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Research Article

Prevalence of Malaria among Children in urban area at Byahi Health Center, Rubavu District, Rwanda

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Abstract

Background: Malaria is one of the most public health and life-threatening parasitic infections caused by the protozoan parasite. Since children are immunologically naive to the malaria parasite, they are the main vulnerable groups to be affected by malaria.

Aim: This study aimed at determining the prevalence of malaria among children in urban area at Byahi Health Center, Rubavu district.

Methods: Cross-sectional study was used to achieve the objectives. To obtain the information regarding social demographic characteristics, written questionnaires in native language were distributed to caregivers. Blood smears were collected and sent to laboratory department for analysis. Data were analyzed using Statistical package for the social sciences (SPSS).

Results: Among 50 children who participated in the study, the majority were males over females with 58% and 42% respectively. The prevalence of malaria among children in urban area was higher with 30%. Among the participants, children of age range 1-5 years shown a high prevalence of malaria than those of 5-8 months with 13 and 2 positive cases respectively and children of 1-5 years old was statistically significant with a p-value (p 0.027).

Conclusion: After getting the results above, we have seen that children from urban area are affected by malaria with the overall prevalence of 30%. There is a need of improving and rechecking the existing malaria in children, prevention and control measures of the country. Byahi health center should create awareness about the importance early malaria checkup recommended reducing malaria infection. The parents are recommended to protect their children and district leaders should make researcher in others school. It must be reported to Ministry of Health that malaria infection mostly affects children.

Keywords: Malaria parasite, children, blood smear, Plasmodium

INTRODUCTION

Malaria is one of the most important public health and life-threatening parasitic infections caused by the protozoan parasite. It is still a major concern in tropical and subtropical parts of the world. *Plasmodium falciparum*, *P. vivax*, *P. ovale*, *P. knowlesi*, and *P. malariae* are the five *Plasmodium* species that cause malaria in humans. In 2018, the World Health Organization (WHO) report indicates that globally an estimated 228 million new cases of malaria were documented. The WHO African region accounted for 93% of all cases followed by the Southeast Asia region (3.4%) and Eastern Mediterranean region (2%). Likewise, there were an estimated 405000 deaths due to malaria in the globe. Children under the age of five-year were accounted for two-thirds (67%) of the world's malaria deaths in 2018¹.

Malaria causes serious complications, such as severe anaemia, cerebral malaria, acute renal failure, and hypoglycemia among infected individuals. It is caused by five species of the genus *Plasmodium*. Among these, four species including *P. falciparum*, *P. vivax*, *P. ovale*, and *P. malariae* are known to infect human beings in Ethiopia. From the four *Plasmodium* species, *P.*

falciparum is more severe in morbidity and mortality followed by *P. vivax* with proportions of 60% and 40%, respectively².

Children under five years old are among the most vulnerable to malaria infection as they have not yet developed any immunity to the disease. Children who survive malaria may suffer long-term consequences of the infection. Repeated episodes of fever and illness reduce appetite and restrict play, social interaction, and educational opportunities, thereby contributing to poor development. Child mortality rates are known to be higher in poorer households and malaria is responsible for a substantial proportion of these deaths³.

Malaria causes much damage to the health and socioeconomic development of the country. The disease is more severe in children and pregnant women in the country. Although several malaria prevalence studies in different parts of Ethiopia have focused on all age groups of individuals, only a few studies have indicated that adulthood malaria is still one of the major public health problems in the country. To date, however, the national estimate of adulthood malaria in the country is not known⁴.

Recent years have seen a substantial increase in malaria control activities. Particularly in East Africa, growing evidence suggests a decline in malaria transmission, morbidity and mortality over the last decade. Control measures considered vital to this improvement are the deployment of artemisinin-based combination treatment (ACT), distribution of long-lasting insecticide-treated nets (LLINs), and indoor residual spraying⁵.

Rwanda is a prime example for the impact of malaria control. Since 2000, several million insecticide treated nets (ITNs) have been distributed (mostly LLINs) increasing the percentage of the population (10 million) covered by nets to potentially ≥70%. In parallel, ACTs have been dispensed on a large scale. In 2007, 56% of households were considered to own a net and 56% of children to sleep under one. Surveillance and health facility-based data indicate that by 2007-2008 these efforts were associated with approximately 50% or higher declines in confirmed outpatient cases, inpatient cases, and deaths due to malaria in children <5 years old⁶.

While this progress does not appear to be questionable, the extent of the declines as deduced from facility-based data might differ at community level. For instance, community-level case management programmes have been reported to shift primary treatment from health centres to villages and thus decrease the health-facility burden. Such a trend, however, does not necessarily reflect the situation in the community⁷. Therefore, this study aims to assess the prevalence of malaria in children from urban area at Byahi Health Center located in Rubavu District, Rwanda.

METHODOLOGY OF THE STUDY

Study area

This study was carried out at Byahi Health Center located at Gisenyi, Rwanda, Western Province, Rwanda.

Table 1: Demographic characteristic of study participants (N=50)

Variables	Characteristics	Frequency	Percentage %
Age	5-8 months	7	14.00
	1-5 years	43	86
Total		50	100
Sex	Male	29	58
	Female	21	42
Total		50	100

This study showed that a total of 50 patients investigated in this study, children between 1-5 years old were the most participants than those between 5-8 months with 43/86% and 7/14% respectively. Malaria causes serious complications, such as severe anaemia, cerebral malaria, acute renal failure, and hypoglycemia among infected individuals. It is caused by five species of the genus *Plasmodium*. Since children are immunologically naïve to malaria parasites, they are the main vulnerable groups. The government of Rwanda has invested great efforts to improve healthcare programs, particularly at the level of primary healthcare.

Identification of plasmodium parasite in children at byahi health center

The study included 50 children and showed that among them positive result for plasmodium parasite was 15 children corresponding with 30% and negative result was 35 which corresponds to 70% of the total population. This study is in line

Study design and population

This was a cross-sectional study. It included all children up to 5 years that attended Byahi health center during the study period with signs and symptoms related to malaria.

Data collection

Upon obtaining consent and an ascent form, a written questionnaires in native language were distributed to caregivers to obtain the information regarding demographic characteristics. Participants were informed of the general purpose and benefits of the study.

Sample collection and processing

Sampling was done by sequentially reviewing all the records and extracted data on children up to five years based on age and sex as captured by the records. After obtaining a dried thick blood smear was stained with Giemsa reagent diluted to 1/10 for 20 minutes wash with tap water and air dried the slide, the 100X objective was used to look for plasmodium species under microscope.

Statistical analysis

Statistical package for the social sciences (SPSS) for windows version 24 software was used to analyse data in order to determine the frequency and statistical significance of records. Data were presented in terms of frequency, graph, tables and percentages.

Results and discussion

Demographic characteristics of study participants

Demographic information of study participants for a cross sectional study was presented in table 1. The age and sex were investigated as variables for demographic characteristics by estimate frequency and percentage

with another study which found that the prevalence of malaria in children under five was alarmingly high at 27.4%⁸.

The study highlighted significant regional disparities, with rural areas showing higher infection rates compared to urban regions. This difference is attributed to factors such as limited access to healthcare, lower socioeconomic status, and inadequate malaria prevention measures like insecticide-treated nets and indoor residual spraying. Similarly, also another research conducted in Southeast Asia, reported a 15% prevalence rate of malaria among children in rural Cambodia⁹.

The research emphasized the role of environmental factors such as proximity to water bodies and agricultural practices that promote mosquito breeding. Additionally, the study pointed to challenges in the healthcare infrastructure, including shortages of antimalarial drugs and limited access to diagnostic facilities, which exacerbate the burden of the disease in these regions. Efforts to combat malaria in children have seen some

success, with interventions like mass drug administration and community health education proving effective. However, the emergence of drug-resistant strains of *Plasmodium falciparum* poses a significant threat to these gains¹⁰.

Continued investment in research, enhanced vector control strategies, and the development of new antimalarial drugs and vaccines are crucial to reducing the prevalence of malaria in children globally¹¹.

