Factors Contributing to Increased Cases of Malaria in Children Below Five Years in Moyo General Hospital, Moyo District. A Cross-sectional Study.

Robert Tamale[a,1], Prosper Mubangizi[a]

[a] Kampala School of Health Sciences, P.O Box 14263, Kampala- Uganda.

Abstract

Background:
The purpose of the study was to determine the factors contributing to increased cases of malaria in children below five years in Moyo general hospital, Moyo District.

Methodology:
Study employed a cross-sectional study with a simple random technique as a sampling technique. Data was collected from a sample of 50 respondents using a questionnaire written in the English language as a data collection tool; later analyzed manually by use of tally sheets presented in tables and figures for easy interpretation of findings.

Results:
Findings in regards to health facility-related factors showed that; (52%) had never acknowledged enough counseling services about malaria, (62%) reported that they don't get enough access to anti-malaria drugs at the health facility, (76%) reported > 5km as the distance from their homes to the nearby health facility, (68%) reported that they don't pay for access to health care services, (60%) visit a doctor when their children's health does not improve, and (54%) reported that the attitude of health workers towards the provision of health care services it is good.

Conclusion:
Poor health-seeking behaviors, low levels of employment, inadequate access to mosquito bed nets, irregular use of mosquito nets among those who had access to them, low uptake of interior spraying, location of respondents' homes, poor housing infrastructures, poor waste management behaviors, long distances and inadequate access to ant- malaria drugs were the major factors that contributed to increased cases of malaria among children below five years.

 Recommendation:
Health workers at Moyo general hospital should intensively enhance access to information on signs and symptoms of malaria, consistent use of ITNs, and environmental management. So that suspicious cases can be quickly identified, improve on health-seeking behaviors of the people and hence minimize the burden of malaria.

Email: tamalerobert2017@gmail.com Date submitted:16th/04/2022 Date accepted: 28th/04/2022

1   Background of the study

According to a World Health Organization report (2020), globally there were an estimated 229 million malaria cases in 2019 in 87 malaria-endemic countries. Children under 5 years of age were the most vulnerable group affected by malaria; they accounted for 67% (274 000) of all malaria deaths worldwide. Of the 87 countries, 29 accounted for 95% of malaria cases globally. Nigeria (27%), the Democratic Republic of the Congo (12%), Uganda

(5%), Mozambique (4%), and Niger (3%) accounted for about 51% of all cases globally.

Overall, about 24 million children below five years were estimated to be infected with Plasmodium falciparum in 2018 in sub-Saharan Africa, and an estimated 1.8 million of them were likely to have severe anemia (UNICEF, 2019).

Ethiopia was one of the malaria-endemic and the most malaria epidemic-prone countries in Africa with 75% of the country being malarious and malaria contributes up to 20% of under-five deaths. However, the number of new cases of malaria declined from 2.8 in 1990 to 621,345 in 2015 (Deribew, 2017).

In the 2018 Electro System Design and Manufacturing VI, children aged 6-59 months were eligible for malaria testing using Rapid Diagnostic Testings in Mali. Nearly 1 in 5 children (19%) tested positive for malaria. Malaria prevalence varies across regions, from a minimum of 1% in Bamako to a maximum of 30% in the Sikasso region. Malaria prevalence among children age 6-59 months has declined from 47% in 2012-13 to 19% in 2018 (Institute National statistics Mali & ICF, 2019).

In Rwanda, national malaria incidence reduced from 401 cases per thousand people in the 2017-2018 fiscal year to 200 cases per 1,000-person in 2019-2020. According to the report, 4,358 cases of severe malaria (representing a 38 percent reduction) were reported at the health facility level compared to 7,054 in 2018-2019. From the general population, 10% of children below five years were at risk of having severe malaria infection (Ministry of Health Rwanda, 2020).

In Uganda, it was estimated that approximately 39 million children below five years were at risk of malaria infection in the financial year (FY), 2017/18. In addition, trends of confirmed malaria Incidence/1000 population in 2019 indicated that there was a slight increase in malaria incidence from 3.6 last week to 3.7 in 2019. The incidence in the same week last year was 2.6. However, Malaria incidence was highest in Adjumani (24.3%), Obongi (19.1%), Lamwo (19.0%), Moyo (12.3%), Busia (11.8%), Madi Okollo (11.7%) and Luuka (10.8%) (MoH, 2021). The purpose of the study was to determine the factors contributing to increased cases of malaria in children below five years in Moyo general hospital, Moyo District.

2   Methodology

Study design

Across-sectional study designs were employed. This design was preferred for this study because it considers issues for the instant economy, rapid data collection, and the ability to understand the population from a selected sample.

Study area

Moyo general hospital is located in the central business district of Moyo Town, just 400 meters east of the heart of Moyo Town in Elenderea village, Elenderea parish, Moyo Town Council sub-county in Moyo District, West Nile sub-region, in Northern Uganda, about 485 kilometers (301 miles) northwest of Kampala City. The hospital was built during the late 1960s and was commissioned by Idi Amin in 1972. The facility receives referrals from nearby health centers such as; Lefori Health center III, Bilbao health center III, Metu HCIII, Eremi HCIII, Laropi HCIII, Dufile HCIII, Eria HCIII, Logoba HCIII, Kali health center II, Obongi health center IV, Yoyo health center III and others. The facility receives approximately, 200 patients per day in several departments namely the Outpatients department (OPD), Inpatients, ART clinic, Dental clinic, ANC, Lab, Pharmacy, Maternity, Eye clinic, Mental health clinic, Paediatrics ward, Medical ward (Male ward and Female ward) Orthopedic department and others. This study area is preferred because the hospital would provide the kind of data required for the study due to increased cases of malaria at the facility.

Study population

The study population was comprised of caretakers of children with malaria cases at OPD in Moyo general hospital, Moyo district.

Sample size determination

To estimate the sample size, Burton's formula (1965) was used.

