Malarial Infection: A Threat to Human Health In South Western Part Of Nigeria

Awolaju, B.A.
Faculty Of Medical And Applied Sciences,
University Of Ilesa, Ilesa
Bisiriyuajani@Gmail.Com
&
Oloyede, J.O. & Akinloye, K.F.
Department Of Geography,
Faculty Of Social And Management Sciences,
University Of Ilesa, Ilesa
Joloye2013@Gmail.Com

Abstract

This Was Conducted On Malarial Infection: A Threat To Human Health In South Western Part Of Nigeria. One Hundred And Two (102) Samples Were Randomly Selected Among Academic Staff, Postgraduate Students Of Olabisi Onabanjo University And Outsiders. This Study Aims At; Assessing The Prevalence Of Global Malarial Infection In Humans, Examining The Risk Of Malarial Hazard, Identifying Factors Promoting Malaria In Endemic Areas And Identifying Control Measures And Treatments That Will Ensure Elimination Of Malaria In An Endemic Areas. The Research Instrument Used To Collect Data For The Study Was An Online Questionnaire Which Was Sent To Respondents' E – Mail Addresses. The Data Collected Were Analysed Using Chi – Square Test. The Results Revealed That;There Is Significant Relationship Between Malarial Infection In Pregnant Women And Living In Malaria Risk Areas. Chi – Square Calculated Value(10.864) Is Greater Than Chi – Square Table Value(10.255). There Is No Significant Relationship Between Maternal Anaemia And Low Birth Weight Which Could Be Assumed To Be Responsible For Death During The First Months Of Life. Chi – Square Calculated Value(14.396) Is Lower Than Chi – Square Table Value(15.603). Chi – Square Calculated Value(13.375) Is Greater Than Chi – Square Table Value(11.965). This Shows There Is Significant Relationship Between Effect Of Malaria On Children's Schooling And Physical And Mental Impairments. This Result Reveals That There Is Significant Relationship Between Acts And Chloroquine / Sulphadoxine – Pyrimethane On Malaria Parasites, Chi – Square Calculated Value(15.790) Is Greater Than Chi – Square Table Value(15.442).Hence, Acts Is Effective In Treating Malaria Compared To Chloroquine/Sulphadoxine – Pyrimethane. Chi – Square Calculated Value (8.107) Is Greater Than Chi – Square Table Value(6.426).This Result Shows That There Is Significant Relationship Between The Use Of Insecticide – Treated Bed – Net And Insect Repellents In Reducing Malarial Infection.Based On The Above Shown Results Recommendations Were Made To Enhance Health Status Of The Inhabitants Of Malaria Risk Areas In South Western Part Of Nigeria.

Key Words: Malarial Infection, *Plasmodium Falciparum,* Vector, Treatment.

Introduction

Malaria Is A Life Threatening Parasitic Disease Caused By The Protozoa Of The Genus Plasmodium (Fana Et Al, 2015). Five Species Are Known To Inflict Humans Namely, *P. Falciparum, P. Malariae, P. Ovale, P. Vivax And P.Knowlesi*. The Disease Is Transmitted By The Bite Of Infected Female Anopheles Mosquitoes. Each Species Causes Slightly Different Symptoms. These Symptoms Include, High Fever, Chills, Headache, Nausea, Vomiting And Sweating. Depending On The Species Of Parasite, Symptoms May Come And Go. Replases May Occur For Up To Five Years (*P. Vivax And P. Ovale*) Or 50 Years (*P. Malariae*) If Not Retreated Properly. *P. Falciparum* May Cause More Serious Symptoms, Including Shock, Kidney And Liver Failure, Coma And Death. It Is Worth Mentioning That *Plasmodium*

Falciparum, Occurs Mainly In Countries With A Tropic Climatic In Particular In Sub-Saharan African (South And Centre Of The Continent), *Plasmodium Vivax*, Has The Broadest Range Of Occurrence (From The Tropical To The Moderate Zone), *Plasmodium Malariae*, Sporandically In Countries With A Subtropical And Tropical Climate; *Plasmodium Ovale*, Occurs In West Of Africa, The Philippines, East Of Indonesia And In Papua. New Guinea And Plasmodium Knowlesi; Occurs In South East Asia, Singapore, Malaysia And Thailand (Jaskiweicz, Graczyk And Rydzak,2010). Among The Five Species, The Most Dangerous Is *Plasmodium Falciparum* (Mita And Tanabe, 2012).In The Transmission Of Malaria, Approximately 30-40 Species Of Mosquitoes Of Genus Anopheles Play The Significant Role Of Vector (Joy Et Al., 2008).These Mosquitoes Vary In Their Nutritional Requirements. Some Species Prefer Human Blood (Anthropophilic) While Others Prefer Blood Of Animals (Zoophilic) Such As Cattle Or Birds (Cholewinski, Derda & Hadas, 2015). Both Play A Significant Role In Transmitting And Spreading Malaria. The Two Strongly Anthropophitic Species Of Mosquitoes, Namely, *Anopheles Gambiae* And *Anopheles Funestus*, Are Responsible For Spreading The Highest Number Of Malaria Cases In Africa (Kelly-Hope, Bockarie, & Molyneux, 2012). Both Species Transmit *Plasmodium Falciparum* And *Plasmodium Ovale* (Lim, Mahmud,Chew Et Al.,2010). Other African Species Transmitting Mainly *Plasmodium Falciparum* And Having Great Significance In Spreading Malaria Among People Include *Anopheles Arabiensis* (Zoophilic) Occurring In South Of Africa.

