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EFFECT OF HEALTH EDUCATION INTERVENTIONS ON KNOWLEDGE OF MALARIA PREVENTION AMONG PREGNANT WOMEN IN SELECTED HOSPITALS IN OYO STATE, NIGERIA

Adeniji, Oluwakemi I. (MPH, PGDE, BNSc)
School of Public and Allied Health,
Faculty of Public Health,
Babcock University, Ilisan Remo, Ogun State

Akinboye, Dora O. (PhD, M.Sc, FIMLS, AIMLS)
School of Public and Allied Health,
Faculty of Public Health,
Babcock University, Ilisan Remo, Ogun State

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ABSTRACT: *The study examined the effect of health education interventions on knowledge of malaria prevention among pregnant women in selected hospitals in Oyo State, Nigeria. The research design adopted for this study was the quasi-experimental design. The population of this study was pregnant women who were attending antenatal clinics in the selected health care facilities in Oyo State, Nigeria. The sample size formula was used to derive 80 respondents. A multi stage sampling procedure was used to select the respondents for the study. The instrument used for the pre and post-intervention was a structured questionnaire. The face and content validity of the instrument was ensured by experts in Public Health. The collection of data was done in three phases: the baseline or pre-intervention phase which was for one week; the immediate post-intervention was for eight weeks (intervention was between the 3rd to 10th week), and the third phase which was the outcome evaluation at the 12th week follow up. Descriptive and inferential statistics were used for data computation. The result revealed that respondents' knowledge on malaria prevention among pregnant women attending antenatal clinics in selected hospitals was low at the pre-intervention stage for both the experimental group and the control group. However, the knowledge increased significantly at the immediate post intervention and at the 12th week follow-up for the experimental group while the control group remained the same. It was recommended among others that nurses should regularly organise health education on malaria prevention for pregnant women attending antenatal clinics.*

KEYWORDS: health education intervention, knowledge, malaria prevention, pregnant women

INTRODUCTION

Malaria is a parasitic infectious disease which has led to 219 million cases and 584 deaths (WHO, 2017). Also, in 2019, it led to worldwide mortality, with high records of 229 million cases and

409,000 deaths (WHO, 2019). It is one of the major public health problems in about 91 countries of the globe with sub-Saharan Africa having 93% of the burden of the disease (WHO, 2019). It has been revealed that this has virtually unaltered for many years. Also, among the world population of 7.8 billion, 3.2 billion people are at risk of being infected with malaria parasites and having full blown malaria (WHO, 2019). Malaria is a preventable, treatable and curable disease. It has been wiped out in developed countries such as Europe, Central and South America since the early 19th century. It is transferred via the bites of infected *Anopheles* mosquito and it is usually present in tropical and subtropical climates where the parasites that cause it live (Burke, et al., 2019). Malaria is caused by parasitic protozoans (a group of single-celled microorganisms) belonging to the *Plasmodium* (*P*) type. There are four main types of *protozoa* of the genus *Plasmodium* that causes malaria. They are *(P) falciparum, (P) vivax, (P) ovale* and *(P) malariae.* Out of all these *Plasmodium types, P. falciparum* is the most severe causative agent of malaria. It is responsible for the highest number (99.7%) of malaria cases in the African region among which is Nigeria (WHO, 2019).

There are 62.8% of cases in the South-East Asia regions; 71% in the Eastern Mediterranean and 65% in the Western Pacific (WHO, 2019). A total of five African countries experienced nearly half of malaria cases globally with Nigeria having 25% of it- National Malaria Control Programme (NMCP, 2015). It is mostly associated with poverty and usually has major effects on the economy of the countries affected. Also, an estimated cost of 12 billion dollars is the losses incurred in Africa because of malaria. This is due to hike in health care costs, lost ability to work and negative effects on tourism. Other species like the *P. vivax* is common in America, with 74.1% cases of malaria (WHO, 2019). *P.vivax*, in comparing with *P.falciparum* has a lower sexual *parasitaemia*, forms dormant liver-stages (*hypnozoites*) and is more transmissible. The *P. ovale* can remain in the liver for a long time and have been given relatively little attention compared with other species with its prevalence been apparently underestimated. This is due to its low *parasitaemia* and low prevalence in limited areas. *P.ovale* occurs in most Africa, India and South-East Asia with its prevalence as high as 15% in Papua New Guinea and rural Nigeria (Cao, et al., 2016). This can be reactivated in the absence of a mosquito bite and thereby lead to complications later. The *P. malariae* only add to a small percentage of infections. This species is found in tropical Africa where co-infections are sometimes met with *P.falciparum*.

