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Prevalence and Density of Malarias is among Educational and Other Sociological Indexed Groups in JOS North Environment of Plateau State, Nigeria

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Abstract: Malariasis remains a major public health problem in Nigeria. This work was aimed at investigating the disease across all educational levels; Primary(P), Secondary (S), Tertiary (T) and University (U) and its endemicity in Jos North Environment, Plateau State, Nigeria. A total of 300 in- and out-patients, receiving various cadre of malarial medical care at some selected primary health centre (PHCs) who had their blood samples, screened microscopically, in Jos North environment, who were considered for the studies. Malariasis was diagnosed using Giemsa-stained blood smears and rapid diagnostic tests. The overall malariasis parasite prevalence was 52% and there was significant association (P<0.05) between malariasis infection and location of the patients, both in-and outpatients examined. Malariasis prevalence was higher in females. (37%) than males (16%), as revealed for sex-related prevalence,but there was no statistical significant differences (P>0.05) between sexes and malariasis infection. The age group 20-30 years had the highest infection rates of 49 (16%), followed by, 6-19, 31-40, >40 and 0-5 years age groups, having 34 (11%), 26(9%), 18(6%), 30(1%) respectively. The age group 0-5 years had the least infection rate of 30(1%) which 20-30 ages had the highest prevalence rates with 49(16%). There were no statistically significant differences (P>0.05).Between malariasis infection and age groups for the patients receiving medical attention at varying capacities in the PhDs. Further results of KAP studies, were analyzed from clearer responses same respondents, who were then both in-and-out patients, in the differently selected PHCs in the studies, under 'Yes' 'No' and 'Not Sure', as attributed to the questionnaires, wellconstructed and administered for determination of these patients' knowledge, attitude and perception about the malariasis infections in the studies. A combination of environmental and preventive measures, as well as community health campaign for awareness on the debilitating larger of malariasis, was done to reduce the transmission rate, which consequently, should drastically improve their general wellbeing of the inhabitants of the study areas.

Keywords: - Malariasis, Endemicity, Dignostics, Debilitating, Questionnaire, Preventive.

Introduction

Malariasis is a life threatening parasitic protozoan infection that has been known since time immemorial. Previously, it was thought that "miasma" (bad air gas from swamp) caused the disease also popularly called malaria. This and a host of others are misconceptions that many theorists have about the disease. It was formerly called ague or marsh fever due to its association with swamps and marshland. (Reuter, 2000). The disease was once common in most of Europe and North America (Lindemann, 1999) where it is no longer endemic (Quartz, 2006) though reported cases to occur (Webb, 2009). Scientific studies on malariasis made their first significant advancement in 1880, when Charles Louis Alphonse Laveran-aFrench army doctor working in military hospital of Constantine in Algeria – observed parasites inside the red blood cells of infected persons for the first time. He therefore proposed that malariasis is caused by this organism, the first time, a protest was identified as causing the disease (The Nobel Foundation, 2012). A year later, Carlos Finlay, a Cuban doctor treating people with yellow fever in Havana, provided strong evidence that mosquitoes were transmitting disease to and from human (Tan and Sinng, 2008). This work followed earlier suggestions by Josiah C. Noh (Cheznen and Noth, 1983) and work by Sir Patrick Manson, the "father of tropical medicine", on the transmission of filariasis (Chermin and Manson, 1977).

Malariasis, a mosquito-borne disease also called malaria, is established to be caused by the parasitic, plasmodium (Nwakoby, 1994). Five species of protozoan parasite of the genus *Plasmodium,* infect humans and cause malaria namely: *P. falciparium, P. malariae, P. ovale, P. vivax and P. knowlesi (*Sign*et al;* 2004) (of these, *P. falciparium* causes the most severe form of malariasis and is responsible for the largest proportion of morbidity and mortality (Nwakoby, 1994). Malaria is transmitted when an infected female mosquito of the genus Anopheles, bites a human. The recent World Malaria Report showed that Nigeria and Democratic Republic of the Congo are responsible for over 40% of the estimated total death due to malariasis in Africa (WHO/World Malaria Report, 2012).

