



Knowledge, Beliefs and Attitude towards Malaria Control and Prevention among Students in Tertiary Institutions in The Gambia

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Summary

BACKGROUND

Even though Malaria caused by five parasite species, two of which – *Plasmodium falciparum* and *Plasmodium vivax* is preventable, curable and treatable, it continues to pose a significant health threat to many communities around the world. Particularly in Sub-Saharan Africa, The Gambia is one of the African countries that has seen a significant reduction in malaria cases. Malaria cases in The Gambia had decreased gradually from 346.9 per 100,000 persons in 2004 to 66 per 100,000 people in 2018. The fight against malaria is great progress for the future.

AIM

This study aimed at assessing the knowledge, attitude and practice of students attending tertiary institutions in The Gambia in regard to Malaria prevention and control.

METHODOLOGY

From May to June 2021, a standardized pre-tested semi-structured questionnaire was used to obtain information from 431 students in four public institutions in The Gambia. The University of The Gambia (UTG) Brikama Campus, The Gambia College-Brikama Campus, Management Development Institution (MDI) and The Gambia Technical Training Institution (GTTI). Respondents were chosen using a random sampling approach of students who were found on campuses and consented to participate. Sample size was determined using the formula described by Thrusfield (2007) based on a 95% confidence interval. It was first entered into excel and then exported to SPSS version 22 (SPSS Inc., Chicago, Ill., USA) for data analyses.

RESULT

The aetiology, symptoms and therapy of malaria were all well-understood by the respondents. Age (P-value=0.005) and program of study (P-value=0.014) were highly significant with students' knowledge on the mode of transmission of malaria as for students belief of the disease. Institution of learning Odd ratio (1.385, P value=0.003) was the only factor which affected students perception of malaria. Gender (Odd ratio=2.491, P-value=0.005) and the institution of learning (Odd ratio=1.506, P-value=0.003) were factors which had a high statistical significance with students practice of sleep under an ITNs.



CONCLUSION

This study reported a high level of knowledge, poor attitude and practice towards malaria control interventions among students attending tertiary institutions in The Gambia. Students from the UTG and GTTI showed a better positive knowledge than those from the other participants. Their curriculum studies and social activities (individual students' unions) exposed them to a higher level of awareness.

RECOMMENDATIONS

Health-related programs on malaria prevention and control should be organized to raise awareness in through television and radio or any other media. Health education should be a compulsory topic or module in institutions.

Keywords: knowledge; attitude; practice; malaria; Institution; The Gambia

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Introduction

Malaria is a life-threatening parasitic disease spread by bites from infected female Anopheles mosquitoes. It's both avoidable and treatable. Malaria is caused by five parasite species, two of which – *Plasmodium falciparum* and *Plasmodium vivax* – represent the greatest harm to humans [1]. Malaria posed a threat to over half of the world's population in 2019. Sub-Saharan Africa accounted for the majority of cases and deaths [1].

Even though, Malaria is preventable, curable, and treatable, it continues to pose a significant health threat to many communities around the world. Particularly in Sub-Saharan Africa [2].

In 2019, there were estimated 229 million cases of malaria with 409,000 deaths worldwide. The continent of Africa alone accounted for 94% of the cases and deaths [1].

The fight against malaria has made great progress in the previous decade, with the burden of disease greatly decreasing, even in Sub-Saharan Africa. Unfortunately, malaria still contributes considerably to morbidity and mortality [3].

The Gambia is one of the African countries that has seen a significant reduction [4]. Malaria cases in The Gambia were 66 per 100,000 people in the year 2018. Those cases had decreased gradually from 346.9 per 100,000 persons in 2004 to 66 per 100,000 people in June 2018 [5].

Malaria is *mesoendemic*, with significant seasonal variations and 90% of the cases occurring during the rainy seasons. This usually lasts from June to October [6]. It is a disease that affects the entire population and is a primary cause of morbidity and mortality, particularly among children under the age of five [6].

