

Assessment of Usage of Insecticide-Treated Nets Distributed Routinely in Health Facilities to Pregnant Women

Samson Mfuyeni
Ntchisi District Health Office,
P.O. Box 44, Ntchisi, Malawi

Yamikani Yafeti
Lake Malawi Anglican University,
P.O. Box 30606, Lilongwe, Malawi

Abstract:- Malaria during pregnancy is a major cause of poor pregnancy outcomes in Malawi. To reduce the burden of Malaria during pregnancy, Insecticide-Treated Nets are distributed routinely to pregnant women in Malawi. This study aimed at establishing contributing factors and determining rate of usage of Insecticide-Treated Nets distributed routinely in health facilities to pregnant women in Ntchisi.

Among the 258 respondents, self-reported Insecticide-Treated Net usage was at 67.4%. Safe-reported Insecticide-Treated Net usage complemented with a verified hanged net over a sleeping place was at 64.0%. Major contributing factors for Insecticide-Treated Net usage and non-usage were prevention of mosquito bites and not having an Insecticide-Treated Net respectively.

Insecticide-Treated Net usage among pregnant women is far less than the targeted 90%. This study recommends that interventions promoting usage of Insecticide-Treated Nets factor in the role of malaria prevention in improving pregnancy outcomes.

Keywords:- Insecticide-Treated Nets, Malaria, Pregnant Women, Routine Distribution and Usage.

I. INTRODUCTION

A. Burden of Malaria in Africa

Malaria is a preventable and curable life-threatening disease. It is a major public health problem in Africa. In 2019, Africa registered 215 million malaria cases that is 94% of all global malaria cases (WHO, 2020). Between 2019 and 2020, malaria cases increased from 213 million to 228 million, and deaths due to malaria increased from 534,000 to 602,000 in Africa (WHO, 2021). All this shows that malaria is a huge and growing problem in Africa.

Malaria disproportionately affects pregnant more than non-gravid women. Malaria during pregnancy is a major cause of poor pregnancy outcomes in Africa (WHO, 2020). These poor outcomes include maternal anaemia, miscarriage, preterm birth, stillbirth, low birthweight, maternal mortality and neonatal mortality (Cutts et al., 2020; Manu et al., 2017; Mwangi et al., 2022). 34% (11.6 million) of all pregnancies in 2020 were exposed to malaria in Africa (WHO, 2021).

Malaria during pregnancy is estimated to result in 10,000 maternal deaths annually in Africa (Kovacs et al., 2015). Reducing malaria during pregnancy would significantly contribute in improvement of maternal health.

B. Global Malaria Control Strategy

The Global Technical Strategy for Malaria 2016–2030 targets reducing both global malaria incidence and mortality rates by at least 90% from 2015 levels by 2030 (WHO, 2016). This is in line with the Sustainable Development Goals (SDG) goal 3.3, which targets ending the malaria epidemic by 2030 (United Nations, 2016). To achieve the 2030 malaria morbidity and mortality targets the World Health Organisation (WHO) recommends core interventions consisting of vector control, chemoprevention, diagnostic testing and treatment. Vector control strategies include Insecticide-Treated Nets (ITNs) and Indoor Residual Spraying (WHO, 2016). Vector control strategies reduce malaria by limiting human contact with mosquitoes.

C. Burden of Malaria in Malawi

Malaria is endemic in Malawi with perennial transmission in most parts of the country that peaks during the rainy season (PMI, 2022). Between the years 2020 and 2021, malaria accounted for 29% of all outpatient health facility visits and 21% of all inpatient's health facility deaths in Malawi (*HMIS-Malawi*, 2023). Malawi aims to reduce malaria incidence from 386 per 1,000 in 2015 to 193 per 1,000 by 2022. To achieve this 50% reduction; Malawi implements interventions which include vector control, case management, behaviour change communication and prevention of malaria during pregnancy. Vector control strategies implemented include universal and routine distribution of ITN, IRS, Larval Source Management and Vector surveillance (NMCP, 2017a).

D. Malaria Control Strategy in Malawi

Routine distribution of ITNs exclusively targets pregnant women during antenatal clinics and infants at time of birth or first contact with a health facility. Pregnant women and under-five children are exclusively targeted because malaria is a leading cause of morbidity and mortality in these groups in Malawi (NMCP, 2017a). Despite this, the national wide Malaria Indicator Survey of 2017 showed that only 68% of under-five children and 63% of pregnant women use ITNs (NMCP, 2017b). This underutilisation of ITNs would contribute to Malawi failing to attain the 2030 global

malaria morbidity and mortality reduction targets.