Sample size (n) = QR/O

Where,

Q- Total number of days taken for data collection

R- Maximum number of respondents to be interviewed per day

O- Maximum time has been taken on each respondent per day.

Values: Q= 10 days

R=5 respondents.

O=1 hour (Time duration will be from 8 am- 1 pm each day)

Therefore, n= QR/O

N= (5x10)/1

= 50 Respondents

Therefore, the total number of respondents was 50.

Study variables

Dependent variable

The dependent variable was increased cases of malaria.

Independent variables

Socio-economic, environmental, and health facility-related factors were the independent variables.

Selection criteria

Inclusion criteria

An inclusion criterion was composed of caretakers of children below five years prone to malaria infection voluntarily ready to consent and participate in the study.

Exclusion criteria

Caretakers of children below five years prone to malaria infection and present during the time of data collection but not willing to take part in the study were excluded.

Sampling technique

A simple random sampling technique was used to select the study participants from the study population. This technique was preferred because it is free from bias and prejudice.

Data collection tool

Data collection refers to the precise, systematic gathering of information relevant to the research purpose or the specific objectives, questions, or hypotheses of a study. Semi-structured questionnaires consisted of both closed and open-ended questions written in English Language and later translated into the local language (Madi) with the help of research assistants for those respondents who were not able to comprehend the English language. The questionnaire was considered the most convenient way of collecting data from respondents because it was easy for the researcher to administer and obtain data within a short time from a large number of respondents.

Piloting the study

Pre-tests of the questionnaire were carried out on 10 caretakers of children below five years with similar dynamics in Logoba health center III, Moyo district. Respondents used in the pre-tested questionnaire were not included in the final study. Questions were adjusted according to the pre-test results to achieve better clarity.

Data collection procedure

Before the commencement of data collection, an introductory letter was obtained from the Kampala School of Health Sciences seeking permission to conduct the study in Moyo general hospital. When permission was granted; research assistants were chosen and trained based on having training in clinical medicine. Thereafter, the sampling procedure began by explaining the purpose of the study to respondents to obtain their consent. Eligible respondents were interviewed in a separate place or room to avoid inconveniences; the researcher folded small sheets of paper containing even and odd numbers mixed; those who picked even numbers were given an interview questionnaire. The whole process of data collection followed the same procedure until when the required sample size was achieved.

Quality control

To ease the data collection process, all activities regarding data collection were done under the monitoring and supervision of trained research assistants.

Standard operating procedures for coronavirus were also strictly followed and implemented during the period of data collection.

3   Data analysis and presentation

Data was analyzed manually; using a scientific calculator, systematically computed into frequency and percentages using Microsoft excel to generate tables and figures for easy presentations.

Data management

Before leaving the study area, data was checked out to see possible mistakes by sorting variables and determining the range, minimum and maximum values of each variable.

Frequency distribution and cross-tabulations were performed to detect controversy between variables. Data were revised for completeness.

Ethical considerations

Ethics is a system of moral values that is concerned with the degree to which research procedures adhere to professional, legal, and social obligations to the research participants. An introductory letter was obtained from Kampala School of

Health Sciences and addressed to the medical superintendent of Moyo general hospital requesting permission to conduct the study; where permission was granted to conduct the study. Before enrolment, the research processes and procedures were based on voluntary informed consent and the researcher further ensured that any information obtained from the respondents was kept confidential whereby no name or identification number of the respondents appeared on the questionnaire or study results.

4   Study Findings
5   Demographic data

From the table above, most of the respondents (46%) their children were within the age bracket of 2-3 years whereas the least (12%) their children were within the age bracket of 0-1 year.

The study results showed that more than half of the respondents (58%) their children were females by sex whereas the least (42%) their children were the males.

Findings from the study showed that half of the respondents (50%) were mothers of the children whereas the least (4%) were sisters to the children.

From the total sample of 50 respondents, majority of the respondents (52%) had attained secondary level of education whereas the minority (6%) had never attained any level of education.

The study revealed that most of the respondents (42%) were Catholics by religion whereas the least (8%) were Muslim by religion.

6   Socio-economic factors contributing to increased cases of malaria in children below five years of age

From the figure above, majority of the respondents (94%) had ever heard about malaria whereas the least (4%) had never heard about malaria.

From the table above, most of the respondents (48%) reported bite by an infected female anopheles mosquito as the way how malaria is spread whereas the least (10%) they didn't know how malaria is spread.

From the figure above, more than half of the respondents (56%) reported home treatment as the action they take when their children develop fever whereas the least (4%) reported that they go to prayer house when their children develops fever.

From the table above, majority of the respondents (70%) were peasant farmers whereas the minority (2%) were civil servants.

From the figure above, half of the respondents (50%) they had three mosquito bed nets at home whereas the least (6%) never had mosquito bed nets at home.

From the table above, majority of the respondents (74%) reported that their children were not always sleeping under mosquito bed nets whereas the minority (26%) their children always slept under mosquito nets.

From the figure above, majority of the respondents (82%) they had never done interior spraying whereas the least (2%) had last done interior spraying one month back.

7   Environmental factors contributing to increased cases of malaria in children below five years of age.

From the table above, almost all respondents (94%) reported villages as the location of their homes whereas the least (2%) reported cities as the location of their homes.

From the figure above, more than half of the respondents (52%) reported to have semi-permanent houses whereas the least (12%) reported to have grass thatched houses.

From the figure above, majority of the respondents (60%) the condition of vegetation cover surroundings around their homes were moderate whereas the least (10%) had low vegetation cover surroundings around their homes.

From the figure above, more than half of the respondents (54%) they didn't know the cluster altitude above sea levels (in meters) around their home place whereas the least (18%) reported <200 meters as the cluster altitude.

From the table above, majority of the respondents (62%) reported that they keep solid wastes at home in open heap garbage place whereas the minority (8%) they keep their solid wastes at home in a small covered container.

Health facility related factors contributing to increased cases of malaria in children below five years of age.

