Socio-economic determinants of malaria prevention and treatment among pregnant women in Specialist Hospital Bauchi

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Abstract
Malaria in pregnancy has remained a public health challenge in Bauchi Metropolis Nigeria, leading to stillbirths, spontaneous abortion and even maternal death. This study investigated the socio-economic determinants of prevention and treatment of malaria among pregnant women in Specialist Hospital Bauchi. The target group were pregnant women between the ages of 15-49 years old. The study was guided by Kleinman's (1980) Explanatory Model (EM). It was a cross-sectional survey research design that adopted a quantitative method of data collection and data analysis. The study used Krejcie and Morgan (1970) formula and arrived at the sample size of 317 respondents out of the total number of 1806 pregnant women attending antenatal during the study period. Simple random sampling technique was used to collect data from respondents during antenatal sessions in Bauchi Specialist Hospital. Data was collected using a closed-ended questionnaire and was analyzed and managed using Statistical Package for Social Sciences (SPSS ver. 22.0). The study findings revealed that poverty was among the prominent determinants that impede malaria prevention and treatment among expectant mothers. The study concluded that lack of income and socio-cultural barriers were found as the major determinants hindering the effective application of malaria prevention and treatment among pregnant women in Specialist Hospital Bauchi. Therefore, the study recommends that pregnant women should be given free ITNs with free malaria treatment as practice in other States of Nigeria. Additionally, health facility across Bauchi Metropolis should plan antenatal sensitization at regular interval in order to ensure all women at reproductive age have access to vital information related to malaria in pregnancy.

Keywords: Antenatal, Income, Malaria, Prevention, Pregnant women, Socio-economic and Treatment

1. Introduction

Malaria is a common disease predominantly within tropical areas of the globe. Globally, around 216 million people are infected by malaria yearly killing about 445,000 persons with pregnant women bearing the highest burden of the infection (UNICEF 2017; WHO 2017). Usually, malaria in pregnancy causes distress to poor persons in endemic nations, the poorest and most relegated individuals. Most malaria cases and deaths in pregnancy happen within low and middle-income nations, particularly Sub-Saharan Africa (PMI 2015). A quite substantial number of pregnant women die unjustly of malaria because of their inability to buy Hospital recommended drugs especially where free malaria pills are not available (WHO, 2020).

South Asia is also an endemic region for malaria transmission with about 1.4 billion persons at threat of contracting malaria (UNICEF 2017). In spite of the improvement in dropping the weight of malaria in pregnancy within the area, pregnant women from deprived social groups or poor households are exposed because they live in poorly built houses 2 that are absorbent for the entry of mosquitoes (Rijken et al., 2012). India, the

nation with the maximum number of persons suffering from poverty, has a grave malaria problem among expectant mothers. A report by MOHFW (2014) found that pregnant women from poor households in India with low immunity to malaria were more vulnerable to maternal anemia and maternal deaths and those who survived had newborns with low birth weight or stillbirths.

However, in Brazil malaria in pregnancy is connected with poverty and this further makes disease treatment and management very expensive amongst the less privileged persons (Desai et al., 2017). The specified medical concerns of malaria during pregnancy are spontaneous abortion, cerebral malaria, maternal anemia, low birth weight, stillbirth (Guyatt & Snow 2004). According to Sachs and Malaney (2014) opined that apart from medical liability, malaria is a substantial economic problem in Brazil.

Malaria during pregnancy is a significant public health issue, particularly in Sub-Saharan Africa where pregnant women pay the bill for anti-malarial drugs, bed nets, and transportation to health facilities (Dellicour et al., 2010). Malaria threatens approximately 25 million pregnant women in Africa, resulting in over 10,000 maternal and 200,000 neonatal deaths each year (WHO 2014).