Globally, malariasis is accountable for approximately 1.24 million deaths per year. It is also the leading cause of morbidity and mortality for children under five in Sub-Saharan Africa (World Malaria Report, 2012). More malaria-related deaths in both children and adults occur in Western, Eastern and Central Africa than any other parts of the world. Roughly 80% of all cases and 90% of all deaths from malaria occur in Sub-Saharan Africa (Onoh, 2015). Malariasis is one of the major public health concerns due to the high morbidity and mortality associated with the disease. A total of 104 countries globally are considered to be malariasis endemic, leaving an estimated 3.4 billion people at risk of contracting the disease (Butler, Moebius, Perve, Traore, Doumbo and Tyrett, 2012). More than 207 million cases of the infection were recorded globally in 2012 (uncertainty range 135-287 million) and 627000

deaths, 80% of these cases and 90% death occurred in sub-saharaAfrica and the highest mortality (77%) occurred among children less than 5 years old (WHO, 2013). Malariasis poses a huge burden to humanity, not only due to high morbidity and mortality rates, but also to huge economic burden. This rangers from poor attendance of school age children, reduction of workforce and productivity by attending to the sick and the cost of treatment of the disease. Globally, huge economic burden through the control and treatment of the disease has been documented (WHO, 2013). For instance, upto 1.84 billion US dollars have been distributed to fightmalariasis in endemic countries of sub-Saharah Africa alone in the last few years (WHO, 2013).

It varies widely in epidemiology and clinical manifestation in different parts of the globe. This variability depends on the species of the parasites that occur in a given occur in a given area, the susceptibility to commonly use or available anti-malarial drugs, the distribution and efficacy of mosquito vectors, climate and other environment factors, the behaviour and level of acquired immunity of the exposed human populations (Bloland, 2001). Malaria is the most important parasitic protozoan disease affecting about 247 million people each year among 3.3 billion people at risk, resulting in nearly a million deaths, mostly children under the age of five (5) years (WHO, 2008). Nearly 90%of these deaths occur in Africa, South of the Sahara, thereby making it the leading cause of mortality, killing an African child every 30 minutes (WHO, 2005a). it accounts for 40% of public health expenditure, 30-50% of in-patient admissions and upto 50% of out-patients visits in area with high malariasis transmission (WHO, 2005b). The mortality due to malariasis is highest in countries with lower Gross National Income. Malaria is endemic throughout Nigeria with seasonal variation in different geographical zones of the country. More than 90% of the total population suffers from at least one episode of malaria each year. Beyond the impact on children and pregnant woman, it affects the general population (RBM, 2005; FHM, 2005b).

Effective malariasis control measure requires a food awareness of every aspectsof disease epidemiology by every member of the community, since the disease remain a major cause of mortality among children under the age of 5 years, it is endemic throughout the country and prevalent with seasonal variation in different parts, as in Jos North, as recent prevalence studies had been undertaken in many parts of the country, but there is probably no data for the later (Jos North) in recent years. This research, is therefore undertaken to determine the prevalence, in order to generate baseline data (Ukpai and Njoku, 2001). There is need to ascertain the present status of the infection and its transmitters, among the people in Jos North. What measures, therefore, have been taken to prevent the disease and what actually is the real cause of it?

It is in an attempt to answer these questions above. That this studies were conceived (Faroke and Onadeke, 2001). The study is generally aimed at investigating malariasis infection in Jos North. Plateau State, Nigeria. With its specific concerns, for prevalence, identify of socio-economic factors influencing its prevalence and finally, to determine the knowledge, attitude and perception of the people in the area about the disease.

A co-incise representation of the disease, malariasis, life cycle is pictorially shows in a plate below

Ookinete develop into new Sporozoites that migrate to the insect's salivary glands, ready to infect a new vertebrate host. The Sporozoites are injected into the skin, in the saliva, when the mosquito takes subsequent blood meals (Zurovac, Midia & Ochola, 2006). Only female mosquito feed on blood; male mosquitoes feed on plant nectar, and thus do not transmit the disease. The female of the *Anopheles* genus of mosquito prefer to feed at night. They usually start searching for meal at dusk, and will continue throughout the night until taking a meal. Malaria parasite can also be transmitted by blood transfusion, although this is rare (Owusu-Ofori, Parry & Bates, 2010).