Table 1. Shows the distribution of respondents according to demographic data

Response	Frequency(f)	Percentage (%)
Children's age (months/ years)		
0-1 year	6	12
2-3 years	23	46
4- 5 years	21	42
Total	**50**	**100**
Sex of the children		
Female	29	58
Male	21	42
Total	**50**	**100**
Relationship to the child		
Mother	25	50
Sister	2	4
Grand parent	14	28
Others	10	20
Total	**50**	**100**
Respondent's education level		
None	3	6
Primary	14	28
Secondary	26	52
Tertiary/ University	7	14
Total	**50**	**100**
Religion		
Muslim	4	8
Catholic	21	42
Born again	10	20
Others	15	30
Total	**50**	**100**

(Primary data, 2022)

Table 2. Shows the distribution of respondents according to their knowledge about how malaria is spread

Response	Frequency (f)	Percentage (%)
Bite by an infected female anopheles mosquito	24	48
Drinking dirty water	8	16
I don't know	5	10
Others	13	26
Total	**50**	**100**

(Primary data, 2022)

Table 3. Shows the distribution of respondents according to their source of income

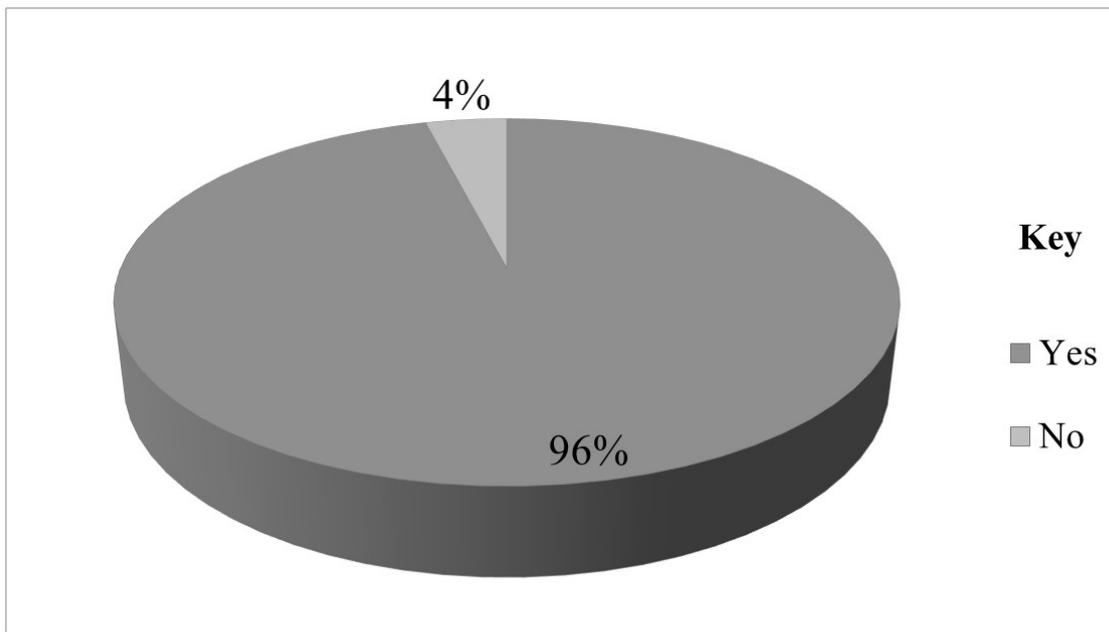| Response	Frequency (f)	Percentage (%)
Peasant farmer	35	70
Civil servant	1	2
Business	14	28
Total	**50**	**100**

(Primary data, 2022)

Figure 1. Shows the distribution of respondents according to whether they had ever heard about malaria
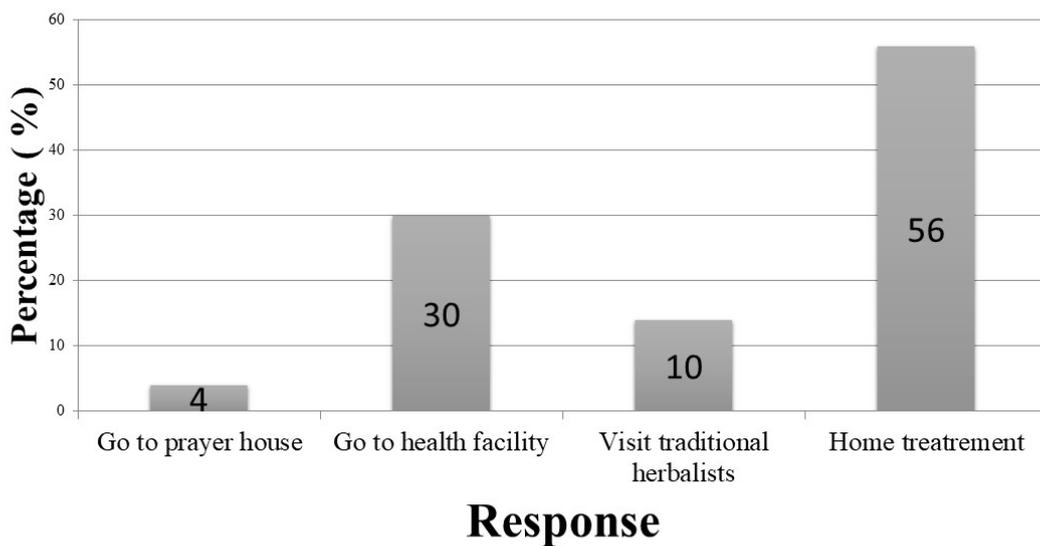