In 2019, six countries led to nearly half of malaria cases worldwide. The countries were as follows: Nigeria (25%), the Democratic Republic of the Congo (12%), Mozambique (4%), Cote d'Ivoire (4%) and Uganda (5%). In Nigeria, malaria has been and still remains endemic, affecting the under-5 children and pregnant women more severely than other population groups (WHO, 2019).

Malaria is a unique disease compared to other diseases as its prevention is basically dependent on two main methods which are use of antimalarial drugs and protection against the bites of mosquitoes (ECDC, 2021). There are several misunderstandings about malaria, and because of this, it is important to understand the local knowledge and practices related to malaria prevention. These are necessary for the implementation of culturally appropriate, sustainable and effective interventions. The main objective of the National Malaria Control Programs is to reduce the

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number of malaria cases and deaths accruing from it. In the African regions there are more than 92% of malaria cases and mortalities globally (Mbacham, et al., 2019). The interventions on malaria control over the years have evolved with a many laudable strides achieved in its implementation (WHO, 2021). The Global Technical Strategy for Malaria, as well as Roll Back Malaria Partnership's Action and Investment to defeat Malaria (AIM) was endorsed by the World Health Assembly at its meeting in Addis Ababa in 2015. The goal of this intervention is to have a malaria-free world by the year 2030 (WHO, 2021).

Health education strategies assist in improving awareness of malaria and this has aided reduction in cases of some areas in developing countries by as much as 20% (Farag, et al., 2018). In developing world, where malaria is common, control measures have been successfully used to decrease the incidence of malaria. Having knowledge on malaria through health education enables identification of the disease at the early stages and stops it from becoming fatal. Also, health education informs people on control of breeding sites of mosquitoes in the environment, thus reducing the risk of having malaria.

The characteristics of health education strategies include a community needs assessment. This is done to identify community capacity, resources, priorities and needs. This is followed by participation of the target population in the health programmes to be carried out. Learning activities are planned towards increasing participants' knowledge and skills and then the planned programmes implementation. This implementation occur in a setting that is easy for the participants and the presentation of information is dependent on the resources that are culturally appropriate and tailored to the target populations to ensure cultural competence (Rural Health Information, 2018). Some of the health education programs to prevent malaria among pregnant women include health education and counselling with the use of insecticide treated nets (Sabin, et al., 2018). Other forms of health education program are intermittent preventive therapy of malaria, mass drug administration, indoor residual spraying, larva control and mass fever treatment (NNDSS, 2018).

In Nigeria, Olayemi et al. (2011) in a study revealed that the build-up of stagnant water in some places after the rain corresponds with the period of malaria transmission. Several other factors have been connected as contributory factors to occurrence and spread of malaria, apart from the fact that it is one of the most climate-sensitive vector borne diseases. These factors are environmental changes, socio-economic changes, health care food production, the modification of microbial/vector adaptation (Dawaki, et al., 2016). Presence of mosquito-friendly environment in malaria endemic areas, which encourages survival and proliferation of the vector and pathogenic parasite, have been linked with factors such as poverty, poor socioeconomic status, poor education, lack of enlightenment and poor environmental sanitation. The rise in population density increased the human exposure to malaria which has increased pressure on land productivity (Olayemi, et al., 2011).

The distribution of ITNs reduced from 360 million to 337 million in 2019 and access to it decreased from 56.3% to 51%; the rate of utilization has increased, though with small fluctuations, from 71.3% to 87.1% (Bertozzi-villa, et al., 2021). Presently, joint efforts are geared

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towards sustaining, improving and expanding efforts to control malaria except with the problems being faced in the hard-hit areas and the COVID-19 pandemic (WHO, 2021). The challenges include poverty, poor sanitation, weak health systems, limited disease surveillance capabilities, natural disasters, armed conflict, migration, climate change and counterfeit antimalarial drugs (WHO, 2021; Tanner & de Savigny, 2018; CDC, 2021). In addition to this, many sub-Saharan African countries are encountering the problem of achieving wide distribution of insecticide treated nets (ITNs) for the control of malaria (Onwujekwe, et al., 2015).