Although, no big *epidemiological* changes in the malaria situation the have been seen, tremendous progress has been made throughout time. The incidence of malaria parasites in children has decreased from 4.0% in 2010 to 0.2% in 2014 [7].

During World Malaria Day, WHO and partners made a great pledge by recognizing the accomplishments of nations in their strive to minimize malaria, with the majority of them focusing on malaria elimination [8]. This study aimed at assessing the knowledge, attitude and practice (KAP) of students attending tertiary institutions in The Gambia regarding Malaria prevention and control.

MATERIALS AND METHODS

Study location

This study was conducted in four public institutions in The Gambia namely: The University of The Gambia (UTG) Brikama Campus, The Gambia College-Brikama Campus, Management Development Institution (MDI) and The Gambia Technical Training Institution (GTTI).



Sample size calculation

A cross-sectional study was conducted in May to June 2021. Participants were carefully chosen using a random sampling approach of students who were found on campuses and who also consented to participate in this study.

The sample size for this study was determined using the formula described by Thrusfield (2007) based on a 95% confidence interval.

$$N = \frac{Z^2 pq}{d^2}$$

Where N = sample size

Z = appropriate value for the standard normal deviation for the desired confidence interval (1.96).

Since there was no data on a similar study, a prevalence of 50% was assumed for this study. However, using the above formula, 384 was obtained and this was further multiplied by 10% for sampling error. As a result, a total of 431 students were chosen for this study, which was then computed based on the total number of students enrolled in each institution.

Data Collection

A standardized, pre-tested, semi-structured questionnaire was used to obtain information from 431 students enrolled in four tertiary public institutions in The Gambia on their knowledge attitude and practice towards malaria prevention practices.

Data Analysis

Data was first entered into excel and then exported to *SPSS version 22* (SPSS Inc., Chicago, Ill., USA) for data analyses. The frequency of the demographic characteristics was obtained and a Chi-square test was performed using Cross-tabulation of the various institutions of learning against knowledge, attitude and practice variables.

Multinomial logistic regression test was used to determine if there was a relationship between knowledge

and the mode of malaria transmission, students' attitude towards malaria and the practices employed by students to prevent mosquito bites with the various demography variables.

The statistical significance level was set at $P < 0.05$. Students KAP scores were calculated from the average correct answers for KAP questions. In this study, ≤ 40 (poor perception), 41 % to 55 % (average), 56 % to 75 % (good perception) and 76 % to 100 % (excellent perception).

Ethical Approval

The study proposal was evaluated and approved by the Ethics Committee, School of Arts and Sciences, University of The Gambia. and written permission was also obtained from each of the institutions in this study. The study was conducted following the Declaration of Helsinki. Written informed consent was obtained from each participant before their participation and confidentiality were kept

Results

Socio-Demographic Characteristics of study participants

A total of 431 participants took part in this study with distribution as follows:

(i) The University of The Gambia (UTG) Brikama Campus	122
(i) The Gambia College-Brikama Campus	209
(iii) Management Development Institution (MDI)	50
(iv) The Gambia Technical Training Institution (GTTI).	50

Most of them were single 356 (82%) Islam was the dominant religion 366 (84.9%). Almost half of the participants 209 (48.5%) were from the Gambia College and 157 (36.4%) of the respondents were Mandinka by tribes (*Table 1*). **Next Page**