Figure 2. Shows the distribution of respondents according to the actions they take when their children develop fever
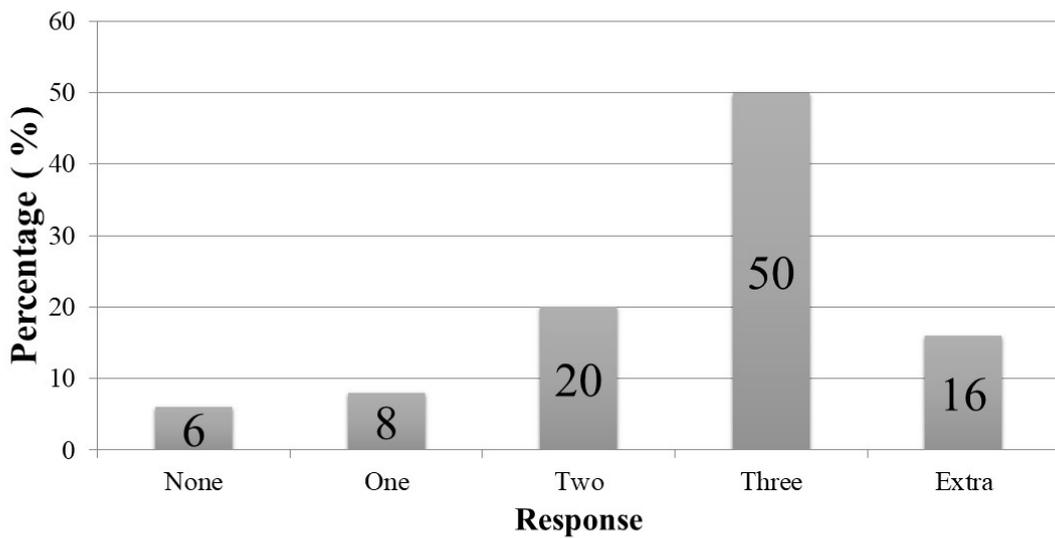
Figure 3. Shows the distribution of respondents according to the number of mosquito bed nets they had at home

Table 4. Shows the distribution of respondents according to whether their children always sleep under mosquito nets

Response	Frequency (f)	Percentage (%)
Yes	13	26
No	37	74
Total	**50**	**100**

(Primary data, 2022)

Table 5. Shows the distribution of respondents according to the location of their homes

Response	Frequency (f)	Percentage (%)
Village	47	94
Town	2	4
City	1	2
Total	**50**	**100**

(Primary data, 2022)

Table 6. Shows the distribution of respondents according to how they keep solid wastes at home

Response	Frequency (f)	Percentage (%)
In open heap garbage place	31	62
In large open containers	15	30
Small covered containers	4	8
Total	**50**	**100**

(Primary data, 2022)
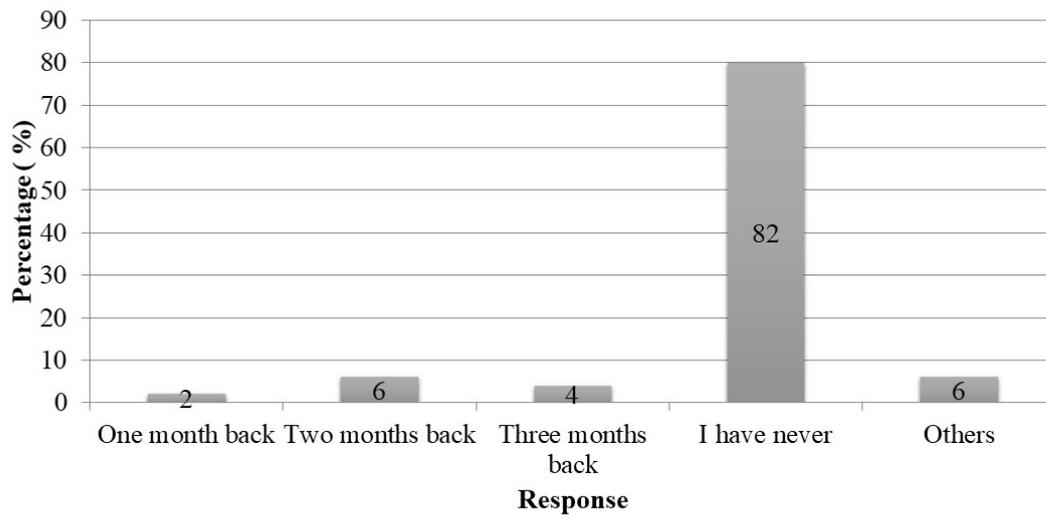
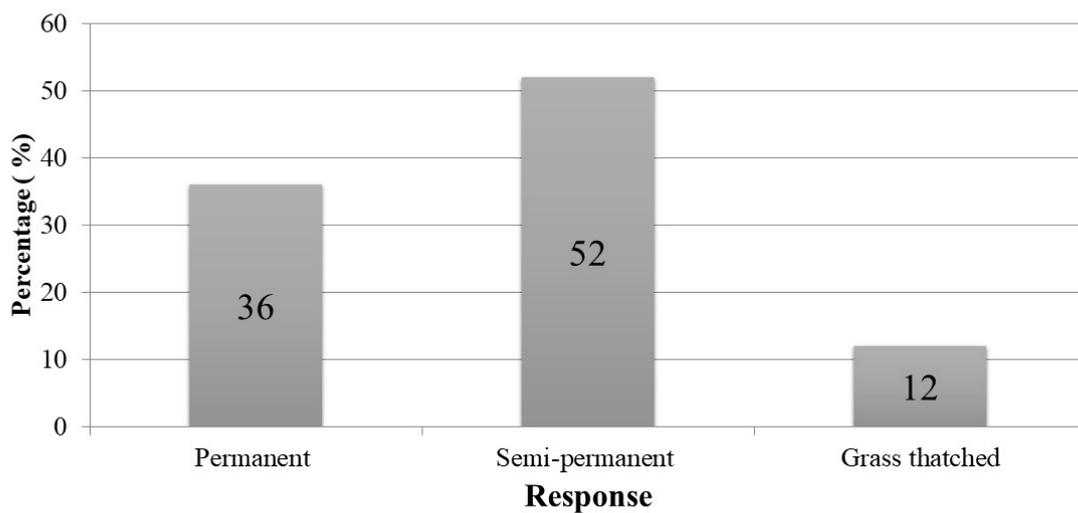**Figure 4.** Shows the distribution of respondents according to when they last did interior spraying

