

## Original Article

## Knowledge, Attitude, and Practices Regarding the Prevention and Control of Malaria in Khyber Pakhtunkhwa: An Observational Study

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**How to cite:** Ullah Z, Shah AS, Shah ZH, Shah FS, Shaf F, Shah FJ. Knowledge, attitude, and practices regarding the prevention and control of malaria in Khyber Pakhtunkhwa: An observational study. J Lahore Med Dent Coll. 2024;1(2): 52-57

**DOI:** <https://doi.org/10.70384/jlmdc.v1i02.50>

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### Abstract

**Background:** This Knowledge, Attitudes, and Practices (KAP) study aims to assess local awareness and preventive behaviors concerning malaria in high-risk areas like Karak District. By evaluating understanding transmission, symptom recognition, and treatment-seeking behaviors, the study seeks to inform and enhance malaria control strategies as malaria is one of the most serious global public health challenges, contributing significantly to illness and mortality. The insights gained will aid in developing targeted interventions and improving the effectiveness of malaria control programs.

**Objective:** To assess knowledge, attitude, and practices regarding the prevention and control of malaria in local population of District Karak.

**Methods:** This cross-sectional study was conducted in Tehsil Takht-e-Nasrati, Karak district, Khyber Pakhtunkhwa (KPK), using convenience sampling to survey 372 household heads. Data was collected through structured interviews, and only respondents who understood Urdu or Pashto were included. Descriptive statistics and Fisher's exact tests were used for analysis, with a significance level of  $p \leq 0.05$ . SPSS version 19 was utilized for analysis.

**Results:** The study found that individuals aged 26-35 years were most affected by malaria. Additionally, 72.31% of participants were employed and awareness and preventive practices showed that 56.45% of participants deemed avoiding outdoor sleeping important, 43.28% advocated for insecticide use and mosquito control, and 42.20% used protective measures, with 42.47% employing bed nets or indoor spraying.

**Conclusion:** The study reveals a solid understanding of malaria prevention among the population yet emphasizes the need for improved implementation of protective measures and targeted government actions to enhance malaria control.

**Keywords:** Malaria, Knowledge, Attitude, Prevention, Education

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Submission Date: September 17, 2024  
Revision Started: September 18, 2024  
Revision Completed: October 28, 2024  
Acceptance Date: October 28, 2024

### Introduction

Malaria continues to be a leading cause of illness and death in tropical and subtropical regions, despite ongoing control efforts. Each year, it causes around 300–500 million cases and nearly one million deaths globally, with over 90% of the burden occurring

in sub-Saharan Africa and Asia.<sup>1</sup> Though, the COVID-19 pandemic has hindered malaria control efforts, jeopardizing the progress made against the disease.<sup>2</sup> As a result, malaria cases and deaths rose in 2020, with an estimated 241 million infections and 627,000 fatalities globally.<sup>3,4</sup>

Malaria control depends on timely and accurate diagnosis, treatment and preventive strategies such as using long-lasting insecticide-treated nets (LLINs), indoor residual spraying (IRS), and intermittent preventive treatment for pregnant women and children. Proportional morbidity dropped from 4.9% in 2015 to 3.3% in 2019, while proportional mortality fell from 3.5% to 1.7% over the same period. However, in 2020, the malaria burden increased again, with morbidity and mortality rising to levels similar to those seen in 2015, reaching 3.8% and 2.1%, respectively.<sup>5</sup> In 2015, malaria cases and deaths significantly dropped, but large populations remain at high risk, especially in Nigeria.<sup>6</sup> Ethiopia is scaling up various malaria control measures to improve access to prevention and treatment, including insecticide-treated nets, indoor residual spraying, and epidemic control. Though malaria mainly affects rural areas, urban transmission is rising due to rapid urbanization and poor sanitation.<sup>7</sup>

The latest world malaria report indicates that nearly half of the global population is at risk, with around 247 million cases and 619,000 deaths reported in 2021.<sup>8</sup> Preventing malaria through improved knowledge and awareness is key to staying healthy. Research on knowledge, attitudes, and practices highlights the importance of direct community engagement in tackling malaria. Community beliefs, perceptions, and attitudes toward symptom recognition, treatment, prevention, and control significantly impact malaria interventions, yet these factors are often overlooked in control efforts. Studies have proven the effectiveness of long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS), in reducing malaria, leading prevention programs to prioritize these methods for controlling transmission.<sup>9</sup>

Various studies emphasized the role of socioeconomic disparities, pointing to the need for targeted interventions for at-risk populations. KP province has faced a significant rise in malaria cases recently. To address this surge, it's crucial to understand current trends to predict future outbreaks and develop effective interventions.<sup>10</sup>

Malaria is prevalent in District Karak and affects people with low socioeconomic status. Effective prevention

depends on local knowledge, attitudes, and practices, but there is a gap in understanding these factors in Karak. This study aims to address this gap and inform targeted awareness interventions in the Karak district timely to decrease malaria cases.