Table 1: Demography of Participants

Characteristics	UTG (n=122) n (%)	MDI (n=50) n (%)	GTTI (n=50) n (%)	College (n=209) n (%)	TOTAL (n=431) n (%)
Sex					
Male	74 (17.2)	23(5.3)	23(5.3)	119(27.6)	239(54.5)
Female	48(11.1)	27(6.3)	27(6.3)	90(2.9)	192(44.5)
Age					
18-20	13(3)	6(1.4)	18(.2)	66(15.3)	103(23.9)
21-24	54(12.5)	39(9)	30(7)	99(23)	222(51.5)
25-27	29(6.7)	3(0.7)	1(0.2)	21(4.9)	54(12.5)
28-30	11(2.6)	1(0.2)	1(0.2)	15(3.5)	28(6.5)
>30	15(3.5)	1(0.2)	0	8(1.9)	24(5.6)
Marital status					
Married	38(8.8)	8(1.9)	1(0.2)	26(6)	73(16.9)
Single	84(19.5)	42(9.7)	49(11.4)	181(42)	356(82.6)
Divorce	0	0	0	2(0.5)	2(0.5)
Religion					
Islam	105(24)	41(9.5)	37(8.6)	183(42.5)	366(84.9)
Christian	17(3.9)	9(2.1)	13(3)	26(6)	65(15.4)
Ethnic Group					
Mandinka	54(12.5)	17(3.9)	10(2.3)	76(17.6)	157(36.4)
Wolof	27(6.3)	18(4.2)	10(2.3)	48(11.1)	103(23.9)
Jola	8(1.9)	4(0.9)	14(3.2)	34(7.9)	60(13.9)
Fula	22(5.1)	6(1.4)	2(0.5)	29(6.7)	59(13.7)
Others	11(2.6)	5(1.2)	14(3.2)	22(5.1)	52(12.1)

Respondents' Knowledge of Malaria Transmission and Symptoms

Respondents were asked if they have ever heard of malaria of which 403 (93.5%) responded positively. The most common sources of malaria-related information were by reading books 44 (19.2%), health talks 199 (46.2%), affected persons 131 (30.4%), formal learning 50 (11.6%) and unaware 7 (1.6%) as shown in *Figure 1*. Most study participants 362 (84%) were aware that malaria is transmitted through the bite of an infected mosquito with malaria.

However, 42 (9.7%), 15 (13.5%), 11 (2.6%) and 1 (0.2%) reported other means of transmittance such

as drinking contaminated water, eating contaminated food, close contact with a malaria-infected patient and I do not know respectively.

The two most commonly mentioned symptoms of malaria included raised temperature and chills 386 (89.6%). The study further assessed the knowledge of participants whether they had ever done a malaria test before.

Out of 431 participants who responded to this question, 347 (80.5%) said yes, they had done malaria tests before (*table 2*). The Chi-square test shows that there was high statistical significance with knowledge of malaria and variables on knowledge (*table 2*).