Malaria has continued to be Nigeria's most common parasitic infectious disease amongst pregnant women commonly caused by plasmodium falciparum species. Despite the involvement by government and international interventions to eliminate malaria amongst pregnant women, the infection remains quite rampant because of environmental and social factors coupled with unsuccessful intervention plans (PMI 2015). Malaria prevalence is high among low-income families living in rural communities devoid of access to primary health care that accounts for 11% of maternal deaths amongst pregnant women in Nigeria (Peter, 2019; FMOH, 2015).

Bauchi State Agency for the control of HIV & AIDS, Tuberculosis, Leprosy, and Malaria (BACATMA) has been distributing free ITNs to the general public every year to shrink the problem of malaria (BSMOH, 2022). Nevertheless, this effort has done little to decrease the load of the infection because considerable importance is given to HIV&AIDS and Tuberculosis. This study, therefore, investigated the socio-economic determinants of prevention and treatment of malaria amongst pregnant women in Bauchi Specialist Hospital, Nigeria.

2. Literature Review
Economic Determinant
Malaria poses a severe health challenge to the global economy, particularly among malaria-endemic nations. In 2017, it was reported that approximately $12 billion was spent worldwide on malaria elimination and reduction by governments of malaria-endemic states and their international collaborators (WHO, 2018). Malaria imposes an enormous economic drain on people, family, and national economies. The economic progress of many African countries has been affected by malaria, as gigantic developmental funds are annually channeled to solving this health problem (FMH 2015). Besides, immense man hours of work are lost resulting in huge imperceptible cost. The world over, malaria harms African economic progress the most and preserves a spiteful sequence of poverty. Billions of dollars are spent every year on treatments and preventions (UNICEF 2021). The vector that transmits malaria, does not select who to bite based on sex or age but is highly devastative among the less privileged people (Dolie & Laishram, 2012).

It is widely believed that malaria is a poverty-related disease since wealth could prevent individuals from getting infected (Sachs & Malaney 2014). Wealthy individuals are much more likely to (a) have better prevention awareness and education, (b) they have the financial means to procure

hospital recommended pills, such as anti-malarial drugs, which can treat or decrease the occurrence of malaria infection, and(c) they could also afford better housing that is very difficult for the mosquito to enter or survive in and also have access to most improved health facilities (Messina et al., 2011). However, it is true that where malaria thrives the most, human communities thrive the least, implying that malaria and poverty are inextricably linked (Kyu 2013).

However, even when health centers are accessible, the costs of malaria prevention and treatment may deter people from seeking treatment (Nabyonga-Orem et., al 2013). Malaria prevention spending, such as the costs of insecticide-treated nets (ITNs) and medication, seems to be linked to individual's income or economic status, with people who are economically stable budgeting a greater amount of their income to malaria treatment and prevention (Ettling 2009). The burden of malaria treatment is enormous, and the treatment costs can be categorized into direct costs such as money spend on services at the health facility and indirect cost such as fees spend on transportation and income loss due to the time waste out of work.

The UNDP's (2010) report estimated that more than 70% of the global poor are women. Women are last in almost every economic and social pointer of well-being (Ricci 2012; Mavis et al., 2004). Poverty includes other types of deprivation, including education, economics, and access to services, health outcomes, resources and skills. Moreover, 58% of malaria mortalities occur in the Sub-Saharan Africa with deflected economy (Yusuf et al., 2010).

It's worth noting that the Plasmodium falciparum species is responsible for the most severe and potentially fatal form of malaria. This species can be found in various regions across the globe, including the Caribbean, the Amazon Basin of South America, parts of Asia, sub-Saharan Africa, and the Middle East. The Plasmodium vivax species, on the other hand, is the most prevalent type and can be found in many parts of Asia, Latin America, some areas of Africa, and the Middle East. Plasmodium ovale is another fewer common species that is mostly found in sub-Saharan Africa, certain areas of the Middle East, and some Pacific Island locations. Lastly, Plasmodium malariae is relatively uncommon and can be found in sub-Saharan Africa, parts of Asia, the Middle East, and the Americas (Zimmerman et al., 2004; Sutherland et al., 2010; Rahimi et al., 2014; Cowman et al., 2016).

