

Malaria infection, Knowledge, Attitude and Practice of persons patronizing drugstores for malaria treatment in Port Harcourt, Rivers State, Nigeria

Abstract

Objectives; The study was to assess Malaria infection, Knowledge, Attitude and Practice (KAP) on malaria of persons patronizing drugstores for malaria treatment in Port Harcourt and its environs, Rivers State, Nigeria. **Methods;** Whole blood samples were collected from 663 participants by venepuncture from 24 randomly selected drugstores at three different locations and were analysed using established practice. Also, a semi structured questionnaires were also administered to obtain socio-demographic characteristics and the participant's Knowledge, Attitude and practice (KAP) on malaria. **Results;** Out of the 663 participants, 151(22.78%) were positive for malaria. The occurrence of malaria in the study area was significantly different ($P = 0.001$). There was a significance difference in the ages of the participants in the three sites ($P=0.001$). There was no significance difference between the sexes across the study areas and marital status of the participants. It was observed that there was significance in the knowledge of the respondents regarding malaria. 98.49% were aware of what malaria is and 89.39% knew that mosquito bite was responsible for malaria. On the whole, 97.13% of the respondents had a good knowledge of malaria. There was no significance difference across the various study area. 97.74% of the participants showed good attitude regarding malaria. 83.86% of the participants had poor practice. There was no significant difference in practice on malaria across the three study areas. **Conclusion;** Malaria infection rate, Knowledge and attitude is high but the practice is low in the study area.

Keywords Malaria infection; Knowledge; drugstores; Attitude; Practice; Treatment.

Introduction.

Malaria remains a public health problem in the tropical and subtropical regions of the world because favourable climate and the presence of the right environmental factors which favour the breeding of mosquitoes and invariably increase the transmission of the malaria parasite abound [1]. It has caused much pain and untimely death in tropical and sub-tropical countries [2].

According to the WHO report of 2015, 90% of malaria incidence is found in sub-Saharan Africa. Nigeria, Uganda, Tanzania Ethiopia and the Democratic Republic of Congo top the list. These countries record 47% of all malaria cases and 50% of deaths due to malaria worldwide [3]. In Nigeria, malaria is a common disease. It is a major health challenge [4]. It is known to have caused infections and significant reduction in economic output [5].

Patronage of drug sellers is a very common practice in Nigeria across every socioeconomic stratum. Medicine sellers in Nigeria are reported to be very important in the treatment of uncomplicated malaria [6]. This occurs even when their knowledge is poor when compared to other professional health care officers. Medicine sellers can be found in general stores, drug stores, kiosks and market stalls [7]. They are preferred even when more convenient and less expensive alternatives exist, such as village health workers [8]. The levels of education vary across medicine sellers. They do not give professional consultation [7]. Majority of them have little or no formal training in pharmacy or medicine. Some drug store staff may be trained or untrained as medical assistants or as nurses [9].

Although, there are reports that majority of the people taking antimalarial reside in rural areas of the world [10]. Nigeria knowledge, attitude and practice (KAP) studies relating to malaria have been conducted mainly in rural communities [11]. In most malaria endemic areas KAP studies have not received much interest. It is often overlooked [12], [13] and so the issue of prevention and control of malaria has raged on over the years. For the achievement of the Sustainable Development Goals (SDGs) on malaria which is to reduce the incidence and death due to malaria world wide by 90% by the year 2030, there is an urgent need to have a holistic view in this regard. This study was to assess malaria infection, Knowledge, Attitude and Practice of persons patronizing drugstores for malaria treatment in Port Harcourt, Rivers State, Nigeria.

Materials and Method

Ethical Considerations

Ethical clearance was obtained from the Research Ethics committee of the University of Port Harcourt in accordance to the declaration of Helsinki for procedures involving human subjects. A written consent was obtained from owners of drugstores and oral consent sort from participating individuals.

Study Population

The participants were consenting individuals reporting to participating drugstores and requesting for antimalarial for treatment of perceived malaria for themselves.

Eligibility Criteria

Eligibility for the study was based on both inclusion and Exclusion criteria

Inclusion Criteria

*Persons who purchase antimalarial to treat perceived malaria for themselves from participating drugstores in the study area and who gave informed consent to participate in the study.

Exclusion Criteria

*Persons who purchase antimalarial for malaria treatment for others not present.