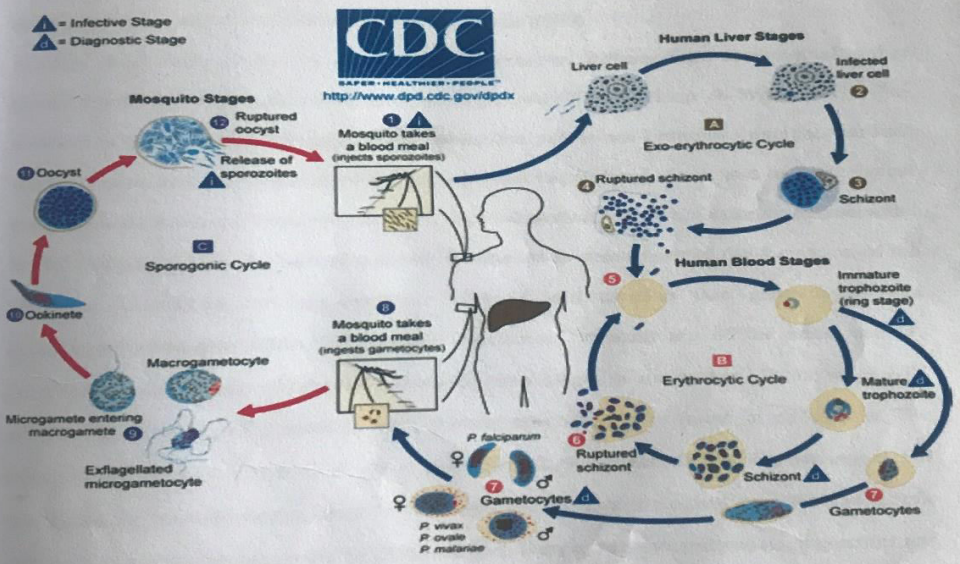

Plate 2.1: A Pictorial presentation of the life cycle of *Plasmodium sp.*

Source: Adapted from CDC www dpdcdcgov/dpd

Materials and Methods

Study Area

This study on the prevalence of malariasis was conducted in Jos North Local Government Area of Plateau State, Nigeria. Jos is located at latitude 9°55° to 10°N and longitude 8°52[1] to 90°E) in the middle belt, North Central of Nigeria. The city has a population density of about 900,000 residents based on the 2006 census with an altitude of 4,062 feet (1.217m) above the sea level. Jos metropolis of Plateau State capital is North Central geo-political zone of Nigeria. It also serves as a referral centre for both the government and private health care facilities within and outside the country. The vegetation is savannah and has a mean annual rainfall of 250cm. malariasis transmission is throughout the year in the area.

