

BARRIERS MITIGATING AGAINST SUCCESSFUL PRACTICE OF MALARIA PREVENTIVE STRATEGIES IN NIGERIA

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ABSTRACT

Malaria remains a rising cause of morbidity and mortality, posing a public health problem to the world, especially Nigeria. In most malaria endemic areas, including Nigeria, pregnant women and children under age five are groups mostly at risk for the severe case of the disease. As a result of absence of any particular recommendable vaccine for malaria prevention and control, as well as the continuous records of malaria parasite resistance to drugs, the effective control of malaria has been narrowed to practice of three strategies; use of Insecticide Treated Nets (ITNs), Intermittent Preventive Treatment (IPT) and Indoor Residual Spray (IRS). This paper reviewed the barriers associated with malaria preventive strategies in Nigeria. To better understand the low adoption of these interventions by Nigerians, the Health Belief Model (HBM) was used to provide the fulcrum for the behavioural tendencies leading to decision- making of the people. Results from this review, revealed that socioeconomic status, religion, lack of awareness, and lack of community involvement in the formulation of policies on malaria interventions, among others serve as major barriers. Measure such as the need to introduce communication programmes on malaria interventions in communities to reach the entire populace rather than seeking to change individual behaviour should be encouraged.

Key Words: Health belief model, Malaria, ITN. Risk factor, IPT

Introduction

The threat of malaria is felt globally with an estimated 300 – 500 million people at risk of the disease, with 40% of the world's population living in malaria endemic areas (World Health Organisation, 2013; America Mosquito Control Association, 2014). The number of people at risk of the infection in the year 2012 stood at 3.4 billion with an annual death toll ranging between 1.5 and 2.7 million with sub-Saharan African countries

constituting of about 90% of the figure (World Health Organisation, 2013). This accounts for how deadly the disease is and calls for a major concern in human capital development.

The 2010 World Malaria Report revealed about 174 million malaria cases in tropical African countries, 28 million in Europe, 1 million in America and 2 million in the South – East Asia regions (World Health Organisation, 2011). The report further indicated that the

impact of malaria is mostly felt by pregnant women, infants and children under five years as well as the elderly, splenectomised and immune compromised (HIV-infected person). Pregnant women and children are the most vulnerable groups to malaria attacks. In pregnancy especially among the primigravidae, direct effect of malaria incidence has been linked to increase in severe anaemia, consequently resulting in risk of maternal mortality. Effects to foetus, although referred to as an indirect consequence results in miscarriages, low birth weight and growth retardation (Ameh, Owoaje, Oyo-Ita, Kabiru, Akpet, Etokidem, Enembe, & Ekpenyong, 2016). However, the brunt of this incidence is felt by children between the ages of 0-5 years; salient reason for this as indicated by a report was because; infants under this age range have yet to fully develop their immune system to fight against the infection (Adogu & Ijemba, 2013).

Similarly, the World Health Organisation estimates for 2015, indicated number of malaria cases decreasing from an estimated 262 million in 2000 to 214 million in 2015 (WHO; Malaria Fact Sheet, 2015), with African Region accounting for 88%, South-East Asia by 10% and Eastern Mediterranean by 2%. Following the report, there were about 200 million cases of malaria and 437 000 deaths worldwide with African Region accounting for 90% of the figure. Interestingly, the global decline of malaria cases by 37% as reported by the organisation was said to have occurred in most WHO African countries, South – East Asia, and the Eastern Mediterranean regions. In line with the 2005 target of World Health Assembly and the Roll Back Malaria initiatives to reduce the burden of malaria to 75% and deaths to near zero, a universal coverage of both effective prevention and treatment interventions were recommended (World Health Organisation, 2012). Following this, there was a report of a decrease in mortality rate globally by 60% between the years 2000

to 2015 (WHO; Malaria Fact Sheet, 2015). It can be ascertain therefore, that strategies aimed at controlling malaria such as use of Insecticide Treated Nets (ITNs), Indoor Residual Spray (IRS), and Intermittent Preventive Treatment in pregnancy (IPTp) as well as Case Management is being adopted.

The 2016 World Malaria Report of the World Health Organisation (2017) declared that deaths were estimated at about 224 000 (WHO, 2017). With the exception of Algeria and Cape Verde with no record of indigenous malaria cases since 2013, six countries out of the seventeen accounted for about 85% malaria cases. Nigeria contributing the highest number of cases by 52% while Burkina Faso, Mali, Ghana and Niger contributed 7% each and Ivory Coast accounting for 5%. Interventions programmes aimed at reducing cases of malaria in the regions include adoption of Long Lasting Insecticide Nets (LLINs), Indoor Residual Spray (IRS) and Artemisin-based Combination Therapies (ACTs) and Rapid Diagnostic Test (RDT) (WHO, 2017). However, for central, East and Southern African Regions, population at risk were estimated at 168 million for central regions and 394.7 million for east and southern regions (WHO, 2017). Cause for the transmission is linked to *P. falciparum* (98%) and *P. vivax* (2%).