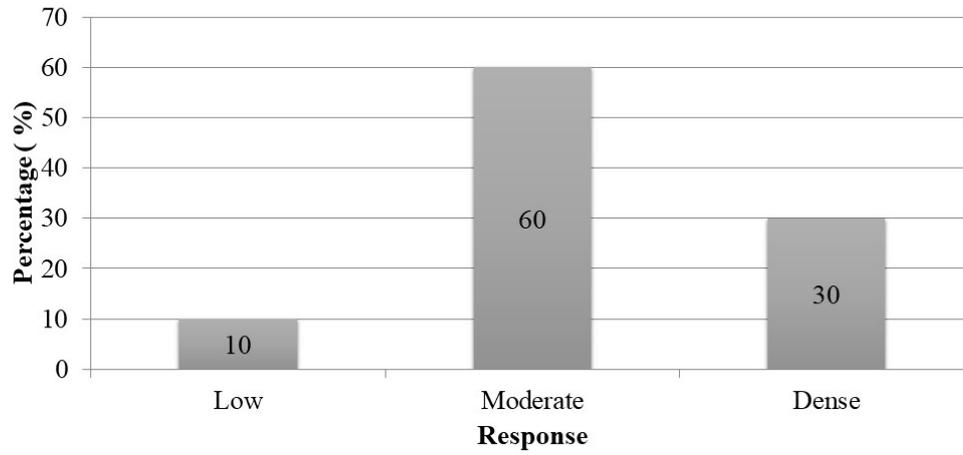**Figure 5.** Shows the distribution of respondents according to the type of their houses

Figure 6. Shows the distribution of respondents according to the condition of vegetation cover surroundings around their homes
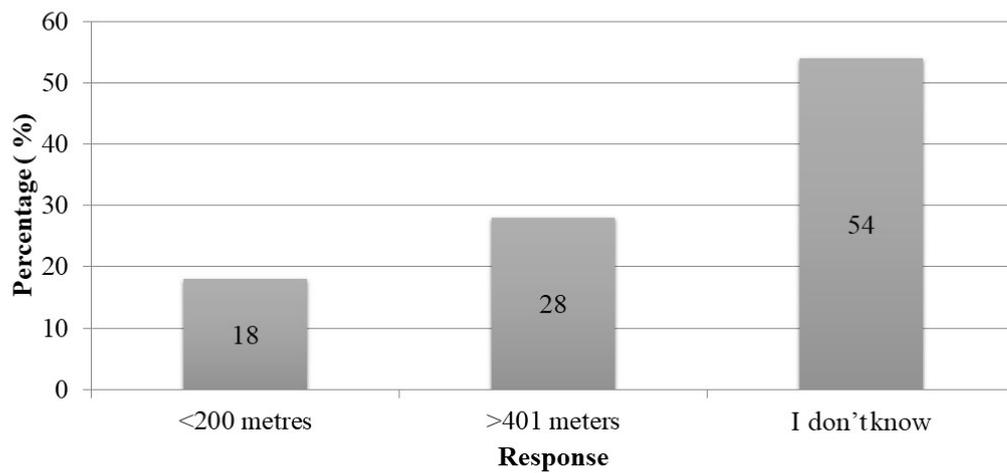

Figure 7. Shows the distribution of respondents according to cluster altitude above sea levels (in meters) around their home place
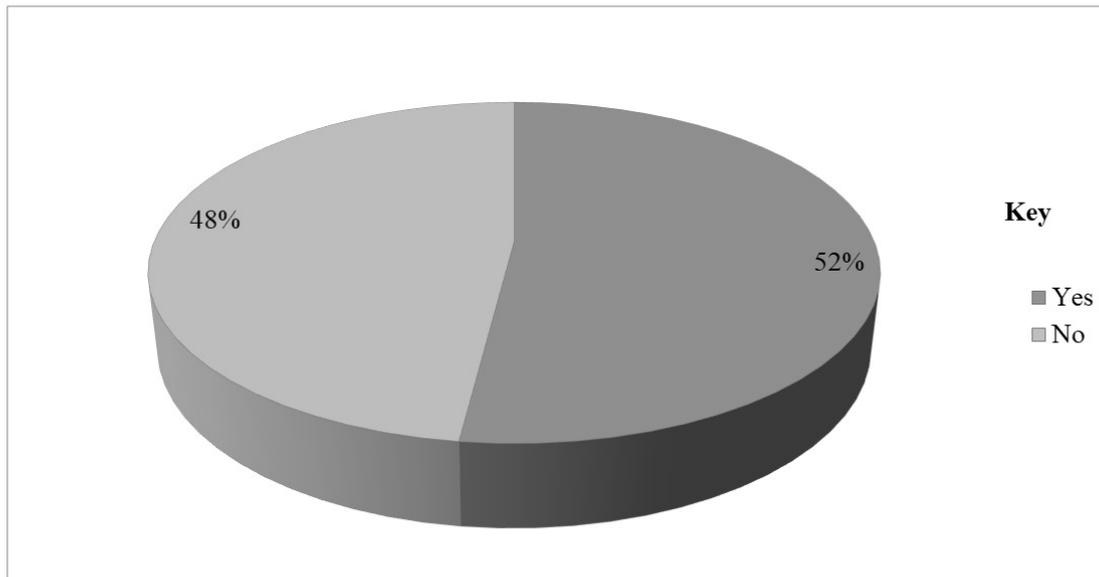
Figure 8. Shows the distribution of respondents according to whether they had ever acknowledged enough counseling services about malaria in children below five years at a nearby facility

From the figure above, more than half of the respondents (52%) had ever acknowledged enough counseling services about malaria in children below five years at a nearby facility whereas the least (48%) had never.

From the table above, majority of the respondents (76%) reported > 5km as the distance from their homes to the nearby health facility whereas the least (6%) didn't know the distance from their homes to the nearby health facility.