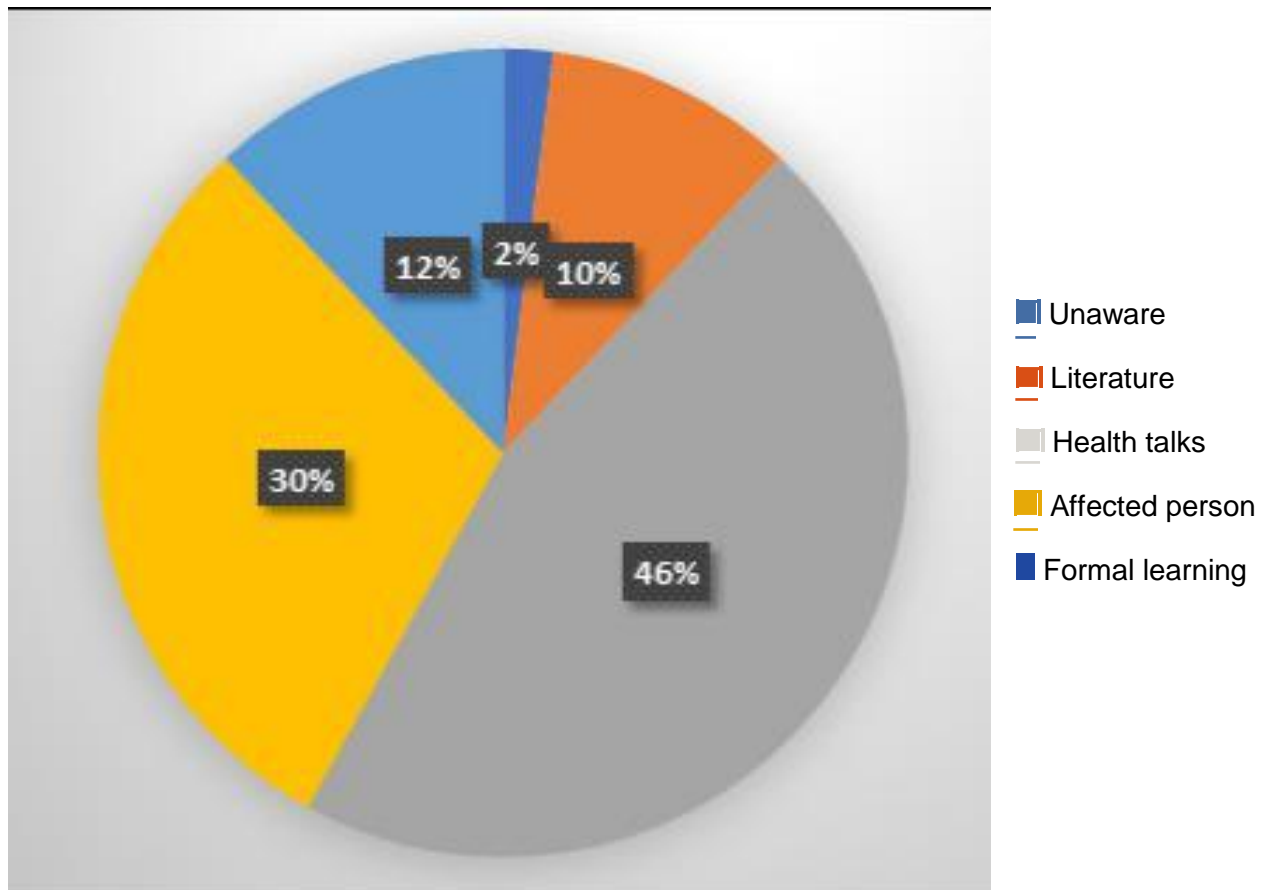


Figure 1: Source of information about Malaria



Table 2: Number and Percentage of Participants' Answers for Questions Related to Knowledge of Malaria Transmission

Knowledge	n (%)	UTG	MDI	GTTI	College	P-value
Are you aware of Malaria?	Yes	120(27.8)	41(9.5)	49(11.4)	193(44.8)	<0.001*
	No	2(0.46)	9(2.1)	1(0.2)	16(3.7)	
How is malaria transmitted	By drinking contaminated water	9(2.1) 2(0.5)	6(1.4) 6(1.4)	1(0.2) 0(0)	26(6) 7(1.6)	0.007*
	By eating contaminated food	110(25.5)	36(8.4)	49(11.4)	167(38.8)	
	Mosquito bite	1(0.2)	2(0.5)	0(0)	8(1.9)	
	Close contact with an infected patient Don't know	0(0)	0(0)	0(0)	1(0.2)	
Do you know about basic signs (high fever and chills)	Yes	116(26.9)	42(9.7)	45(10.4)	183(42.5)	0.088 _{ns}
	No	6(1.4)	8(1.9)	5(1.2)	26(6)	
When do mosquito bites?	During night hours	52(12.1)	30(7)	33(7.7)	140(32.5)	0.001*
	Any time of the day	66(15.3)	18(4.2)	17(3.9)	65(15.1)	
	Don't know	4(0.9)	2(0.5)	0(0)	4(0.9)	
Causative Agent.	<i>Plasmodium falciparum</i>	43(10)	14(3.3)	14(3.3)	70(16.2)	0.059 _{ns}
	<i>Entamoeba Histolytica</i>	2(0.5)	7(1.6)	3(0.7)	7(1.6)	
	<i>Anopheles mosquitoes</i>	69(16)	26(6)	32(7.4)	121(28.1)	
	<i>Glossina palpalis</i>	8(1.9)	3(0.7)	1(0.2)	11(2.6)	
Computed knowledge score of respondents		73%	60%	70%	65%	



Attitude Towards Malaria Prevention Practice

Table 3 shows the attitudes of respondents towards malaria. Most of the respondents 154 (35.7%) agreed that anyone can be infected with malaria and 191 (44.3%) agreed that, malaria is a life-threatening disease.