Social and Cultural Determinants

People attitude toward malaria: Social and cultural determinants could heavily affect some substantial characteristics such as acceptance of treatment and incorporation of treatment into everyday life (Sachs & Malaney 2014). Pregnant women's perception of the disease is paramount in understanding the success or failure of malaria intervention in any community. Some individuals may not even consider mosquito bite as harmful. It is highly unacceptable for people to perceive mosquito bite as non-harmful despite the available medical evidence that malaria is caused due to biting by female anopheles' mosquito, and expectant mothers and children under the age of 5 are the most at risk. There is also a belief among some expectant mothers that insecticide-treated nets produce heat, that lead to bad dreams and make them uncomfortable.

Religion: Society's religion, as one of the cultural factors, can affect people's capacity to utilize health-care services such as seeking malaria treatment and prevention. In some countries in Africa and Asia, restricted mobility amongst women, especially expectant mothers, hampered their right to attend health facility for malaria diagnosis. Some of the religious doctrines do not allow women to inter-mingling with men except on rare occasion.

Women often have to seek permission from the household heads before going for a medical checkup. Hence this culture may prevent pregnant women from going to health centers for malaria diagnosis and treatment on time. Women suffered from all forms of social violence, including discrimination and harassment from their in-laws and husbands for the financial burden incurred concerning their malaria ailments (UNDP, 2015).

Social migration: It is impossible to overstate the significance of human population movements and patterns in malaria control. Indeed, such moves might aid in the spread of drugs resistant Plasmodium falciparum especially with chloroquine. In African states, individuals migrate to farming communities during the early months of the rainy season, when agriculture, sowing, and clearing occur. This movement of people is much higher among rural women who migrate from one village to another looking for jobs and farming land (Erhart et al., 2004).

More so, movement of sick people from areas where malaria was eradicated to areas where it was still endemic was the reason for the disease's resurgence. There are, meanwhile, other ways in which population migration could accelerate or worsen malaria's spread. However, to successfully eradicate malaria, people's culture and society's norms must be put into consideration whenever the need to design malaria intervention arises. The success of malaria elimination depends solely on the realization of cultural norms and values of the society in question for proper application and implementation of the malaria elimination programs.

Theoretical Framework

The Explanatory Model was advocated by Kleinman (1980) to provide explanations on how to manage illness and assist people to attach social meaning to the understanding of their health problem. Most importantly, the Explanatory Model mainly provides explanations on health aspect such as the origin of sickness, signs, and its management.

The Explanatory Model is greatly directed by personality and social elements. Individuals use the Model to manage certain health-related problem among themselves. The Model can also be comprehended by observing the exact context in which they are employed. Such context consists of economic, societal settings and the religious practiced by the patient's society. For example, the realization of how serious an infection is and how it will affect their health may not only be determined by its origin but also by other social factors such as kind help available or accessible, and whether the sick person can manage to pay for the treatment expenses among other factors. The model believes that the social and economic setting of a patient's society influence the kind of treatment he/she may likely receive from his community.

3. Methodology

This work adopted a cross-sectional survey research design. A survey research design that is cross-sectional is very suitable for this type of study because it is good for population-based study or survey and access the incidences or prevalence of diseases (Creswell, 2014; Fowler, 2014). A cross-sectional survey is simple and easy to conduct because multiple data can be collected at the same time. It is also not expensive to use, does not necessarily require a lot of time, and the data from a cross-sectional survey can be used for various types of research.

The study used a quantitative method of data collection. According to Creswell (2013) quantitative study endeavors to quantify, collect and analyze statistical information, and emphasizes the relations amongst a smaller number of characteristics across several cases. The study relied on primary data. The primary data was collected from the respondents during antenatal sessions in Bauchi Specialist

Hospital through the use of a closed-ended questionnaire.