*Persons who purchase antimalarial for malaria treatment for themselves from participating drugstores but not resident in the study area.

*Persons who purchase antimalarial from participating drugstores but not willing to give consent.

Sample Size Determination

The sample size was 663.221 per cluster. It was determined using the formula,

$$n \times D + 5\%(n)$$

Where n = the minimum sample size

$$n = Z^2 PQ / e^2$$

z = the standard normal deviation corresponding to the level of significance = 1.96

p = estimated prevalence = 30%

$$q = (1-p)$$

e = level of precision of error estimated at 95% confidence level = 0.05.

D = designed effect = 2

5% (n) = for reliability or non-response (attrition rate)

$$n = \frac{(1.96)^2 (0.3) (1-0.3)}{(0.05)^2}$$

$$n = \frac{1.96^2 \times 0.3 \times 0.7}{0.0025}$$

$$n = \frac{0.806736 \times 2 + 5\% (n)}{0.0025}$$

$$= 322.69 \times 2 + 16.1345$$

$$= 645.38 + 16.1345 = 661.52$$

$$= 662$$

Thus, sample size = 662

Number of cluster = 3

$$\text{Therefore, number of sample per cluster} = \frac{662}{3} = 221$$

Study Area

The study was conducted in three areas of Port Harcourt (Rivers State, Nigeria) and its environs.

These were D/line, a major business and medium densely populated residential area, Mile IV

(Rumueme), a highly densely populated residential area and Rumuosi, a farming community, in a

semi-urban setting. Port Harcourt is a metropolitan city. It is the capital of Rivers State in the south-

south geopolitical zone of Nigeria. It lies along the Bonny River and has many creeks. It is host to

many major companies, and is the centre of Nigerian economy. Port Harcourt is one of the largest cities in Nigeria with an estimated population of 1, 865, 000 inhabitants [14]. It is found in the forest bet of Nigeria with a lengthy and heavy wet climate. It has a very short dry season and the average temperature is between 25°C and 28°C. (Fig 1).

Study Design

The design was a clustered randomized one

Sampling Method

24 drugstores whose owners gave written consent were randomly enrolled for the study. There were 8 drugstores per cluster. Clients patronizing participating drugstores for antimalarial to treat perceived malaria were approached for oral consent to participate in the study. They were informed that they will be offered a free malaria test before drug administration.

Questionnaire. A semi structured questionnaire was used to obtain socio-demographic characteristics and the participant's Knowledge, Attitude and practice (KAP) on malaria. The questionnaire was administered after an informed consent had been obtained.

Sample Collection. Whole blood samples were collected from participants by venepuncture, using established practice. The samples were put in a clean well labelled container, containing anticoagulant (EDTA). RDT was conducted immediately. The samples were then put into a box and transported to the laboratory. Thick and thin blood film preparation for Giemsa staining technique was performed on all samples for parasite identification and quantification.

Rapid Diagnostic Test (RDT). RDT was performed on the samples immediately after collection using a standard RDT kit (Aria, manufactured by CTK Biotech, Inc., San Diego, CA 92121, USA).

The kit contains a pouch, which was opened and placed on a clean flat surface. It was labelled with the participants' identification (ID) number. Proper mixing of the sample was then done. With the aid of a mini plastic dropper (blood transfer device) that came with the kit, 5µl of blood was obtained. Holding the device vertically, the blood was transferred into the sample well(s) in the pouch, ensuring that there were no bubbles. Immediately holding the buffer lysis bottle vertically, two drops of lysis buffer was added to the buffer well in the pouch. The pouch was allowed to stand for 20 minutes after which the result was read.

Interpretation of Test. There are three bands on the RDT pouch. These bands are the C (control), P_V (*Plasmodium vivax*), and P_F (*Plasmodium falciparum*). A negative result is indicated by a burgundy colour on the C band and non on the P_V and P_F bands. A burgundy colour on the C band and on the P_V or P_F bands or both indicates a positive result. Absence of a burgundy colour on the C band, irrespective of presence on the P_V and P_F bands, indicates an invalid result.

Microscopy. Thick and thin blood films were prepared, stained using Giesma staining technique and examined following method described by Cheesbrough [15].

The thick blood film was allowed to air dry and transferred to a staining rack. It was then flooded with a freshly prepared Giemsa working solution for 30 minutes.