From the table above, majority of the respondents (62%) reported that they don't get enough access to anti malaria drugs at the health facility whereas the minority (38%) reported that they get enough access to anti malaria drugs at the health facility.

From the figure above, majority of the respondents (68%) reported that they don't pay for access to health care services whereas the least (32%) reported that they pay for access to health care services.

From the table above, majority of the respondents (60%) visit a doctor when their children's health does not improve whereas the least (10%) reported that they use traditional medicine when their children's health does not improve.

From the figure above, more than half of the respondents (54%) reported that the attitude of health workers towards the provision of health care services is good whereas the least (46%) reported that the attitude of health workers towards the provision of health care services is bad.

8   Discussion, Conclusion and Recommendations:

To study findings, the majority of the respondents (94%) had ever heard about malaria. This implies that a considerable number of study participants were familiar with the study context. This was consistent with a study that was done by Aklilu (2017), where results revealed that (94.5%) of respondents had heard about malaria.

However, more than half of the respondents (56%) reported home treatment as the action they take when their children develop a fever. This denotes that an average number of the caretakers possessed poor health-seeking behaviors. This was inconsistent with a study that was done by Ashenafi *et al.,* (2020), where results showed that a significant number of respondents (78.3%) took their children to health facilities when they had developed a fever.

Table 7. Shows the distribution of respondents according to the distance from their homes area to the nearby health facility.

Response	Frequency (f)	Percentage (%)
<5km	9	18
>5km	38	76
I don't know	3	6
Total	**50**	**100**

(Primary data, 2022)

Table 8. Shows the distribution of respondents according to whether they get enough access to anti malaria drugs at the health facility

Response	Frequency (f)	Percentage (%)
Yes	31	62
No	19	38
Total	**50**	**100**

(Primary data, 2022)
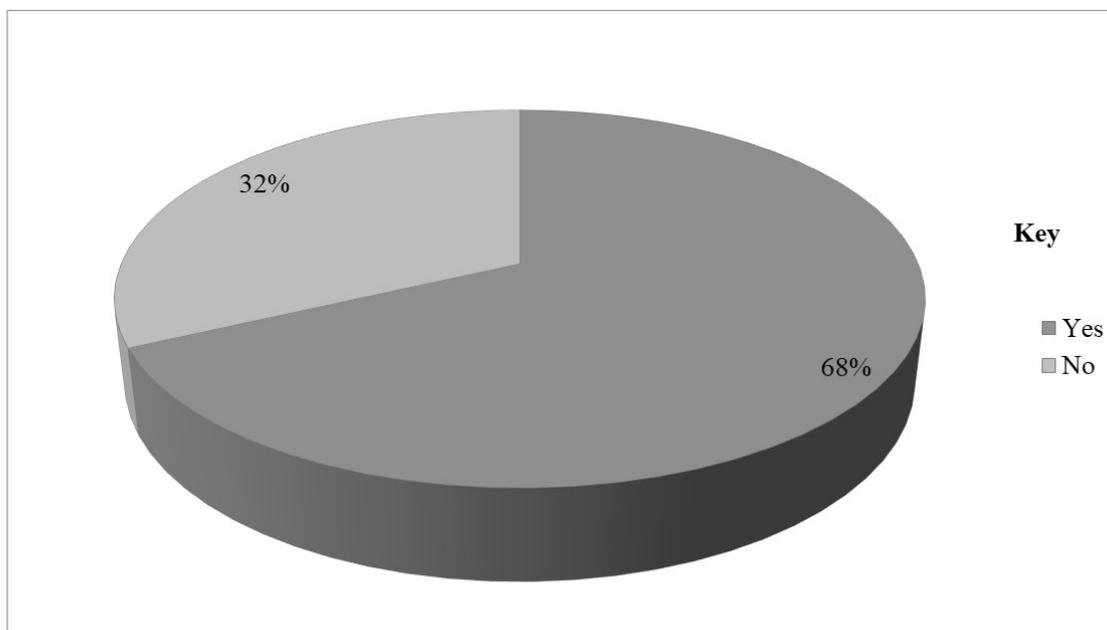
Figure 9. Shows the distribution of respondents according to whether they always pay for access to health care services

Table 9. Shows the distribution of respondents according to what they do when their children's health does not improve

Response	Frequency (f)	Percentage (%)
Self-medicate with modern medicine	15	30
Visit a doctor	30	60
Use traditional medicine	5	10
Total	**50**	**100**

(Primary data, 2022)
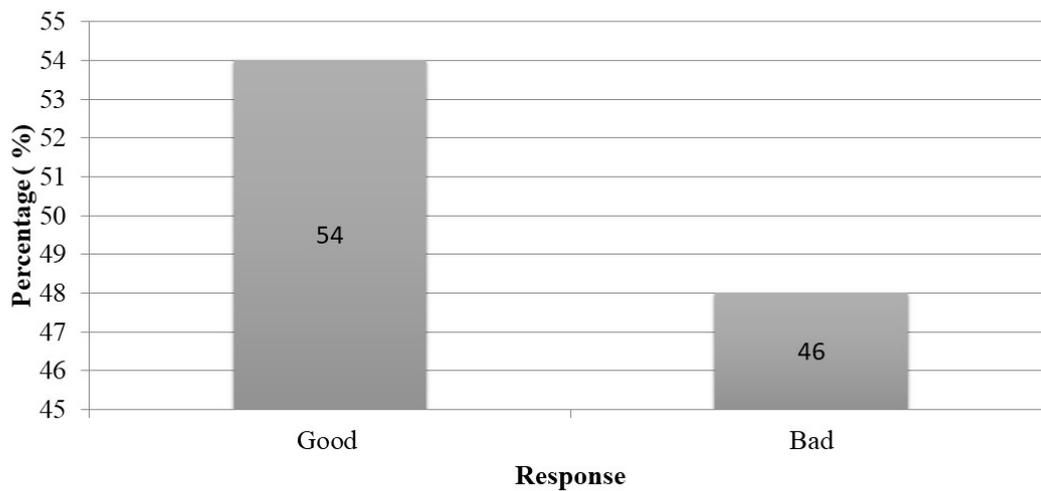
Figure 10. Shows the distribution of respondents according to how they rate the attitude of health workers towards the provision of health care services

Add to that, the study revealed that the majority of the respondents (70%) were peasant farmers. This signifies that households had low-income levels and were most likely not to afford health care services which increased the likelihood of behaviors adopting home-based treatment hence paving the way to persistent illness. The study results were in line with Kweku *et al.*, (2017), where findings from their study revealed that children whose parents/guardians were into farming and trading were 1.73 and 1.83 times more likely to have malaria infection.