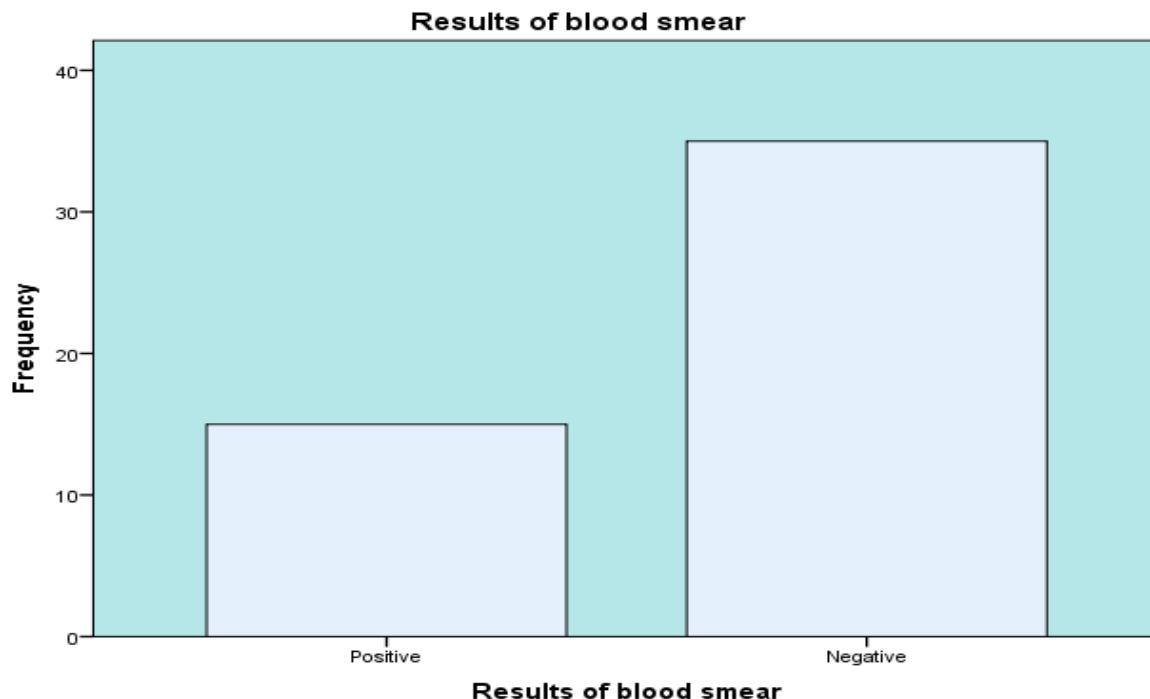


Figure 1. Identification of plasmodium parasite in children of urban area at byahi health center.

Prevalence of malaria based on socio demographic characteristics among children at Byahi health center

Table 2: The table below shows the distribution of malaria based on age and gender among urban children at Byahi health Center.

Variables	Parameters	Malaria result		Total	df	P value
Age		Positive	negative			
	5-8months	2	5	7	1	0.929
	1-5 years	13	30	43	1	0.027
Total		15	35	50		
Sex	Male	10	19	29	1	0.416
	Female	5	16	21	1	0.62
Total		15	35	50		

The table above described the prevalence of malaria among children in urban area at Byahi Health center. Among the participants, children of age range 1-5 years shown a high prevalence of malaria than those of 5-8 months with 13 and 2 positive cases respectively and children of 1-5 years old was statistically significant with a p-value (p 0.027). Based on gender, male shown a high prevalence than female with 10 and 5 positive cases respectively.

Based on sex, male was more participated with 29/58% while female were participated at 21/42% as shown in table1. This is because Children are particularly vulnerable to malaria as, unlike adults that have grown up in endemic regions, they have yet to develop the necessary immunity to defend themselves against the disease, malaria can affect people of all age but young children are more likely to develop severe illness.

This study showed that the prevalence of malaria was 30%. The high proportion of malaria in this district could be because of many environmental factors in the district. Prominent among

these are the several man-made water bodies' couples with farming close to houses during the rainy season. These could largely contribute to malaria transmission in these areas and nearby communities. There are some communities in the district where people are engaged in dry season gardens using dugouts water and dams to irrigate the crops. It is obvious that these activities could create breeding grounds for the mosquito that transmits the disease.

Similar study conducted at Butare, where the prevalence of malaria in under-five children was identified to be 20% and a study of analysis of the five-year trend of malaria at among under-five children in Huye District, Southern Rwanda where the overall prevalence of malaria was 19.8%¹².

This concurred with the study done on prevalence of malaria and associated factors among under-five children in Sherkole refugee camp, Benishangul-Gumuz region, Ethiopia where the overall prevalence of malaria among under-five children in sherkole refugee camp was 20.9%¹³.

CONCLUSION

The aim of this study was achieved because the plasmodium parasite was identified and this study reported high prevalence of malaria infection among children attending Byahi Health Center, which was 30%. A total of 50 patients investigated in this study, children between 1-5 years old were the most participants than those between 5-8 months with 43/86% and 7/14% respectively. Based on sex, male were more participants with 29/58% while females were participated at 21/42%. There still a need to conduct further research to confirm the decrease of malaria prevalence in children under 5 years and investigate on the risk factors that can be linked with this prevalence.

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Conflict of interest

Authors declare no conflict of interest

Fundings

N/A

Author contributions

All author contributed equally to this manuscript

Ethical consideration

A recommendation letter of data collection was obtained from INES-Ruhengeri and this study was approved by the hospital research committee before conducting the study. Consent form was used to gather permission from the parents.

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