The slide was flushed with water, allowed to dry and examined with x100 objective of the microscope for the presence of *Plasmodium* parasite.

Data Analysis and Presentation

The data was entered on Microsoft excel and spreadsheets, analyzed using the latest version of Statistical Package for the Social Sciences (SPSS version 22). It was presented as tables.

Results

Occurrence of Malaria among Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs showed that a total of 663 participants took part in this study. Out of which 151(22.78%) tested positive for malaria. *P. falciparum* was found to be responsible for all the positive cases. None tested positive for *P. Vivax*.

Mile IV (Rumueme) had the highest occurrence of positive cases. They were 68(20.74%) out of the 221 cases. Rumuosi had 51(22.08%). The least occurrence was found in D/Line area.

This was 32(14.88%) out of 221 participants. The occurrence of malaria in the study area was significantly different as shown on Table .1. ($X^2 = 16.69$; $p = 0.001$).

Socio-demographic characteristics of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs showed that for age range, the ages, Table 2, varied from those below 18 to those above 25. There was a significance difference in the ages of the participants in the three sites. 25 years and above were the highest participants with 159

(71.75%) in D/line, 146 (66.06%) in Mile IV and 153 (69.23%) in Rumuosi. This was followed by those of ages 18 to 25 and finally by those of ages below 18. For Sex, More males than females participated in the study as seen in Table 3. This difference was significant in the Mile IV area with 124 (56.11%) being males and 97 (43.89%) being females. The X^2 value was 6.60 and $p = 0.01$. No difference was observed across the study areas. And marital status, from the table 4, it was observed that more single people patronized the drugstores for antimalarial treatment than the married, divorced, widows or widowers. 369 (55.66%) of the participants were single individuals, 258 (38.91%) divorced, 13 (1.96%) widows and 10 (1.15%) widowers. There was no significance difference in the marital status of the participants between the sites ($X^2 = 7.36$, $p = 0.498$).

Table 5 showed Knowledge of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs on Malaria. It was observed that there was significance in the knowledge of the respondents regarding malaria. Of the 663 participant, 655 (98.49%) were aware of what malaria is and only 10 (1.51%) did not know what malaria is. There was a significant knowledge as to the fact that mosquito bite was responsible for malaria. Of the 663 participants 649 (89.39%) gave a positive response. Only 4 (0.55%) of the participants believed that food could cause malaria. Only 73 (10.06%) of the participants felt that dirty environment could cause malaria. 341 (56.64%) of the participants felt one could diagnose malaria by visiting a laboratory, 253 (42.03%) by visiting the hospital/clinic, 5 (0.88%) from other people and 3 (0.49%) from pharmacy/chemist. 643 (96.98%) of the participants felt malaria could be prevented. Most of the participants 644 (97.13%) believed that malaria could be prevented by sleeping under LLITN. 621(93.67%) believed that it could be prevented by using insecticide sprays. This Percentage 323(48.72%), believed that putting nets on door/windows malaria could be prevented. Only 0.44% (7) of the participants believed that malaria could be prevented by improving personal hygiene. While only 2 (0.13%) believed that by wearing protective clothing, malaria could be prevented.

Knowledge score on malaria of persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs as Shown from the statistical analysis (Table 6) of the respondents knowledge regarding malaria, it was found out that 644 (97.13%) of the respondents had a

good knowledge of malaria. This was significant and 19 (2.87%) had poor knowledge. There was no significance difference across the various study area. ($X^2 = 0.43$; $P = 0.807$).

Table 7 contains the attitude of the respondents regarding malaria. Most of the respondent 328 (49.47%) said they had treatment after 2 days of feeling they had malaria while 321 (48.42%) responded that they sort treatment immediately they observed the symptoms of malaria. 11 (11.66%) said they waited for 3 to 7 days before seeking treatment and 3 (0.45%) sort treatment after a week of having symptoms. A significant number of 592 (89.29%) said they would visit hospital or clinic when they felt they had malaria, while only 7 (1.06%) said they would visit the drug store. A significant number of the participant, 661 (99.70%) believed malaria could be treated while only 0.30% (2) said they did not believe it could be treated. 623 (93.97%) of the participants believed that one needed to go for a test before treatment. As to while they prefer drugstores to visiting hospital/clinic many did not respond. Only 10 (0.04%) people responded, saying they could obtain the drugs from the drugstore, so why visit the hospital. After statistical analysis, 648 (97.74%) of the participants showed good attitude regarding malaria as against 15 (2.26%) who showed poor attitude (Table 8).