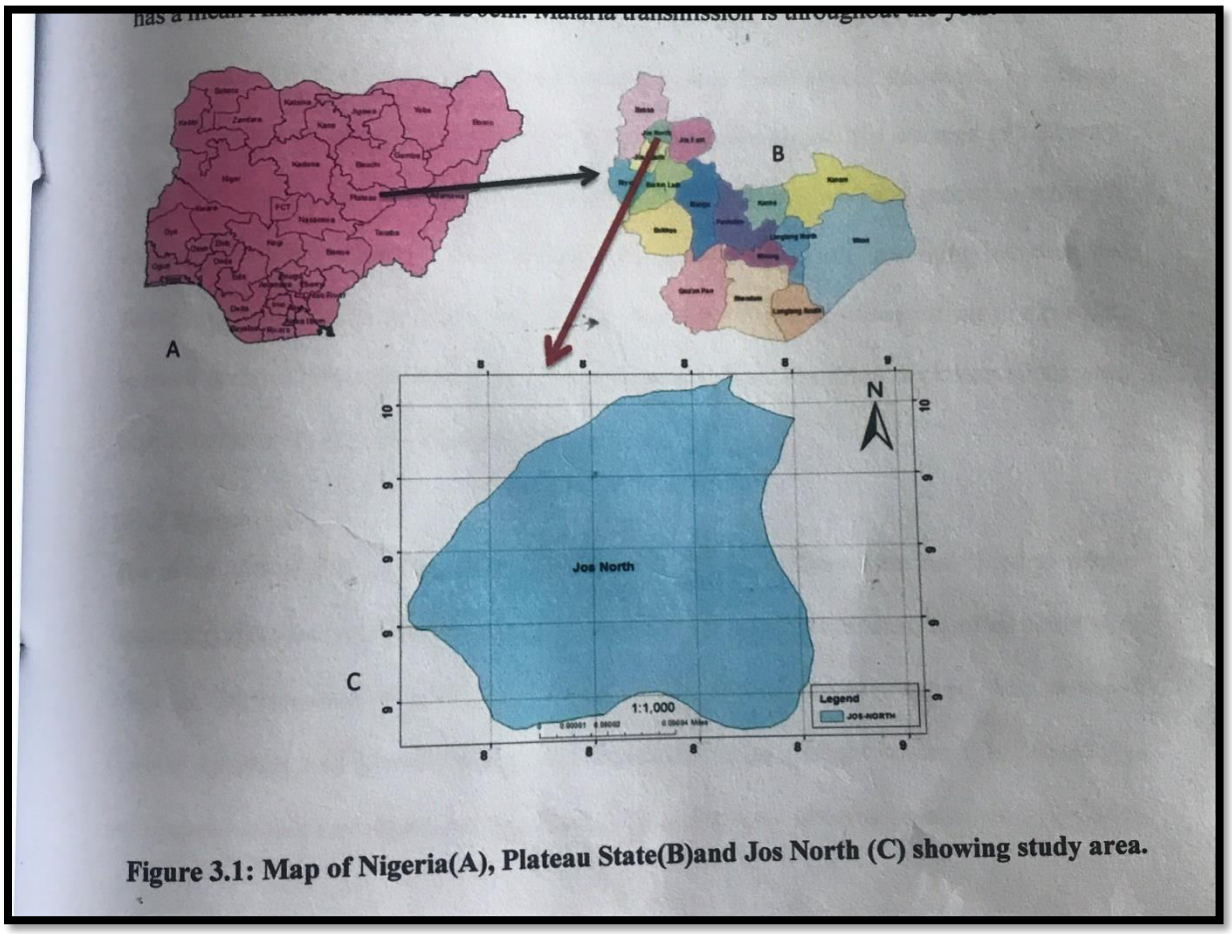

Figure 3.1: Map of Nigeria(A), Plateau State(B)and Jos North (C) showing study area.

Source: Ministry of Land and Survey, Plateau State, Nigeria

Collection of Blood Sample

Sampling of primary health centers (PHCs) for blood sample collections,

were done, starting with brief recognizance visits, to interact with the differently selected PHCs in the study area, namely Apata, Dogon-Ayogo and Nasarawa. The PHCs (mainly clinics) were choosers based on the fact that Jos metropolis is divided across the different wards, tribes and religious majority boundaries covering the areas. Human blood samples were collected from individuals, using the finger pricking methods, after securing informed consents from the in-and out-patients during the reconnaissance visits. Tip of the fingers were first disinfected with alcohols using cotton wool. Blood lancets were further used to prick their fingers. Three hundred identifiable in and out patients randomly selected within three months, following regular visits to the PHCs were considered as the sample population across the different educational levels for the studies.

Microscopical studies with frosted ends, were used for the thick blood films prepared for the oil immersion. Microscopical examination of the samples, which were properly stored or preserved in sterilized sampling bottles on which the three hundred (300) patient identities, in terms of sex, age, educational status, occupational status, were carefully enshrined on the bottles for easier identification during the process of analysis of the blood samples to ascertain its lens.Chi-square (x^2) method was used to determine the difference in the results between the different sexes, age groups, and occupational status of the respondents and between the results of each PHC. Means and simple percentages were further used to obtain prevalence of malariasis parasites. SPSS version. 20 was used for analysis ($P<0.05$) was considered statistically significant and ($P>0.05$) no statistically significant.