E. Burden of Malaria in Ntchisi

Ntchisi is categorised as a mid-burden malaria district in Malawi. Malaria, which is a leading cause of morbidity and mortality in Ntchisi, accounted for 34% of all health facility visits and 13% of all inpatient deaths in 2020/21 fiscal year in the district. During the same period, 99% of all pregnant women who attended ANC and 100% of infants who contacted a health facility in Ntchisi received ITN (*HMIS-Malawi*, 2023). Despite these very high distribution rates of ITNs, the rate of usage is not known in Ntchisi.

This study, as part of a major study developing and verifying an ITN Usage Promotion Model therefore, seeks to establish contributing factors and determine rate of usage of ITNs distributed routinely in health facilities to pregnant women in Ntchisi. The findings of this study will help in designing new or modifying health promotion interventions used in promoting usage of ITNs among pregnant women and the public.

II. METHODS

A. Study Area

This study was conducted in Ntchisi district (13°31-39.9"S, 33°54-53.64"E). Ntchisi district is one of the nine districts in the central region of Malawi. The district is dominated by mid-gradient planes in the western and rolling hills with high gradients in the eastern parts of the district. Average temperatures range from 17.5°C in eastern hilly areas to 22°C in western plane. Ntchisi district receives between 700mm to 1640mm of rainfall from November to April annually (Ntchisi District Council, 2020). The rainy season is peak malaria season in Ntchisi. Malaria contributed to 34% of all health facility visits and 13% of all inpatient deaths in 2020/21 fiscal year in Ntchisi (*HMIS-Malawi*, 2023).

B. Study Design

This was a cross-sectional study. Data was collected in March and April 2023. A pretested structured questionnaire was used to collect data. Study respondents were sampled from all the thirteen health facilities of Ntchisi. One health post was randomly sampled from a list of all health posts of every health facility. All pregnant women from the sampled health facility who had started attending antenatal clinics were included in the study. All pregnant women who attend antenatal clinics receive an ITN for malaria prevention during pregnancy. A trained community based health worker administered the questionnaire.

C. Data Management and Analysis

This study collected quantitative data. The data was entered and analysed using SPSS statistical software (IBM SPSS Statistics 20). Frequencies and proportions were computed. Differences in frequency and proportions were compared to compute variations and determine whether the variations were significant or not. Variations with P-values of less than 0.05 were considered significant. Odds ratios were also computed on study variables like level of formal education, age, marriage status and household population size.

III. RESULTS

A. Social-demographic Characteristics of Respondents

This study interviewed pregnant women who had started attending antenatal clinics and had received an ITN for prevention of malaria in pregnancy. Out of the 258 pregnant women who were interviewed, 99 (38.4%) were less than 20 years old. Most of the respondents 243 (94.2%) had formal education. Out of the 258 respondents, 222 (86.0%) were married of whom 218 (98.2%) were staying together with their partners. Table 1 below shows full social-demographic characteristics of the respondents.

Table 1: Social-demographic characteristics of respondents

Variable	Frequency (n)	Percentage (%)
Age		
10-19	99	38.4
20-45	159	61.6
>45	0	0
Education		
None	12	4.7
Junior Primary School	270	34.9
Senior Primary School	105	40.7
Above primary School	48	18.6
Marital Status		
Married	233	86.0
Single	36	14.0
Living with partner	218	98.2
Household size		
1-2 people	111	43.0
3-5 people	99	38.0
Above 5 people	42	16.0

B. Usage of ITNs by Pregnant Women

Among the 258 respondents, 174 (67.4%) reported to have slept under an ITN the previous night. However of 174, 165 (94.8%) gave permission to have their sleeping place inspected to verify whether an ITN was hanged, while 9 (5.2%) refused. Of the 165 who gave permission to have their sleeping place inspected all (100%) had ITNs hanged.

C. Knowledge on importance of sleeping under ITN for pregnant women

Out of the 258 respondents, 114 (44.2%) indicated that pregnant women need to sleep under an ITN to prevent mosquito bites. 225 (87.2%) of the respondents indicated that pregnant women need to sleep under an ITN to prevent getting malaria. 54 (20.9%) demonstrated an understanding

of the importance of sleeping under ITN in relation to effects of malaria in pregnancy. Thus, 45 (17.4%) indicated that the expected child (fetus) can get malaria and 27 (10.5%) indicated that the fetus can have poor development.

D. Motivating Factors for ITN Usage

Among the 258 respondents, 174 (67.4%) indicated that they slept under an ITN the previous night. Of these, 138 (79.3%) mentioned prevention of mosquito bites and 132 (75.9%) mention prevention of malaria as motivators for sleeping under ITN. Very few respondents 27 (15.5%) mentioned any health effects either positive or negative on the developing fetus as a motivator for sleeping under an ITN. Table 2 below shows respondents motivators for sleeping under ITNs.