In a quasi-experimental study by Amoran, et al., (2013) involving 400 women on the uptake of ITNs among pregnant women, it was revealed that there was a rise in use of ITNs due to the health education that was administered on the respondents. The experimental and control groups were selected from the northern axis and the southern axis of Ijebu Local Government Area in Ogun State respectively. The study was carried out in three phases which are the pre-intervention, intervention and post-intervention phases. Phase one was the cross sectional comparative descriptive study while phase two was the comprehensive health education intervention in the experimental group only. The last phase which is the phase three compared the intervention group with the control group. The intervention activity which was structured educational program, with its content adapted from the national malaria control program, and which contain information on gaps in knowledge on malaria, was carried out for one day. The post intervention was carried out after three months from the intervention phase to determine the residual gain on knowledge on malaria. It was deduced from the study that knowledge on use of ITNs was increased in the experimental group from 69.4% to 95%.

In a study by Adebayo et al., (2015), it was concluded that there was poor knowledge to prevent malaria among pregnant women. Balami, et al., (2019), in a randomized control trial study conducted to determine the effects of health educational intervention on the level of knowledge, motivation and behavioural skills on the use of ITNs and uptake among pregnant women in the North East (Borno), Nigeria submitted a significance of 12.75% in knowledge skills, 8.55% in motivational skills and 6.35% in behavioural skills.

The study examined the effect of health education intervention on knowledge of malaria prevention among pregnant women in selected hospitals in Oyo State, Nigeria. This study specifically examined

1. assess the baseline level of knowledge of malaria prevention among pregnant women attending antenatal clinics in selected hospitals in Oyo State;
2. examine the level of knowledge of malaria prevention among pregnant women at immediate post intervention for experimental and control groups in selected hospitals in Oyo State; and
3. analyse the level of knowledge of malaria prevention among pregnant women at 12^{th} week follow-up for experimental and control groups in selected hospitals in Oyo State

Research questions

The following research questions were raised to guide this study.

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1. What is the baseline level of knowledge of malaria prevention among pregnant women attending antenatal clinics in selected hospitals in Oyo State?
2. What is the level of knowledge of malaria prevention among pregnant women at immediate post intervention for experimental and control groups in selected hospitals in Oyo State?
3. What is the level of knowledge of malaria prevention among pregnant women at 12th week follow-up for experimental and control groups in selected hospitals in Oyo State?

Research hypotheses

$H_0$1: There is no significant difference in the respondents' level of knowledge of malaria prevention between baseline and immediate post intervention.
$H_0$2: There is no significant difference in the respondents' level of knowledge of malaria prevention between immediate post intervention and 12th week follow-up.

METHODOLOGY

The research design adopted for this study was a quasi-experimental design. The population of interest in this study was pregnant women who were attending antenatal clinics in the selected health care facilities in Oyo State, Nigeria. There were two study areas, Moniya Primary Health Care centre (experimental group) and Idi Ogungun Primary Health Care centre (control group). The sample size formula according to Lwanga and Lemeshow (1991; as referenced by Suresh & Chandrashekara, 2015) was used to derive 80 respondents. A multi stage sampling procedure was used to select the respondents for the study. The first stage was to select primary health centres offering antenatal care services within Oyo State, through purposive sampling. The second stage was to select two Local Government Areas within Oyo State through purposive sampling. The third stage was to select one antenatal care centre out of each of the two Local Government Areas within Oyo State using purposive sampling. The fourth stage was to select pregnant women who were in their first or second trimesters with no co-morbidities, who indicate their willingness to participate and give their consent through purposive sampling. A full explanation of the study was given to the proposed respondents. Therefore, based on the calculation of the sample size, 80 respondents were used for the study.

The instrument used for the pre and post-intervention was a structured questionnaire which was divided into two sections (sections A-B). Section A sought for the socio-demographic data of the respondents while section B measured knowledge (social diagnosis) of malaria prevention. The face and content validity of the instrument was ensured by experts in Public Health. The reliability of the instrument was ensured through test re-test method and Pearson Product Moment Correlation was used to compute the collected data (Reliability = 0.83-0.87).

A pre-tested and validated instrument was used for the collection of the data. The data were collected with the help of four research assistants who would have been trained properly for a week on collection of data. The collection of data was done in three phases: the baseline or pre-intervention phase which was for one week; the immediate post-intervention was for eight weeks (intervention was between the 3rd to 10th week), and the third phase which was the outcome

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evaluation at the 12th week follow up. The baseline data was collected at the beginning of the study after the familiarization with the respondents. This was done for one week and it served as a reference point for the intervention. It also provided rationale for comparison among the two groups at the post intervention phase for all variables that are influenced by the intervention and to detect possible changes that may be attributed to the intervention. The immediate post-intervention data was collected after the 10th week following the collection of the baseline data. This was done after the intervention was carried out. This served as a reference to measure the impact of the intervention. At the 12th week follow-up, data were collected to measure the outcomes of intervention with respect to behavioural outcome.

Descriptive and inferential statistics were used for data computation. Paired sample t-test had been used to test the 8 hypotheses at p=0.005 level of significance. The decision rule was that if the data computed is $p \leq 0.05$, then the null hypothesis was rejected while if $p \geq 0.05$, then the alternate hypothesis was not rejected

RESULTS

Objective 1: Baseline level of knowledge of malaria prevention
The pregnant women's level of knowledge about malaria prevention before intervention was measured on a 15-point rating scale which enquired about knowledge of malaria prevention. The mean ± SD scores for the level of knowledge about malaria prevention in the experimental group and the control group were 6.95±1.22 and 6.85±1.42 respectively.

Furthermore, the categorization into low (0-7), moderate (8-10) and high (11-15) of knowledge among the groups showed that, none of the patients in the experimental group had a high knowledge while only 2.5% of the pregnant women in the control group had a high knowledge regarding malaria prevention at baseline (See, Table 1 below).
Table 1: Level of knowledge of malaria prevention at baseline for groups in the study

Knowledge of Malaria prevention	**Experimental Group F (%)**	**Control Group F (%)**
Low (0-7)	29 (72.5)	28 (70.0)
Moderate (8-10)	11(27.5)	11 (27.5)
High (11-15)	-	1 (2.5)
Mean ±SD	**6.95±1.22**	**6.85±1.42**

Objective 2: Level of knowledge of malaria prevention at immediate post intervention
The pregnant women's level of knowledge about malaria prevention after intervention was measured on a 15-point rating scale which enquired about knowledge of malaria prevention. The mean ± SD scores for the level of knowledge about malaria prevention in the experimental groupand the control group were 13.03±1.07 and 7.70±1.40 respectively (See Table 2 below).
Furthermore, the categorization into low (0-7), moderate (8-10) and high (11-15) of knowledge among the groups showed that, all the pregnant women in the experimental group had a high knowledge while only 2.5% of the pregnant women in the control group had a high knowledge regarding malaria prevention at immediate post intervention (See, Table 2 below).

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Table 2: Level of knowledge of malaria prevention at immediate post intervention for groups in the study

Knowledge of Malaria prevention	Experimental Group F (%)	Control Group F (%)
Low (0-7)	-	16 (40.0)
Moderate (8-10)	-	23 (57.5)
High (11-15)	40 (100.0)	1 (2.5)
Mean ±SD	**13.03±1.07**	**7.70±1.40**

Objective 3: Level of knowledge of malaria prevention at 12th week follow-up
The pregnant women's level of knowledge about malaria prevention at 12th week follow-up was measured on a 15-point rating scale which enquired about knowledge of malaria prevention. The mean ± SD scores for the level of knowledge about malaria prevention in the experimental group and the control group were 13.10±0.98 and 7.68±1.21 respectively (See Table 3 below)
Furthermore, the categorization into low (0-7), moderate (8-10) and high (11-15) of knowledge among the groups showed that, all the pregnant women in the experimental group had a high knowledge while none of the pregnant women in the control group had a high knowledge regarding malaria prevention at 12th week follow-up (See, Table 3 below).
Table 3: Level of knowledge of malaria prevention at 12th week follow-up for groups in the study

Knowledge of Malaria prevention	Experimental Group F (%)	Control Group F (%)
Low (0-7)	-	15 (37.5)
Moderate (8-10)	-	25 (62.5)
High (11-15)	40 (100.0)	-
Mean ±SD	**13.10±0.98**	**7.68±1.21**

Test of Hypotheses

$H_0$1: There is no significant difference in the respondents' level of knowledge of malaria prevention between baseline and immediate post intervention
A paired t-test was conducted to determine if the total mean difference observed in the patients' level of knowledge of malaria prevention due to the intervention was statistically significant. As shown in table 4, the intervention program had statistically significant effect on the respondents' level of knowledge in the experimental group (t= 26.06, p= 0.000; p<0.00). Also, in the control group, there was statistically significant difference in the level of knowledge of malaria prevention (t= 4.52, p= 0.000; p<0.00). The intervention group had the larger effect size (ES) of 4.12(5.079 to 3.155). The results showed that there was significant difference in the respondents' level of knowledge of malaria prevention between baseline and immediate post intervention. Therefore, based on these values the null hypothesis is rejected.

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Table 4: Paired Sample T-test analysis showing the respondents' level of knowledge of malaria prevention between baseline and immediate post intervention

Variables	Groups	Mean Diff	S. D	S. E	df	T	ES (95%Cl)	p-value
Level of Knowledge of malaria prevention	Experimental	6.075	1.47	0.23	39	26.06	4.12(5.079 to 3.155)	0.000*
	Control	0.850	1.18	0.19	39	4.52	0.715 (1.059 to .364)	0.000*

***Significant at <0.05**

$H_0$2: There is no significant difference in the respondents' level of knowledge of malaria prevention between immediate post intervention and 12th week follow-up.

A paired t-test was conducted to determine if the total mean difference observed in the patients' level of knowledge of malaria prevention between immediate post intervention and 12th week follow-up was statistically significant. As shown in table 5, the increase in mean score at the immediate post intervention was sustained at the follow-up period as there was no difference in their knowledge at the follow-up period in the experimental group (t= 1.78 p=0.083; *p*>0.00). Also, in the control group, there was no statistically significant difference in the level of knowledge of malaria prevention between immediate post intervention and 12th week follow-up (t= 0.27, p=0.785; *p*>0.00). The results showed that there was no significant difference in the respondents' level of knowledge of malaria prevention between immediate post intervention and 8th week follow-up. Therefore, based on these values the null hypothesis is not rejected.

Table 5: Paired Sample t-test analysis showing the respondents' level of knowledge of malaria prevention between immediate post intervention and 12th week follow-up

Variables	Groups	Mean Diff	S. D	S. E	df	T	ES (95%Cl)	p-value
Level of Knowledge of malaria prevention	Experimental	0.075	0.27	0.04	39	1.78	0.281(0.596 to 0.037)	0.083
	Control	0.025	0.58	0.09	39	0.27	0.043 (0.267 to .353)	0.785

DISCUSSION

The present study revealed that respondents' knowledge on malaria prevention among pregnant women attending antenatal clinics in selected hospitals in Oyo State was low at the pre-intervention stage for both the experimental group and the control group. However, the knowledge increased significantly at the immediate post intervention and at the 12th week follow-up for the experimental group while the control group remained the same. This finding is corroborated by the study of Balami, et al., (2019) found that educational intervention achieved significance of 12.75% in knowledge skills of malaria prevention than those in control group. Amoran, et al., (2013) involved 400 women on the uptake of ITNs among pregnant women, it was concluded that there was increase in use of ITNs due to the health education that was given

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to the respondents. They concluded that knowledge on use of ITNs was increased in the experimental group from 69.4% to 95%. On hypotheses testing, it was revealed that there was significant difference in the respondents' level of knowledge of malaria prevention between baseline and immediate post intervention. The intervention group had the larger effect size (ES) of 4.12(5.079 to 3.155). It was however revealed that there was no significant difference in the respondents' level of knowledge of malaria prevention. This implies that the increase in mean scores at the immediate post intervention was sustained at the 12th week follow-up.

CONCLUSION

The study concluded that adequate health education increased the level of knowledge of malaria prevention as demonstrated in the experimental group. It is safe to conclude that health education intervention is needed to influence a change in the knowledge of malaria prevention.

Recommendations

1. Nurses and midwives should be exposed to in-service training on malaria prevention.
2. Nurses should regularly organise health education on malaria prevention for pregnant women attending antenatal clinics

Contribution to Knowledge

Findings from this study heighten the roles of health education as a potential tool in health campaigns to promote knowledge of malaria prevention among patients. Obtained results from this study further validate the claim that interventions through health education are successful in influencing behavioral change.

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