Objectives of The Research Work

This Study Aims At;

(I) Assessing The Prevalence Of Global Malarial Infection In Humans

(Ii) Examining The Risk Of Malarial Hazard

(Iii) Identifying Factors Promoting Malaria In Endemic Areas And

(Iv) Identifying Control Measures And Treatments That Will Ensure Elimination Of Malaria In An Endemic Areas.

(Iv) To Find Out The Best Drugs And Method To Treat And Eradicate Malaria.

Hypotheses

$H0_1$: There Is No Significant Relationship Between Malaria Infection In Pregnant Women And Living In Malaria Risk Areas.

$H0_2$: There Is No Significant Relationship Between Maternal Anaemia And How Birth Weight Quick Factor For Death In The First Month Life.

$H0_3$: There Is No Significant Relationship Between Effect Of Malaria On School Children's Schooling And A Serious Attack Of Malaria Resulting In Physical And Mental Impairment.

$H0_4$: There Is No Significant Relationship Between The Effectiveness Of Artemisinin Containing Combination Treatments (Acts) And Chloroquine/Sulphadoxin-Pyrimethane On Malaria Parasites.

$H0_5$: There Is No Significant Relationship Between The Use Of Insecticide-Treated Bed-Net And Insect Repellants In Reducing Malaria Infection.

Area of Study

Southwest Nigeria

Southwest Nigeria Is An Integral Region In Nigeria. It Falls In The Tropical Region Of The World. This Region Lies Between Longitude 3^0 To 7^0East And Latitude 4^0 To 9^0N (Oni And Odekunle, 2016). It Has A Total Area Of 77,818km2 And A Tone Region In Densely Populated With An Average Of 100-500 People Per Square Kilometer. The Region Is Believed To Have Estimated Population Of 55 Million. The Climate Of Southwest Can Be Termed Warm Humid Climate. It Has Two Seasons Viz Wet Season April To October, And The Dry Season November To March (Akinloye, Et Al, 2017). The Day Temperature Varies From 32^0C In The Coastal Area Of Lagos To 34^0C Inland And The Night Temperature Can Be Around 26^0C To 28^0C From The Coastal Inland Respectively. This Can Be A Little

Lower In The Rainy Season. Two Different Winds Blows Over Southwest. There Are Southwest Monson That Comes From The Ocean. It Brings Moisture, It Blows From April To October. The Second Is Northeast Trade Wind Called Harmattan In Local Language. It Blows From The Desert To Nigeria,It Comes Between November To March. Rainfall Is High, It May Rain Throughout The Year In The Coastal Area Of The Region. On The Inland, It May Rain For 8 Months. There Are Two Maxima Of Rainfall (June/July And September/October) Every Year. Though There Are Variations Now With The Effect Of Climate Change That Is Battering The Entire World.

The Vegetation Of Southwest Is Forest. The Forest Is Discussed Under These Headings:

The Coastal Forest

This Comprises Of Mangrove Or Swampy Forest And Fresh Water Forest.