Table 2: Motivators for sleeping under ITNs

Variable	Frequency (n)	Percentage (%)
Prevention of mosquito bites	138	79.3
Prevention of malaria for pregnant woman	132	75.9
Prevention of malaria negative effects to fetus	21	12.1
Prevention of poor fetus development	12	6.9
Others	3	3.5

E. Motivating Factors for ITN non-usage

Out of the 258 respondents, 84 (32.6%) indicated that they did not sleep under an ITN the previous night. 42 (50%) of the 84 indicated that they did not have an ITN, 18 (21.4%) indicated that they were unable to hang an ITN and six (7.1%) indicated that ITNs bring bedbugs. Table 3 below shows respondents motivators for not sleeping under ITNs.

Table 3: Motivators for not sleeping under ITNs

Variable	Frequency (n)	Percentage (%)
Prevention of mosquito bites	138	79.3
Prevention of malaria for pregnant woman	132	75.9
Prevention of malaria negative effects to fetus	21	12.1
Prevention of poor fetus development	12	6.9
Others	3	3.5

IV. DISCUSSION

This study aimed at establishing contributing factors and determine rate of usage of ITNs distributed routinely in health facilities to pregnant women in Ntchisi. Among the 258 respondents, self-reported ITN utilisation was at 67.4%. Self-reported ITN usage complemented with a verified hanged ITN over a sleeping place was at 64.0%. This finding is surprisingly similar to 63% national ITN usage among pregnant women found by the Malaria Indicator Survey of 2017 (NMCP, 2017b). In 2017, Malawi set a target of 90% ITN usage among pregnant women by 2022 (NMCP, 2017a). This shows that the target has been missed by far in Ntchisi and that ITN usage among pregnant women has not improved during the five years strategic period (2017 – 2022). This is very worrying considering the fact that the surveyed population in this study was confirmed to have received an ITN during the current pregnancy.

Pregnant women who attend antenatal clinics in Malawi receive ITNs primarily for prevention of malaria during pregnancy (NMCP, 2017a). Despite this, a high percentage (32.6%) of respondents in this study were not utilising the received ITNs. Additionally, very few respondents (15.5%) mentioned any health effects on the developing fetus as a motivator to prevent malaria by sleeping under an ITN. This is in contrast to a higher percentage (79.3%) who indicated prevention of mosquito bites as motivation for sleeping under an ITN. This finding contrasts that by Alemu et al. (2018) and Muhumuza et al. (2016) who found that knowledge on malaria transmission and availability of ITNs are major predictors of ITN usage. It is very likely that ITN usage among the respondents would be lower during off peak malaria season as the greatest motivator for ITN usage was prevention of mosquito bites. However, malaria transmission is perennial in the study area and most parts of Malawi.

This study demonstrates the need for promotion of other motivators for pregnant women to consistently sleep under ITNs. Highlighting the negative effects of malaria on the developing infant and the intrinsic need of women to have positive birth outcomes, would probably motivate additional women to be sleeping under ITNs every night during pregnancy (Anikwe et al., 2020; Dun-Dery et al., 2022). Health promoters would help to develop and verify these motivators for promotion of ITN usage.

Even though 98% of all respondents in this study confirmed to have received an ITN during the current pregnancy, 32.6% indicated that they did not utilise it the previous night. Half (50%) of these indicated that they no longer had the ITN which they received. This is very worrying as the ITNs were far less than 9 months old as 89% of the respondents started attending antenatal clinics after the first trimester. It can be argued that the ITNs received were not considered as important by respondents who lost them during a very short time period.

Another big factor (21%) for non-usage of ITN was inability to hang the ITN over a sleeping place. This comes up in many studies as factor for non-usage of ITNs (Anikwe et al., 2020; Dun-Dery et al., 2022; Manu et al., 2017). Rectangular ITNs distributed to pregnant women in Malawi are considerably more difficult to hang those conical ITNs. Mategula et al. (2020) demonstrated that ITNs of preferred shape have 3.55 times odds of being used. Similarly, Koenker & Yukich, (2017) demonstrated that having a preferred colored and shaped ITN increases the odds of usage by 1.78. Shape preference maybe explained by the difficulty recipients of rectangular ITNs encounter in hanging them. However, it is not known if distribution of conical ITNs alone would increase ITN usage among pregnant women.

V. RECOMMENDATIONS

This study aimed at establishing contributing factors and determine rate of usage of ITNs distributed routinely in health facilities to pregnant women in Ntchisi. It has been shown that ITN usage among pregnant women is low at 67.4%. Motivators for pregnant women to utilise ITNs were mostly prevention of mosquito bites and malaria than positive pregnancy outcomes. This study therefore recommends that;

- Interventions promoting usage of ITNs factor in the effect of malaria prevention in improving pregnancy outcomes.
- There be periodic ITN hang-up campaigns to promote usage of ITNs among pregnant women and the public.
- Community health workers and volunteers to help ITN recipient who cannot manage to hang up their nets.

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