Practice of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs on Malaria, When asked if laboratory diagnosis (test) was carried out before seeking treatment 649 (97.99%) said no. only 14 (2.11%) of the participants said yes (Table 9). As to the wearing of protective cloth in the evening only 2 (0.31%) said they did wear them, most of the participants, 661 (99.69%) said they do not wear them. There was no significant difference in these practices across the study areas.

Out of the 663 respondents, only 149 (22.47%) had a mosquito net 514 (77.53%) did not have one. Out of those that had one only, 101 (67.79%) slept under it. 48/32.21% did not sleep under it. This practice cut across the areas. From statistical analysis of the participants practice as seen in Table 10, it was found that 596 (83.86%) of the participants had poor practice. Only 107 (16.44%) had good knowledge. There was no significant difference in practice on malaria across the three study areas. ($X^2 = 38.54$; $p = 5.991$)

Discussion

Present study shows that out of 663 persons that patronized drugstores for malaria treatment in Port Harcourt and its environs Rivers state, Nigeria, 22.78% (151) had an occurrence of malaria. This figure is higher than 3.9% reported in a similar study in Ibadan [6]. It is also higher than the 3.0% recorded in the University of Port Harcourt Health Center [16]. However, the figure is closer to the prevalence rate of 26% recorded among pregnant women attending antenatal clinics in Port Harcourt [17] and lower than 35.5 % reported on malaria infection and socioeconomic status of some residents of Port Harcourt [18]. The low prevalence recorded in Ibadan [6] and in Port Harcourt [16] could be location dependent. Ibadan is located in the western part of Nigeria, with an environment that is not as conducive as Port Harcourt for the breeding of mosquitoes. The University of Port Harcourt study [16] was carried out in a community highly enlightened. There, most people would have been practicing malaria preventive and control measures.

In this study, it was observed that the patronage of drugstores for malaria treatment was mostly by persons of ages 25 years and above (69.08%), single (55.66%), with a tertiary education (49.17%) as against secondary (38.16%), primary (11.92%) and no education (0.75%). They were also observed to be mostly unemployed (43.74%). They were more likely to be males (56.11%) than females (43.89%). Most of these socio-demographic characteristics agree with those of other researchers. And they were not location dependent. In their study in Zambia [19] observed the fact parents preferred taking their younger ones to the formal health sector. The finding in this study is in agreement with earlier study [6] that the single and unemployed were more likely to patronize drugstores for malaria treatment than married and employed person. This might be due to the fact that the unemployed find drugstores cheaper than visiting a health facility. Married person are also more cautious than

single people. They would prefer not to take a risk with their lives. This fact also geos for females, which might be the reason why males patronize drugstores more as agreed by study in Enugu state [20].

However, the result of this study does not agree with those of Mulenga and Kwamibe [19] as to the educational status of persons that patronize drugstores for malaria treatment. They observed the highest patronage from those with secondary education (53.3%) as against 20% and 26.7% patronage by those with tertiary and primary education respectively.

In terms of knowledge on malaria, 98.49% of the persons were found to have good knowledge. This figure is higher than that obtained in Northern Nigeria [13] and also higher than the 60 % target defended by the Abuja summit in 2000 [22] meeting that there has been a great improvement in knowledge on malaria over the years. It is also much higher than the 90% reported in some Nigerian communities [11]. In his study in Delta state, participants were assessed based on answers to 10 questions. This included knowledge on the use of ITN and 97.13% had good knowledge on the use of ITN. This is higher than the 87.4% recorded in the western parts of Nigeria [21]. Reasons for this great improvement in knowledge could be as a result of the massive advocacy and enlightenment campaign by Government agencies, stakeholders and their international partners.

The attitude of the participants on malaria was also assessed in this study and 97.4% of them were found to have good attitude. This is against the 56.7% recorded in Northern Nigerian [13]. That study was carried out in 2014. If another one was to be conducted today, the result would be different. This is as a result of the premium now placed on enlightenment campaign on malaria.

In this term of practice, it was observed that despite good knowledge and attitude, practice was poor. Present study recorded 16.14% good practice and 83.86% poor practice on malaria.