In Nigeria, more than 90% of the population is exposed to malaria infection; about 40% suffers at least once from this infection annually (Abdullahi, Abubakar, Adamu, Daneji, Aliyu, Jiya, Ibraheem, & Nata'ala, 2009). The disease accounts for about 60% of the outpatient visits to health facilities, about 25% result in deaths with the majority being children under the age of five, 11% of maternal deaths and 30% of childhood deaths (Abdullahi, et al, 2013). According to WHO (2013), Nigeria recorded an annual incidence of malaria of about 31,913 out of 100,000 population; with children under the ages of five as the most affected, with 20%

death ratio. However, several efforts have been adopted by the Nigerian government to tackle the incidence of malaria. In 2014, the malaria control programme began implementation of a National Malaria Strategic Plan (NMSP) for a pre-elimination status. The target was to lessen malaria cases by 5000 per 100 000 and to reduce malaria death to zero by 2020 (Federal Ministry of Health (FMOH) & National Malaria Elimination Programme (NMEP), 2014).

The increase in the level of malaria transmission in sub-Saharan Africa, especially, among the vulnerable groups is a thing of public health concern. Although, there have been intervention programmes over the years to combat this problem, which is mostly directed at tackling the vector causing disease (mosquito) with major focus on the use of strategies such as the adoption of Insecticide Treated bed Nets (ITNs), Intermittent Preventive Treatment (IPT) and Indoor Residual Spray (IRS). It is surprising, however, to note that there are still persistence reports of low patronage of these strategies, thus prevalence of the disease. (Abdullahi, Van Zyl-Schalekamp, and Seneka, 2013; Ameh, Owoaje, Oyo-Ita, Kabiru, Akpet Etokidem, Enembe, & Ekpenyong, 2016). This paper, therefore, aims at reviewing the existing factors posing as barriers to the practice of malaria preventive measures in Nigeria, with a view to suggesting appropriate remedies.

Conceptual Clarification

According to reports, malaria transmission is through the bite of an infected female *Anopheles* mosquito of the protozoa belonging to the genus plasmodium. There are about 156 plasmodium species, however four are of important to human; *P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*. Of these four, *P. falciparum* is the cause of most malaria mortality especially in the sub-Saharan African regions (David, Anasco & Ozurumba, 2016).

Malaria infection is believed to be aided by four major factors; the human host, malaria parasite, the *Anopheles* vector, and the physical, biological and socioeconomic environment (Strickland, 1992; cited in Heggenhougen, Hackethal, & Vivek, 2003). In other words, rate of transmission of the disease is dependent on the prevalence on man, who is the reservoir, the characteristics of the vector; in terms of their density, feeding behaviour and finally the condition of the environment that encourages the breeding of the vector.

Malaria control/preventive measures depend on the vector species, epidemiology context, cost and accessibility by populations. Prior to the present malaria preventive strategies of the World Health Organisation, the use of vector elimination strategy through method of Indoor Residual Spray (IRS) was the most recognised (Heggenhougen, Hackethal, & Vivek, 2003). However, due to *Anopheles* mosquito resistance, the elimination of vector became non-feasible. Therefore, the WHO and partners saw a need for a shift towards control measures. This strategy is based on two approaches; the diagnosis and treatment of malaria cases (chemoprophylaxis) and a community-based intervention through the use of insecticide treated bednets (WHO, 2012; Desai, ter Kuile, Nosten, McGready, Asomoa, Brabin, & Newman, 2007).

To understand the appropriate measure in the control of malaria, studies have shown the need of an understanding of the epidemiological triad. The interplay between the vector, the human host and the environment on malaria infection (Chirebvu, Chimbari & Ngwenya, 2014). Each of these epidemiological stages in one way or the other are linked to risk factors associated with malaria transmission, most especially those factors brought about by the environment and climatic conditions. Therefore, efforts towards disease reduction should be tailored in line of this explanation.

The role of the environment in the transmission of malaria cannot be over emphasised. For effective vector control measure, the need to adopt the practice of environmental sanitation is imperative. Through clearing of vegetation and drainage systems, the breeding sites of the vector could be eliminated, thus reducing the rate of transmission.

Also, due to the nocturnal feeding habits of most *Anopheline* mosquitoes, malaria transmission occur mostly at night. Therefore, according to the European Centre for Disease Prevention and Control (2018), protection against mosquito bites should include treated bed nets, wearing of protective cloths, and use of insect repellent cream on exposed skin.

Theoretical Framework

The Health Belief Model (HBM) provides succinctly the explanation to the factors behind people decision making patterns when it come to their health and the ideas shaping their thought processes is the most preferred. The model looks at diseases from the individual level. In other words, it is used to explain the change and maintenance in health related behaviours. There are four concepts under this model which serves as basis in understanding individual behaviours in the prevention and treatment of diseases. According to Rosentock (1966 cited in Jirojwong & MacLennan, 2002), the proponent of this model, it assumes the following:

- a. Belief about the impact of illness and its threats:
 - i. Perceived susceptibility to a particular health problem; this refers to an individual's perception of the risk in contracting a particular health condition- in this case malaria. Thus people will not readily accept to sleep under treated bed nets or take preventive drugs if they don't believe that they are at risk of getting malaria.