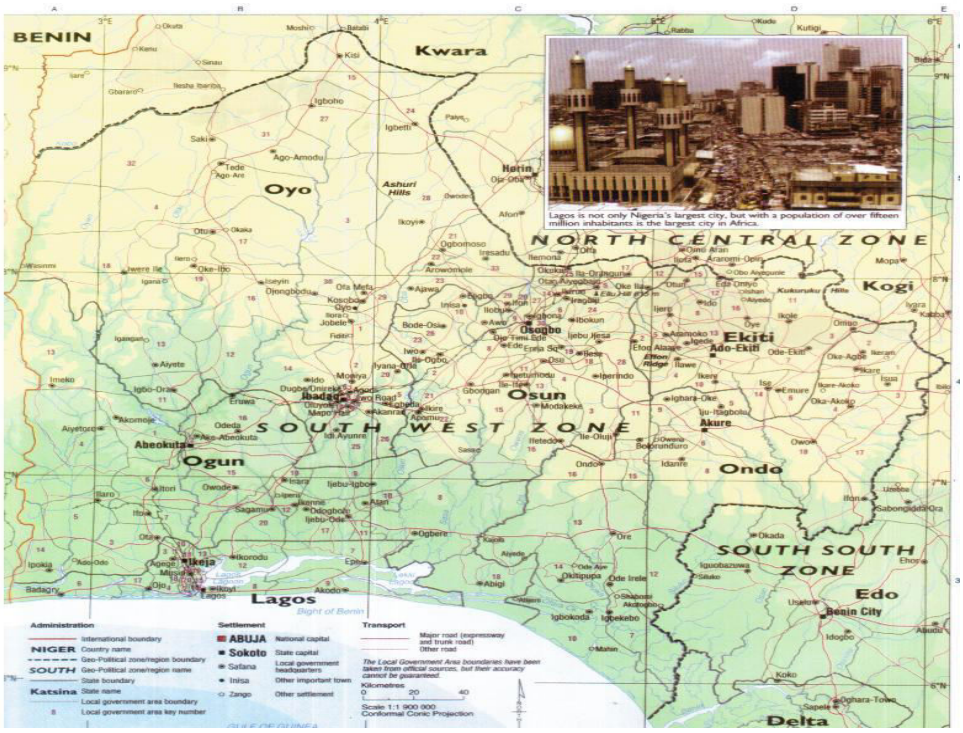
The Mangrove/Swampy Forest: Is The Forest That Is Of An Extensive Occurrence In The Coasts Of Southwest Such As Lekki, Epe, Badagry, Ikorodu In Lagos State And Araromi Seaside In Ondo Water Side. The Forest Grows On Lagoons And Creeks. The Woody Species Are Angiosperms, Good Examples Are Rphizophora Species (The Red Mangrove) And Avicennia Nitida (White Mangrove). Animals Populations Of This Vegetation Include Brachiostoma, Barnacles, Oxysters And Different Species Of Worms, And Crabs. All Types Of Mosquitoes Breed Heavily In This Forest.

The Fresh Water Swamp: This Lies Next To The Mangrove Swamp. It Is Also On The Valleys Of Rivers In The Region. It Grows On The Water Of Streams, Rivers, Ponds And Lakes. Common Species Is Raffia Palm. It Is Also The Home Of Mosquitoes.

The Tropical Lowland Forest Or High Rainfall Forest: This Is Found Immediately After Fresh Water Swamp Forest. It Occurs In The Wet, Non-Water-Logged Areas Of Southwest,Notably The Rest Of Urban And Rural Areas Of The Region. The Tropical Rain Forest In Its Natural (I.E. Virgin Or Primeval) State, Is A Dense Luxuriant Vegetation, Composed Of Many Different Species Of Plants, Characterized By Fast Rate Of Growth.

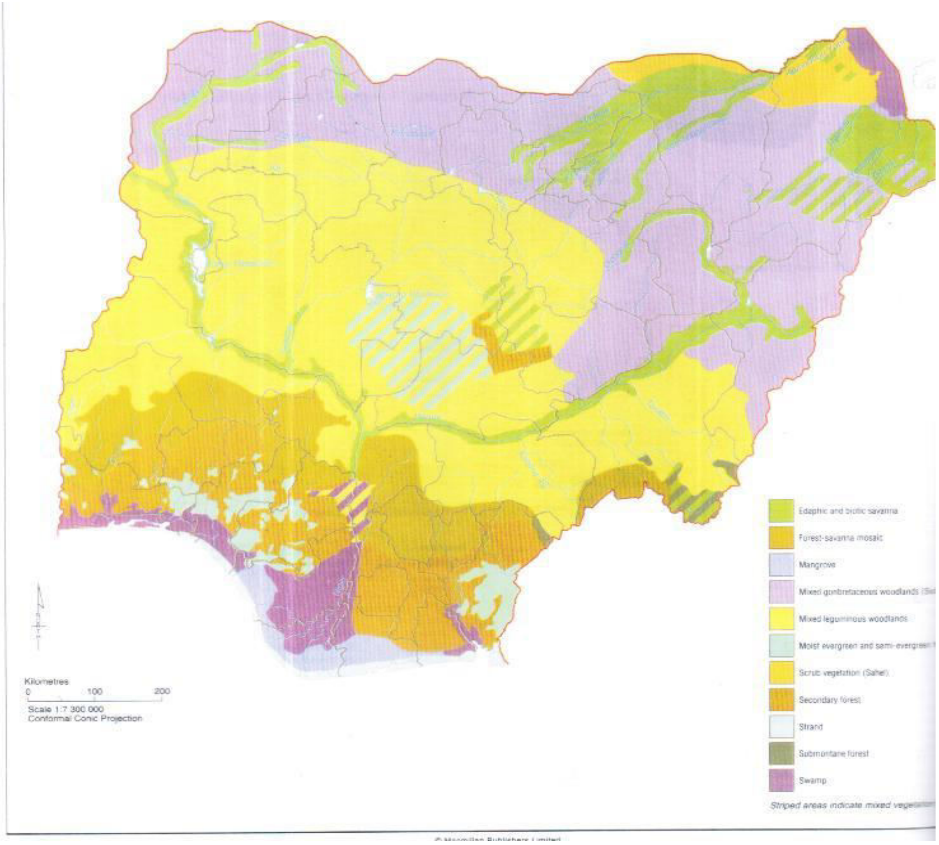
The Growth Of Most Of These Plants, Occurs All Over The Year Round. The Species Of Tees Are Evergreen. Trees Are Grown In Layers, With The Highest Which Can Be Up To 60 Metres Above The Sea Level. The Next May Be Between 30-45 Metres And The Lowest Layer May Be Up To 20 Metres. The Foliage Of The Trees Can Form Canopy-Like Structure, The Inside Of The Forest Is Always Cool Even In The Heart Of Dry Season. Valuable Big Trees Like Melicia Excels, Khaya Grandifolia, Ceba Pantaudasa, Etc. This Forest Is Also The Habitat Of Mosquitoes.