Furthermore, 188 (43.6%) of the respondents agreed that sleeping under a mosquito net during nighttime can prevent malaria (Table 3). The Chi-square test also shows that there was high statistical significance with some questions on attitude towards malaria with institutions of learning (Table 3).

Table 3: Number and Percentage of Participants' Answers for Questions Related to Attitude Towards Malaria Prevention Methods.

Attitude	n (%)	UTG	MDI	GTTI	College	P-value
Anyone can be infected with malaria	Strongly disagree	29(6.7)	11(2.6)	4(0.9)	29(6.7)	0.013*
	Disagree	12(2.8)	5(1.2)	6(1.4)	36(8.4)	
	Agree	31(7.2)	19(4.4)	20(4.6)	84(19.5)	
	Strongly Agree	50(11.6)	15(3.5)	20(4.6)	60(13.9)	
Thinks malaria as a life-threatening disease	Strongly disagree	16(3.7)	5(1.2)	5(1.2)	35(8)	0.001*
	Disagree	11(2.6)	13(3)	8(1.9)	31(7.2)	
	Agree	47(10.9)	15(3.5)	26(6)	103(23.9)	
	Strongly Agree	48(11.1)	17(3.9)	11(2.6)	40(9.3)	
During night time, sleeping under a mosquito net can prevent malaria	Strongly disagree	14(3.3)	3(0.7)	2(0.5)	19(4.4)	0.516 _{ns}
	Disagree	7(1.6)	7(1.6)	47(10.9)	18(4.2)	
	Agree	54(12.5)	20(4.6)	19(4.4)	95(22)	
	Strongly Agree	47(10.9)	20(4.6)	25(5.8)	77(17.9)	
I feel like I should visit the health centres to get my blood tested if I suspect malaria	Strongly disagree	12(2.8)	10(2.3)	1(0.2)	14(3.3)	<0.001*
	Disagree	9(12.1)	10(2.3)	1(0.2)	33(7.7)	
	Agree	47(10.9)	18(4.2)	28(6.5)	92(21.4)	
	Strongly Agree	54(12.5)	12(2.8)	20(4.6)	70(16.2)	
Recovering from malaria without getting any treatment is possible	Strongly disagree	23(5.3)	8(1.9)	8(1.9)	40(9.3)	0.354 _{ns}
	Disagree	39(9.1)	24(5.6)	25(5.8)	75(17.4)	
	Agree	46(10.7)	15(3.5)	15(3.5)	68(15.8)	
	Strongly Agree	14(3.3)	3(0.7)	2(0.5)	26(6)	
Computed attitude score of students		35%	27%	31%	26%	



Malaria Prevention and Treatment Practice

Table 4 depicts the preventive and treatment actions taken by respondents to prevent and treat malaria. Sleeping under a mosquito net was said to be a common practice for respondents 205 (47.7%), whilst repellents and insect sprays were mentioned to be used only occasionally 263 (61 %).

Furthermore, 220 (51%) said they cleaned the grasses and shrubs in their neighbourhood regularly. More than half of the respondents 219 (50.8%) indicated that they go to the health centre regularly for treatment if they get signs of malaria. The Chi-square test shows that there was high statistical significance again with almost all the questions asked on malaria control practice with institutions of learning (Table 3).

Table 4: Number and Percentage of Participants' Answers for Questions Related To Practice Towards Malaria Prevention Methods.