The research was conducted in Bauchi Specialist Hospital, Bauchi State, Federal Republic of Nigeria. Bauchi Metropolitan is located at the Northern edge of Plateau State covering 7, 259, 01 square kilometres of landmass and a population of 493,730 people (NPC 2006). The town is the state capital of Bauchi State. Most of the population are Muslims while Hausa, Fulani, Jarawa, and Gerawa are the major languages. Malaria, pneumonia, and flu are the major diseases in this area (National Bureau of Statistics 2011).

The sample size for this study was 317 based on the Krejcie and Morgan (1970) formula. A simple random sampling technique was used to obtain the required number of respondents. A table of random numbers designed as a guide and the pregnant women were selected based on the randomized number created until the required number was reached. Simple random sampling offers the basis from which the other more difficult sampling procedures are arrived (Kanupriya 2012). Therefore, the lists of all pregnant women attending antenatal care in Bauchi Specialist Hospital were collected from the maternity section and randomly selected 317 respondents out of the total population of 1806. The data collected were sorted, cleaned and coded. The study used the Statistical Package for Social Sciences (SPSS ver. 22) and analyzed the responses from the respondents. Simple descriptive statistical tables with percentages, frequency counts and graphs were used to summarize the results.

Ethical matters are important for the realization of any research and most importantly in the field of social science (Ahmed et al., 2011). This research was conducted per the research procedures, rules, and regulations. During the visit to the hospital, health workers in charge of the antenatal services were made aware of the study's purpose and its objectives. Thus, the health workers gathered pregnant women and told them about the importance of the study. Additionally, informed consent of the respondents was obtained individually and willingly accepted to participate in the study before engaging them. Similarly, their right to privacy and anonymity were highly respected and treated with the utmost confidentially.

4. Results and Discussion
Table 1: Demographic characteristics of the respondents

Age (years)	Frequency	Percent
15 – 29	178	56.1
30 – 39	103	32.4
40 – 49	36	11.5
Total	**317**	**100**
Marital status		
Married	232	73.2
Widowed	28	8.8
Divorced	31	9.8
Never married	26	8.2
Total	**317**	**100**
Education level		
Primary	36	11.4
Secondary	68	21.5
Diploma	102	32.2
University	111	35.0
Total	**317**	**100**

Among the sampled women, the majority were young adults of 15 – 29 years of age 56.1%. These women were mainly married (73. 2%). The majority of these women were educated with 35.0% having a degree and 32.2% having diploma level of education as shown in table 1.

Socio-economic characteristics of the study participants

The socio-economic characteristics discussed in this study include among others; employment status, culture, religion and income level of the respondents and how it influences malaria prevention and treatment. The results are presented below.

Table 2 Distribution of study participants by occupation status

(N=317)	Freq. Count of Participants (n)	Percentage (%) distribution
What type of occupation do you do?		
House wife only	221	69.7
Civil servant	73	23
Business	23	7.3
Total	**317**	**100**

This finding revealed that civil servants were represented at 23.0%, while those engaged in some forms of trade/business were represented at 7.3%. Those in trade/business included casual laborers, artisans, road-side food vendors and general household merchandise. Similarly, the majority of the respondents at 69.7% were housewives with no particular engagement in any form of employment be it private or public. Regarding the high rate of employment among the respondents, a study by Usman et al., (2011) buttressed this finding when it revealed that in households headed by people who have no work, pregnant women find it difficult to attend health facilities and to cover the direct and indirect costs of malaria treatment compared to those households headed by people who have work.

Income status of the respondents and how it influences malaria prevention and treatment

This section observed the financial aspect of pregnant women by looking at their income and how it impacts malaria prevention and treatment. This income was measured on monthly basis and compared with the cost of complete malaria treatment per respondent. The findings were presented in table below.