This study agrees with similar study in Lagos State [11]. It was observed that good knowledge and attitude on malaria does not translate to good practice. Out of the 663 participants, only 22.47% had a mosquito net and only 1 person slept under it. This result is similar to that of other studies conducted on the possession and use of ITNs in Nigeria. A study in a rural community in Nigeria observed 87.4% possession but only 10% usage [21]. Also another study in Northern Nigeria recorded such a similar low practice score of 16% [13]. Nigerians seems not to have assimilated the fact that good knowledge and attitude must translate to good practice.

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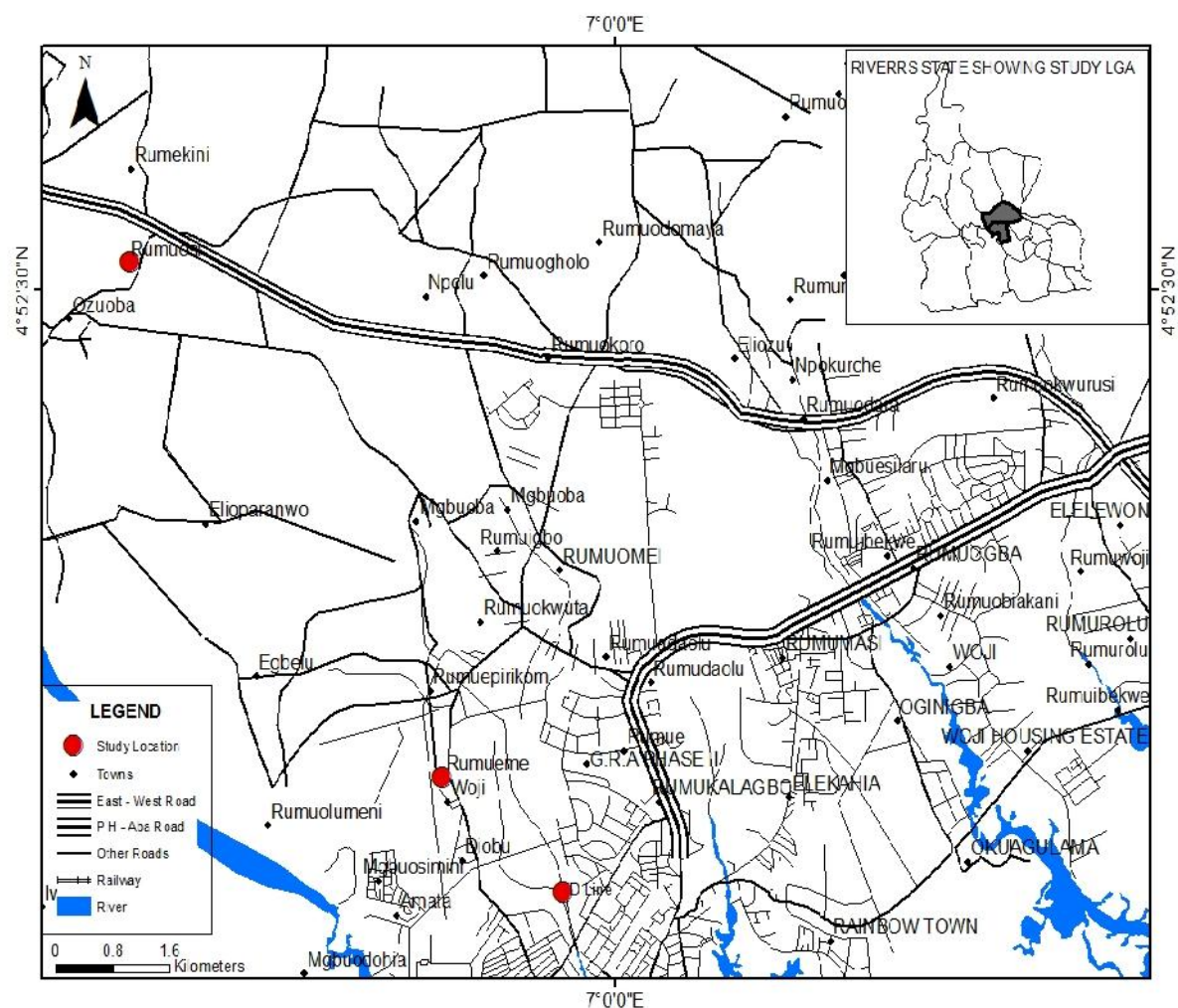