## Methods

The ethical approval of the study was taken from the ethical review board of Gandhara University Peshawar (No GU/2021/112). The cross-sectional study design was conducted in the Tehsil Takht-e-Nasrati, Karak district, KPK from 1<sup>st</sup> June 2021 to 20<sup>th</sup> January 2022. The data was gathered through structured interviews using a questionnaire by the convenience sampling technique. Participation in the malaria study was voluntary, and informed consent was obtained from all participants beforehand. A prevalidated questionnaire was used for the data collection and Cronbach's alpha for this questionnaire was determined to be 0.81 for knowledge, 0.86 for attitude, and 0.91 for practices, respectively. A sample size of 372 was calculated using the open epi sample size calculator, with a 95% confidence level, a 5% margin of error, and a prevalence of 59.5% was used.<sup>11</sup> Inclusion criteria were age (16-55 years), both genders and those who would understand Urdu and Pashto were included. Those who did not consent to participate and individuals who could not understand Pashto or Urdu were excluded from the study and ages below 16 and above 55 were excluded. Older adults may face cognitive challenges, affecting the accuracy of their KAP responses.

The statistical analysis was conducted using SPSS version 19. Descriptive statistics, including frequencies and percentages, were used for variables such as the age of the respondent, monthly income, and employment status, as well as knowledge, attitude, and practice (KAP) variables. For quantitative variables like age, knowledge score, attitude score, and practice score, frequency, and percentages were calculated, and Fisher exact tests were calculated. A significance level (p-value) of  $\leq 0.05$  was considered statistically significant.

## Results

Most respondents are aged 26-35 (53.49%), with 72.31% being employed. Over half (51.61%) hold a BA/BSc degree, and most earn between 21,000-40,000 (62.90%). Overall, the respondents are young, educated, employed, and have moderate income levels.

The results show significant awareness about malaria,

**Table I:** Frequency and Percentage of the Participants (n = 372)

Age of the respondent	f	(%)
16-25	103	27.69
26-35	199	53.49
36-45	67	18.01
46-55	03	0.81
<b>Education level</b>	<b>f</b>	<b>(%)</b>
FA/FSc	29	7.80
BA/BSc	192	51.61
MA/MSc	94	25.27
Not Affected	57	15.32
<b>Monthly income</b>	<b>f</b>	<b>(%)</b>
Less than 20,000	52	13.98
Between 21,000-40,000	234	62.90
Between 41,000-60,000	66	17.74
Between 61,000-80,000	12	3.23
Above 80,000	08	2.15
<b>Employment status</b>	<b>f</b>	<b>(%)</b>
Employed	269	72.31
Unemployed	103	27.69

Percentages (%) and f=Frequency

with 57.26% recognizing it as a deadly communicable disease and 56.45% understanding that mosquito nets prevent it. Additionally, 45.97% know delayed treatment can be fatal, while 43.55% acknowledge the role of personal hygiene in prevention.

A majority (56.45%) believe in avoiding outdoor sleep to prevent malaria, with highly significant results ( $p = 0.00$ ). Additionally, 53.49 believe that there should be an awareness session regarding the prevention of malaria. ( $p = 0.02$ )

The results suggest significant associations between malaria prevention practices and specific behaviors, with Fisher's exact test showing highly significant values ( $p < 0.05$ ) for several items, such as bed net usage, protective measures, and seeking treatment.

## Discussion

In this study, most respondents (53.49%) were between 26-35 years old, with 27.69% falling in the 16-25 age group. More than half (51.61%) held a BA/BSc degree, while 25.27% had completed an MA/MSc, and a smaller group (7.80%) had an FA/FSc qualification. Most respondents (62.90%) earned between 21,000-40,000,

**Table II:** Frequency and Percentage of Knowledge (n = 372)

Knowledge of Malaria	Yes		No		Uncertain		Fishers exact test	
	f	%	f	%	f	%	$\chi^2$	p value
You believe that malaria is a communicable and deadly disease?	213	57.26	84	22.58	75	20.16	12.01***	0.00
Is malaria spread through mosquito bites?	160	43.01	115	30.91	97	26.08	5.20*	0.02
Do you know that stagnant water is the main areas for mosquito breeding?	160	43.01	122	32.80	90	24.19	18.01	0.00
Does a mosquito net prevent malaria?	210	56.45	88	23.66	74	19.89	9.10***	0.00
Does personal hygiene prevent malaria?	162	43.55	119	31.99	91	24.46	5.20**	0.02
Does environmental hygiene prevent malaria?	154	41.40	117	31.45	101	27.15	13.43*	0.00
Do you know that malaria is a treatable disease?	161	43.28	116	31.18	95	25.54	5.19*	0.02
Do you know that delayed treatment seeking and inadequate treatment of malaria can lead to death or is equal?	171	45.97	110	29.57	91	24.46	9.18***	0.00

n = sample size, p value calculated by Fisher-Exact Test, p value less than 0.05 considered significant, \* $p < 0.05$ . \*\* $p < 0.01$ , \*\*\* $< 0.001$ .

**Table III:** Frequency and Percentage of Attitude (n= 372)

Attitude of the participants	Yes		No		Uncertain		Fishers exact test	
	f	%	f	%	f	%	$\chi^2$	p value
Do you use protective measures against malaria?	157	42.20	123	33.06	92	24.73	12.50***	0.00
Should environmental hygiene be promoted?	151	40.59	130	34.95	91	24.46	9.20***	0.00
Should we avoid sleeping outdoor?	210	56.45	88	23.66	74	19.89	19.03***	0.00
Should mosquito nets be used?	158	42.47	115	30.91	99	26.61	6.55**	0.01
Should there be awareness raising sessions for malaria prevention?	199	53.49	90	24.19	83	22.31	5.20*	0.02
Do you believe on using insecticide aerosol sprays, destruction of mosquito breeding and resting areas?	161	43.28	116	31.18	95	25.54	8.68*	0.03

n = sample size, p value calculated by Fisher-Exact Test, p value less than 0.05 considered significant, \* $p < 0.05$ . \*\* $p < 0.01$ , p\*\*\* $< 0.001$ .

**Table IV:** Frequency and Percentage Distribution of Practices (n = 372)

Practices against Malaria	Yes		No		Uncertain		Fishers exact test	
	f	%	f	%	f	%	$\chi^2$	p value
Do you use bed nets in the house for preventing malaria disease?	150	40.32	129	34.68	93	25.00	10.78	0.00***
Do you use indoor residual spraying of insecticides against mosquito?	158	42.47	120	32.26	94	25.27	5.10	0.02*
Do people in your house use short sleeves?	158	42.47	121	32.53	93	25.00	7.97	0.03*
Is your door and windows protected by mosquito nets?	160	43.01	125	33.60	87	23.39	21.02	0.00***
Is there any stagnant water in your surrounding?	160	43.01	120	32.26	92	24.73	5.20	0.02*
Do you consult a doctor when you or your family member suffers from malaria fever?	157	42.20	126	33.87	89	23.92	23.29	0.00***
Do you use protective measures against malaria fever?	161	43.28	121	32.53	90	24.19	18.01	0.00***
Do you preferred to seek treatment within 24 hours of presenting Malaria symptoms?	158	42.47	123	33.06	91	24.46	6.54	0.01**

n = sample size, p value calculated by Fisher-Exact Test, p value less than 0.05 considered significant, \*p < 0.05, \*\*p < 0.01, \*\*\* < 0.001.

and 72.31% were employed. Overall, the respondents were primarily young, moderately educated, employed, and earning a mid-range income. The previous studies showed that the age distribution of respondents was mostly between 19 and 45 years old (51.5% %), 19.5% had no education, while 24.5% completed primary education, people were mainly in business (28.5%) and farming (26%) and 8.1% of respondents lacked knowledge about malaria transmission, while 90% of respondents had comprehensive knowledge about malaria prevention measures.<sup>12</sup> According to previously published literature, 50.3% of participants reported an income of 5,000–10,000 Saudi riyals, while 26% earned below 5,000. Regarding education, most had attained secondary school (61.4%), while only 3.6% were uneducated while knowledge regarding malaria was generally high (87.9%).<sup>13</sup>

According to current study, the majority (57.26%) recognized malaria as a deadly disease and considered mosquito nets effective for its prevention. Previous studies support these findings, with around 90% of respondents identifying bed nets as the primary malaria prevention method. Of these, 64% were aware of insecticide-treated nets (ITNs). Mosquito coils were the second most recognized preventive measure, used by 37.8% of respondents. Additionally, 48.5% reported cleaning their surroundings, and 29% mentioned draining stagnant water to prevent mosquito breeding.<sup>14</sup> A high level of awareness about using bed nets for malaria prevention was reported in studies from Ethiopia and Malawi. Despite widespread knowledge of ITNs, only 31.9% of respondents actively used them.<sup>15</sup> In the survey, 71.2% of residents believed ITNs provided better protection than regular bed nets. The use of insecticide-treated nets

was considered an effective, low-cost method for reducing malaria and other vector-borne diseases in sub-Saharan Africa.<sup>16</sup> Eliminating mosquito habitats early on was emphasized as a key primary prevention strategy for malaria. The study demonstrated that respondents had a strong knowledge of environmental prevention methods, consistent with findings from other studies in Nigeria.<sup>17</sup> However, many people continued to rely on home remedies due to accessibility and other barriers to healthcare facilities, despite recommendations for hospital treatment.<sup>18</sup>

The current study revealed that the majority believed avoiding outdoor sleeping was an effective way to prevent malaria, with highly significant results (p value 0.00). Additionally, 53.49% of respondents supported the need for awareness sessions on malaria prevention. Bed nets were widely recognized as effective for protecting against mosquitoes, with numerous studies emphasizing the benefits of ITNs.<sup>19</sup> Similar results were also reported that mosquito bed nets were crucial in preventing malaria in African countries. Families without bed nets were more susceptible to infection compared to those who used them.<sup>20</sup>

Other methods used against mosquitoes included sleeping with windows closed (30.7%) and burning coils or grass as repellents (22.3%). IRS and burning coils and local plants were also noted as key precautionary measures for mosquito control in Atacora, Benin Republic.<sup>21</sup> A study in Zimbabwe revealed a significant connection between people's understanding of malaria causes and their preventive actions, with better knowledge of insecticide spraying correlating with higher compliance.<sup>22</sup>

The second most common preventive measure was mosquito coils, used by 17.5%. In a previous study, it was found that most parents visit government or private doctors immediately, with 16.2% opting for self-medication first. Common precautionary measures include using insect repellents, mosquito nets, closing windows and doors, wearing long sleeves, and burning cow dung<sup>6</sup>, furthermore, the use of insecticide sprays, mosquito coils, and window screens for protection also protects the individual. However, studies suggest that insecticide sprays, particularly in agricultural areas, may increase mosquito resistance, reducing the effectiveness of LLINs.<sup>23</sup> Preventive strategies reported were 32.4% pesticide spraying, 26.1% preventing stagnant water, 14.1% wearing long-sleeved shirts, and 27% focusing on hygiene and education. Additionally, 45.2% use protective clothing.<sup>6</sup>

## Conclusion

The survey results indicate a significant level of awareness regarding malaria as a contagious and deadly disease, with a majority understanding that mosquito nets and personal hygiene play important roles in prevention. While a considerable number of respondents recognize the importance of environmental hygiene and insecticide use, fewer actively engage in protective measures such as bed net usage, indoor residual spraying, and immediate consultation upon the onset of symptoms. The government should emphasize improving knowledge and practices related to consistent bed net usage, immediate medical consultation upon malaria symptoms, regular indoor residual spraying, and eliminating stagnant water sources.

**Conflict of Interest:** None

**Funding Disclosure:** None

**Acknowledgments:** The authors acknowledge the people of Tehsil Takht-e-Nasrati, Karak district, KPK, for their participation and cooperation in the data collection for this study.

**Ethical consideration:** The researcher obtained informed written consent from all participants and ensured the confidentiality of their information. The ethical approval of the study was taken from the ethical review board of Gandhara University Peshawar (No GU/2021/112).

**Authors Contribution:** All the authors contributed equally, in accordance with ICMJE guidelines and are accountable for the integrity of the study.

**ZU:** Conception, design, data analysis, and initial and final draft-making

**SASS:** analysis and interpretation, initial and final draft making

**SZSS:** initial and final draft-making and design work

**SFSS:** Revising the initial and final draft, data collection and data analysis

**FS:** Data analysis, initial and final draft revision

**FJS:** initial and final draft-making, data collection

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