Rapid Diagnostic Tests

The materials for the rapid diagnostic tests brought out from their packs before the test was done and RDT kit by standard diagnostic inc placed on a flat surface. The individual identification codes were written on the RDT cassette. The thumb of each participant (big toe for impact was disinfected with a cotton wool. Clean swab to remove first and grease from the balls of the fingers in a quick rolling action (retractable) sterile lancets were used for the infants). A gentle pressure was then applied to the thumb and the first drop f blood was wiped off with a dry cotton wool with no cotton strands remains. The rubber pipette was used to take 5mg of whole blood by touching the tip of the pipette to the blood spot and gently sucking up the blood to the first 5mm line on the pipette. The blood was transferred to the test cassette by touching the nozzle of the pipette to the small sample well and gently squeezing the bulb. Recipient A (or buffer) bottle was then vertically, and 5 drops of recipients A was slowly added to theinfective status to be either positive (+) or negative (-).

Two drops of blood were then collected from each participant from among the in and out patients, using the pipette and dropped at the centre of the clean, pre-face slides. Two drops of blood were then joined and spread to make an even, thick film in a circular form, using the tip of the pipette. The remaining blood samples on the fingers were wiped off, with a cotton wool, held at a grip position for few minutes to stop continuous blood flow from the fingers. The thick film was allowed to air-dry in a flat leveled position protected from this, dust and extreme heat. The air-dried thick film slides, were then kept for laboratory microscopic examination. During which, the 100 slides were stained with guinea stain.

The thick films were not fixed to permit dehaemoglobinization. Ten(10%) of Giemsa solutions were prepared in buffered, distilled water with 10ml of Giemsa stain to 90ml of water (in ration 1:9) and properly mixed. The prepared Games solutions were allowed to stay for 45 minutes, out of sunlight before they were poured into staining chambers and slide put into them. The slides, were allowed to slain for 10 minutes, removed from the stain and rinsed in clean tap water to clean off excess stain on them. They were further placed on a slide sack to drain and dry in position that the films do not touch the slide rack. The dried slides were viewed under the microscopic using the oil immersion large round well. The reagent Analysis the whole blood sample and allows migration past a purple pad. The purple pad contains colloidal fold conjugated antibodies that are directed against HRPH. Reactions were allowed to proceed for 15 minutes before the results were read through the viewing window. The results of the RDT test were then recorded in a laboratory form. When the positive sample is applied to the cassette, *Plasmodium falciparum* antigens bind to the fold conjugated antibodies. The antibody/antigen complex continues migration along the test strips where they are captured by immobilized antibodies. When the captures occur a pink-purple line (C) and a pink-purple line (T) will form on test windows.

Results

A total of 300 blood samples were collected from patients (in-and-out) from some selected Primary Health Centres (PHCs) mainly clinics in Jos North of Plateau State to examine for the presence of Plasmodium falciparum parasites using microscopy and rapid diagnostic tests between April and August, index review 2016 of which 157 (52%) were positive for Plasmodium falciparum parasites. The results of the study which is presently under review, showed highest prevalence rate in patients attending PHCs Dogon-Agogo 66(22%); followed by PHCs Apata 51(17%) and the least was PHC Nasarawa 40(13%). There was significant statistical difference ($P<0.05$) between prevalence rate in patients reviewinguarying cadre of medical attention in the PHCs. (See table 4.1 below).

Alongside the determination of the densities of the prevalence of the discuss across the three selected PHCs in relation with the locations, results showed malariasis infections densities in the order of Plasmodium falciparum + 1&DA-PHC = 40 (0.13), N-PHC = 41 (0.14), A - PHC = 49 (0.16); +2 {DA-PHC=21 (0.07), N-PHC=13 (0.04), A-PHC=12(0.04, +3 {DA-PHC = 4 (0.01), N-PHC= 11 (0.04), A-PHC = 0 (0.00); +4> {DA-PHC=4 (0.01), N-PHC=(0.01), A-PHC= 0(0.00) and Nil (-) {DA-PHC = 31 (0:10%), N-PHC = 28 (0.09), A-PHC=39 (0.13)]. There were significant statistical differences (P<0.05) between malariasis infection density and location of patients receiving varying cadre of medical attention in the PHCs (See table 4.2 below).