Table 3: Distribution of study participants by income and a cost complete malaria treatment

	Sample =317	
Do you have any source of income?	**Freq**	**%**
Yes	96	30.3
No	221	69.7
Total	**317**	**100**
Monthly income		
$0------------$20	229	72.1
$21-----------$40	29	9.1
$41-----------$60	41	13.0
$61-----------$80	3	1.1
$100 and above	15	4.7
Total	**317**	**100**
Cost of malaria treatment		
$5-------------$15	33	10.4
$16-----------$24	178	56.3
$25-----------$35	77	24.2
$36 and above	29	9.1
Total	**317**	**100**

The finding indicated that 30.3% of the respondents affirmed that they engaged in some income-generating activities, while the majority 69.7% confirmed that they did not partake in any revenue-generating activities. Even though the majority of the respondents are educated, the redundancy rates among them are high, and most of the pregnant women did not involve in other business. However, staggering number of the respondents at 72.2% reported having zero (0) to $20 per month, while 9.1% have an income that range between $21 to $40. And 1.1% have monthly income of $61 to $80. However, only few among the pregnant women 4.7% have a monthly income above $100.

However, these findings showed that pregnant women in Bauchi Specialist Hospital finds it difficult to afford the expenses of malaria treatment. However, this finding is corroborated with another study by Chuma et al. (2019) that households with limited resources spend a considerably greater percentage of their earnings in the treatment of malaria during pregnancy than their wealthier equivalents who can manage and spend more on malaria prevention.

Additionally, when the study women were asked on the cost malaria treatment, the majority of them 56.3% reported that the complete cost for both the direct and direct expenses range from $16 to $24 per person. This was followed by 24.2% who affirmed that malaria treatment costs around $25 to $35 per person, while 10.4 reported $5 to $15 per treatment. And finally, those who believe that malaria treatment is above $36 are 9.1%. This finding showed that malaria treatment is a significant economic challenge to pregnant women given that a complete malaria treatment (direct and indirect cost) per person as indicated by the majority of the respondents is $16 to $24 (NGN19,600 to 29,400) with a present exchange rate of NGN1,225 per 1 USD. Nevertheless, the respondents who are at a greater risk of the financial burden of

malaria are those who have no any source income and those whose monthly income is less than the minimum wage in Nigeria which stands at NGN30,000 per month (20 USD).

Therefore, this result is in agreement with a study by Chijioke et al., (2020) where they found that malaria was an economic burden to the pregnant women in Rivers State, Nigeria with a reported treatment cost per woman stands at 50.75 USD (NGN18, 271) with the exchange rate than at NGN360 per 1 USD. Similarly, The According to the United Nations Development Program (UNDP 2010), women account for 70% of the global poor. Furthermore, women lag behind men in almost every economic and social well-being predictor (Ricci 2012). According to the Explanatory Model, people find it difficult dealing with the economic aspect of a disease. It's a general conviction that if patients do not get the needed treatment, his/their condition may likely deteriorate or worsen.

Cost of malaria treatment and the propensity of patients to seek treatment
Respondents were asked if the cost of malaria treatment can be a barrier for seeking immediate treatment, the respondents at 65% answered in the affirmative as presented in figure 1 below.
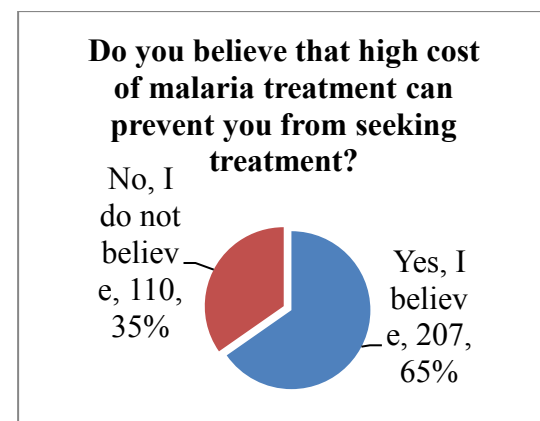
The high cost of malaria treatment can prevent one from seeking immediate treatment as indicated by 65% of the respondents. The rest 35% of the respondents do not believe that the high cost

of malaria treatment can prevent them from seeking immediate treatment. As a result of the financial burden involved, many pregnant women may choose not to seek care from health facilities. Similarly, some respondents may resort to herbal medication, which is relatively cheaper. Based on this finding, it is evident that the high cost of malaria treatment amongst pregnant women serves as a barrier to

malaria treatment among the respondents. Additionally, this finding is consistent with that of Obinna et al. (2013) where they found that the cost of malaria treatment was high and households endure a larger percentage of this amount owing to a high level of indirect costs. However, the study analysis revealed a significant association between poverty and malaria treatment-seeking behavior among the respondents.

Table 4: Things that are likely affect malaria treatment and prevention

Which of the following may likely affects the effective application of malaria prevention and treatment?	Sample Population (N=317)	
	Freq. Count	%
Pregnant women's attitudes towards the disease	47	14.8
Health worker's attitudes and performance	38	11.9
Lack of good medication	61	19.2
Cultural misconception about malaria	171	54.1
Total	**317**	**100.0**

Based on the above findings, more than half of the respondents 54.1% pointed out that cultural misconception related to malaria serve as an impediment to the effort geared toward malaria elimination. While 19.2% mentioned lack of good medication and 11.9%-pointed health worker's attitudes and performance. Few of the respondents 14.8% stated that pregnant women's attitudes towards the disease serve as a major factor that hinders the effective application of malaria prevention and treatment among the respondents. Referring to 14.8% of the respondents who believed that women's attitudes towards malaria also affect the application of conventional malaria preventive measures.
Health Belief Model (1974) rightly postulated that human behavior is a factor that determines individual health or well-being and the success or consequences of particular actions taken by such individuals. Interventions based on the HBM could address these characteristics and encourage pregnant women in Bauchi metropolitan to

seek treatment and prevent malaria. For instance, educational initiatives should dispel prevalent myths and obstacles while addressing the severity and vulnerability of malaria during pregnancy, the advantages of early diagnosis and prevention, and other pertinent issues. Perceived hurdles may also be lessened by expanding the supply of bed nets and antimalarial medications, as well as by enhancing access to healthcare facilities.
Poor access to malaria preventive and treatment services is linked to low socioeconomic status, poverty, and illiteracy (Samadoulougou et al., 2014). Malaria prevention and treatment may be hampered by limited access to prenatal care services and medical facilities (Ogbu et al., 2019; Nega et al., 2019). Poor health-seeking behavior can result from ignorance of malaria prevention and treatment during pregnancy (Mubyazi et al., 2014). Cultural practices, preconceived notions, and traditional beliefs can affect how well malaria preventive and treatment strategies

are received and implemented (Ouattara et al., 2011). The use of insecticide-treated bed nets, antimalarial medications, and other preventive interventions may be hampered by their high cost and restricted availability (Chourasia et al., 2017). Malaria prevention and treatment may be impacted by subpar prenatal care services, such as insufficient counseling, a lack of focused prenatal care, and stock shortages of necessary supplies (Mosha et al., 2014).

5. Conclusion and Recommendations

On the determinants of prevention and treatment of malaria amongst pregnant women, the study concluded that socio-economic reasons were found as the major determinants hindering the effective application of malaria prevention and treatment. In particular, poverty was found to be higher among the respondents as more than two-thirds of them had an income of $0-$20 per month. When comparing this with the current cost of malaria treatment at $16 to $25 (NGN19,600 to 29,400) per person, it is very obvious that poverty has so much influence on malaria infection in Bauchi Metropolis specifically within Bauchi Specialist Hospital. Additionally, cultural misconception related to malaria was found to impact malaria prevention and treatment.

The study recommends that pregnant women in the Bauchi Specialist Hospital be given free malaria treatment as practiced in other States of Nigeria. Additionally, health centers across Bauchi Metropolis should plan antenatal sensitization at regular interval in order to ensure all women at reproductive age have access to vital information related to malaria in pregnancy.

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