Practice	n (%)	UTG	MDI	GTTI	College	P-value
How often do you sleep under a mosquito net?	Always	40(9.3)	15(3.5)	20(4.6)	84(19.5)	0.014
	Sometimes	62(14.4)	19(4.4)	21(4.9)	103(23.9)	
	Never	20(4.6)	16(3.7)	9(2.1)	22(5.1)	
How often do other members of the household sleep under mosquito nets?	Always	37(8.6)	15(3.5)	19(4.4)	81(18.8)	0.016
	Sometimes	69(16)	25(5.8)	24(5.6)	118(27.4)	
	Never	16(3.7)	10(2.3)	7(1.6)	10(2.3)	
How often do you check for holes/repair mosquito nets?	Always	20(4.6)	11(2.6)	14(3.3)	67(15.6)	0.028
	Sometimes	76(17.6)	26(6)	23(5.3)	110(25.5)	
	Never	26(6)	13(3)	13(3)	32(7.4)	
How often do you use mosquito repellent coils on your house	Always	19(4.4)	10(2.3)	22(5.1)	2(0.5)	0.028
	Sometimes	81(18.8)	31(7.2)	17(3.9)	60(13.9)	
	Never	22(5.1)	9(2.1)	31(7.2)	120(27.8)	
How often do you use the anti-mosquito spray in your house?	Always	25(5.8)	19(4.4)	13(3)	64(14.9)	0.012
	Sometimes	76(17.6)	25(5.8)	37(8.6)	117(27.2)	
	Never	21(4.9)	6(1.4)	0(0)	28(6.5)	
How often do you clean/cut bushes around your house?	Always	55(12.7)	23(5.3)	28(6.5)	114(26.5)	0.515
	Sometimes	60(13.9)	23(5.3)	21(4.9)	83(19.3)	
	Never	7(1.6)	4(0.9)	1(0.2)	12(2.8)	
How often do you receive visits from the community health workers	Always	10(2.3)	3(0.7)	7(1.6)	38(8.8)	0.002
	Sometimes	63(14.6)	26(6)	32(7.4)	124(28.8)	
	Never	49(11.4)	21(4.9)	11(2.6)	47(10.9)	
Computed practice score of students		24	27	35	31	

The Multinomial Logistic Regression Result

Tables 5, 6 and 7 show the multinomial logit results for the influence of the socio-demographic factor by students' perception of KAP towards malaria control and prevention in this study. Age (odd ratio=0.612; 95% CL 0.861-0.435 and P-value=0.005) and program of study (odd ratio=1.627; 95% CL 2.401-1.103 and p-value=0.014) were highly significant with students'

knowledge on the mode of transmission of malaria as for students belief of malaria, institution of learning (95% CL 1.714-1.12; odd ratio 1.385 and P-value=0.003) was the only fact which affects students perception of malaria and finally, gender (odd ratio=2.491; 95% CL 4.679-1.326 and P-value=0.005) and the institution of learning (Odd ratio=1.506; 95% CL 1.97-1.151 and P-value=0.003) were the factors which had a high statistical significance with students practice of sleep under an ITNs.

Table 5: Factors Influencing Student's Knowledge on The Mode of Malaria Transmission

Demographic variables	Std. Error	Sig.	Odd ratio	95% Confidence Interval	
				Lower Bound	Upper Bound
Gender	0.359	0.532 _{ns}	1.252	0.619	2.530
Age	0.174	0.005*	0.612	0.435	0.861
Marital Status	0.499	0.959 _{ns}	0.975	0.366	2.593
Ethnic Group	0.124	0.711 _{ns}	1.047	0.821	1.335
Religion	0.425	0.069 _{ns}	0.462	0.201	1.063
Program	0.199	0.014*	1.627	1.103	2.401
Institution	0.152	0.361 _{ns}	0.870	0.645	1.173

Table 6: Factors Influencing Student's Attitude towards The Mode of Life-Threatening