Result of sex-related prevalence of malarias infection among in-and-out patients attending the three selected PHCs (DA, N and A), showed that in gender-specific infection rate, females had the higher infection rate 110 (0.37) than male, who had a total of 47 (0.16) infection. There were no significant statistical differences (P>0.05) betweenmalariasis infection prevalence and sex of the patients examined in the study (See table 4.3 below).While densities of malariasis infection with respect to sex among patients attending the three selected PHCs (DA, N and A), showed that concentration of Plasmodium falciparum with male patients having {+1 (0.15), +3(0.03), +4> (0.02) and Nil (-) (0.10), while the female patients had {+1(0.28), +2 (0.11), +3(0.02) +4> (0.02) and Nil (-) (0.23). The female patients manifested higher densities, 197(0-660 prevalence rate, that the male patients 103(0.34). These therefore, no significant statistical differences (P>0.05) betweenmalariasis infection densities sand sex of the patients examined in the study (See table 4.4 below).

Results of age-related prevalence of malariasis infection among in-and-out patients attending the selected PHCs, (DA, N and A) in Jos North, showed that the age group 20-30 years had the highest infection rate of 49(16%), followed by 6-19, 31-40-, and 0-5-years age groups, having 34(11%), 26(8%), 18(6%) and 30(1%) respectively. The age group 0-5 years had the least infection prevalence rate of 30(1%) while 20-30 years significant statistical difference (P>0.05) between malariasis infection prevalence and age-group of the patients examined in the study, at the different PHCs (See table 4.5 below).

Following results of densities malariasis infection among age groups of patients attending PHCs (DA, N and A) in Jos North showed thatmalariasis infection densities across age-group, there was highest 61(20%)malariasis infection density in patients with age range between 20-30 years, followed by those with age group ranges from 0-5 years 48(16%), then 6-19 years with (13%); 31-40 years with 28(9%) and the least malariasis infection densities, which was in the age group >40 years with (8%). There was therefore, no significant statistical differences (P>0.05) betweenmalariasis infection densities and age groups of the patients examined in the study, at the differently selected PHC. (See table 4.6 below).

Table 4.1: Primary Health Centres (PHCs) – Related Prevalence of Malariasis among in-and-out patients at all Educational levels (PSTU) Examined in Study in Jos North Environment.

PHC/Edu, Levels, PSTU	Number Examined	Number Positive	Percentage %
Dogon-Agogo	100	66	0.22
Nasarawa	100	40	0.13
Apata	100	51	0.17
TOTAL	300	157	0.52

Chi-square = 13.656 of =2. P<0.05 (Primary (P), Secondary(S), Tertiary(T), University(U)

Table 4.2: Density of Prevalence of Malariasis among in-and-out patientsat all Educational levels (PSTU) Examined in Study in Jos North Environment

PHC Location	Number Examined	Malariasis Parasite Density				
		+1	+2	+3	+4>	Nil(-)
Dogon-Agogo	100	40(0.13)	21(0.07)	4(0.01)	4(0.01)	31(0.10)
Nasarawa	100	41(0.14)	13(0.04)	11(0.04)	7(0.02)	28(0.09)
Apata	100	49(0.16)	12(0.04)	0(0.00)	0(0.00)	39(0.13)
TOTAL	300	130(0.43)	46(0.15)	15(0.05)	11(0.04)	98(0.33)

Chi-square = 25.404 of 8. P<0.05 (Apata = A, Dogon-Agogo = DA and Nasarawa = N) PHCs.