The results from the study also revealed that half of the respondents (50%) had three mosquito bed nets at home. This implies that the children had increased chances of getting malaria infection as a result of inadequate access to mosquito bed nets compared to the ratio of the family members. The current study findings were in agreement with a study that was done by Nyirakanani *et al.*, (2018), where findings showed that children who were not sleeping under an insecticide-treated net were more likely to have malaria infection (61.5%).

Interestingly, the majority of the respondents (74%) reported that their children were not always sleeping under mosquito bed nets. Therefore, this implies that irregular use of ITNs increased children's chances of being exposed to malaria infections. Findings differ from the study that was done in Botswana by Elijah *et al.,* (2014), where (91.5 %) of respondents reported that their children always slept under mosquito nets.

In regards to interior spraying, more than half of the respondents (82%) had never done interior spraying. This could be attributed to the fact that a considerable number of the caretakers were unemployed and therefore they could not afford to purchase interior spraying materials. The study results were in line with Danielle *et al.,* (2016), where results showed that 91 % of the households had never sprayed within the last 6 months.

Environmental factors contributing to increased cases of malaria in children below five years

Findings obtained from 50 respondents revealed that almost all respondents (94%) reported villages as the location of their home place and such locations are surrounded by gardens and forest which also acts as breeding sites for mosquitos. The current study findings were in agreement with Armand et al (2015), where the majority of the respondents (68.5%) lived in rural areas.

In addition, more than half of the respondents (52%) their houses were semi-permanent. This implies that poor housing infrastructures inhabitant's conditions like humidity and temperature where mosquitos survive and hence paving the way to increased spread of malaria infection. The study results were in line with Kituyi (2018), where findings showed that 49.2%of respondents had semi-permanent houses.

Given the study findings, the majority of the respondents (62%) keep solid wastes at home in open heap garbage places. Therefore, this reveals that open heap garbage places act as breeding sites for mosquitos. The study results were consistent with Ashenafi *et. al.,* (2020), where findings showed that (38.2%) of malaria infection was observed in children who lived near mosquito breeding sites in this study such as swamps and open heaps garbage places.

Health facility-related factors contributing to increased cases of malaria in children below five years

The study showed that the majority of the respondents (76%) reported > 5km as the distance from their homes to the nearby health facility. This implies that long distances imposed an impact on timely health-seeking behaviors; since a substantial number of the participants could not afford the transport costs. The results were in agreement with a study that was done in Zimbabwe by David (2018), where findings related to the element of distance

to the health facility showed that the frequency of malaria cases in households that were more than 1 kilometer away from the health facility (36.6%), compared to (33.3%) for households that are less than one kilometer away from the health facility.

Amusingly, more than half of the respondents (62%) reported that they don't get enough access to anti-malaria drugs at the health facility. This could be attributed to the fact that patients outweigh the anti-malaria drugs the facility receives paving the way to the persistent incidence of the infection. This is consistent with Edelu, et al (2018), where results showed that half of the caregivers (50%) reported that they didn't get enough access to anti-malaria drugs.

Limitations of the study and their solutions

The researcher encountered financial constraints during the study in gathering information from the Internet, Libraries, drafting questionnaires, printing, and typing. This was solved by borrowing/ requesting some money from friends and my family relatives.

The researcher also faced the challenge of uncooperative respondents who were not willing to give information; the researcher solved this by explaining the importance of the study to the respondents.

In addition, the coronavirus pandemic in Uganda imposed an impact on the completion of the data collection process in time because the researcher met few respondents per day to maintain the standard operating procedures and hence making data collection lengthy. This was solved by budgeting the little available time and using it effectively.

9   Conclusion

Based on the overall study findings, the following conclusions were made by the researcher:

The major socio-economic factors that contributed to increased cases of malaria among children below five years noted by the researcher were; poor health-seeking behaviors as (56%) of the respondents resorted to home treatment when their children developed fever, low levels of employment (70%) of the participants were peasant farmers, low utilization of mosquito nets among those who had access to them (74%) and low uptake of interior spraying as (82%) of the respondents had never done interior spraying.

The study discovered that the location of respondents' homes had an impact on increased malaria

infections as (94%) were from villages surrounded by vegetation, poor housing infrastructures since (52%) had semi-permanent houses, and poor waste management behaviors as noted by (62%) who kept solid wastes at home in open heap garbage places were the overall environmental factors that contributed to increased cases of malaria among children below five years.

The major health facility-related factors that contributed to the increased spread of malaria among children below five years were long distances as noted by (76%) of respondents who reported > 5km as the distance from their homes to the nearby health facility and inadequate access to anti-malaria drugs as (62%) of the caretakers reported that they don't get enough access to anti-malaria drugs at the health facility.

About the overall findings, the researcher concluded that poor health-seeking behaviors, low levels of employment, irregular use of mosquito nets among those who had access to them, low uptake of interior spraying, location of respondent's homes, poor housing infrastructures, poor waste management behaviors, long distances from their homes to the nearby health facility and inadequate access to ant- malaria drugs were the major factors that contributed to increased cases of malaria among children below five years.

Recommendations:

The Ministry of health should consider targeted interventions in malaria prevention programs and concentrate on areas with high prevalence as this will help to maximize the use of the available resources so that malaria can be effectively eliminated.