FIGURE 1: MAP OF PORT HARCOURT (RIVERS STATE, NIGERIA) AND ITS ENVIRONS SHOWING SAMPLE LOCATION

Table 1: Occurrence of Malaria among Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs

STUDY AREA	TOTAL NO. TESTED	NUMBER POSITIVE	PERCENTAGE (%) POSITIVE	<i>P. falciparum</i>	<i>P. vivax</i>	Chi-square (χ^2) (p-value)
D LINE	221	32	14.48	32	0	

MILE IV	221	68	30.77	68	0	16.69 (0.001)*
RUMUOSI	221	51	23.08	51	0	
TOTAL	663	151	22.78	151	0	

*Statistically significant ($p < 0.05$)

Table 2: Age Range of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs

Age Range	STUDY AREA (n=663)			TOTAL	Chi-square (χ^2) (p-value)
	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		
Below 18	25 (11.31)	36 (16.29)	25 (11.31)	86 (12.97)	3.84 (0.428)
18-25	37 (16.74)	39 (17.65)	43 (19.46)	119 (17.95)	
25/above	159 (71.95)	146 (66.06)	153 (69.23)	458 (69.08)	
$\chi^2(p\text{-value})$	223.87 (0.001)*	159.90 (0.001)*	195.53 (0.001)*		

Statistically significant ($p < 0.05$)

Table 3: Sex of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs

Sex	STUDY AREA (n=663)			TOTAL	Chi-square (χ^2) (p-value)
	D/LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		

Male	118 (53.39)	124 (56.11)	115 (52.04)	357 (53.85)	0.76 (0.684)
Female	103 (46.61)	97 (43.89)	106 (47.96)	306 (46.15)	
$\chi^2(p\text{-value})$	2.04 (0.154)	6.60 (0.01)*	0.73 (0.391)		

367 Statistically significant (p <0.05)

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Table 4: Marital Status of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs

Marital Status	D/Line (n=221) Freq (%)	STUDY AREA (n=663)		Rumuosi (n=221) Freq. (%)	Total X ² (P-value) (n=663) freq (%)
		Mile IV (Rumueme) (n=22) Freq. (%)			
Single	123 (55.6)	135 (61.09)		111 (50.23)	369 (55.66)
Married	85 (38.46)	77 (34.84)		96 (43.44)	258 (38.91)
Divorced	4 (1.81)	4 (1.81)		5 (2.26)	13 (1.96)
Widow	4 (1.81)	1 (0.45)		5 (2.26)	10 (1.51)
Widower	5 (2.26)	4 (1.81)		4 (1.81)	13 (1.96)
$\chi^2(p\text{-value})$	357.55 (0.001)*	407.77 (0.001)*		334.69 (0.001)*	

369 Statistically significant (p<0.05)

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Table 5: Knowledge of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs on malaria

Characteristics	Study AREA			TOTAL n=663 Freq (%)	Chi-square (χ^2) (p-value)
	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		
Do you know what malaria is					

Yes	217 (98.19)	216 (97.74)	220 (99.55)	653 (98.49)	2.64 (0.267)
No	4 (1.81)	5 (2.26)	1 (0.45)	10 (1.51)	
$\chi^2(p\text{-value})$	410.58 (0.001)*	402.90 (0.001)*	434.04 (0.001)*		
Causes of malaria					
<i>(Multiple response)</i>					
Eating oily food	3 (1.27)	0 (0.0)	1 (0.41)	4 (0.55)	
Mosquito bite	212 (89.83)	216 (88.16)	221 (90.20)	649 (89.39)	4.92 (0.295)
Dirty environment	21 (8.90)	29 (11.84)	23 (9.39)	73 (10.06)	
Total	236	245	245	726	
$\chi^2(p\text{-value})$	511.56 (0.001)*	504.89(0.001)*	539.31(0.001)*		
How do you know that one has malaria					
<i>(Multiple response)</i>					
From other people	1 (0.51)	3 (1.59)	1 (0.46)	5 (0.83)	
Hospital/Clinic	75 (38.46)	73 (38.62)	105 (48.17)	253 (42.03)	
Laboratory	118 (60.51)	112 (59.26)	111 (50.92)	341 (56.64)	6.98 (0.322)
Pharmacy/Chemist	1 (0.51)	1 (0.53)	1 (0.46)	3 (0.49)	
Total	195	189	218	602	
$\chi^2(p\text{-value})$	274.73(0.001)*	252.63(0.001)*	280.54(0.001)*		
Can malaria be prevented					
Yes	214 (96.83)	214 (96.83)	215 (97.29)	643 (96.98)	0.1 (0.951)
No	7 (3.17)	7 (3.17)	6 (2.71)	20 (3.02)	
$\chi^2(p\text{-value})$	387.77 (0.001)*	387.77 (0.001)*	395.30 (0.001)*		
How malaria can be prevented					
<i>(Multiple response)</i>					
Improving personal hygiene	2 (0.39)	3 (0.57)	2 (0.36)	7 (0.44)	
Wearing protective clothing	1 (0.19)	1 (0.19)	0 (0.0)	2 (0.13)	
Sleeping under ITN	211 (40.66)	218 (41.68)	215 (38.74)	644 (97.13)	5.78 (0.672)
Putting nets on doors/windows	100 (19.27)	95 (18.16)	128 (23.06)	323 (48.71)	
using insecticide spray	205 (39.50)	206 (39.39)	210 (37.84)	621 (93.67)	
Total	519	523	555	1597	
$\chi^2(p\text{-value})$	513.93 (0.001)*	529.27(0.001)*	507.97(0.001)*		

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**Statistically significant ($p < 0.05$)*

377 **TABLE 6: Knowledge score on malaria of Persons Patronizing Drugstores for Malaria**
378 **Treatment in Port Harcourt and its Environs**

Characteristics	Study AREA (n=663)			TOTAL (n=663)	Chi-square (χ^2) (p-value)
Knowledge score of persons on Malaria (no. of answers assessed=10)	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)	Freq (%)	
Good Knowledge (≥ 5)	214 (96.83)	214 (96.83)	216 (97.74)	644 (97.13)	0.43 (0.807)
Poor Knowledge (< 5)	7 (3.17)	7 (3.17)	5 (2.26)	19 (2.87)	
$\chi^2(p\text{-value})$	387.77 (0.001)*	387.77 (0.001)*	402.90 (0.001)*		

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**Statistically significant ($p < 0.05$)*

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390 **Table 7: Attitude of Persons Patronizing Drugstores for Malaria Treatment in Port**
391 **Harcourt and its Environs on Malaria**

Characteristics	STUDY AREA (n=663)			TOTAL	Chi-square (χ^2) (p-value)
	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		

Length of waiting before seeking treatment					
Immediately	116 (52.49)	95 (42.99)	110 (49.77)	321 (48.42)	
After 2-3days	100 (45.25)	120 (54.30)	108 (48.87)	328 (49.47)	4.84 (0.564)
After 3-7 days	4 (1.81)	5 (2.26)	2 (0.90)	11 (1.66)	
After a week	1 (0.45)	1 (0.45)	1 (0.45)	3 (0.45)	
$\chi^2(p\text{-value})$	271.80 (0.001)*	271.27 (0.001)*	278.94 (0.001)*		
How do you normally treat malaria					
Takes herbal medicine	4 (1.81)	3 (1.36)	6 (2.71)	13 (1.96)	
Visit to hospital and clinics	198 (89.59)	207 (93.67)	187 (84.62)	592 (89.29)	
Visit to lab	2 (0.90)	2 (0.90)	0 (0.0)	4 (0.60)	40.24 (0.001)*
Visit to pharmacy and clinic	5 (2.26)	2 (0.90)	0 (0.0)	7 (1.06)	
Visit to traditional herbalist	12 (5.43)	7 (3.17)	28 (12.67)	47 (7.09)	
$\chi^2(p\text{-value})$	837.81 (0.001)*	937.41 (0.001)*	735.88 (0.001)*		
Do you believe that Malaria can be treated					
Yes	219 (99.1)	221 (100.0)	221 (100.0)	661 (99.70)	3.98 (0.137)
No	2 (0.90)	0 (0.0)	0 (0.0)	2 (0.30)	
$\chi^2(p\text{-value})$	426.14 (0.001)*	422.0 (0.001)*	422.0 (0.001)*		
Do you believe that testing before treatment is necessary					
Yes	217 (98.19)	219 (99.10)	219 (99.10)	655 (98.79)	1.0 (0.611)
No	4 (1.81)	2 (0.90)	2 (0.90)	8 (1.21)	
$\chi^2(p\text{-value})$	410.58 (0.001)*	426.14 (0.001)*	426.14 (0.001)*		
Are you aware that you should test after treatment malaria					
Yes	203 (91.86)	208 (94.12)	212 (95.93)	623 (93.97)	3.25 (0.197)
No	18 (8.14)	13 (5.88)	9 (4.07)	40 (6.03)	

