al in 2018 in Cameroon with an average of 24.74±6.26 years and a represented age range of 20-29 years whose age variability was also 15 to 49 years. [5]. This observation can be explained by the great representativeness of this age group on the one hand and on the other hand by its experience (because it also includes multi and large

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multiparous women) thus believing to understand much more the aspects of ANC. Our results are similar to those of kayentao B, whose age varied between 15 and 49 years with an average of 25.66 years; a median of 25 years and more than half of the participants were older than the mean and median. [10]

It was noted that the majority of respondents lived with their spouse. Our result is similar to that of Dembélé M [39] as well as that of Guindo M. [11] where brides represented 99% of the participants.

We found that the secondary/university level of study was more represented. Our results are different from those of Kayentao B [12] where almost half of the participants had no level of education. Dembélé M [11] had 51% illiterate people, which is significantly lower than that of MICS 2018 where two thirds of women aged 15-49 had no level of education. Low educational attainment may be a determining factor in reproductive health indicators. These rates attest to the problem of girls' education in our country, the Democratic Republic of Congo [13].

Most of the respondents did not have a job., this result is close to that of Mahamadou et al who found 92.9% [14] but higher than that of Traoré et al [15] for whom housewives represented 64.20%. This difference could be due to the fact that his study was carried out in an urban environment.

Malaria indicators showed that half of the household had at least one ITN in the household of 3-4 people. We noted that more than half of the ITNs came from the CPN and the distribution campaign. Half of the children under 5 years old had spent the night under an ITN the night before the survey. This result is close to that of the Ryansoro mortality survey where 65.6% had not received ITN [16]. This is due to the fact that those who were not at their first ANC had already received ITNs during previous ANCs.

We note that 1/3 of pregnant women had consumed at least twice the SP dose. Our results were better than those of Guindo M in whom 78.2% were not applied by DOTS. In a study by Dellicour et al only 40 and 53% of eligible women received IPTp by DOTS [17]. Our results were comparable to those of Mcwampaka et al in Tanzania in 2017 with 75% absorption of SP in DOTS strategy. [17]

Concerning care, more than half of children under 5 years old had had a fever in the last two weeks, the majority had received a heel injection in a hospital/health center followed by any antibiotic and ACT. Free treatment of malaria cases is recommended by the WHO and the PNLP [18,19].

Figure n°1 shows us regarding the prevalence of malaria that, more than half of the children had had a fever in the last two weeks, among the febrile children 1/3 had a positive rapid diagnostic test (RDT+) and had received a antibiotic and a CTA. Our result is close to Fatoumata who found during these secondary

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analyses, surveyed 902 patients, the prevalence of malaria was 27.2% out of 257 suspected cases. Our results were similar to those found by Dembélé O et al in Mali in 2019 [10].

It appears from our study that, concerning the factors associated with the use of insecticide-treated mosquito nets, there was a statistically significant association with the level of secondary/university education (odds ratio 4.55 95% CI [0.0936-1 .0211] p= 0.0879), marital status (odds ratio 0.33 95% CI (0.0156-0.723) p= 0.0126 and knowledge of malaria (odds ratio 20.3 95% CI [80.147) -264.85] p= <0.0001). This is explained by the fact that in our society housewives with a certain level of education have more responsibility and increase their knowledge of certain practices in the field of health.

Table 4 shows us that, taking at least 3 doses of SP was favored by the early start of CPN (odds ratio 0.06 95% CI [0.015-0.2] p= 0.001); by the number of ANC ≥ 4 (p = **<0.00001**) and by knowledge of malaria in pregnant women (p = 0.026). Our result is similar to that of Chabi Olaniran Alphonse Biaou and al who attributed the merit to the effort made by the National Malaria Control Program of Benin for the improvement of IPT coverage [12] . This situation is entirely favorable to the adequate use of IPT to the extent that it is during these sessions that the administration of SP is carried out.