Table 4.3: Sex Related Prevalence of Malariasis among in-and-out patientsat all Educational levels (PSTU) Examined in Study in Jos North Environment

Sex /PSTU	Number Examined	Number Positive	Percentage %
Male	103	47	0.16
Female	197	110	0.37
TOTAL	300	157	0.52

Chi-square = 2.825 of =1. P<0.05

Table 4.4:

Density of Sex-Related Prevalence of Malariasis among in-and-out patients at all Educational levels (PSTU)Examined in Study in Jos North Environment

Sex/PSTU	Number Examined	Malariasis Parasite Density 1% (Parasites/Nil)					
		+1	+2	+3	+4>	Nil(-)	-%
Male	103	45(0.15)	14(0.05)	9(0.03)	5(0.02)	30(0.10)	0.35
Female	197	85(0.28)	32(0.11)	6(0.02)	6(0.02)	68(0.23)	0.66
TOTAL	300	130(0.43)	46(0.15)	15(0.05)	11(0.04)	98(0.33)	1.00

Chi-square = 5.903, of =4. P<0.05

Table 4.5: Age Related Prevalence of Malariasis among in-and-out patientsat all Educational levels (PSTU) Examined in Study in Jos North Environment.

Age Group/PTSU	Number Examined	Number Positive	Percentage %
0-5 (P)	71	30	0.01
6-19 (PS)	66	34	0.11
20-30 (TU)	87	49	0.16
31-40 (TU)	40	26	0.09
<40 (TU)	36	18	0.06
TOTAL	300	157	0.52

Chi-square = 6.116, of =4. P<0.05

Table 4.6: Density of Age-Related Prevalence of Malariasis among in-and-out patientsat all Educational levels (PSTU) Examined in Study in Jos North Environment

Age group	Number Examined	Malariasis Parasite Density 1% (Parasites/Nil)					
		No. of Positive	+1	+2	+3	+4>	Nil(-)
0-5 P (P)	71	48(0.16)	24(0.08)	12(0.04)	6(0.02)	6(0.02)	23(0.08)
6-19 (PS)	66	40(0.13)	26(0.09)	9(0.03)	4(0.01)	1(0.01)	26(0.09)
20-30(TU)	87	61(0.20)	40(0.13)	16(0.05)	2(0.01)	3(0.03)	26(0.09)
31-40 (TU)	40	28(0.09)	19(0.06)	7(0.02)	2(0.01)	0(0.00)	12(0.04)
<40 (TU)	36	25(0.08)	21(0.07)	2(0.01)	1(0.00)	1(0.00)	11(0.04)
TOTAL	300 (1.00)	157(1.57)	130(0.43)	46(0.15)	15(0.05)	11(0.04)	98(0.33)

Chi-square = 18.573, of =16. P<0.05

Discussion:

The total prevalence of malariasis infection in the study population was 52%, for a disease like malariasis with serious debit agitating consequence; it can be described to be high or hyper-endemic. These results are higher that findings of Animudu, Adepuju, Adeniran, Adeoye, Kassim, Oyewole and Nwuba (2006) who is in a similarresearch in Eastern Nigeria reported 17% prevalence rate, Uneanaeto and Ekejundu (2006) who reported 46% prevalence in Nnewi, Anambra State, but much lower than that of Aribodor, Njoku, Eneanya and Onyali(2003) who had reported 76% prevalence in Azia, Anambra State. This result is also higher than the 40% annual prevalence rates reported in Nigeria (FMH, 2005a).

The overall relatively high prevalence could be attributed due to optimal temperature and suitable weather conditions that encourage mosquitoes thriving in

their breeding environment, in line with such activities that increase their infections abilities especially the breeding sites and activities of biting and transmitting by Anopheles mosquito species implicated for the Plasmodium parasites infecting healthy individuals, having bitten an infected person earlier. The period of intensive vectoral activities within the month of April to July of the year during which the study was undertaking, is another main factor to the high prevalence.

The rates had a relatively lower prevalence rate of 16%, compared with their female counterparts that had a prevalence rate of 37%, no significant statistical differences between the sexes of patients examined in the study. Through similar studies had indicated higher prevalence in males than females, (WHO 2005b, WHO 2006, Nwibari 2007), but not all established their findings with sufficient scientific proofs, rather mostly on socio-cultural activities of males that exposes them more to mosquitoes bite and including careless exposure of their bare bodies both at homes and on farms as well as bush paths, where water related environment that encourage thriving and breeding mosquitoes, with consequential transmitting malariasis plasmodium parasite, thereby experiencing increase in male infection less than the females, whose domestic outdoor and farming or water related environmental female activities are reduced and more so, a more careful body exposure to regular and intense mosquito bites. Gender susceptibilty what gender (Gilles and Warrell, 1993). These studies see females higher prevalence rate to certain excessive domestic activities during local food productionthat brings them more closer of water bodies, where mosquitoe breeding and bites are more intense, especially during domestic water fetching from well waters and other streams where females walk through bush path to even at night hours, thereby exposing them mostly to infection of the parasites of malariasis. More water and bushy environments around living hours, where females are less interested in sleeping under mosquitoes treated bed-nets, than in alis, could as well foster reason for more attacks of the disease on females than males.

This is supported by the findings of Nwibari and Udonsi (2006), where females prevalence 107(14%) was higher compared with males 66(9%) with just 5% difference in sex-related prevalence of the disease in parts of Ogoni land. Though this study wasn't in total acceptance, rather saw the females higher prevalence rate to be by mere chance but apex with females engaging more in domestic activities as well as compared to males who wear long sleeve shirts and trousers to cover most from regular bites of mosquitoes and consequent malariasis infection especially during cold seasons in Jos North, where the study obtained, which was supported and further buttressed by findings by World Health Survey (2006) in similar research.

Age-related prevalence being reported higher in the study, as specified among 6-19 and 20-30 years, seems attribute to facts that they are age-group known to exhibit higher work force that puts them in the fore front of both in and out-door

activities at home and at work places, including farming and fishing activities, thereby increasingly placing them higher in terms of malariasis infectivity in the study. Furthermore, these age groups are also more activity-driven towards all kinds of youthful exuberance, even though with higher level of protective immunity, yet vulnerable due to excessive careless attitudes generally towards more practices that exposes them to mosquitoes, especially more at night, visits from house to house, to friends and relatives, where they also engage in major lifestyle of body exposure to bites and regular transmission of malariasis parasite by among themselves.

Sleeping without body coverings as well as, away from mosquitoes treated bed-nets, sometimes under the control of alcoholism and heavy food consumption, at under developing levels of immunity and prophylaxis against the parasites, yet experience greater attacks by mosquitoes to tend to negate such preventive tendencies, as supported by similar findings by Ekeh and Teclaire (2008), Nwibari (2007), who separately reported malariasis higher prevalence rate 56.9% and 33.8% 21-30 years age group, with males 12.3% and 7.9% females while the earlier reports supported findings among under five (5) attending primary health centre facilities in Jos North; Daboer et al (2010) who also reported lower prevalenceof 38% in a community survey of children less than 5 years in Jos metropolis. A recent study reported by Okoli and Solomon (2014) found a prevalence of 48.06% in hospital-based study all in support of the findings in the present study. though variation in some aspects. These studies were conducted during the high transmission season either during the rainy seasons or shortly before the end of the rain and subjects were under five children who were either febrile or presenting with malaria related symptoms to confirm different infectivity levels of patients in the study across the PHCs in Jos North.

The research study revealed the prevalence of malariasis infection at hyper-endemic and intensities which densities across sex, age-groups and occupational related prevalence, hence creating an awareness to dwellers and inhabitants of Jos North, towards working towards preventive measures to exposures of mosquito bites on regular basis and intense infections by Plasmodium parasites. Investing heavily in clearing of grasses and draining of waterlogged areas to prevent mosquitoes breeding sites, to eliminate regular mosquito attacks. Use of mosquito treated bed-nets was encouraged among all dwellers, as well as avoidance of out-door activities late nightly, when mosquito bites are mostly observed, stepped up preventive measures. Socio-cultural and socio-economic activities that boost body exposures to mosquito bites to increase malariasis parasites transmission rates, were not overemphasized. More researchers are encouraged to explore other factors as areas for further research as to improve the general decline in exposure to transmission of Malariasisin the area and beyond.

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