$\chi^2(p\text{-value})$	309.73 (0.001)*	344.12 (0.001)*	372.93 (0.001)*	
Why do you not visit hospitals/clinic				
Because one can get the drugs from pharmacy	2 (50.0)	1 (50.0)	0 (0.0)	3 (30.0)
Drug doesn't work for me	2 (50.0)	1 (50.0)	0 (0.0)	3 (30.0)
I don't like drugs	0 (0.0)	0 (0.0)	4 (100.0)	4 (40.0)
$\chi^2(p\text{-value})$	3.0 (0.223)		12.0 (0.002)*	

392 **Statistically significant ($p < 0.05$)*

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Table 8: Attitudinal score of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs on Malaria

Characteristics	STUDY AREA (n=663)			TOTAL	Chi-square (χ^2) (p-value)
Attitudinal score of respondents on Malaria (no. of questions assessed=5)	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		
Good Attitude (≥ 3)	214 (96.83)	216 (97.74)	218 (98.64)	648 (97.74)	1.64 (0.440)
Poor Attitude (< 3)	7 (3.17)	5 (2.26)	3 (1.36)	15 (2.26)	
$\chi^2(p\text{-value})$	387.77 (0.001)*	402.90 (0.001)*	418.33 (0.001)*		

*Statistically significant ($p < 0.05$)

Table 9: Practice of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its environs on Malaria

Characteristics	SITE AREA (n=663)			TOTAL	Chi-square (χ^2) (p-value)
	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		
Do you have mosquito net					
Yes	47 (21.27)	53 (23.98)	49 (22.17)	149 (22.47)	0.48 (0.787)
No	174 (78.73)	168 (76.02)	172 (77.83)	514 (77.53)	
$\chi^2(p\text{-value})$	145.96 (0.001)*	119.68 ((0.001)*)	136.91 (0.001)*		
Do you sleep under it					
Yes	32 (68.09)	36 (67.92)	33 (67.35)	101 (67.79)	0.01 (0.991)
No	15 (31.91)	17 (32.08)	16 (32.65)	48 (32.21)	
Total	47	53	49	149	
$\chi^2(p\text{-value})$	12.30(0.001)*	13.62 (0.001)*	11.80(0.001)*		
Was the Lab diagnosis performed before treatment					
Yes	10 (4.52)	4 (1.80)	0 (0.0)	14 (2.11)	100.40
No	21 (95.48)	217 (98.20)	221 (100.0)	649 (97.99)	(0.001)*
$\chi^2(p\text{-value})$	54.26(0.001)*	410.50 (0.001)*	442.0 (0.001)*		
Do you wear protective clothing in the evening					
Yes	1 (0.45)	1 (0.45)	0 (0.0)	2 (0.31)	1.003 (0.606)
No	220 (99.55)	220 (99.55)	221 (100.0)	661 (99.69)	

$\chi^2(p\text{-value})$ 434.04(0.001)* 434.04 (0.001)* 442.0 (0.001)*
**Statistically significant ($p<0.05$)*

Table 10: Practice score on Malaria of Persons Patronizing Drugstores for Malaria Treatment in Port Harcourt and its Environs

Characteristics	STUDY AREA (n=663)			TOTAL	Chi-square (χ^2) ($p\text{-value}$)
Attitudinal score of respondents on Malaria (no. of questions assessed=5)	D LINE (n=221) Freq (%)	MILE IV (RUMUEME) (n=221) Freq (%)	RUMUOSI (n=221) Freq (%)		
Good Attitude (≥ 3)	63 (28.51)	23 (10.41)	21 (9.50)	107 (16.44)	38.54(38.54)
Poor Attitude (< 3)	138 (71.49)	198 (89.51)	200(90.50)	556 (83.80)	(5.99)
$\chi^2(p\text{-value})$	143.25 (0.001)*	133.52 (0.001)*	152.76 (0.001)*		

**Statistically significant ($p<0.05$)*