Table 5 shows us that low birth weight of newborns was statistically associated with low intake of SP at least 2 doses (odds 1.6 95% CI [0.807-3.038] p=<0.0001). Our results are different from that of Chabi Olaniran Alphonse Biaou and al who found that concerning the effect of IPT on birth weight, he noted a significant gain in birth weight in favor of newborns of mothers who observed the three doses of IPT. This observation remains superimposable to data from the literature [9 , 10 , 11 , 12]. Furthermore, the results reveal that the risk of LBW was higher in mothers who had received less than 3 doses, as reported in the literature on the issue [17].

It emerges from this study that, concerning the factors associated with the management of cases of fever in children under 5 years old, there is a statistically significant association with the mother's level of education (odds ratio 4.55 CI 95% [0.0936-1.0211]p= <0.0001), the mother's occupation (odds ratio 0.2 95% CI [0.04-1.02] p= < 0.0001) and the mother's level of knowledge (odds 2.3 95% CI [80.147-264.85]p=<0.0001). Our results are similar to those of STEPHANIE DOS SANTOS et al, (2015) who found that at the 5% threshold, children of mothers classified in other occupations and those of housewife mothers have respectively 16 and 24% more chance of not not have a fever like those of unemployed mothers**.**

Table 7 shows us that the factors associated with the positive RDT were the fact that the child under 5 years of age suffered from fever in the last two weeks preceding the survey, OR the fact that the child had fever (t °≥38°) during the investigation. This is explained by the hot climate on the day of the survey.

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CONCLUSION

The prevalence of malaria among children under 5 years old remains high. Despite the WHO recommendations concerning means of prevention against malaria in pregnant women, this study shows significantly associated factors in particular: the level of study, marital status, occupation of the woman and low consumption of MS during ANC, occupancy still remains a problem. These determinants hamper the achievement of the objectives of the malaria indicators. Therefore, antenatal care visit strategies should be strengthened with emphasis on sulfadoxine-pyrimethamine use . Despite the limitations, our results achieved the objectives of the study.

Conflicts of interest

The authors declare no conflict of interest

Contribution of the authors

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REFERENCES

1. World Health Organization (WHO). Lives in danger: malaria during pregnancy consulted on April 14, 2023
2. Augustine Mulangu , _ – Gray A Wakamb - The Best Of Gray A Wakamb , [1,&] Kristel Nzeba - I'm [Not] Afraid , Tony Kasole Lubala , – Blood Nsangaji Kabuya , – Stannis Okitosho Wembonyama , [1] and Oscar Numbi Luboya [1] The home management of malaria in the 0- to 5-year-old child: A real public health problem in Lubumbashi (DR Congo) Pan Afr Med J. 2014; 18: 214. Published online 2014 Jul. 15. French. DOI : 10.11604/pamj.2014.18.214.4733
3. World Health Organization. Global Malaria Report 2021: The WHO African region is among the hardest hit by malaria: https://targetmalaria.org/fr/rapport-mondial-sur-le-paludisme-2021-la-region- African-de-loms-figure-among-the-hardest-hit-by-malaria/
4. World Health Organization. Global malaria report 2019 at a glance Geneva: WHO; 2019 available at https://www.who.int/malaria/medical/world-malaria-report.2019/en/