- ii. Perceived severity of health condition; looking at how serious malaria is on the population of Nigeria. What are the social, clinical and medical consequences of it? People will not change their health behaviour until they take into consideration the implications posed by malaria in the country.
- b. Beliefs about the consequences of health practices: Perceived benefits of preventive practices; this refers to when people have to belief that the anticipated barriers to taking action are outweighed by its benefits. In other words, Nigerians need to ascertain if using treated bed nets as well as the other preventive strategies can prevent malaria incidence before accepting to adopt.
- c. Beliefs in the effectiveness of the new behaviour; this is looking into the fact to ascertain whether the use of any of the preventive strategies are effective methods of preventing malaria transmission.
- d. Cues to action; this looks at both internal and external factors that lead to action. For instance, witnessing the death of a loved one to malaria incidence could serve as a necessary action to make people to want to change their health behaviour.
- e. Barriers to taking action; the factors responsible for the non compliance to malaria preventive strategies in the prevention of malaria in Nigeria

The intervention programmes for the control of malaria are basically centred on health belief promotion. Therefore, the need to put into cognisance the beliefs of the people about disease threats must be placed above all others. And this can be achieved by concentrating on methods of behavioural evaluation. HBM has been regarded as a useful tool in predicting health behaviour change and it remains the most widely used

model (Abdullahi et al, 2013). It operates from the social psychological perspective, where individuals' decisions are predicted from psychological variables (Metiboba, 2012). The model posits that the belief and attitudes of the people are major determinants of their health actions. For instance in this study, the barrier associated with malaria preventive strategies in Nigeria can be understood by the perception of the people as to the benefits accruing in the adoption of the preventive measure.

However, the Health Belief Model is criticised for its neglect in exploring other determinants present in other models, such as previous experiences, perceived control, advantages in mal-adaptive behaviour, etc (Carpenter and Christopher, 2010). Furthermore, HBM limited scope to only preventive situations where the behaviour under study are mainly voluntarily is another skewed aspect of the model (Metiboba, 2012). The model's strength lies in the explanations of the users' perception of disease, belief system and the therapeutic choices people make when attacked by malaria. However, it neglects to give reasons to why people exhibit some form of health behaviour and the conditions accountable for the adoption of such strategies as ITNs, IPT, IRS amongst others.

Interestingly, the merit of the model lies on the principle that individual recognises or identify the risk of specific health problems and when it is weighed with level of susceptibility and the perceived severity, he or she will take the necessary action; in the case of malaria, the use of ITNs and other recommended measures. This means that people's assessment of their health issues is more important than a medical diagnosis (Tinuola, 2009). Therefore, the HBM model is adopted on this merit for this report. Because, when it comes to health decision making, an individual grasp of the impact of the disease is the force that propels any choice to be taken.

It is therefore necessary to tailor interventions programmes on the assertions of the HBM, especially if it is directed at behavioural change.

According to a study carried out in Awka Nigeria,(Ikeako, Aziuke, Njelita, Nwachukwu, Okafor, Nwosu, Agbanu, & Ofomata, 2017) stated that only female mosquitoes which feed on blood transmits the disease. The life expectancy of mosquito as well as density depends greatly on environmental conditions (WHO, 2003). The variations on relative humidity, which shorten their life expectancy determines the parasite development in an infected mosquito, thus their density.

Similarly, environmental factors such as presence of clogged drainages, low level of sanitation, high density of human population and types of housing; in addition to behavioural patterns of vectors have been linked to conditions aiding malaria transmission (Boutin, Pradines, Legross, Rogier, & Migliani, 2005; cited in; Adebayo, Akinyemi & Cadmus, 2015). In addition, in a study by Jamieson, Toovey, & Muriel (2006), it was stated that malaria is prevalent in areas experiencing high rainfall, consistent high temperature and high humidity. Consequently, leading to stagnant waters, which provide mosquito an enabling environment for continuous breeding. The variations in temperature and relative humidity within the tropical environment also aids in the breeding and feeding of mosquitoes; they feed when temperature is above 20°C and breed when it is below 20°C (Ifatimehin, Falola & Edosa; 2014). Consequently the sanitary condition of the environment is a major factor.

In addition, mosquito breeds well during rainy season as a result of surface water collection that occurs during this period. A monthly rainfall of about 80 mm is considered suitable, thus encouraging mosquito density (Kretis, Schwarz, Kruger, Fobil, Nkrumah & Acquah, 2011). The level of humidity

generates from this collection helps prolong the lifespan of mosquito consequently bringing about widespread of malaria incidence. However, heavy rainfall could lead to washing out of breeding sites thereby disrupting the life cycle of larvae (Galardo, Zimmerman, Lounibos, Young, Galardo, Arruda, et al, 2009 cited in Park, Cheong, Honda, Ha, Kim, Kolam, Inape & Mueller, 2016).

The 2011 World Malaria Report of the World Health Organisation declared about 1006 countries malaria endemic in the world (WHO, 2011). Globally, some two billion people according in 2014 as reported were at risk of the infection with 207 million cases (WHO; Malaria Fact Sheet, 2014). According to the Report, cases of infection consist majorly of children under five years and pregnant women. The Estimate of malaria mortality rate per 100,000 population at risk for the year 2010 stood at about 70%, however, there has been a decline to 43.0% in 2016 (WHO, 2017). According to the report, largest decline occurred in WHO regions of South-East Asia (44%), Africa (37%), and America (27%). Similarly, findings from studies on malaria prevalence have shown a higher rate in rural areas than in the urban (Cui, Yan, Stabongkot, Cao, Chen, Chen, Fan, Fang, Jongwutiwes, Parker, Sirichaisinthop, Kyaw, Su, Yang, Wang, Xu, Zheng, Zhong and Zhou, 2012).