Figure 1: Map Of Southwest Political (Lagos City Inset)



Source: Macmillan (2010

Figure 2: Map Of Nigeria Showing Vegetation Of Southwest Of Nigeria



Source: Macmillan (2010)

Literature Review

Studying, The Vectors And Parasites Responsible For Causing Malaria Infection, It Is A True Revelation That Malaria Remains The Leading Causes Of Morbidity And Mortality Globally And Nearly Half Of The Global Populations Are At Its Risk. Malaria Is An Infectious Disease That Has A Major Impact On Global Public Health And Economy With An Estimated 3.4 Billion People At Risk. Currently, Malaria Threatens Almost One Third Of The World's Population In 104 Tropical Countries And Territories Where It Is Considered Endemic Diseases. The World Health Organization (WHO) Estimates That 207 Million Cases Of Malaria Occurred Globally In 2012 And Lead To 627,000 Deaths. Africa, South East Asia And Eastern Mediterranean Were The Regions With Highest Number Of Reported Cases And Death Reported; Mainly In Children Under Five Years Of Age (WHO 2013). In The Americas, 22 Countries Are Affected By Malaria, With Approximately 1.1 Million Cases And 1,100 Deaths Registered In 2010. In Many African Countries, In 2015, 88% Of Global Cases And 90% Of Global Deaths Due To Malaria Were Recorded (WHO,2016). In 2016, 91 Countries Reported A Total Of 216 Million Cases Of Malaria, An Increase Of 5 Million Cases Over Previous Year. The Global Tally Of Malaria Reached 445,000 Deaths, About The Same Number Reported In 2015 (WHO 2017). In 2016, Just Over Half (54%) Of People At Risk Of Malaria In Sub-Saharan Africa Were Sleeping Under An Insecticide-Treated Mosquito Net- The Primary Prevention Method. Most Malaria Cases In 2016 Were In The WHO African Region (90%), Followed By The WHO South – East Asia Region (7%) And The WHO Eastern Mediterranean Region (2%). The Incidence Rate Of Malaria Is Estimated To Have Decreased By 18% Globally From 76 To 63 Cases Per 1000 Population At Risk Between 2010 And 2016 (WHO, 2017). The WHO South – East Asia Region Recorded The Largest Decline (48%) Followed By The WHO Region Of The Americas (22%) And The WHO African Region (20%), WHO (2017), Reported That *Plasmodium Falciparum* Is The Most Prevalent Malaria Parasite In Sub-Saharan African, Accounting For 99% Of Estimated Malaria Cases In 2016. Outside Of Africa, *P. Vivax* Is The Predominant Parasite In The WHO Region Of The Americas, Representing 64% Of Malaria Cases And Is Above 30% In The WHO South-East Asia And 40% In The Eastern Mediterranean Regions.