ISSN: 2582-6271

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5. Michel Modi Mbala, Maitenge Kibonge Jacques and al Frequency and prognoses of malaria on pregnancy and its outcome in Kamina. Cases from Kamina zn RD university clinics. Great Lakes Medical Review vol.13 , No. 02, June 2022.
6. 2. World Health Organization. Switzerland : Geneva; 2010. World Malaria Report 2010; pp. 1–238. [Google Scholar]
7. Michel Light Offono Flesh , Patrick Akono Needle , Arthur Mbida Mbida , Noel Nopowo Takap , Brice Mbiada , Odette Star Ngo Hondt , Romeo Change , Pasma March Nkouandou , Gaelle Magne Tamdem , Leopold Gustave Lehman and al. Malaria: knowledge, attitudes and practices of household heads in the western Cameroon region
8. **Soumaïla Abdou MAÏGA et al Attitudes and behaviors of populations towards malaria In the** Kindié health area (Cercle of Bandiagara). Bamako 2004; 84 p.
9. DJOURDEBBE BF (2016). Immediate environmental factors and children's health in the areas of the Ouagadougou Population Observatory (Burkina Faso). Retrieved from https://papyrus.bib.umontreal.ca/xmlui/handle/1866/13592
10. Dembélé O. Maternal and fetal prognosis of high-risk pregnancies at the Reference Health Center of commune V about 343 cases in 2019. [Internet] [Thesis]. USTTB; 2021 [cited September 5, 2021]. Available at: https://www.bibliosante.ml/handle/123456789/4698
11. DEMBELE.M. Prevalence and factors associated with low birth weight in the health districts of Kita and San in Mali, 2019. [Memory]. [health districts of Kita and San in Mali in 2018]: DERSP; 2020.
12. Kayentao et Al, 2014. Research data collected in 9 health districts in Mali in 2014
13. KAYENTAO.AKB. Potential obstacles and factors associated with non-completion of prenatal consultation in the health districts of Kita and San in Mali in 2018 [Memory]. [health districts of Kita and San in Mali in 2018]: DERSP; 2020.
14. Mahamadou T, Diakaridia DY, Habiyata M, Aminata S, Amadou D, Alou MO, et al. FACTORS RELATED TO EXCLUSIVE BREASTFEEDING IN RURAL AREAS IN MALI IN 2015. 2015;14:12.
15. Azizi SC, Chongwe G, Chipukuma H, Jacobs C, Zgambo J, Michelo C. 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 and Childbirth.* 2018 Dec;18(1):118. [Article PMC gratuit] [PubMed] [Google Scholar]
16. Likwela JL, d'Alessandro U, Lokwa BL, Sorongane EM, Gasana G, Kakoma JB, et al. Effect of intermittent preventive treatment (IPT) of pregnant women with sulfadoxine-pyrimethamine (SP) on the birth weight of children in an environment with high resistance of Plasmodium falciparum to SP in the East of the Democratic Republic of Congo (DRC) *Rwanda Medical Journal.* 2010; 68 (4):10–5. [Google Scholar]

ISSN: 2582-6271

Vol. 5, Issue.1, Jan-Feb 2024, page no. 12-29

17. Retrospective mortality survey in the Ryansoro health district , Gitega province, Burundi Report [Internet]. [cited Oct 4, 2021]. Available at: https://fieldresearch.msf.org/bitstream/handle/10144/619946/mortality_study_ryansoro_ final.pdf ?sequence =1&isAllowed=y
18. GUINDO.M. Potential obstacles and factors associated with inadequate optimal intake of Sulfadoxine - Pyrimethamine in intermittent preventive treatment among pregnant women in the Health Districts of Kita and San, 2019 [Memory]. [health districts of Kita and San in Mali in 2018]: DERSP; 2020.
19. Dellicour S, Hill J, Bruce J, Ouma P, Marwanga D, Otieno P, et al. Effectiveness of the delivery of interventions to prevent malaria in pregnancy in Kenya. Malaria Journal. 18 avr 2016;15(1):221.
20. Mchwampaka WM, Tarimo D, Chacky F, Mohamed A, Kishimba R, Samwel A. Factors affecting uptake of ≥ 3 doses of Sulfadoxine-Pyrimethamine for malaria prevention in pregnancy in selected health facilities, Arusha region, Tanzania. BMC Pregnancy and Childbirth. 27 nov 2019;19(1):440.
21. WHO | Malaria in pregnant women [Internet]. WHO. World Health Organization ; [cited May 21, 2021]. Available at: http://www.who.int/malaria/areas/high_risk_groups/pregnancy/en/
22. Ministry of Health (DRC). Technical Guide. Kinshasa: PNLP 2019.