Whereas, in Africa, the prevalence rate of the disease is high in both rural and urban areas. However, a higher percentage has been recorded in the rural during the period when agricultural work is greatest (Machault, Vignolles, Borch, Vounatsou, Pages, Briolant, Lacaux and Rogier, 2011; WHO, 2002). Some African countries such as, Burkina Faso, Mozambique and Mali have been reported as the deadliest countries per population of this disease. With death rate ranging from 473,000 and 789,000 in these endemic countries, malaria has remained the leading cause of death. This incidence of malaria is increasing

due to increasing vector resistance to insecticide and drug resistance of parasites (America Mosquito Control Association, 2014).

In Nigeria, malaria is holoendemic with the largest population at risk of malaria in Africa accounting for about 192,284 deaths (WHO, 2015). The stable transmission of malaria throughout the country accounts for 60% of out-patient visits and about 30% of hospital admission (Abdullahi, Abubakar, Adamu, Daneji, Aliyu, Jiya, Ibraheem, & Nata'ala, 2009; Lagos State Ministry of health, 2016). According to a study conducted in Kano state, Nigeria revealed 60.6% prevalence rate (Dawaki, Al-Mekhlafi, Ithoi, Ibrahim, Atroosh, Abdulsalam, Sady, Nur Elyana, Adamu, Yelwa, Ahmed, Al-Areeqi, Subramaniam, Nasr, & Ling, 2016). Similarly, studies conducted in Kebbi, Abuja and Awka, Anambra states revealed rates of prevalence of 64.0%, 58.0% and 59.0% respectively (Nmadu, Peter, Alexander, Koggie, & Maikenti, 2015; Singh, Musa, Singh & Ebere, 2014; Mbanugo & Ejims, 2000). Transmission is exclusively through *P.falciparum*, contributing about 60% to morbidity and 40% of mortality among children under five.

Following the continuous rise in the rate of prevalence, a study conducted in Aba and Umuhia, Abia state, South East Nigeria, indicated rate of prevalence of 86.40% and 74.40% respectively (Kalu, Obasi, Nduka, & Otuchristian, 2012). Studies have indicated the influence of nutritional conditions on malaria infection (Alexandre, Benzecry, Siqueira, Victor-Silva, Melo, Monteiro, Leite Lacerda, & Alecrim 2015; Oldenburg, Guerin, Berthe, Grais, & Isanaka, 2018). According to Oldenburg et al, (2018), 55.3% of respondents diagnosed with severe acute malnutrition were infected with malaria. This was explained on the basis where vulnerable groups lacking a proper nutrition are reported to lack the necessary anti bodies to fight against the infection.

The persistence rise in the rate of malaria cases in Africa, especially in Nigeria can be attributed to state of the environment with particular reference to temperature, rainfall patterns as well as general sanitation level. However, people's belief system and their socioeconomic status play major role in the rate of the disease prevalence. For instance, not linking the cause of malaria to the bite of an infected *Anopheles* mosquito affects the adoption of its preventive measures, thus increasing the number of people at risk of the infection.

Risk factors for malaria infection

The exposure to vectors or parasites can be influenced by the physical environment and people's proximity to these vectors within the environment, thus serving as essential for transmission of infection. As such, factors such as maternal age, nutrition, as well as host and parasite genetics have been noted to influence the rate of infection in areas of both low to stable malaria transmission. Also, these risk factors vary most significantly on the basis of settlements; that is, parity depending on urban or rural settings (Cisse, Sangare, Lougue, Bamba, Bayane, and Guiguemale, 2014). This is similar to the findings of Chirebvu et al, (2014) in Botswana where the record of infection stood at 44.8% for rural people classified as poor when compared to the 30.6% in the urban centres. Consequently, placing residents' especially pregnant women and children under five in these rural communities at greater risk of malaria disease. The implication is that, rural dwellers are not only faced with an environment considered as conducive for breeding by the vector-mosquito but they don't possess the wherewithal to adopt strategies for prevention from this disease.

A study carried out in Lagos state Nigeria has shown that the use of un-recommended antimalarial medications such as chemoprophylaxis is likely to increase the risk

of malaria infection among pregnant women (Agomo and Oyibo, 2013). Medications such as chloroquine and pyrimethamine formally recommended by WHO and partners over the years has been reported to be ineffective in the treatment of malaria in pregnancy. Although, the failure rate recorded by this study was low (8.6%) however a higher percentage ranging from 37.9% to 59.1% have been reported by other studies (Ogunbamigbe, Ojuronbe, Ogunro, Okanlawon, and Kolawole, 2008; Federal Ministry of Health, 2005).

Furthermore, education, season and environment have been linked to risk factors of malaria transmission among the populace (Cot, Abel, Roisin, Barro, Yada, Carnevale, and Feingold, 1993; Agomo et al, 2013). Educational level, high or low has been said to affect practices of preventive strategies among the populace within a particular age bracket. It has been stated that those with low education display poor practice of malaria control strategy due to low awareness (Fana, Bunza, Anka, Imam, and Nataala, 2015). Among the pregnant women, the parity between education and gestation age has been reported to be less significant, however season with regards to rainy and dry periods with particular emphasis on the effect of rainy season on the environment, has shown a higher densities on the breeding sites of mosquito, consequently leading to high transmission.