Epidemiology:

This Refers To The Study Of The Distribution And Determinants Of Health Related States Or Events (Including Disease) And Application Of This Study To The Control Of Disease And Other Health Problems (CDC, 2012).Malaria Affects The Lives Of Almost All People Living In The Area Of Africa Defined By The Southern Fringes Of Sahara Desert In The North And A Latitude Of About 28° In The South. (The African Report, 2003). Most People At Risk Of The Disease Live In Areas Of Relatively Stable Malaria Transmission. In Areas Of Stable Malaria Transmission, Very Young Children And Pregnant Woman Are The Population Groups At Highest Risk For Malaria Morbidity And Mortality. Most Children Experience Their First Infections During The First Year Or Two Of Life, When They Have Not Yet Acquired Adequate Clinical Immunity- Which Makes These Early Years Particularly Dangerous. Ninety Percent (90%) Of All Malaria Deaths In Africa Occur In Young Children. Adult Woman In Areas Of Transmission Have A High Level Of Immunity, But This Is Impaired Especially In The First Pregnancy, With The Result That Risk Of Infection Increases. Studies Have Shown That Infection Rates Are Highest In First And Second Parity Women With Lower Rates In Later Pregnancies (Steketee Et Al.,2002;RBM,No 4,Duffy And Fried, 2005). Pregnant Women Are Not Only At Risk During Malaria Infection, This Infection Also Spreads To Her Foetus And The Newborn. Most Cases Of Malaria In Pregnancy In Area Of Stable Malaria Transmission Are Asymptomatic (Mockennopt Et Al.,2002) . Depending On The Endemicity Of Malaria In An Area, It Can Be Expected That 1 – 50% Of Pregnant Women May Carry Malaria Parasitaemia Especially In The Placenta Without Noticing It (Steketee Et Al., 2002).

This Is Attributed To Anti-Disease Immunity Acquired During Previous Exposure That Protects Against Clinical Malaria (Staalsoe Et Al.,2004). Pregnant Women Are Three Times More Likely To Suffer From Severe Diseases As A Result Of Malaria Infection Compared With Their Non –Pregnant

Counterparts And Have Amortality Rate That Approaches 50% (WHO,2006).Adult Men Are Not Also Exempted From Malarial Infection.

Determinants of Level Of Transmission Of Malaria Parasites:

(A) Factors Relating To The Parasite:
This Is Concerned With The Species And Strain Of Plasmodium And Their Degree Of Infectivity To The Mosquitoes And Man In The Area.

(B) Factors Relating To The Vector, Such As The Susceptibility Of The Local Species And Strains Of Anopheles To Infection With The Local Strain Of Plasmodium And Their Capacity To Transmit The Parasite To Man; As Well As Their General Ecology, Breeding, Feeding And Resting Behaviour And Population Structure Etc.

(C) Environmental And Climatic Factors:The Temperature, Humidity And Rainfall Have Significant Effect On The Malarial Epidemiology. Temperature And Humidity Not Only Affect The Life Cycle And Behaviour Of The Mosquito Vector But Also The Rate Of Development (Sporogony) Of The Parasite Within It. For Instance, The Time Taken To Complete The Sporogony Is Doubled When Temperature Falls By 10°c. Thus Temperature Impacts The Length Of Larval Development Mosquito Survival And Parasite Development. Elevated Temperatures Accelerates The Development Rate Of A Higher Number Of Mosquito Larva And Of The Plasmodium Parasites (Paaijmans, Read And Thomas ,2009).With Increased Development Rates, A Higher Number Of Mosquito Generations Arise And In Greater Abundance. As Temperatures Increase, Malaria Transmission Rates Increase Up To A Threshold Level Of Approximately 37°c That Is Rarely Surpassed (Beck – Johnson Et Al.,2013).

The Effects Of Increased Rainfall On Malaria Transmission And Risks For Malaria Outbreaks Are Compounded By Increased Temperatures And Increased Humidity (Mabaso And Ndlovu,2012). However, Several Studies Have Found That Elevated Temperatures In The Absence Of Humidity, Reduces Mosquito Longevity And Hence Their Capacity To Spread Plasmodium (Lindsy And Martens,1998).

(D) Entomological Factor: The Behaviour Of Vector Matters When Evaluating The Role Of Mosquitoes In The Epidemiology Of Malaria (Taye Et Al.,2006). This Shows That Behavioural And Biological Variation Across Mosquito Species, Such As Habitat Associations And Associated Climatic And Environmental Drivers Of Population Abundance, Host-Seeking Behaviour, And Resistance To Insecticides, Affect The Nature Of Malaria Outbreaks (Lindsy And Martens, 1998;Gatton Et Al.,2013).

(E) Human Factors: Man Plays A Significant Role In Malaria Epidemiology;

(I) Some Malariogenic Activities Of Man Promote Peri-Domestic Breeding As Well As Those Involving Developmental Activities. These Activities Include;

(1) Building Project, Road, Railway And Airport Construction And Maintenance Create Breeding Sites In The Excavations And Pits Etc Which Contain Water.

(2) Growing Near The Houses, Plants Which Are Capable Of Retaining Water. The Axis Of Plants Like Pineapple, Cocoyam, Pawpaw, Banana, Plantain And Certain Ornamental Plants Are Capable Of Holding Water To Support The Breeding Of Some Species Of Mosquitoes.

(3) Littering Residential Premises With Discarded Objects Which Serve As Containers Suitable For Mosquito Breeding. These Man-Made Containers Include Can, Tin, Plastics, Packages, Abandoned Old Cars And Discarded Car Parts Etc.

(4) Storage Of Water For Domestic Use Around The Houses.

(Ii) Malaria Can Also Be Transmitted Through Avenues Other Than By Mosquitoes, For Examples;

(1) During Blood Transfusion

(2) In Malaria Therapy In Which Deliberate Infection With Malaria Has Been Found To Cure Neurosyphilitic Patients.

(3) Through The Communal Use Of Syringes By Drug Addicts.

(4) Transplacentation.

(Iii) Malaria Is Found To Be Most Prevalent In Rural Areas And Is Generally Associated With Agricultural Occupation.

Methodology

Research Design

The Research Design Used For This Study Was Expost - Facto Research Design In Which Online Questionnaire Was Sent To Respondents To Ease Collection Of Data.

Population

The Academic Staff, Postgraduate Students Of Olabisi Onabanjo University, Ago – Iwoye And Outsiders Were Involved In The Study.

Ago-Iwoye And Its Environ Was Selected As A Place To Take Data Simply Because Apart From The Fact That The Place Is In The Heart Of Forest Of Southwest, Nigeria, Its Also Closer To The Riverine I.E. Coastal Area Of The Region Of Southwest. The Area Is Also A Quasi Rural And Urban. It Is An Ideal Place To Gather Data For This Type Of Research Work.

Sample

This Consisted Of 102 Academic Staff, Postgraduate Students And Outsiders Who Were Randomly Selected In South Western Part Of Nigeria.

Research Instrument and Administration

Questionnaire Was Used To Collect Data For This Study. This Questionnaire Was Constructed Online Through Google Form And Sent Directly Into The Respondents' E-Mail Addresses For Their Responses. This Questionnaire Was A 5 – Point Likert Scale; Strongly Agreed(SA), Agreed(A), Undecided(U), Disagreed(D) And Strongly Disagreed(SD).Their Responses Were Received Through The Same Process For Analysis To Be Done.

Method of Data Analysis

The Data Collected Were Analysed Using Chi – Square Test.

Results and Analysis

The Data Collected Were Analysed As Shown In The Following Tables;

Table I: Shows The Relationship Between Malarial Infection In Pregnant Women And Living In Malaria Risk Areas.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	10.255[a]	12	.594
Likelihood Ratio	10.864	12	.541
N Of Valid Cases	102		

A. 11 Cells (55.0%) Have Expected Count Less Than 5. The Minimum Expected Count Is .22.

Chi – Square Calculated Value(10.864) Is Greater Than Chi – Square Table Value(10.255). This Result Shows There Is Significant Relationship Between Malarial Infection In Pregnant Women And Living In Malaria Risk Areas.

Table II: Shows The Relationship Between Maternal Anaemia And Low Birth Weight , A Risk Factor For Death In The First Months Of Life.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	15.603[a]	9	.076
Likelihood Ratio	14.396	9	.109
N Of Valid Cases	102		

A. 10 Cells (62.5%) Have Expected Count Less Than 5. The Minimum Expected Count Is .76.

This Result Reveals That There Is No Significant Relationship Between Maternal Anaemia And Low Birth Weight Which Could Be Assumed To Be Responsible For Death During The First Months Of Life.Chi – Square Calculated Value(14.396) Is Lower Than Chi – Square Table Value(15.603).

Table III : Shows The Relationship Between Effect Of Malaria On Children's Schooling And A Serious Attack Of Malaria Resulting In Physical And Mental Impairment.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	11.965[a]	9	.215
Likelihood Ratio	13.375	9	.146
N Of Valid Cases	102		

A. 9 Cells (56.3%) Have Expected Count Less Than 5. The Minimum Expected Count Is .75.

Chi – Square Calculated Value(13.375) Is Greater Than Chi – Square Table Value(11.965). This Shows There Is Significant Relationship Between Effect Of Malaria On Children's Schooling And Physical And Mental Impairment.

Table IV: Shows The Relationship Between The Effectiveness Of Artemisinin - Containing Combination Treatments(Acts) And Chloroquine / Sulphadoxine – Pyrimethane On Malaria Parasites.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	15.442[a]	9	.079
Likelihood Ratio	15.790	9	.071
N Of Valid Cases	102		

A. 9 Cells (56.3%) Have Expected Count Less Than 5. The Minimum Expected Count Is .14.

This Result Reveals That There Is Significant Relationship Between Acts And Chloroquine / Sulphadoxine – Pyrimethane On Malaria Parasites, Chi – Square Calculated Value(15.790) Is Greater Than Chi – Square Table Value(15.442).Hence, Acts Is Effective In Treating Malaria Compared To Chloroquine/Sulphadoxine – Pyrimethane.

Table V: Shows The Relationship Between The Use Of Insecticide- Treated Bed – Net And Insect Repellents In Reducing Malarial Infection.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-Sided)
Pearson Chi-Square	6.426[a]	12	.893
Likelihood Ratio	8.107	12	.777
N Of Valid Cases	102		

A. 12 Cells (60.0%) Have Expected Count Less Than 5. The Minimum Expected Count Is .55.

Chi – Square Calculated Value (8.107) Is Greater Than Chi – Square Table Value(6.426).This Result Shows That There Is Significant Relationship Between The Use Of Insecticide – Treated Bed – Net And Insect Repellents In Reducing Malarial Infection.

Conclusion

Malaria Is A Biological Hazard Which Has Become A Disaster In The World Because Of Its Damaging Tendencies(Dada And Tunde, 2015; Adepoju And Akpan, 2017). Being A Life – Threatening Disease, Attacking Children Under Five Years Who Are Worst Hit And Pregnant Women(WHO, 2012, 2015, 2016),Government Must Not Relent In Its Effort In Funding Researches That Will Ensure Total Elimination Of Malaria In Our Society.

Recommendation

The Following Measures Should Be Taken To Reduce Or Prevent Malaria In Humans;

(I) Early Treatment Of Malaria Should Be Done Which Will Shorten Its Duration, Prevent Complication And Avoid A Majority Of Deaths.For Example The Roll Back Malaria (RBM), A WHO Initiative Against Malaria Was Established To Control Malaria To A Level Where It Would Not Be Regarded As The Major Contributor To Mortality And Morbidity.

(Ii) The Best Available Treatment, Particularly For *P. Falciparum* Malaria Is A Combination Of Artemethelymefantrine, Artesunate – Amodiaquine. Artemisinin Has Several Characteristics That Makes It An Excellent Malaria Medicine.Artemisinin And Its Derivatives Are Potent And Rapidly Acting Blood Schizonticides Active Against All Plasmodium Species. These Medicines Kill All Stages Of Young Rings Of Schizonts And Gametocytes. Artemisinin Brings Down The Parasitaemia(The Number Of Parasites In The Blood) Faster Than Any Other Anti – Malarial Drug.No Resistance To Artemisinin Has Been Reported.

(Iii) The Use Of Insect- Treated Net(ITN) Is Seen As A Good Measure For Preventing Mosquitoes From Biting And Transmitting Parasites Into Humans. Government Should Try As Much As Possible To Provide This To Assist In Reducing Malarial Infection Among Humans.

(Iv) Paris Green: A Green Powder Which When Spread On The Water Surface And Is Ingested By Mosquito Larvae Is Active In Killing Them. People Should Be Encouraged To Use It Against Mosquito Larvae.

(V) Elimination Of Breeding Sites: These Include Draining Of Pools And Pot Holes And Water Logged Areas, Weed Control, Levelling Of Excavation And Development Of An Efficient Drainage System. This Practice Should Be Encouraged Among People Living In Malaria Risk Areas.

References

1. Adepoju, K.A. And Akpan, Godwin .E. (2017). Historical Assessment Of Malaria Hazard And Mortality In Nigeria – Cases Bioener –1955-2015. *Int. J. Environment Bioener*. 12(1) : 30 – 46.
2. Akinloye, L., Akinpade, J. & Makinde, A (2017). Analysis Of Climate Of Southwestern Nigeria For Building Design. *International Journal Of Constructive Research In Civil Engineering (IJCRCE),* 3, 1-7
3. Beck-Johnson, L.M; Nelson W.A., Paanijmans, K.P, Read A.E., Thomasm.B.And Bjornstad And Bjornstad, O.N (2013).The Effect Of Temperature On Anopheles Mosquito Population Dynamics And The Potential For Malaria Transmission. *PLOS ONE 8*, 11) [Cross Ref][Pub Med].
4. CDC – Centre For Disease Control And Prevention(2012).Global Health Strategy, 2012 – 2015 : Reduce Malaria Mortality. 19 – 22.
5. Cholewinski, M. Derda, M & E. Hadas (2015). Parasitic Diseases Inhumans Transmitted By Vectors. *Annals Of Parasitology* 61 (3), 137-157.
6. Dada, T. And Oguntola, T. (2015). World Malaria Day: Nigeria Ranks Highest In Dealth Rate-US . *Leadership Newspaper*, April 26.
7. Duffy, P.E. And Fried, M. (2005). Malaria In The Pregnant Woman. *Current Topics In Microbiology And Immunology*. 295:160-200.
8. Fana, S. A.;Bunza, M.D.A.; Anka, S. A. And Imam, A.U.(2015). Prevalence And Risk Factors Associated With Malarial Infection Among Pregnant Women In A Semi – Urban Community Of North-Western Nigeria. *Infectious Diseases Of Poverty*. 4:24
9. Gatton, M.L.; Chitnis, N.; Churcher, T. Donnelly, M.J.; Ghani, A.C., Godfray, H.C.J.; Gould F.; Hastings, I; Marshall, J. And Ranson, H. (2013). The Importance Of Mosquito Behavioural Adaptations To Malaria Control In Africa. *Evolution*. 67,1218-1230 [Cross Ref][Pub Med]
10. Jaskiweicz, E., Graczyk, J. And Rydzak, J.(2010).Bialka Biorace Udzial Procesie Inwazji Erytrocytow Ludzkich Przez Zarodzce Wywolujacemalaria. *Postepy Higienyi Medyeyny Doswiadezalnej*.64: 617 – 626.
11. Joy, D.A. Gonzalez-Ceron L, Carlton, J.M., Gueye, A., Fay.M., Mccutchan, T.F., Su, X.Z. (2008). Local Adaptation And Vector–Mediated Population Structure In *Plasmodium Vivax* Malaria. *Molecular Biology And Evolution* 25: 1245-1252.
12. Kelly-Hope L.A. Bockarie, M.J. & Molyneux (2012). Loa Loa Ecology Incentral Africa: Role Of The Congo River System. *Plos Neglected Tropical Diseases* 6: E1605.
13. Lim, Y.A., Mahmud, R. Chew, C.H., Thiruventhiran, T. And Chua, K.H. (2010). *Plasmodium Ovale* Infection In Malaysia: First Imported Case. *Malaria Journal* 9:272.
14. Lindsay, S.W. And Martens, W.J. (1998). Malaria In The African Highlands: Past, Present And Future. Bull. *World Health Org*. 76, 33-45 [Pub. Med].
15. Mabaso, M.L.H &Ndlovu N.C. (2012). Critial Review Of Researchliterature On Climate – Driven Malaria Epidemics In Sub – Saharan Africa. *Public Health*. 126, 909-919.
16. Mita, T And Tanabe, K. (2012): Evolution Of *Plasmodium Falciparum* Drug Resistance: Implications For The Development And Containment Of Artemisinin Resistance. *Japanese Journal Of Infectious Diseases* 65:465-475.
17. Mockennopt, F.B. Ulmen. U.Von Gaertner, C., Bedu-Ado, G. Benzle, U(2002). Diagnosis Of Placental Malaria .*J. Clin. Microbiol*. 40: 306-8.
18. Oni, F.G.O. & Odekunle, T.O. (2016). An Assessment Of Climate Change Impacts On Maize (Zee Mays) Yield In Southwest Nigeria.
19. Paaijmans, K.P, Read, A.P And Thomas, M.B (2009) Understanding The Link Between Malaria Risk And Climatic. *Proc Nah. Acid. Sci*. USA. (Cross Ref) (Pub Med) 106, 13844.
20. Roll Back Malaria. Malaria In Pregnancy. *RBM Infosheet* No. 4.Staalsoe, T. Shulman, C.E., Buhner, J.N., Kawuondo, K. Marsh, K And Haviid, L. (2004). Variant Surface Antigen-Specific Igg And Protection Against Clinical Consequences Of Pregnancy Associated *Plasmodium Falciparum* Malaria. *Lancet* 363: 283 -9

21. Steketee, R.W., Nahlen, B.L. And Menendez, C. (2001): The Burden Ofmalaria In Pregnancy In Malaria – Endemic Areas. *Americanjournal Of Tropical Medicine And Hygiene*. 64:28-35.
22. Taye, A.; Hadis, M., Adugna, N., Tilahun, D And Wint, R.A. (2006). Bitting Behaviour And Plasmodium Infection Rates Of *Anopheles Arabiensis* From Sille, Ethopia, *Acta Trop*. 97, 50-54 [Cross Ref)[Pub Med].
23. WHO 2017. World Malaria Report. Geneva: World Healthorganization. Licence: CCBY-NC-SA 3.0 1 G O.
24. WHO- World Health Organization (2013). WHO Global Malaria Programme. World Malaria Report 2013, WHO , Geneva, 255.
25. World Health Organization (2006). Guidelines For Treatment Of Malaria. Geneva World Health Organization.