Demographic variables	Std. Error	P-value	Odd ratio	95% Confidence Interval for Exp(B)	
				Lower Bound	Upper Bound
Gender	0.257	0.433 _{ns}	1.223	0.739	2.025
Age	0.141	0.677 _{ns}	0.943	0.715	1.243
Marital Status	0.362	0.428 _{ns}	1.333	0.656	2.709
Ethnic Group	0.089	0.958 _{ns}	1.005	0.843	1.197
Religion	0.343	0.522 _{ns}	0.803	0.410	1.573
Program	0.142	0.841 _{ns}	1.029	0.779	1.359
Institution	0.109	0.003*	1.385	1.120	1.714



Table 6: Factors Influencing Student's Practice to Prevent Mosquito Bites by Sleeping Under ITNs

Demographic variable	Std. Error	df	P-value	Odd ratio	95% Confidence Interval for Exp(B)	
					Lower Bound	Upper Bound
Gender	0.322	1	0.005*	2.491	1.326	4.679
Age	0.192	1	0.060 _{ns}	1.437	0.985	2.095
Marital Status	0.491	1	0.265 _{ns}	0.578	0.221	1.514
Ethnic Group	0.110	1	0.112 _{ns}	0.839	0.676	1.042
Religion	0.435	1	0.604 _{ns}	0.798	0.340	1.871
Program	0.165	1	0.835 _{ns}	1.035	0.749	1.429
Institution	0.137	1	0.003*	1.506	1.151	1.970

Discussion

This study documented the knowledge and practices about malaria through a survey of Knowledge, Beliefs and Attitude towards Malaria control and prevention among students in tertiary institutions in The Gambia. The aetiology, symptoms, and therapy of malaria were all well-understood by the respondents. The majority of students 403 (94%) were aware that malaria is spread by mosquitoes. This study has revealed a relatively good knowledge about malaria by students attending tertiary institutions in The Gambia.

The degree of knowledge about the epidemiology of malaria reported in this study is similar to studies conducted from other community-based studies in Bangladesh [9,10,11] in Kwara State, Nigeria [2] in Rajasthan, India [12] in Lindi Urban District and Tumbi Referral Hospital Tanzania [13,14].

This study is in line with the findings of many studies in malaria-endemic areas where a majority of the respondents reported that health talks on TV and radios were their main source of information or sensitization [15,16,14]. According to studies conducted in Colombia and Nigeria, a large number of the public was unaware of the source of malaria and its means of transmission [17,12]. This study shows that 68 (15.8%) of respondents

felt that malaria was spread by drinking contaminated water, eating contaminated food, or coming into contact with an infected individual. However, other researchers in Guatemala found that half of the respondents polled had inaccurate views regarding the disease's cause.

More than one-third 386 (90%) of the students were well aware that high fever and chills are among the basic signs of malaria and more than half of the students 255 (59%) reported that, mosquitos usually bite at night. Mosquitoes are primarily believed to bite people during nighttime.

This is in agreement with the findings of other studies[18]. More than half of the total students 248 (57%) reported that female mosquitoes usually cause malaria. This finding is similar to [19], who also reported that almost half 48.8% of the respondents in a study conducted in Ethiopia were able to identify female mosquitoes as the causative agent of malaria.

Generally, students from the UTG and GTTI showed a better positive knowledge than students from the other institutions in this study. This could have been a result of a higher level of awareness among the students ranging from their curriculum studies in their institutions and social activities individual students' unions are exposed to.



However, the student's knowledge of malaria was observed to be satisfactory as a 74% score was rated as "average" grade because respondents provided correct answers. This report is similar to the findings of [13, 14], who reported a higher overall knowledge of malaria among respondents in Tanzania.

Students in this study also showed a positive attitude with an overall score of 71% "average". Students from GTTI again got the highest attitude score as compared to other students from other institutions.

However, this study also confirms certain misconceptions that are existing among students. One hundred and thirty-two (132) 30.6% strongly disagreed with the fact that, anyone can be infected with malaria. This result opposes a report by [20] which states that almost everyone is at risk of malaria even though some individuals are at greater risk of contracting malaria and developing the severe disease than others. Likely, these groups include: children under five years and all immune-compromised individuals.

About three-quarters of the students 307 (71.2%) agreed that malaria is a life-threatening disease. This finding is also in agreement with the result of [12, 14]. In our study, 82.8% of the students reported that sleeping under treated mosquito nets can prevent malaria. This result is a similar reflection of studies in a different parts of the globe such as in Rangamati Hill tracts of Bangladesh [11], in Kavango East, Namibia [21] in Tumbi Referral Hospital Tanzania [14].

In this study, 159 (40%) of the students mentioned sleeping under ITNs as a means of malaria prevention and control, which is similarly reflected in previous studies [14,22,23].

However, the Respondents reported that 152 (35%) of other family members always sleep under ITNs, this was evidenced that students acknowledged ITNs' can prevent one from mosquito bites and scale up the prevention and control of Malaria in the community.

More than half of the respondents reported that, sometimes they use mosquito coils 263 (61%) and anti-mosquito sprays 255 (59%) in their houses. Use of mosquito coils and anti-mosquito sprays prevention was a tool for prevention and control of malaria. However, the evidence for the effectiveness and efficiency of

using mosquito coils and repellents was rather limited for inhabitants living in remote malaria-endemic areas in Nigeria [16].

Furthermore, 266 (62%) of the respondents confirmed they do clean bushes around their environment to prevent mosquitoes from breeding. However, this finding differs with that of [14] who reported that a significant number of participants in their study from Tanzania, did not know that clearing of the bushes close to houses and mosquito sprays could prevent transmission of malaria.

Incidentally, respondents in this study also showed a very poor attitude with an overall score of 29%. Students from tertiary institutions in this study demonstrated a poor practice towards controlling and eliminating malaria where the lowest score was 24% seen among students from UTG.

The results of multinomial logit regressions show that age, gender, program of study and institution are the main factors significantly influencing students' KAP on malaria. This result is consistent with the fact that the socio-demographic characteristics influence respondents Perception of Knowledge, Attitudes and Practice about malaria [19].

The results of the logit regression suggest that the age of students is also a good predictor associated with the KAP on malaria in The Gambia. Indeed, older students have been exposed to more awareness programs than younger students. This result is in agreement with the findings of [24] but opposes that of [11,14]. The Programs of study and the institutions students attend are also a good predictor associated with the students KAP on malaria control and prevention in

The Gambia. Higher programs of study and the educational level of respondents resulted in a better understanding of malaria with regards to KAP simply because they have many ways to access malaria publications. This work is similar to [25], who also reported that level of education was a significant factor in determining respondents' perception of climate change.

Study limitation

The main limitation of the present study is that only students who were enrolled by the University of The Gambia, Gambia College, Management Development



Institution and Gambia Technical Training Institution and attending face to face lectures during the COVID - 19 pandemic participated in this study.

Conclusions

This study has shown a high level of knowledge, poor attitude and poor practice towards malaria control interventions among students attending tertiary institutions in The Gambia. Never the less, there are still a few misconceptions on malaria disease, its transmission, and prevention as can be seen here, which should be addressed and clarified through health education in the form of seminars, conferences, etc. Using findings from our study, it is recommended that other health-related programs on malaria prevention and control should be organized to raise awareness in The Gambia through television and radio shows. Health education should be a compulsory topic or module in tertiary institutions in The Gambia.

Authors' Contributions

AK, EJ and PAM conceived the project idea. Ak, EJ, PAM, EM and MK prepared the research instruments. AK, EJ, PAM, EM, MK and BS collected all the necessary data and analyzed and drafted the manuscript. The study was guided and supervised by AK. AK, EJ and PAM wrote the manuscript. All co-authors reviewed and discussed the results, helped in the interpretation of the results, and contributed to the draft and final manuscript. All authors read and approved the final manuscript.

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Availability Of Data And Materials

Will be made available upon request

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