In addition, it has been postulated that the low level of success achieved on malaria control in Sub-Saharan Africa over the years can be linked to the poor acknowledgement of risks posed by environmental factors (Abah, Awi-Waadu, Nduka, & Richard, 2017). According to De Silva, and Marshal, (2012), malaria incidences are less in urban environment as the vector specie especially the *An. Gambiae* has a high preference for clean and unpolluted water for breeding. On this basis, it indicates a higher malaria

transmission in rural environments as the lifespan of the vector measured in urban areas is less than half of what is obtainable in the rural areas. Therefore inhabitants in these areas are more exposed than their urban counterparts.

According to the study, distance of houses from a swamp is more important risk factors of malaria than distance from a stream. Results derived from the study indicate an incidence rate of 0.41 (residence few meters away from swamp) to 2.22 (residence within a swamp). Residence near a stream was shown to have low impact on incidence rate; whereas residence from a swamp was a stronger predictor. Similarly, rainfall and altitude have been associated with malaria prevalence (Graves et al, 2008), where increase in altitude of above 300m has been shown to reduce incidence of malaria among individuals living in the community while rainfall seems to increase the rate of transmission.

Preventive Strategies for malaria infection

To achieve sustainable control over malaria, interventions have been formulated to tackle the disease. The goal of these interventions is to reduce the rate of transmission as well the number of malaria related deaths. The following recommended treatment and prevention interventions in areas of low to steady transmission such as Insecticide Treated Nets, Intermittent Preventive Treatment, and Indoor Residual Spray among others have been introduced. With efforts geared towards reducing the incidence rates especially in Africa over the years, the use of the three pronged WHO strategies; Insecticide Treated Nets (ITNs), Indoor Residual spray (IRS) and Intermittent Preventive Treatment (IPT) has been recommended to help in making the effort effective (Bardaji, Bassat, Alonso & Menendez, 2012).

Insecticide Treated Nets (ITNs)

The use of ITNs have been shown to reduce malaria case and incidence rate by 50% (Cibulskis, Aregawi, Williams, Otten, & Dye, 2011; WHO, 2017)) and reduces malaria mortality rate by 55% in children under age five in the sub-Saharan regions of Africa. These insecticides impregnated- bed nets are generally made from nylon, polyester and cotton. It is covered with chemicals such as, permethrin, deltamethrin and lambdacyhalothrin (Sexton, 1994). Treating the nets provide double protection, not only does it prevent mosquito bites but also kills other insect that make contact, consequently reducing further spread of malaria. For instance, if the person inside the net is suffering from malaria, and lack of access by the mosquito to bite the individual due to the gametocytes, it will prevent the mosquito from sucking from an infected blood thus the chance of transmitting the parasite to another will be greatly reduced.

Mosquito net ownership is far from universal despite the gains which it provides. In most African countries including Nigeria, ownership rates remain low as local residents prefer to adopt the methods of burning mosquito coils, leaves, dung to ward off mosquito as against purchasing treated bed nets due to financial constrain (Ziba, Slutsker, Chitsulo, and Steketee, 1994). Besides, its ownership in itself does not translate to utilization (Kunche et al, 2017), there is need to address the factors limiting the practice of this strategy. The efficacy of bed nets is high because it gives protection against mosquito bites all through the night while the other methods like burning of coils and leaves only work while people are still awake and able to keep the coils burning or stoking the fire. However, notable are findings of reports stating, bed nets do not offer protection during the early hours of the evening, when individuals are not yet on beds (WHO, 2003). The implication is that, if the peak hour of

mosquito bites occurs at that time, of course one cannot say bed nets serve any importance in the control/ prevention of malaria.

Intermittent Preventive Treatment (IPT)

This is one of the recommended interventions for preventing malaria disease for pregnant women living in high transmission areas (CDC, 2015). This involves the administration of dose of an effective antimalarial drug (sulfadoxine-pyrimethamine) to all pregnant women whether or not they are infected with the malaria parasite. They are mostly given at each routine antenatal care meetings, usually in the second trimester of pregnancy right up to time of delivery without any cause for concern (South Sudan Medical Journal, 2012). It is therefore advised that each dose should be given at least one month apart and not to be combined with daily intake of folic acid equal or above 5mg. Until recently, chemoprophylaxis combined with chloroquine has been advised for use but due to poor compliance and the resistance of the parasite, an administration of IPT with sulfadoxine/pyrimethamine has now been recommended by the WHO and partners (Deloron, Bertin, Briand, Massougboji & Cot, 2010; WHO, 2000). Although, this drug is currently facing resistance by malaria parasites in many countries, efforts are now being shifted to screening and treatment with the use of Rapid Diagnostic Tests (RDT). This approach involves the screening of women for malaria at the first visit or at each antenatal visit and treatment of positive women with Artemisinin Combination Therapies (ACTs). (Gesase, Gosling, Hashim, Ord, Naidoo, & Madebe, 2009).

Indoor Residual Spray (IRS)

Indoor Residual Spray (IRS) and Insecticide Treated Nets (ITNs) are two most effective malaria prevention strategies recommended for large scale use especially in Sub-Saharan

Africa. The WHO World Malaria Report (2012), indicated reductions in malaria illness by 42% in the region as ITNs ownership reached 53%, while 11% of the population at risk without ITNs were covered by this strategy (IRS). The adoption of IRS in the control of malaria disease is usually combined with use of ITNs, according to a study this has helped in reducing malaria cases compared to ITNs or IRS alone (Fullman, Burstein, Lim, Medlin, & Gakidou, 2013). It is reported that effect of either ITNs or IRS is greatly dependant on the behaviour and resistance status of malaria vector (Giminig, Otieno, Were, Marwanga D, Abong'o, Wiegand, 2016). The report indicates the difference in patterns of feeding behaviour of mosquito as a basis for selecting a particular strategy in controlling malaria in an area. That is, the endophagic vector which feed mostly at night is best controlled by use of ITNs in areas where they are predominant while the endophilic vectors known to permanently reside indoor is best controlled with IRS method. Therefore, behaviour and feeding pattern of vectors is very important in selecting any of the recommended strategies in combating malaria infection in an area.

Barriers to malaria Preventive strategies in Nigeria

In malaria endemic countries, the prevention of malaria depends to a large extent on the use of ITNs, which have been shown by several studies to reduce malaria incidence in children under the ages of five and pregnant women significantly (Faiza, et.al., 2012). However, previous studies indicated that most communities are still sceptical in the usage of ITNs and thus yet to fully adopt this method of malaria prevention. Although preventive strategies such as Intermittent Preventive Treatment (IPT), Indoor Residual Spray (IRS), have also been recommended as malaria preventive measures, their use has been plagued by various factors. The perceived

reasons or factors underlying this will be considered by this paper.

Socio-economic factors: malaria commonly referred to as the 'disease of poverty' or the 'neglected disease' rates among the major health challenges facing the poorest countries in the world (Ricci, 2012). Having the awareness of the importance of the use of the nets as well as the other strategies have not been enough for most people in adapting to them. Financial constrain of population in developing countries like Nigeria serves as limitation to owning ITNs in the control of malaria. Although, intervention agencies in the control of malaria have made serious effort in making sure that the nets are affordable even to the extent of making these nets free to most communities. In most cases, people who initially made use of the ITNs do not retreat it as at when due, the reason given in such cases is the lack of money in purchasing the chemicals used for the treatment (Tusting, Willey, Lucas, Thompson, Kafy, Smith, & Lindsay, 2013; Steketee & Eisele, 2009). Thus, most bed nets become less protective against mosquito bites and the increase in malaria transmission become evident.

Socio-cultural factors: it is the behaviour of individuals that determine how or whether efforts geared toward malaria control will be successful. For this reason it is necessary to take into recognition the people's perception, the manner in which they decide whether a given preventive measure is efficient, the pattern of treatment seeking behaviour when having malaria episode and the role the community in which the people reside plays in planning and evaluating a particular disease. In Nigeria, many people have blatantly refused to make use of ITNs or other strategies for one cultural belief or the other. Some have attributed the cause of malaria to several other factors such as working long hours

under the sun, eating too much palm oil, and so on (Onwujekwe, Ojukwu, Dike, Ikeme, & Eshu, 2005).

In a study carried out by Dembo (2012), it was discovered that people believe ITNs to contain chemicals that is capable of making them sterile. It is belief that this is another form of contraceptive of family planning by the government to control population growth, thus most of the men refuses to sleep under it. According to reports from the study, some go as far as using bed nets for fishing. Also, local names of malaria are linked directly to its cause and symptoms. Peoples' interpretations of these names which is based on their cultural beliefs, lead to varying interpretation to the cause of malaria (Obol, Lagoro & Garimoi, 2011). The implication to the perception of many causes of malaria is that, its control will become a herculean task. People will be unwilling to participate in any of the intervention programs if it's not in line with what their perception of the cause of the disease.

Poor community participation: A situation whereby there was no active community participation in the design and implementation of malaria intervention projects, there are great chances that measures of malaria control such as ITNS, IRS, amongst others will not be comply by the local community members. According to Nitcher (1984), he pointed out that, wants; needs and the will of the community are not always put into consideration by program planners such that these decisions are made without consulting them. Many times, such programs are forced upon the villagers and their responses to them are only passive. To a great extent, the attitude of many Nigerians to the use of malaria interventions can be linked to this reason. That means, even if the bed nets or IPT are distributed freely, they won't still make use of them because they were not

consulted before such policies were implemented.

Beliefs in the potency of traditional medicine:

Members of communities tend to rely on their local methods in the control of malaria, such as the burning of leaves, cattle dung, etc. Although some of these beliefs stems from biological knowledge, where individuals make use of some shrubs by spreading around the house and sometimes speared on the body to repel mosquitoes (Dembo, 2012). However, the effectiveness of these methods cannot be wholeheartedly praised as their records of success leave much room to commend.

Difficulty in mounting/sleeping arrangement:

Previous studies have shown that people, especially those in local communities find it difficult to mount bed nets due to the fact that most homes do not own beds as majority sleep on mats on the bare floor. The inconveniences of mounting it every night make people to sometimes sleep without it. In addition, it is common among local residents to sleep outside during hot season. The use of ITNs will be relatively low during this period because it is almost impossible to mount it in open spaces. The vulnerable groups - little children and pregnant women access to its use will greatly be affected.

Religion factor: in Nigeria, especially among women, religion plays a crucial role in the way they access health care services. This is true in states with Muslims dominants (Diala, Choi, & Rogers, 2012), as indicated in the 2008 National Population Commission (NPC) report, where visits to health care centres by pregnant women in the North East and West were estimated at 43% and 31% respectively, compared to 87%, 70% and 87% for South East, South-South and South West regions (NPC and ICF Macro 2009 cited in Diala, Pennas, Choi, Rogers, 2012). The reason is mostly traced to the fact that women are not

permitted either married or single to take such health decisions on their own. Instead, they are required by religion to consult their partners/ husbands or fathers. Since malaria interventions are usually accessed at health care centres, it goes without saying that these women will be at a disadvantage if their spouse or father are not supportive of the services, thus the control measures in the elimination of malaria from a particular population under this settings will not be effective.

Other notable barriers associated with malaria preventive strategies include attitudes of health workers towards clients, availability of these preventive strategies, health communication channels, perceived toxicity of ITNs, size and type of ITNs (Olamideji, Tsoka-Gwegweni, Gengiah, Daftary & Naidoo, 2018, Diala et al, 2012).

Numerous barriers to effective control of malaria now exist, when combined with the increasing prevalence of drug and insecticide resistance, the burden becomes very high in endemic regions (Greenwood, Bojang & Whitty, 2005). In order to understand the current factors affecting malaria prevention, a report of a study conducted in Uganda revealed that, misconceptions on malaria cause and transmission is a major hindrance (Lagoro & Christopher, 2011). This is as a result of low level of knowledge on malaria, as such making its prevention strategies very difficult to adopt. The different beliefs held by people on the causal factors of the disease, influences the adoption of preventive measures (Oladimeji, Tsoka-Gwegweni, Gengiah, Daftary, & Naidoo, 2018). Also, Diala, Pennas, Choi & Rogers, (2012) surmised that, the lack of uptake and adherence to malaria prevention strategies (IPT) is associated with lack of provider knowledge on it and pregnant women beliefs on its efficacy.

According to findings, a common factor featured in most reports as a barrier to uptake of malaria prevention measures is the

perceived discomfort of sleeping under ITNs and difficulty in the usage (Teo, Hassang, Randall, Unger, Siba, Mueller, Brown & Rogerson, 2015). In addition, the high prices at which bed nets are being sold to people at health centres is deterrence to wide practice of this preventive measure. According to a report, in Nigeria, health care staff has been known to hoard these items, making it unavailable to people only to later sell at a price (Oladimej, Tsoka-Gwegweni, Gengiah, Daftary, & Naidoo, 2018). This act of professional misconduct as well as the diversion of global health funds by government officials contributes to the poor results of malaria control initiatives in endemic areas. Therefore, the government needs to put up an investigative body to check on these excesses.

It has been reported also, that cultural belief regarding the causes of malaria is a reason for the low level of adoption of the strategies (Maslove, Mnyusiwalla, Mills, McGowan, Attaran, & Wilson, 2009). This is because, this belief system usually differ from the scientific explanations of malaria transmission and control, thus local residents difficulty in accepting these scientific measures. It should be noted also, that these beliefs consequently influence the preventive measure adopted. As indicated by a study, local preventive measures include, use of charms, amulets, among others to prevent malaria related illnesses (Mwenesi, Harpham, Marsh & Snow, 1995). Following this, according to studies, cause of malaria by majority of respondents are not being linked to mosquitoes (Adongo, Kirkwood, & Kendall, 2005; Munguti, Okrah, Traore, Pale, Sommerfeld & Muller, 2002). This has a major implication on its control strategies. It is relatable to the fact that, since most malaria control measures are vector elimination based, especially the use of ITNs, level of adoption will be greatly affected.

The findings from this review indicate significant poor knowledge on malaria and the use of its control strategies. This is influenced by local perceptions and beliefs about the disease and the way it is transmitted. It is not surprising to discover people, especially caregivers of young children living in endemic areas with heavy reliance on charms or amulets as a way of preventing malaria. This practice is aided by the lack of understanding on the vector causing parasite of this infection as well as the local names given to the disease which is a function of their understanding of malaria.

Whereas, people make effort to adopt malaria control strategies, the difficulty they encounter serves as a turn off for the effective and continuous practice. A common instance is the report from studies indicating high percentage of respondents' lack of interest, due to discomfort and difficulty in their use, especially as it relate to ITNs. Also, misconception on the use of ITNs to result in sterility among men is a major barrier of its uptake by male population.

Following this, the lack of access to some of the malaria prevention strategies to the larger part of the population serves as a barrier. It has been reported that, those in charge of service delivering as well as government officials end up enriching themselves at the expense of the people. Thus, frustrating the goal of the WHO and partners of reducing malaria to a barest minimum level.

Finally, while it is possible to achieve complete malaria elimination in the sub-Saharan African regions, many factors contribute to serve as deterrence. From this review, it is obvious that people social, educational, cultural and economic background go a long way in determining their acceptance and practice of the recommended malaria prevention strategies.

Our submission

The findings gathered from some studies indicated the poor knowledge on the cause and modes of transmission of malaria as a major factor affecting the practice of its preventive strategies (Singh et al, 2014 and Skeet, 2005). It was stated that people's low awareness on basic information about the protozoan carrying vector (mosquito) and the manner in which the infection is transmitted affects the uptake of the strategies. Similarly, reports from another study indicated that although people recognize malaria as an important disease, however perception held as to the cause of the infection serves as a reason for not accepting the recommended control measures (Chukwuocha et al, 2010). Of note is the perception that malaria has multiple causes and as such scepticism on the part of the people on the effectiveness of these strategies. A clear instant of this kind of belief was reported in some studies where people linked the cause of malaria to not eating breakfast, flies, eating uncovered food and working under sun (Altaiar, 2009; Langit, 2000; Nuwaha, 2002 & Alaii, Borne and Kachur, 2003). The implication of such beliefs is that, since it has little or no relationship to mosquito bites, it may seem absurd to them to accept sleeping under an ITN or taking a dose of sulfadoxine-pyrimethamine and the other recommended IPTp as a preventive measure.

Consistent with reports from this review is the fear associated with the adoption of ITNs for the control of malaria. According to a report of a study conducted in Kenya, use of ITNs was low as a result of the perception that chemical used in the treatment of nets results in sterility in men and miscarriages among pregnant women (Alaii et al, 2003). This conforms to the findings of a study by Dembo (2012) where he surmised that people reluctance to adopt these measures especially ITNs is the belief that it is associated with family planning. The need to demystify the

belief held concerning the chemicals used in the treatment of ITNs through health education and general awareness campaigns on malaria preventive strategies should be adopted. Contrarily, reports from a study carried in Uganda linked the low practice of malaria preventive strategies to financial constraints due to the high cost involved in their adoption (Musoke, Miiro, Ndejjo, Karani, Morris, Kasasa, Nakiyingi- Mirro, Guwatudde and Musoke, 2018). Although, most of the nets owned by households in the study area were provided by government freely yet household members stated financial constraints as a reason for non ownership and use. Further investigation is recommended on this issue.

The role of low education, income and employment has been reported as an important barrier. It was stated that low uptake of malaria preventive measures in low income countries is as a result of the low socioeconomic status of the people to practice some of these strategies, thus the high transmission rate of the disease (Fokam, Kndzeka, Ngimuh, Dzi and Wanji, 2017; Moon, Hayes, Blevins, Lopez, Green and Gonzalez-Calvo, 2016 and Wale & Mindaye, 2016 cited in David et al, 2018; Okonofua, Feyisetan, Davis-Adtugbo and Sanusi, 1992). It was surmised that increase in education and employment will invariably result in increase in income which will promote the practice of the malaria preventive measures. However, the findings from a study identified poor quality of healthcare delivery as a major barrier (Chukwuocha et al, 2010). This is consistent with reports from other studies (Diala, Choi, and Rogers, 2012; Issues such as poor communication skills among nurses, careless handling of pregnant women who come for antenatal and the long waiting hours affects their practices of these strategies in the study area. Assumption here is that, availability of the strategies is not a barrier instead the service delivery sector serves as an

impediment. Therefore, there is need to focus attention on the manner in which this sector is being run especially in the aspect of provision of adequate malaria preventive services such as IPTp and ITNs to clients. Other studies with high percentages on knowledge and awareness on the cause and transmission of malaria (Astatkie, 2010; Musoke, 2015, and Micheal, 2017), however have reported low practice of its preventive measures. This difference could be explained by people's experiences with these strategies; issues such as discomfort due to heat (ITNs), inconvenience in moving household items before spraying (IRS), perceived ineffectiveness, and potential health impact were identified as possible reasons. There is need to address these issues in order to scale up the practice of malaria preventive strategies. Worthy to note is the benefit of practice of malaria control measures (use of ITNs) on other mosquito and vectors related diseases such as yellow fever and dengue in a population. It becomes imperative therefore, to encourage a wide practice of these strategies as it not only prevent the further spread of malaria but tackles other related diseases currently found in the population. Consequently, Malaria is becoming a burden on our public health system because many of these identified factors are still rubbing off on the strategies.

Conclusion

Following the World Health Organisation recommendations, Insecticide Treated Nets (ITNs), Intermittent Preventive Treatment (IPT) and Indoor Residual Spray (IRS) have been directed for use by all vulnerable groups especially pregnant women and children due to high prevalence of malaria among them by the Nigerian government. But the underlying issues to the full acceptance and practice of malaria preventive strategies as discussed in this paper serve as a major reason why the incidence of malaria is still on the high side in

the country. To a large extent, the 2010- 2015 goals of World Health Organisation of reducing malaria episodes by 75% through the use of malaria control interventions is yet to be achieved in Nigeria. The obvious factors as discussed in this review are responsible for the non-commendable achievements thus far recorded in the sub-Saharan regions, especially in Nigeria. Therefore, there is still much work to be done and it requires the combine efforts of individuals, corporate bodies, government and non-governmental organisations, if the fight against the disease is to be defeated.

Recommendations

From the following discussions, the following recommendations are made:

1. Good policy implementation at both the community, individual and service delivery levels should be adopted. This will ensure proper compliance to the use of ITNs, IPT and IRS in Nigeria.
2. Before any health planning is to be carried out, the need to carry the residents along in the planning process should be considered. This is because; the actual needs and feelings of the people will be properly taken into consideration in designing the policy and its implementation will be in line with the people needs.
3. For a significant reduction in malaria transmission to occur, there is a need to educate the people on the causes and modes of transmission of the disease. With adequate knowledge on this, without so much conviction, people will be ready to practice these recommended measures.
4. A barrier to the practice of malaria prevention strategies is the poor attitude of health care workers towards their clients, is one factor affecting the utilization of malaria preventive strategies. Therefore, there

is need for improvement on their attitudes by ensuring they undergo trainings periodically where emphasis will be laid on the importance of open and friendly demeanour in improving level of utilization of these services by clients, and

5. Finally, service providers should endeavour to reduce the long waiting

time which clients face each time they pay a visit to health centres, for this long waiting hours may make many clients to be disinterested and discouraged from visiting health care centres to seek correct and appropriate malaria preventive measures.

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