ITNs are also an important tool in malaria control and must be made available to the population in need. Therefore, the government of Uganda through MoH should make sure that enough funding is available to provide the required ITNs and programs and must prioritize their availability adequately to the population.

The government of Uganda through MoH should ensure interior spraying is available to all households, at no cost.

The government through MoH should decentralize health care services by building more health facilities to reduce the distance.

Local councils in Moyo district should set and implement programs that will empower the communities so that they improve their Social-economic

and this, in turn, helps to reduce the prevalence of malaria.

Health workers at Moyo hospital should intensively enhance access to information on signs and symptoms of malaria, consistent use of ITNs, and environmental management. So that suspicious cases can be quickly identified, improve health-seeking behaviors of the people, and hence minimize the burden of malaria.

Moyo general hospital in partnership with the local council and the Village health teams should sensitize the community to embrace interior spraying.

10   Acknowledgement:

11   List of Abbreviations

CDC: Centre for Disease Control

HMIS: Health management information system

IPTp: Intermittent Presumptive Treatment

IRS: Indoor residual sprays

ITNs: Insecticide Treated Mosquito Nets

LLIN: Long-lasting insecticidal nets.

MoH: Ministry of Health

OPD: Outpatient Department

RDT: Rapid Diagnostic Testing

UNICEF: United Nations International Children's Emergency Fund

USAID: United States Agency for International Development

Definition of Key Terms:

Anemia: Is defined by WHO, as hemoglobin (Hb) level less than 11g/dl and is divided into three levels in terms of severity: Mild anemia (Hb level, 9-10.9g/dl), Moderate anemia (Hb level, 7-8.9g/dl), and Severe anemia (Hb level 7-4.5 g/dl)

Caretaker: A person responsible for providing direct care to a young child.

Factors: A constituent or element which brings about certain effects or Malaria incidence: Number of newly diagnosed malaria cases during a defined period for a specified population

Malaria: An infectious disease characterized by cycles of chills, fever and sweating, caused by a protozoan of the genus Plasmodium in blood cells, which is transmitted to humans by the bite of an infected female anopheles mosquito.

The population at risk: Population living in a geographical area where locally acquired malaria cases have occurred in the past 3 year

Plasmodium: A type of protozoa, a single-celled organism responsible for causing malaria fever.

Severe anemia: Hemoglobin level from 7 g/dl and below.

12   References:

1) Aklilu Abrham R (2017). Preventing Malaria among Under Five Children in Damot Gale Woreda, Wolayta Zone, Ethiopia: The Role of Parents Knowledge and Treatment Seeking; Prim Health Care, an open access journal, vol. 7 • Issue 4 • https://doi.org/10.4172/2167-1079.1000284

2) Ashenafi Abossie, Tsegaye Yohanes, Adisu Nedu, Weynshet Tafesse, Mengistu Damitie (2020). Prevalence of malaria and associated risk factors among febrile children under five years: A cross-sectional study in Arba Minch Zuria District, South Ethiopia, Infection and Drug Resistance, 133-64https://doi.org/10.2147/IDR.S22387 3PMid:32104008 PMCid:PMC7012238

3) Danielle Roberts, Glenda Matthews, Roberts Matthews (2016). Risk factors of malaria in children under the age of five years old in Uganda; Malar J , vol. 15, no. 246

4) David Takudzwa Zinyengere (2018). Household determinants of Malaria among children below five years in Mutasa District of Zimbabwe

5) Elijjah Chirebvu, Moses John Chimbari and Barbra Ntombi Ngwenya (2014). Assessment of risk factors associated with malaria transmission in Tubu village Northern Botswana, malaria research and treatment; Malar Res Treat; vol. 2014https://doi.org/10.1155/2014/403069PMid:24757573 PMCid:PMC3976786

6) Kituyi Irene Rose (2018). Malaria prevalence and associated factors among children below the age five years attending Nakaloke health center III IN Nakaloke Town Council, Mbale district

7) Kweku Margaret, Nyavor Peace, Bani Fafali , Kudzo Wisdom Axame, Owusu Richard, Takramah Wisdom, Takase Mohammed, Tarkang Elvis, Adjui Martin (2017).Prevalence and Factors associated with Malaria Infection among children under Five in Urban and Rural communities in the Hohoe Municipality of Ghana; International Journal of Case Studies in Clinical Research An Open Access Journal, Vol. 1, Issue 4,https://doi.org/10.33425/2639-8 494.1003

8) Institute National statistics Mali & ICF (2019). 2018 Mali Demographic and Health Survey Key Findings. Rockville, Maryland, USA. INSTAT and ICF.

9) Ministry of Health Rwanda (2020). Malaria trends in Rwanda.Kigali

10) MoH (2021).Uganda weekly malaria status-week 4, 2021 week 25th-31st; Kampala, Uganda; anuary 2021

11) Mohamed Salieu Bah (2020). The Relationship Between Malaria Status in Under-five Children and Some Household Demographic, Socioeconomic and Environmental Factors Associated with the Disease in Sierra Leone

12) Mutsigiri Faith, Mafaune Trish Patron, Shambira Gerald, Tsitsi Juru,&, Donewell Bangure, More Mungati, Notion Tafara Gombe, Mufuta Tshimanga (2017). Factors associated with severe malaria among children below ten years in Mutasa and Nyanga districts, Zimbabwe, 2014-2015

13) Nyirakanani Chantal, Chibvongodze Raymond, Habtu Michael, Masika Moses, Mukoko Dunstan, Kato J. Njunwa (2018). Prevalence and risk factors of asymptomatic malaria among under-five children in Huye District, Southern Rwanda; Tanza-

nia Journal of Health Research, Vol. 20, No.1https://doi.org/10.4314/thrb.v19i3.8

   14) UNICEF (2019). Malaria data. USA World Health Organization (2020). World malaria report 2020.Geneva, Switzerland

13   Publisher details: