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Review Article

Interventions for Pregnant Women against Malaria: A Mini Review

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1. Introduction

Malaria remains highly endemic in sub-Saharan Africa [1], and about 25 million pregnancies are estimated to occur yearly in malaria-endemic regions of the sub-continent [2]. Several interventions aimed at improving knowledge, attitude, and practice of malaria prevention, have been studied among different groups, only a few of which were among pregnant women. A systematic review of educational interventions in sub-Saharan Africa, which included studies which focused on ITN, IPTp, home-based management and environmental management revealed evidence of its effectiveness in improving these practices among the intervention group [3]. Amoran [4] had demonstrated that directly training caregivers could lead to improvements in knowledge, attitudes and practice of ITN use. Among refugee mothers, health education, facilitated by Vector Control Program personnel and Voluntary Collaborators, also led to improvements in knowledge of malaria transmission and positive treatment seeking behaviors for fevers with chills [5]. In Iran, a health education intervention based on the Protection Motivation Theory had led to improvements in malaria prevention, self-efficacy scores, but not preventive behavior scores among households in the intervention group [6]. Net impregnation also significantly improved among households, following a health education intervention on malaria with provision of net impregnation services in Piron, Mali [7]. Among Home-Based Care workers in Limpopo, South Africa, enrolled into a three to four-week training under the Malaria Awareness Program (MAP), those who had completed the full course had thrice the odds of having knowledge of malaria transmission and knowledge of malaria prevention

compared to those who were not in the training, or those who had dropped out after just a week [8].

For pregnant women, sleeping under an insecticide-treated net (ITN) and receiving intermittent preventive treatment in pregnancy (IPTp) would be the ultimate aim of any preventive intervention, as they are the main preventive practices recommended by the World Health Organization [9]. We reviewed published studies on interventions for pregnant women against malaria. The aim was to ascertain the progress made so far, identify current gaps, and provide suggestions for policy makers and future researchers on possible ways forward.

2. Results

Summaries of few intervention studies conducted among pregnant women are presented in Tables 1 to 3.

A recent study in a health center in north-eastern Nigeria revealed that a four-hour malaria health, educational intervention based on the information-motivation-behavioral skills were effective in leading to an overall improvement in knowledge, motivation and behavioral skills by 12.75% ($p<0.001$), 8.55% ($p<0.001$), and 6.350% ($p < 0.001$) respectively [10]. Training of Community-Directed Distributors (CDDs) to give basic counselling to antenatal women, was effective in improving both ITN use and IPT uptake among the intervention group [11]. In another study in Bangladesh, Community Health Workers are visiting households with at least one pregnant woman or an under-five child, to give health education on malaria, was followed by an increase in insecticide net use to above 80% [11]. This study, however, makes it difficult to draw conclusions as it had no control group.

Study	Balami et al., 2019
Location	Maiduguri, Nigeria
Participants	372 antenatal care attendees (186 intervention + 186 controls)
Intervention:	a. Malaria health education intervention
Contents	b. Information on malaria transmission, complications, and prevention (ITN and IPTp)
Methods	a. Lectures using power point projections b. Brain storming sessions c. Practical demonstration sessions
Duration	Four hours
Guiding theory	Information-motivation-behavioral skills
Control :	Educational session on breastfeeding
Methods	a. Lectures with power point projections b. Brain storming sessions c. Practical demonstration sessions
Duration	Four hours
Guiding theory	None
Dependent variables:	a. Knowledge, motivation and behavioral skills for malaria prevention
Follow-up duration	2 months and 4 months post-intervention
Summary of results:	Knowledge of malaria and malaria prevention in pregnancy = 12.75%
	Motivation for malaria prevention in pregnancy = 8.55%

	Behavioral skills for malaria prevention in pregnancy = 6.350%

Table 1: Malaria health education intervention for household members.

Study	Okeibunor et al., 2011
Location	Akwa Ibom, Nigeria
Participants	Pregnant women: 1,280 and another 1,380
Intervention:	Complementary community-directed intervention (CDI) program
Contents	Community-directed distributors (CDDs) were trained a. To deliver ITNs and SP (IPTp1 and IPTp2) to pregnant women, and b. To provide basic health counselling services.
Methods	
Duration	Each batch was trained for 5 hours (all in a single day)
Guiding theory	None
Control:	a. No CDI program b. Provision of public health clinics with drugs, functional equipment and other supplies such as tracking sheets c. Training for health personnel to antenatal care
Contents	-
Methods	-
Duration	7 months
Guiding theory	-
Dependent variables:	a. ITN use b. IPT uptake (at least two doses)
Summary of results	**ITN use**
	Percentage increase for intervention group: 8.5 percentage points (95% CI: 0.045-0.122, p-value < 0.001)
	IPT adherence
	35.3 percentage points (95% CI: 0.280-0.425, p-value < 0.001)

Table 2: Malaria health education intervention for pregnant women.

Study	Ahmed et al., 2011
Location	Thirteen malaria-endemic districts in Bangladesh
Participants	3,760 households and another 7,895 households (household must have at least one under 5 children and/or a pregnant women)
Intervention:	a. Malaria health education intervention, and b. Long-lasting insecticidal nets

Contents	Information on: a. Malaria and its transmission b. Norms of use of insecticidal bed nets (e.g., when to hang the net, where and how to wash and dry the net, and how many washes in a year etc.) c. Diagnosis (by rapid diagnostic test) and prompt treatment of malaria following an algorithm	
Methods	a. Each community health worker (CHW) visits 10 households in a day to give health education on malaria b. Distribution of long lasting insecticidal nets to poor households by the CHWs	
Duration		
Guiding theory	None	
Control :	No control group	
Contents	-	
Methods	-	
Duration	-	
Guiding theory	-	
Dependent variables:	a. Knowledge of malaria and insecticidal bed nets b. Insecticidal net ownership c. Insecticidal net use	
Follow-up duration	2 years	
Summary of results:	**Percentage of pregnant women who slept under an LLIN/ITN**	
	South-eastern districts	North-eastern-districts
	% change = 6.8	% change = 6.6

Table 3: Malaria health education intervention for household members.

The cost implications as well as small effect sizes of the previous interventions do not seem encouraging enough to make governments adopt them. More effective interventions are thus needed. The intervention module in one of the previous studies [10] could however complement the on-going routine health education given to pregnant women during their ANC. The target pregnant women need to be actively involved in all stages of the development of such interventions. Qualitative studies in the form of focus group discussion and key informant interviews would play a greater role in identifying strategies which need to be incorporated into such studies. Furthermore, additional interventions directed at significant others need to be implemented, considering the important role they play in determining the pregnant women's use of ITN [13]. Owing to its wide coverage and effectiveness in influencing behavior [14], the mass media also provides a promising platform for not only disseminating such intervention programs, but also actively engaging remotely-located participants.

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